

A Sheep in Wolf's Clothing?

**The Role of Animal Welfare Science in European Union Farm Animal Welfare
Legislation**

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The candidate confirms that the work submitted is her own and that appropriate credit has been given where reference has been made to the work of others.

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This thesis is dedicated to the millions of European farm animals who will never feel the warmth of the sun on their backs or breathe fresh spring air or wander through the fields

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Abstract

This thesis analyses the relationship between science and law in the context of European Union farm animal legislation, assessing the validity of the Union's assertion that its animal welfare policy is evidence-based, being founded upon sound science.

European farmed animals are, paradoxically, both sentient beings and goods within EU law. The EU has tended to govern animal welfare through minimum harmonising Directives, enacted following an assessment of scientific data by EFSA specialists. Yet, since 2009, no new legislation has been forthcoming, despite an ever-expanding catalogue of research on the physical and mental experiences of animals. Such an impasse has resulted from policymakers' desire to act on the basis of certainty in circumstances where scientists are unable to offer definitive evidence.

The thesis evaluates the role of science in EU animal welfare policymaking and proposes novel methods to improve welfare without the need for additional scientific research. It argues that greater pragmatism is urgently needed in this field of law-making. Complexity of husbandry systems means that obtaining definitive data is an unrealistic goal, even though ample evidence of animal pain and suffering in intensive production systems exists. The research outcome is the proposal of two novel pathways, based on the methodology and findings of the EFSA AHAW Panel, which would facilitate immediate legislative change. Pathway One applies a threshold of 'beyond reasonable doubt' with respect to existing data, so as to determine whether a management factor is demonstrated to cause acute and chronic pain. Pathway Two is designed to address entire husbandry systems known to cause harm, where definitive causative links between management factors and negative outcomes are unlikely to be established, but serious welfare compromises are observed; in such circumstances, it employs use of the Precautionary Principle to facilitate greater animal protection.

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*'Science and Policymaking thrive on challenge and questioning; they are vital to the health of inquiry and democracy'*¹

*'Political Ideology can corrupt the mind, and science'*²

Introduction

On 1st December 2009, the Treaty on the Functioning of the European Union (TFEU) came into force, heralding a new era for animal welfare. For the first time, animal welfare appeared within the main body of a Treaty, as a novel provision having general application, Article 13, which states:

*'In formulating and implementing the Union's agriculture, fisheries, transport, internal market, research and technological development and space policies, the Union and the Member States shall, since animals are sentient beings, pay full regard to the welfare requirements of animals, while respecting the legislative or administrative provisions and customs of the Member States relating in particular to religious rites, cultural traditions and regional heritage'*³.

The acknowledgement of sentience is an important step in European policy; the legal recognition that animals have capacity to experience feelings that are positive and negative, including joy, pleasure, pain and distress, is a clear acceptance of knowledge arising from decades of scientific research into animal experience, enshrining scientific understanding in law. Acceptance of sentience also appears consistent with the standard approach of the European Union (EU) to animal welfare policy, it having been stated that: *'[s]ince 1974, when the first EU legislation on animal welfare was adopted, animal welfare requirements have evolved based on sound scientific knowledge, improving the quality of animals' lives in accordance with citizens' expectations and market demands'*⁴. Through this single statement, however, the European Union confirmed the true complexity of animal welfare policymaking. Whilst

¹ Nicholas Stern, UK Economist and Academic

² E.O. Wilson, US Biologist, Naturalist and Author

³ Consolidated Version of the Treaty on the Functioning of the European Union [2008] OJ C 115/47 (TFEU)

⁴ EUROPA, Animal Welfare < <https://eur-lex.europa.eu/EN/legal-content/glossary/animal-welfare.html>> accessed 10 April 2022

scientific knowledge abounds, many other potentially conflicting factors are at play. Animals are sentient, but are also goods⁵ and therefore subject to the rules of the Internal Market. The quality of life they experience may be affected by the economic, cultural or religious views of their keepers, or those purchasing their produce⁶. Even when their negative experiences are confirmed via years of research, the resulting data is viewed through a prism of politics, social agendas and monetary concerns. European policy and science are interlinked in EU policymaking, but the pathway to legislation is paved with difficulty. This is reflected in the fact that, despite an ever-increasing database of knowledge about the physical health, physiological status, behavioural and emotional lives of animals, no significant EU welfare legislation has been introduced since 2009.

The purpose of this thesis is therefore to assess the validity of the EU's assertion that its animal welfare policymaking is grounded in science. It is important to emphasise from the outset that the research contained herein is an interdisciplinary analysis focusing on two principal strands – European policymaking and the available animal welfare science. On the other hand, this thesis also recognises that modern policymaking is composed of numerous interwoven threads: research data, political ambition, public opinion, economic concerns and consumer preferences. These different elements cannot all be examined in detail within a single thesis; yet, since public opinion and religious freedom have played an extremely significant role in this specific field of policymaking, they represent an important secondary focus within the text. Consumer choices and voluntary welfare schemes are only alluded to, where relevant.

The role of science in EU welfare policy is of particular interest to the author, a UK practising veterinary surgeon, who has worked in mixed practice as well as in meat hygiene. The thesis offers a unique perspective on this field of policymaking since it permits review of both doctrinal law and veterinary / animal welfare scientific data, analysing both sides of the coin to assess the overall impact – and future potential scope of influence - of science on EU law. It is important to clarify that this thesis neither examines animal rights theory, nor does it have any ambition to convert the

⁵ TFEU (n 3) Article 38 – ‘Agricultural products’ means the products of the soil, of stockfarming and of fisheries and products of first-stage processing directly related to these products’

⁶ D.R. Deemer and L.M. Lobao, ‘Public Concern with Farm-Animal Welfare: Religion, Politics, and Human Disadvantage in the Food Sector’ (2011) 76 *Rural Sociology* 2

reader to an animal rights activist; in addition, it does not bring under scrutiny the ethical or moral aspects of consuming animal products. Indeed, the author acknowledges that carnivorism is ubiquitous in nature, and she works professionally to encourage welfare improvements in intensive production systems rather than simply opposing intensive systems per se. Nor does the thesis promote the interests of particular stakeholders; its focus is the value of objective, scientific data as the basis for policy, the foundations of which derive from the concept of animal welfare. The challenges faced in creating a universally accepted definition of animal welfare are discussed in the second half of the thesis but throughout the text, the accepted definition for the purposes of the research contained herein is that of Professor Donald Broom: “*the welfare of an individual is its state as regards its attempts to cope with its environment*”⁷.

Farm animal welfare legislation and farm animal welfare science lie at the heart of this thesis. Detailed doctrinal analysis of the EU legislative framework (Treaties and Regulations or Directives) and the judgments of the Court of Justice of the European Union (CJEU) is the first aspect of the methodology. Additional analysis of policy papers and academic commentary has also been undertaken. The second aspect is close analysis of the relevant scientific research, drawing on sources internal to the EU, in the form of Opinions and publications of the EFSA Panel on Animal Health and Welfare (AHAW), the European Commission and the Directorate General SANTE, as well as external research publications from the veterinary, agricultural and ethological sciences. The majority of scientific papers analysed pertain to the most common – and numerically greatest – farmed mammals: pigs, chickens and cattle. The stimulus for this thesis was the author’s observation that a vast amount of scientific knowledge is available with respect to the negative, detrimental experiences of animals in intensive production systems, yet various damaging practices are currently permitted in EU law; in fact, many management techniques have become accepted as routine despite causing serious pain and suffering. The most concerning management practices are surgical mutilations, such as beak trimming in chickens and tooth clipping in piglets, which are responsible for causing severe acute and chronic pain.

⁷ D.M. Broom, *Sentience and Animal Welfare*, (CAB International 2014) 22

The thesis structure is as follows. Chapter One explores advances in agricultural science and the subsequent development of European farm animal production systems, with focus on the historical move towards intensification. Veterinary public health science is examined – an important element of the welfare science picture since it deals with human health and zoonotic disease (the transference of infection between species) – followed by discussion of the evolution of animal welfare science as a distinct discipline. Although welfare science is a defined field, it inevitably involves overlap of numerous different concepts including neurology, ethology, psychology, physical health and mental experience. This Chapter provides the first hint of the problems faced by researchers and policymakers when interpreting welfare data, discussed in detail in subsequent chapters. Although animal rights and philosophy are not the focus of the thesis, an overview of this area is provided. Chapter One then provides an examination of the principal EU intensive farming systems, with discussion of the basic environmental and behavioural requirements of the animals confined in these systems; key hazards to animals are listed, which are notable given the presence of legislation which claims to protect welfare⁸. The final part of this chapter looks at the role of non-governmental organisations (NGOs) and consumer concerns. The purpose of addressing the historical development of agricultural and scientific disciplines, alongside the evolution of public views on the lives of animals, is to demonstrate the climate that led to policy creation in this field: a deeper understanding of animal experience stimulated a desire within sections of the population to ensure that animals can experience as positive an existence as is possible. In fact, the concept of public morality is ever-present within this thesis and has regularly been cited as a justification for the introduction of EU animal welfare policy. In the context of this research, public morality with respect to animal welfare can be defined as the subjective opinions held by citizens about how farm animals should be treated. Public morality is a powerful consideration for policymakers in modern Europe and, under some circumstances, has instigated convergence between moral views and law.

⁸ For example, despite Council Directive 1999/74/EC of 19 July laying down minimum standards for the protection of laying hens [1999] OJ L 203/53, which banned battery cages, birds are still kept in unsuitably barren and restrictive cages. Despite Commission Directive 2001/93/EC of 9 November 2001 amending Directive 91/630/EEC laying down minimum standards for the protection of pigs [2001] OJ L 316/36, pigs are still routinely subjected to painful mutilations such as tooth clipping and tail docking

An extensive analysis of the EU legislative framework is provided in Chapter Two, which offers an overview of the current system and considers Treaty provisions, with particular reference to Article 13 TFEU and the legal status of farm animals within the EU. Although Article 13 is in its infancy, recent CJEU cases on religious slaughter⁹ have indicated that it does wield some authority; this is heartening from the perspective of this thesis because reliance on the scientific concept of sentience in these cases has led to stronger welfare provisions. At the same time, Article 13 was reinforced by judicial acknowledgement of the importance of animal welfare with respect to public morality. The Chapter contrasts these judgments with two earlier rulings, *C/WF* and *Hedley Lomas*¹⁰, made at a time when animals were primarily viewed as goods, with any protective measures taken by Member States generally viewed as barriers to free trade and public morality swiftly dismissed as a form of justification for import or export bans. EU welfare legislation is based upon creation of minimum standards and this concept is discussed, along with harmonisation of laws. The thesis argues that minimum standards are problematic because, unless they are regularly reassessed in light of new data, they diminish the value of research; if studies are carried out to ascertain the most suitable conditions for animals, failure to then apply these standards to all animals is inconsistent. Following assessment of the efficacy and scope of relevant Directives, ongoing welfare problems are identified, providing evidence that current legislation does not adequately protect farm animals in intensive production systems.

In order to assess the role of science in EU welfare policy, it is essential to consider the nature of scientific discovery, including its limitations, with recognition of any impediments encountered during both interpretation and application. Chapter Three focuses on the role of scientific research within the EU and offers an overview of the development of evidence-based policy making - relevant to this thesis because animal welfare policy is repeatedly asserted as being based on sound science. Politicians and policymakers appreciate conclusive scientific data because it provides justification on

⁹ Case C-426/16 *Liga van Moskeeën en Islamitische Organisaties Provincie Antwerpen, VZW and Others v Vlaams Gewest* [2018] ECLI:EU:C:2018:335, C-497/17 *Oeuvre d'assistance aux bêtes d'abattoirs (OABA) v Ministre de l'Agriculture et de l'Alimentation and Others* [2019] ECLI:EU:C:2019:137 and Case C-336/19 *Centraal Israëlitisch Consistorie van België and Others v Vlaamse Regering* [2020] ECLI:EU:C:2020:1031

¹⁰ C-5/94 *R v. Ministry of Agriculture, Fisheries and Food, ex parte: Hedley Lomas (Ireland)Ltd.* [1996] ECR I-2553 and C-1/96 *R v. Minister of Agriculture, Fisheries and Food, ex parte Compassion in World Farming* [1998] ECR I-1251

which to 'hang' legislative measures. An outline of modern, accepted scientific research principles follows, presenting the methods now accepted as most reliable to elicit accurate data. The discussion then considers why science is viewed as the most appropriate discipline to underpin key areas of European policy and why uncertainty can be embraced without necessarily compromising the quality of policy. Of particular relevance to the discussion is the current SARS-COVID 19 pandemic which perfectly reflects the problems faced by policymakers grappling with the challenging combination of inconclusive science, public pressure and political ambitions¹¹. These problems lie at the heart of the relationship between law and science which is examined in this thesis. Finally, an analysis of the European Union Seal Products case¹² is provided, with specific reference to these difficulties. The ban provides fascinating insight into a welfare problem of significant concern to citizens, which could not be fully addressed by scientific research; the subsequent ban on seal products demonstrated tenacity on the part of the EU in protecting welfare, but did not reflect either complete reliance on scientific data or a consistent approach with respect to public morality.

Chapter Four provides deeper exploration of animal welfare as a social concern and scientific enterprise in its own right. Problems associated with defining the term are explored, which reveal the complexity of a subject often reduced to the catch-all phrase 'animal welfare'. In order to explain why welfare assessment seldom yields absolutes, accepted research methods are discussed, which focus on either biological functioning, affective state or natural living parameters of assessment¹³. As the Chapter explains, none of these methods will offer optimal data if applied in isolation, since each focuses on a separate thread of welfare, all of which are necessary to understand the whole-animal's experience. The Chapter also introduces the concept of 'input' and 'outcome' factors – management practices and their effects on animals; these factors interact and overlap, meaning identification of causative links between

¹¹ G. Daniele, A.F.M. Martinangeli et al, 'Wind of Change? Experimental Survey Evidence on the COVID-19 Shock and Socio-Political Attitudes in Europe' (2020) Working Paper of the Max Planck Institute for Tax Law and Public Finance <<https://ssrn.com/abstract=3671674>> accessed 10 May 2022

¹² Regulation (EU) 2015/1775 of the European Parliament and of the Council of 6 October 2015 amending Regulation (EC) No 1007/2009 on trade in seal products and repealing Commission Regulation (EU) No 737/2010 (Text with EEA relevance) OJ L 262/1

¹³ P.H. Hemsworth, D.J. Mellor, G.M. Cronin and A.J. Tilbrook, 'Scientific assessment of animal welfare' (2015) 63 New Zealand Veterinary Journal 24

risks and harms is very challenging. When considering legislation for a particular welfare issue, the EU institutions generally task the EFSA AHAW Panel with reviewing and summarising current research findings on that topic. It is essential, therefore, to examine the Panel's methodology in order to understand the conclusions that they reach and the recommendations that they make to policymakers. In fact, to date, it is understood that there has been no research carried out with respect to the Panel's approach. This thesis aims to clarify the degree to which the AHAW Panel makes firm recommendations, or even gives prescriptive direction. Chapter Four identifies three conclusions the Panel may reach when assessing data, and demonstrates that a vicious circle has developed with respect to inconclusive data and policymaking. Essentially, if AHAW reverts with inconclusive advice (which will almost always happen given scientific uncertainty), policymakers are generally reluctant to legislate and, instead, commission further research. Since the additional research is unlikely to yield greater certainty, an impasse results, with never-ending calls for additional research, whilst policy remains unaltered and animals continue to suffer in intensive systems.

The purpose of Chapter Five is to propose a possible way-forward with respect to the three AHAW panel conclusions - a mechanism by which the current, vast database of welfare knowledge can be more appropriately harnessed to bring stronger animal protection. The first part of the chapter argues in favour of accepting the limitations of welfare science and of establishing a threshold of evidence for data to support policymaking. The concept of reasonable doubt is advanced as a suitable model for adoption in this context; in other words, where evidence exists beyond reasonable doubt that a practice is directly linked to animal welfare compromise, it can be relied upon to introduce legislation prohibiting that practice. The subsequent sub-chapters then advance two science-based pathways that are currently available to European animal welfare policymakers.

Pathway One uses the EU's legislative approach to welfare at slaughter as a template. The Slaughter Directive features a provision to prohibit a detrimental practice (non-stun slaughter) consistently shown to cause harm, beyond reasonable doubt. Here, a single management factor can be directly linked to negative outcomes of pain, fear and distress - and this model can be applied to other painful practices currently permitted. The goal of Pathway One is to allow elimination of individual management

practices shown to cause acute or chronic pain. Since animals are sentient, and can experience pain and distress, Pathway One provides the perfect opportunity to uphold the provisions in Article 13 and features four key steps: (i) identification of a single input factor (management practice); (ii) identification of hazards to welfare with identifiable or observed animal-based measures (ABMs) which lead to pain; (iii) evidence that data supportive of welfare compromise is beyond reasonable doubt, with supportive specialist or expert opinion; and (iv) justification for the policy in light of Article 13 TFEU. Two examples of painful management practices that could be prohibited – tooth clipping in pigs and beak trimming in chickens – are utilised as examples for Pathway One application.

Pathway Two can be applied where entire husbandry systems are under review and where harm is clearly being caused to animals, but insufficient evidence is available to permit definitive conclusions on all aspects of the welfare scenario. As explained above, policymakers have traditionally been reluctant to act without certainty. Given the difficulties associated with reaching definitive conclusions on causation with respect to welfare compromises in complex husbandry systems, this thesis proposes that protective action could be initiated via the precautionary principle¹⁴. The Chapter analyses in detail, the European Commission's Communication¹⁵ on use of the principle, as well as its instructions on application¹⁶, establishing that there is no evidence that the principle cannot be applied to animal welfare policymaking (alongside policymaking in the realms of the environment and public health where it is more established). Pathway Two facilitates a precautionary approach following firstly Von Schomberg's requirements¹⁷ to engage the principle (a normative risk management exercise built on scientific risk assessment, together with provisional measures open to amendment on the basis of new research) and then adopting the Commission's approach from 2000 in implementation of the principle. This Pathway can be applied to a husbandry system in its entirety and facilitate stronger welfare

¹⁴ The Precautionary Principle is enshrined in numerous European texts and policy documents, discussed in detail in Chapter Five. In UK law the Precautionary Principle is formally enshrined in the Environment Act 2021 (Eiz. 2 c30), s.17, but only in so far as relating to the environment and therefore is not of significant assistance within the context of this thesis

¹⁵ European Commission, 'Communication from the Commission on the Precautionary Principle' COM (2000) 1 final, Brussels

¹⁶ European Commission, Science for Environment Policy, 'Future Brief: The precautionary principle: decision-making under uncertainty' Issue 18 (September 2017)

¹⁷ R. Von Schomberg, 'The precautionary principle: Its use within hard and soft law' (2012) 3 European Journal of Risk Regulation (2) 147

protection where negative outcomes are identified even although exact causative links between input and outcome factors cannot be established. The example of enriched cages is utilised as a testbed for application of Pathway Two: birds housed in this system experience various welfare problems, generally unattributable to any one input factor. This thesis argues that a precautionary approach to such systems allows acknowledgement of serious harm to animals and permits action to be taken, even where some scientific uncertainty with respect to causative links is present.

Accordingly, it is argued that, whilst animal welfare science played a significant role in the awakening of consumers and politicians to the plight of animals in intensive production systems, recent years have witnessed a failure of policy to keep pace with scientific understanding. Article 13 TFEU enshrines sentience in law, but there is a vast amount of animal welfare knowledge that could underpin stronger welfare legislation which is not being put to use in a similar way. The CJEU has afforded considerable weight to Article 13 in religious slaughter cases, but whether Article 13 will significantly influence creation of better policy is yet to be established. Minimum standards legislation was a positive first step for animals, yet this method is inadequate in providing protection from pain, distress or suffering, as demonstrated by the current catalogue of welfare concerns noted in modern systems.

It is clear that for too long a quest for scientific certainty has induced an overly-cautious approach to animal policymaking; whilst public health and environmental policymakers have been able to employ the precautionary principle to overcome this hurdle, the method has not been openly adopted with respect to animal welfare. From a legal perspective, there is no justification for denying application of the principle to animal welfare policymaking. Although there is sufficient scientific evidence of suffering to warrant immediate introduction of stronger policy, this thesis has found that public morality often carries more weight than science. This is concerning, because whilst public pressure can be immensely helpful in promoting better welfare, citizens' approaches to welfare can be contradictory and stem from a fundamental lack of understanding of animals' needs. This thesis argues that whilst public morality can be harnessed effectively to bolster campaigns for legislative change, as well as being invoked as a factor in engagement of the precautionary principle with respect to public acceptability of risk, science is the most appropriate foundation for welfare policy to improve the welfare of farmed animals.

*'The greatness of a nation and its moral progress can be judged by the way its animals are treated'*¹

1

A brief history of European farm animal welfare legislation

The development and union of two emerging disciplines: animal welfare science and animal welfare law

1.1 Introduction

The following chapter explores the European approach to the moral value of animals and acknowledgement of their sentience, which has evolved gradually over several centuries. It will demonstrate that the last sixty years have been close to revolutionary with respect to the pace of discovery and development in the disciplines of farming, veterinary medicine, animal welfare science and public health. Parallel to the academic and professional developments which have taken place, the general public's awareness of animal welfare has blossomed. Europe has seen the development of a collective consciousness, reflected most clearly by food consumers; these citizens are significantly influenced by the educational campaigns of animal welfare charities and now openly express a clearer understanding of the welfare problems faced by farm animals and a desire to ensure that these animals are spared any harm or suffering. In 2016, 94% of citizens who undertook the Eurobarometer Animal Welfare survey stated that the protection of farm animal welfare is important and 82% of respondents believed that farm animals require better protection than is currently in place².

In order to fully understand the current European Union legislative position on animal welfare, it is useful to consider the historical background to its creation. The six sub-chapters, below, will examine socio-economic factors and fields of scientific

¹ Attributed to Mohandas Karamchand Gandhi

² European Commission, Special Eurobarometer 442: 'Attitudes of Europeans Towards Animal Welfare' (2016 Brussels) 8

development which have influenced the creation of farm animal welfare legislation in Europe:

1. Advances in agricultural science and the consequential development of farm animal production systems in Europe – a historical perspective of the move towards species-specific intensive farming
2. The development of Veterinary Public Health (VPH) Science – the field of veterinary science which safeguards and improves human health and social wellbeing
3. The evolution of animal welfare science as a distinct discipline (assessment of the well-being of animals under human management) and development of animal welfare principles
4. The philosophical and ethical debate surrounding animal rights and animal welfare
5. Contemporary, species-specific intensive systems and associated welfare concerns: an examination of the principal intensive farming systems currently utilised in the EU, discussion of the basic environmental and behavioural requirements of the animals confined in these systems, and key welfare problems that animals have been demonstrated to experience within these systems.
6. Consumer concerns and the role of non-governmental organisations

In addressing the six elements detailed above, this first chapter provides an introductory insight into the complexity of legislating to protect animal welfare, by highlighting the multitude of factors (explored in subsequent chapters) which contribute to contemporary discussion and debate on the sentience and wellbeing of farmed animals.

1.2 Advances in agricultural science and the consequential development of farm animal production systems in Europe – a historical perspective of the move towards species-specific intensive farming

This sub-chapter provides an overview of the expansion of farm animal production systems in Europe, considering the principal socio-economic changes which occurred over the last three centuries.

1.2.1 The Development of Agricultural Science

During the 17th century in Europe, philosophers of the Enlightenment declared knowledge – more specifically, science - as the most appropriate indicator of mankind's evolutionary progress. European philosophers questioned restrictive, religious dogma, advancing the belief that man's knowledge contributed to his evolution and success far more than reliance upon the whims of a faceless god³. European academics rejected the constraints of Christian creationism, turning instead to metaphysics and scientific analysis which were heralded as the means of achieving social justice for all⁴; scientific discoveries were to be used in the creation of a more prosperous and abundant society. By the 1800s modern science had been imported into agriculture, with a view to increased yields and greater financial return for labour which came in response to the increasing food requirement of an expanding European urban population⁵.

Prior to the European Agricultural Revolution (1750-1880)⁶, early agricultural scientists had explored horticulture, meteorology, fertilization and soil quality with the aim of increasing land productivity⁷. Principles of animal husbandry and breeding were not explored until the 1750s⁸. In the latter half of the eighteenth century, the English agriculturalist Robert Bakewell, pioneered systematic selective livestock breeding, creating the first two dedicated meat producing breeds, the Leicestershire sheep and long horn cattle⁹; his Austrian counterpart, Ferdinand Geisslern, advanced theories of

³ M.A. Peters, 'The Enlightenment and its Critics' (2019) 51 *Educational Philosophy and Theory* 886, 887. For an interesting and novel discussion on the development of the schools of science and religion, see P. Harrison, '“Science” and “Religion”: Constructing the Boundaries' (2006) 86 *The Journal of Religion* 81

⁴ The Enlightenment was a period that promoted reason as sovereign, advancing values of tolerance, egalitarianism and separation of church and state; as such, many scientists and philosophers asserted that science should form part of a broader programme for social change. See J. Golinski, *Science as Public Culture: Chemistry and Enlightenment in Britain 1760-1820* (Cambridge University Press 1992) 9

⁵ See T. McKeown, R. Brown and R. Record, 'An Interpretation of the Modern Rise of Population in Europe' (1972) 26 *Population Studies* 345, for a detailed exploration of factors which led to increases in English, Welsh and European populations in the eighteenth and nineteenth centuries

⁶ G. P. H. Chorley 'The Agricultural Revolution in Northern Europe, 1750-1880: Nitrogen, Legumes, and Crop Productivity' (1981) 34 *The Economic History Review* 71

⁷ For a detailed examination of the early development of farming systems, see G.E. Mingay and A.D. Chambers, *The Agricultural Revolution 1750-1880*, (Batsford 1966)

⁸ Sir J.E. Russell, *A History of Agricultural Science in Great Britain 1620-1954* (Allen and Unwin 1966) 48

⁹ O. Vitezslav, 'The “Useful Questions of Heredity” before Mendel' (2009) 100 *Journal of Heredity* 421. Bakewell was the first European agriculturalist to implement selective breeding, a principle which is now embedded in plant and animal agriculture; it involves the selection of individual organisms which

intense genetic selection, improved wool production and in-breeding¹⁰. The growth of agricultural societies such as the Royal Highland and Agricultural Society of Scotland, founded in 1784, encouraged breeding and showing of livestock as well as research and development of new husbandry techniques¹¹.

The devastating outbreak of Rinderpest virus in Europe in 1785 caused the death of millions of cattle, but also highlighted the need for advances in veterinary medicine and led to the creation of European Veterinary Schools in many cities, including London, Vienna and Lyon¹². During their early development, agricultural and veterinary sciences were very closely linked – indeed, in 1823 the aforementioned Royal Highland and Agricultural Society of Scotland founded and financed Edinburgh’s ‘School of Veterinary Surgery’¹³ whose stated aim was to provide a course of lectures, available to agricultural students and apprentice farriers, ‘*on the veterinary art, embracing the knowledge of the causes, prevention and cure of the diseases of horses, black cattle and sheep*’¹⁴. At that time, veterinary science focused on equine and, to a lesser extent, livestock medicine¹⁵ and a gradual growth in understanding of animal health and disease led to a steady increase in livestock numbers over the following century – for example, in Germany, in 1800, 10 million head of cattle were counted; by 1913 this figure had risen to 21 million. In the same period and location, pig numbers increased from 3.8 to 25 million¹⁶.

will transmit desirable characteristics to subsequent generations, bringing better yield or disease resistance or improved quality of produce.

¹⁰ R.J. Wood, ‘The Sheep Breeder’s View of Heredity Before and After 1800’, in Staffan Muller-Wille and Hans-Jorg Rheinberger (eds) *Heredity Produced; At the Crossroads of Biology Politics and Culture, 1500-1870* (MIT Press 2007) 238

¹¹ Alexander Ramsay, *History of the Highland and Agricultural Society of Scotland* (William Blackwood and Sons, 1879) 45

¹² S. Mishra, ‘An Introduction: Veterinary History Comes of Age’ (September 2014) *Social History of Medicine* (Special Virtual Issue, Editorial) 20

<http://www.oxfordjournals.org/our_journals/sochis/veterinaryhistoryintro.pdf> accessed 1 May 2022

¹³ A.A Macdonald, ‘The Royal (Dick) School of Veterinary Studies: What’s in a Name?’ (2013) 17 *Veterinary History* 33. Established by William Dick in 1823, Edinburgh Veterinary School was the second British veterinary teaching establishment to be founded (after London Veterinary College in 1791) and became part of Edinburgh University in 1951

¹⁴ Highland Society of Scotland. ‘*Caledonian Mercury* (12 July 1823) p. 4

<<https://www.britishnewspaperarchive.co.uk/search/results/1823-07-12/1823-07-12?NewspaperTitle=Caledonian%2BMercury&Issued=BL%2F0000045%2F18230712%2F&County=Midlothian%2C%20Scotland>> accessed 12 January 2020

¹⁵ A. Kraft, ‘Breaking with Tradition: The Reform of British Veterinary Education, 1900-1920’, (2004) 3 *History of Education* 316, 317

¹⁶ J. Hartung, ‘A short history of livestock production’ in Andres Aland and Thomas Banhazi (eds) *Livestock Housing: Modern management to ensure optimal health and welfare of farm animals* (Wageningen Academic Publishers 2013) 28

1.2.2 European Farming Systems

Prior to 1950 in Europe, the majority of farm animals were reared in relatively traditional, extensive (outdoor, or partially outdoor) settings, with a manual labour requirement for feeding and cleaning out of animal housing¹⁷. Intensification of farm animal production began following the end of the Second World War, when improvements in medicine (notably the development of antibiotics¹⁸) and increasing fertility rates led to a pan-European 'baby boom' and resultant population growth¹⁹. Confronted with post-war rationing and food shortages, and in the face of expanding populations, countries recovering from conflict were keen to develop self-sufficiency and secure increased yields from animal production. At the same time, advances in technology created increasingly mechanised methods of farm animal production and slaughter (with automation often replacing labour) and increased scientific knowledge enabled genetic selection for optimal stock growth-rates, in conjunction with improved nutrition and veterinary medicine in the form of vitamins, antibiotics and vaccines²⁰.

Agricultural science research was thus channelled into the development of farming systems which would guarantee a consistent production of animal goods at low cost to the consumer²¹ and intensification of farm animal production was the result - a move towards more confined husbandry systems with a concentration of production on relatively fewer farm units. Confinement systems grew in number throughout Europe, primarily for the production of animals raised on a concentrate or grain diet (for example, poultry – meat 'broiler'²² chickens and hens producing eggs – pigs and veal calves). Forage-fed animals tended to remain in more extensive grazing systems (and even today, in some European settings, beef cattle will stay in extensive systems until the point of slaughter), spending only their last few months confined in pens, being 'finished' on grain-based diets²³ similar to the American feedlot system. The feedlot

¹⁷ FAO Readings in Ethics 2, D. Fraser, 'Animal Welfare and the Intensification of Animal Welfare Production, an Alternative Interpretation' (Rome 2005) 2

¹⁸ For an overview of antibiotic development, see R.I. Aminov, 'A brief history of the antibiotic era: lessons learned and challenges for the future' (2010) 1 *Frontiers in Microbiology* 134

¹⁹ J. Van Bavel and D.S. Reher, 'The Baby Boom and Its Causes: What we know and what we need to know' (2013) 39 *Population and Development Review* (2) 257

²⁰ M. Lombard, P.P. Pastoret and A.M. Moulin, 'A Brief History of Vaccines and Vaccination' (2007) 26 *Scientific and Technical Review of the Office International des Epizooties* (Paris) 29

²¹ J. Anomaly, 'What's wrong with factory farming?' (2015) 8 *Public Health Ethics* 246

²² 'Broiler' was a term originally used in the USA to describe smaller, younger chickens used for meat; other categories would have been fowl, roaster and fryer but these terms are not generally used in Europe

²³ Fraser (n 17) 7

system, developed in the 1950s and 1960s, resulted from abundant grain harvests, due to improved irrigation techniques and the creation of hybrid grains (more vigorous varieties of crop)²⁴. During periods where pasture is unavailable, feedlots ensure steady growth and, therefore, sustain meat production throughout the year, utilising grains and some forage, offering farmers economic stability and maximising production whilst providing the population with a constant supply of animal produce²⁵. However, intensive systems house large numbers of animals in close proximity, in often barren and unnatural environments, and various welfare issues have been shown to result from these management practices, including stereotypic or abnormal behaviour, health problems (reduced immunity, increased disease transmission), pain from surgical mutilations²⁶ (carried out with inadequate / no anaesthesia or analgesia), injuries and increased mortality rates²⁷. Intensification has gradually become the management system of choice in the United States - one study has stated that in 1964, 50% of American beef cattle were housed in lots of 50 animals or less; by 1996, almost 90% of housed cattle rearing took place on lots with 1,000 cattle or more with nearly 100 lots holding in excess of 30,000 cattle²⁸.

Whilst advances in agricultural science and husbandry techniques led to a massive increase in European livestock numbers, the overall total number of farms decreased significantly, and this trend has continued to the present day: in 1970 in Denmark, 68,900 farms were rearing chickens for meat; by 2001, this number had dropped to

²⁴ Michigan State University, D.R. Hawkins, 'The Cattle Feeding Industry' <<https://slideplayer.com/slide/5736295/>> accessed 1 May 2022

²⁵ T.J. Centner, 'Limitations on the Confinement of Food Animals in the United States' (2010) 23 *Journal of Agricultural and Environmental Ethics* 469

²⁶ For example, during castration or de-horning of calves: see I. Lorenz, B. Earley et al, 'Calf health from birth to weaning. III. housing and management of calf pneumonia' (2011) 64 *Irish Veterinary Journal* 14. It is important to note that pain from surgical mutilation is not simply an acute event, which passes once the procedure has ended – chronic pain from surgical mutilation can continue throughout an animal's lifetime; for example, as a result of beak trimming in chickens, see H.W. Cheng, 'Morphopathological changes and pain in beak trimmed laying hens' (2006) 62 *World Poultry Science Journal* 41. Surgical mutilation, pain and animal welfare are discussed in detail in Chapter Five

²⁷ J. C. Swanson, 'Farm Animal Well-being and Intensive Production Systems' (1995) 73 *Journal of Animal Science* 2744. Welfare issues associated with intensive system husbandry factors will be discussed at length in later chapters. There is a large and ever-increasing body of veterinary research on the effects of intensive husbandry factors on animal welfare – see, for example: H.A.M. Spolder, S.A. Edwards, and S. Corning 'Effects of group size and feeder space allowance on welfare in finishing pigs' (1999) 69 *Animal Science* 481. See also S. Buijs, L. Keeling et al, 'Stocking density effects on broiler welfare: Identifying sensitive ranges for different indicators' (2009) 88 *Poultry Science* 1536

²⁸ Commission for Environmental Cooperation, C. Ford Runge and G. Fox, 'Issue Study 2. Feedlot Production of Cattle in the United States and Canada. Some Environmental Implications of the North American Free Trade Agreement (NAFTA)' (1 March 1999) 20

5676 farms²⁹. More recently, in the United Kingdom, the number of dairy producers fell more than 50% from 35,741 in 1995 to 15,716 in 2010³⁰ and the British dairy industry has also witnessed a move to fewer dairy units with larger numbers of cattle. In 2009, construction of the first UK 'super-dairy' was proposed at Nocton Heath in Lincolnshire: a single unit housing over eight thousand cows, the largest in Europe at that time³¹. Although the planning application for the dairy was ultimately withdrawn in light of concerns raised by the Environment Agency and massive opposition from local residents / animal welfare organisations, it is a notable example of the desire to further intensify European farming by creating single, large-scale production units.

1.2.3 Food Security and Intensification

The increased availability of produce resulting from intensified systems has further fuelled American and European consumption of meat and animal goods but the intensification revolution is not confined to these regions³² - there is an ongoing, worldwide increase in food requirement, driven by population growth, dietary changes and the need for low-cost produce. The Asian continent has become progressively urbanised, and economic growth, coupled with the influence of globalization, has led to a notable transformation of diet, with a bias towards greater consumption of meat and dairy produce³³. By 2050, the world's population is predicted to reach in excess of nine billion and this population growth will be accompanied by an ever-increasing world food requirement³⁴. Future food security³⁵ is major concern – in 1900,

²⁹ Fraser (n 17)

³⁰ Select Committee on Environment, Food and Rural Affairs, *EU Proposals for the Dairy Sector and the Future of the Dairy Industry*, (HC, 2010-12, 952-I).

³¹ M. Reed, 'Contesting 'sustainable intensification' in the UK: The emerging organic discourse', in: Reed, M, ed. (2012) *Organic Food and Agriculture - New Trends and Developments in the Social Sciences* (InTech 2012) 134.

The 'Nocton Dairies' controversy saw the application for the super dairy challenged by animal welfare groups, neighbouring farmers and local residents; an Early Day Motion (signed by 172 MPs) was submitted and 14,000 objections were ultimately received: Tracy McVeigh, ' "Super-dairy" with 3,330 cows triggers 14,000 planning objections', *The Observer*, London, 13 February 2011

³² H. Charles, J. Godfray, J.R. Beddington et al, 'Food Security, the Challenge of Feeding 9 Billion People' (2010) *Science* 327:5967, 812-818

³³ P. Pingali 'Westernization of Asian diets and the transformation of food systems: Implications for research and policy' (2007) *32 Food Policy* 281

³⁴ Interestingly, the world's population is predicted to reach 10.9 billion by 2100 but will also at that point virtually stop growing. Nonetheless, the demand for water, food and other resources will be massive. See Pew Research, 'World's population is projected to nearly stop growing by the end of the century' <<https://www.pewresearch.org/fact-tank/2019/06/17/worlds-population-is-projected-to-nearly-stop-growing-by-the-end-of-the-century/>> accessed 1 May 2022

³⁵ P. Pinstrip-Adersen, 'Food Security, Definition and Measurement', (2009) *1 Food Security* 5. At the 1996 World Food Summit, the FAO stated that "Food security [is] a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food

approximately ten percent of the global grain harvest was fed to animals; by the late 1990's it had exceeded 40%³⁶ and currently more than one third of global land for crop growth is utilised to produce livestock feed³⁷; in the face of ever-expanding demand for animal produce, the increase in intensification of animal production to meet human needs will have inevitable detrimental effects upon animal welfare. These negative welfare outcomes will be discussed throughout the thesis, which argues that stronger protective legislation is required to protect farm animals from pain and suffering.

Since the early 1960s global meat production has quadrupled - to more than 320 million tonnes in 2018. Europe was the world's largest meat producer in 1961, representing 42% of global production, but by 2013 its market share had fallen to 19% - at that time, Asian meat production had increased to represent between 40 and 45% of global trade. It is, however, important to appreciate that although Europe experienced an overall reduction in production share, there was still an exponential increase in meat output, with current production being double that of 1961³⁸. Since the 1980s, the model of European livestock farming has altered almost beyond recognition, from predominately smallholders on mixed farms to large scale, intensive specialist livestock units³⁹; although a number of extensive operations persist, particularly in less-favoured agricultural regions, intensification predominates. Philip Lymbery, CEO of Compassion in World Farming has commented that 'without fuss or fanfare, farm animals have slowly disappeared from fields and moved into cramped airless hangars and barns'⁴⁰.

Research suggests that European consumption of meats over the last 50 years has risen by approximately 70%, with a three-fold increase in poultry consumption and

that meets their dietary needs and food preferences for an active and healthy life"; FAO Policy Brief, 'Food Security', Issue 2, June 2006

³⁶ For a detailed exploration of the evolution of meat consumption, see Vaclav Smil, '*Should we eat meat? Evolution and Consequences of Carnivory*' (Wiley Blackwell 2013) 71

³⁷ T. Kastner, M.J.I. Rivas, W. Koch and S. Nonhebel, 'Global Changes in Diets and the Consequences for Land Requirements for Food' (2012) 109 Proceedings of the National Academy of Sciences of the United States of America (PNAS) 6868

³⁸ Our World in Data, H. Ritchie and M. Roser, 'Meat and Dairy Production'

<<https://ourworldindata.org/meat-production>> accessed 1 April 2022

³⁹ EUROSTAT Agriculture, Agiculture and Livestock

<<https://ec.europa.eu/eurostat/web/agriculture/data/database>> accessed 1 May 2022

⁴⁰ P. Lymbery and I. Oakeshott, *Farmageddon The true cost of cheap meat* (Bloomsbury Publishing Plc 2014) 3

80% increase in the consumption of pork⁴¹, and international studies confirmed that European egg production continues to expand, with an output in 2012 of 10.5 million tonnes⁴². As detailed, above, the primary aim of intensification was to ensure cheap meat, eggs and milk were available to all – in 1900 an average German family devoted 57% of their income to nutrition, by 2013, this figure had dropped to 14%⁴³. Western Europe has witnessed an increasing trend towards vegetarianism and veganism but overall, the vast majority of European continue to eat meat⁴⁴.

It is evident from the statistics, above, that modern intensified farming systems bring proven benefits to man, including a year-round supply of animal produce, regular income for producers, and low-cost nutrition for consumers.

In summary, intensive farm animal production involves high-density stocking of animals in indoor, usually year-round housing, with mostly automatic operations (feed, water, clearing waste) and minimal labour requirement. Intensification is also usually associated with specialisation (keeping only one species of animal in species-specific housing)⁴⁵. Species-specific intensive systems will be discussed later in this chapter but prior to examining contemporary intensive production systems, the evolution of a branch of science, closely allied to agriculture, will be considered.

1.3 Veterinary Public Health Science

An inevitable consequence of the development of large, single-species animal groups housed within intensive production systems was increased human exposure to animal disease – pathogen transmission risks increase for those working within intensified

⁴¹ M. Kanerva, 'Meat consumption in Europe: issues, trends and debates' (2013) (artec-paper, 187). Bremen: Universität Bremen, Forschungszentrum Nachhaltigkeit (artec) <<https://nbn-resolving.org/urn:nbn:de:0168-ss0ar-58710-6>> accessed 29 September 2020

⁴² International Egg Commission, 'Latest figures show dynamic egg production in Eastern Europe', <<https://www.internationalegg.com/corporate/news/details.asp?nid=918>> accessed 10 September 2020

⁴³ Hartung (n 16) 32

⁴⁴ One study from 2017 revealed that around 9% of Swedish citizens were vegetarian or vegan – NOVUS, Opinionsundersökning Våren (2017) <<https://www.djurensratt.se/sites/default/files/2017-06/vegoopinion-novus-2017.pdf>> accessed 1 May 2022. Another study found that 4.3% of German adults follow a vegetarian diet - G. Mensink, C.L. Barbosa and A.K. Brettschneider, 'Prevalence of persons following a vegetarian diet in Germany' (2016) 1 Journal of Health Monitoring (2) 2

⁴⁵ Specialization refers to a reduction in the diversity of produce species (animal or plant), i.e. the most specialised farms produce the least diverse range of produce – see A. Czyżewski and K. Smędzik-Ambroży 'Specialization and diversification of agricultural production in the light of sustainable development ' (2015) 8 Journal of International Studies (2) 63

husbandry systems and those handling or consuming meat and other animal produce also experience greater vulnerability to disease. Unsurprisingly, therefore, another branch of science evolved which focused on the public safety element of agricultural produce – public health – and the specific discipline of veterinary public health has become the principal driver for food safety legislation within the modern European Union.

1.3.1 Origins of Veterinary Public Health Science

Even within ancient civilisations, there was societal awareness of a potential link between human and animal disease. In the Old Testament, Exodus⁴⁶, anthrax is described as one of the seven Egyptian plagues⁴⁷ and the first hypothesized zoonosis was reported by the ancient Hindus who postulated a connection between an outbreak of human plague and rodents⁴⁸. However, although these links were suspected, scientific exploration and identification of zoonotic disease (and the potential for the animals we keep and their produce to cause harm to human health) only began in earnest in Europe during the eighteenth century, around the same time as the burgeoning of agricultural science.

Seventeenth and eighteenth century Europe experienced a massive surge in animal diseases such as contagious bovine pleuropneumonia, glanders and rinderpest⁴⁹, primarily due to the widespread practice of armies travelling with herds of cattle, to provide food and draught power⁵⁰ for their troops. (In addition, at that time, storage options for animal produce were limited, meaning that animals were normally transported live, to be slaughtered where they were required; this inevitably caused

⁴⁶ Exodus, Verses 9:3, 9:9. *The Holy Bible, Revised Standard Version, Catholic Edition*, (Oxford University Press 2004) 52 Verse 9:9 describes 'boils breaking out in sores on man and beast'

⁴⁷ W. Schönherr, 'History of Veterinary Public Health in Europe in the Nineteenth Century' (1991) 10 *Scientific and Technical Review of the Office International des Epizooties* 985

⁴⁸ R.W.M. Johnson, 'Veterinary Public Health, an historical perspective', in Azzedine Azzam (ed) *Public Policy in Food and Agriculture*, (EOLSS 2009) 126

⁴⁹ J. Blancou, 'A history of the Traceability of Animals and Animal Products' (2001) 20 *Scientific and Technical Review of the Office International des Epizooties* 413. For a detailed discussion of early surveillance of Rinderpest, see J. Blancou, 'Ancient methods of surveillance and control of rinderpest' (1994) 47 *Revue d'élevage et de médecine vétérinaire des pays tropicaux* 21. See also Karl Appuhn 'Ecologies of Beef: Eighteenth Century Epizootics and the Environmental History of Modern Europe' (2010) 15 *Environmental History* 268 for a discussion of beef cattle epizootics in 18th Century Venice, the disease problems associated with processing large numbers of cattle traded from across Europe and early attempts at control of zoonotic disease

⁵⁰ P. Roeder, J. Mariner and R. Kock, 'Rinderpest, the Veterinary Perspective on Eradication' (2013) 368 *Philosophical Transactions of the Royal Society B: Biological Sciences* 1623, 20120139

the spread of disease from district to district. Once slaughtered, methods for storage and preservation of meat were also very limited, adding to the public health risks).

In the face of disease epidemics, various practical strategies were adopted – which can be viewed as early steps towards veterinary public health practices. In 1711, Pope Clement XI's physician, Lancisi, eradicated Rinderpest from Rome by employing a strategy remarkably similar to modern veterinary public health practices⁵¹: culling, meat inspection and restriction of cattle movement⁵². As discussed previously in relation to agricultural science, animal disease epidemics were the driving force behind the creation of numerous veterinary schools in Europe⁵³ and these establishments also pioneered veterinary public health. In 1840, England lifted her restrictions on the importation of animals from Europe – in 1867 sheep pox entered the UK and outbreaks of pleuropneumonia significantly increased⁵⁴. In 1865, the British State Veterinary Department was founded⁵⁵, largely in response to public concern regarding animal disease, and around that time, similar state organisations were founded in other European countries.

1.3.2 Epidemiology and Meat Hygiene

By the early nineteenth century, the surge in human and animal populations, mass migration of workers from villages to towns and insufficient basic sanitation were all contributing to the spread of epizootics (widespread animal diseases) throughout Europe. In many cities, large numbers of private butcheries slaughtered animals in unhygienic conditions, and cheap meat (often the by-product of knacker's yards) was eaten by the poor. Waste from knackers' premises and slaughterhouses was dumped

⁵¹ One example is the United Kingdom's Foot and Mouth Strategy, which includes the application of protection, surveillance and restriction zones, a culling policy and plan for carcass disposal: 'Foot and Mouth Disease Control Strategy for Great Britain', Department for Environment, Food and Rural Affairs (DEFRA), UK, November 2011
<https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69456/fmd-control-strategy111128.pdf> accessed 20 November 2020

⁵² W.P. Taylor, 'Towards the Global Eradication of Rinderpest', in T. Barrett, P.P. Pastoret and W. Taylor (eds) *Rinderpest and Peste des Petits Ruminants, Virus Plagues of Large and Small Ruminants* (Elsevier 2006) 299

⁵³ Johnson (n 48) 5

⁵⁴ Schönherr (n 47) 5

⁵⁵ A. Hardy, 'Professional Advantage and Public Health: British Veterinarians and State Veterinary Services, 1865–1939' (2003) 14 *Twentieth Century British History* (1) 3

in ditches, contaminating waterways; multiple outbreaks of disease and food poisoning regularly occurred.⁵⁶.

Largely as a result of veterinary surgeons and agriculturalists establishing the causal link between animal and human disease, the science of epidemiology (distribution, incidence and control of disease)⁵⁷ was able to develop and provide methodologies for protection of human (and animal) health. One of the earliest demonstrations of the link between human and animal health was Jenner's theory on smallpox⁵⁸, which led to a primitive form of vaccination⁵⁹ in the late 1790s. Dairy-maids had long been noted to have natural immunity from smallpox - as a result of cowpox infection⁶⁰ - and the realisation that the close link between animal and human disease could also lead to protection of human health heralded a new era, which ultimately identified the microbial model of disease⁶¹. In 1870, Louis Pasteur theorised that microbial agents caused disease and in 1882, the tubercle bacillus (tuberculosis) was discovered by Robert Koch⁶². In the early 1880s the term 'bacteriology' was used for the first time, to designate the scientific study of 'germs' which caused disease⁶³. In light of Koch's discovery, the association between beef consumption and human tuberculosis was advanced and, a decade after Koch's discovery, the German veterinary surgeon Robert Von Ostertag confirmed the zoonotic link; he was appointed as the first European academic chair in milk hygiene and meat inspection, by the University of Berlin. In 1900, under his direction, the world's first meat inspection act was created⁶⁴, forming the basis for modern veterinary public health.

⁵⁶ P.A. Koolmees, 'Veterinary Inspection and Food Hygiene in the Twentieth Century', in D. Smith and J. Phillips (eds) *Food, Science, Policy and Regulation in the Twentieth Century*, (Routledge 2000), 55

⁵⁷ C.W. Schwabe, 'History of the scientific relationships of veterinary public health' (1991) 10 *Scientific and Technical Review of the Office International des Epizooties* 937

⁵⁸ Jenner is widely regarded as the creator of the smallpox vaccine but, in fact, other individuals had made the same link between cowpox and smallpox immunity: see P.J. Peard, 'Benjamin Jesty, the first vaccinator revealed' (2006) 368 *The Lancet* 2202

⁵⁹ S. Riedel, 'Edward Jenner and the history of smallpox and vaccination' (2005) 18 *Baylor University Medical Center Proceedings* 21

⁶⁰ Cowpox is a viral disease, of the viral genus Orthopox, and is transmitted to people via pustules on the udders of infected cows. It is closely related to the virus Variola which is responsible for Smallpox. Once an individual's immune system had encountered Cowpox it was then able to 'recognise' the antigen proteins on the similar Variola virus and mount an effective immune response

⁶¹ The concept that proposing that a single, biological agent is responsible for infectious disease

⁶² A. Sakula, 'Robert Koch: Centenary of the Discovery of the Tubercle Bacillus, 1881' (1983) 24 *Canadian Veterinary Journal* (4) 127

⁶³ L.N. Magner, *A History of Infectious Diseases and the Microbial World* (Praeger 2009) xvii

⁶⁴ D. Grossklaus, E. Weise, H. Kolb et al, 'Notes on Technical Progress in Veterinary Public Health' (1991) 10 *Scientific and Technical Review of the Office International des Epizooties* 995, 996

As the scientific community developed an understanding of pathological agents, veterinary schools focused their research on animal disease transmission arising from the consumption of meat derived from infected beasts. The discipline known today as meat hygiene evolved as various human diseases were proven to be related to meat consumption: the life cycles of trichinosis (roundworm) and tapeworm were identified in the 1860s⁶⁵ allowing early meat inspectors to carry out investigations and instigate control measures⁶⁶. By the 1890s various meat-borne agents had been identified⁶⁷ and slaughterhouses set up laboratories to carry out biological research; in the early 1900's, British meat inspection had evolved into a practical veterinary science⁶⁸. European countries created professional associations for veterinary meat inspectors and, as the science developed further, the now traditional meat-inspection system was created: animal inspection (both ante- and post-mortem) with some bacteriological investigation if required⁶⁹. However, following the escalation in intensive farming methods and the expansion of the European market as detailed, above, veterinary public health has been required to expand its competencies, to incorporate disease surveillance and state control / intervention strategies.

Meat inspection was one of the earliest areas of harmonised European Union legislation⁷⁰, with food safety being of paramount importance during the construction of the single market for agricultural products under the Treaty of Rome in 1957⁷¹. Cross-border trade in live animals and their produce clearly carried potential animal and human health risks, and two directives adopted in the 1960s enshrined in law the requirement for official veterinarians to extensively supervise both animal slaughter

⁶⁵ F. Küchenmeister. 'The *Cysticercus cellulosus* transformed within the organism of man into *Taenia solium*' (1861) *Lancet* i:39

⁶⁶ Koolmees (n 56) 60. For an overview of the development of parasitology, see F.E.G. Cox, 'History of Human Parasitology' (2002) 15 *Clinical Microbiology Review* 595

⁶⁷ Including tuberculosis, *Clostridium Botulinum*, *Escherichia Coli* – see D.A.A. Mossel and K.E. Dijkmann, 'A centenary of academic and less learned Food Microbiology Pitfalls of the past and promises for the future' (1984) 50 *Antonie Van Leeuwenhoek* 641

⁶⁸ Hardy (n 55) 372. From around 1900, the *Veterinary Record* and the *Journal of State Medicine* began to publish occasional articles and commentaries on the subject of animal disease and comparative medicine i.e. examining human and animal disease in order to identify similarities and differences between human and animal health

⁶⁹ Koolmees (n 56)

⁷⁰ J. Lawless and K. Wiedemann, 'European Meat Inspection - Continuity and Change in Building a (more) Risk-Based System of Regulation' (2011) 6 *European Food and Feed Law Review* 96

⁷¹ Treaty Establishing the European Economic Community, March 25, 1957, 298 U.N.T.S. 11

and processing of meat⁷². As the areas of European Union competence have expanded, various legislative instruments have incorporated veterinary public health measures to form part of the strategy to protect human health. The Single European Act of 1986⁷³ confirmed the Commission's goal to adopt a high level of health protection in the consumer and environmental fields and Article 129 of the Treaty on European Union (TEU) 1992⁷⁴ granted the Commission a measure of legal competence in the field of public health for the first time⁷⁵.

In 1996, the United Kingdom's outbreak of Bovine Spongiform Encephalopathy (BSE) created a crisis within British agriculture and public health; concerns about meat safety and risks to meat consumers prompted assessment of the British government's handling of the crisis. As a result of the investigation, the Phillips Inquiry⁷⁶ highlighted two specific considerations which were deemed fundamental in safeguarding public health:

- (i) a practical animal disease surveillance system which was found to be a prerequisite to controlling animal diseases effectively
and
- (ii) a valid system of passive surveillance (the committee emphasising that any such system would be dependent upon veterinary surgeons and farmers being sufficiently motivated and also capable of identifying cases of animal disease, to bring them to the attention of the state veterinary service⁷⁷).

⁷² Council Directive 64/432/EEC of 26 June 1964 on animal health problems affecting intra-Community trade in bovine animals and swine, OJ 121/1977 and Council Directive 64/433/EEC of 26 June 1964 on health problems affecting intra-Community trade in fresh meat, OJ 121/2012

⁷³ Single European Act, 17 February 1986 OJ L 169/1, Article 25

⁷⁴ Treaty on European Union, 29 July 1992, OJ C 191/01 (The 'Maastricht Treaty') Title X, Public Health, Article 129

⁷⁵ S. Cucic, 'European Union Health Policy and its implications for national convergence' (2000) 12 *International Journal for Quality in Health Care* 217, 218

⁷⁶ Lord Phillips of Worth Matravers, Chairman. 'The BSE inquiry: report, evidence and supporting papers of the inquiry into the emergence and identification of Bovine Spongiform Encephalopathy (BSE) and variant Creutzfeldt-Jakob Disease (vCJD) and the action taken in response to it, up to 20 March 1996'. London: The Stationery Office. 26 October 2000

⁷⁷ Lord Phillips of Worth Matravers, 'Lessons from the BSE enquiry' (2001) 17 *The Journal of the Foundation for Science and Technology* (2) 3. There is a wealth of commentary on the BSE crisis and handling of risk in public health strategy – see, for example, M. Beck, D. Asenova and G. Dickson 'Public administration, science and risk assessment: a case study of the U.K. Bovine Spongiform Encephalopathy crisis' (2005) 65 *Public Administration Review* 396, and W.D Hueston 'BSE and variant CJD: Emerging science, public pressure and the vagaries of policy-making' (2013) 109 *Preventative Veterinary Medicine* 179

In a territory as large as the European Union, provision of such measures presents a significant challenge. In the wake of the BSE crisis, the European Parliament also conducted an inquiry into the failure of the Community to adequately protect the health of its citizens⁷⁸ and as a result, measures regarding BSE were set out in Regulation (EC) No.999/2001, introducing strategies such as traceability of animals and animal products, education and training and protocols for diagnosis / disease control⁷⁹. The EU has also created various meat hygiene regulations, the purpose of which is to safeguard consumers from animal-borne parasitic disease⁸⁰.

The EU Animal Health Strategy of 2007-2013 was created with a focus on policies to reduce the incidence of animal disease as well as minimise the risk of disease outbreaks; 2016 saw the adoption of Regulation (EU) 2016/429 on transmissible animal diseases, also known as ‘the European Animal Health Law’⁸¹. This regulation is the amalgamation of numerous legal acts which seek to ensure, *inter alia*, improved detection and control of animal diseases, greater freedom to adapt regulations to local circumstances in the face of disease outbreak, more widespread animal protection strategies (such as pathogen surveillance and livestock identification) and clarification of the roles of various stakeholders in the field of animal production⁸².

Although the European public might, arguably, have been less aware of VPH than animal welfare science over the last few decades, this is no longer the case; following public health scares such as the United Kingdom’s Foot and Mouth Disease outbreak in 2001⁸³, consumers now demonstrate a stronger awareness, and in fact, high levels

⁷⁸ European Parliament, Temporary Committee of inquiry into BSE, ‘Report on alleged contraventions or maladministration in the implementation of Community law in relation to BSE’ A4-0020/97/PART A.III, 7 February 1997

⁷⁹ Regulation (EC) No 999/2001 of the European Parliament and of the Council of 22 May 2001 laying down rules for the prevention, control and eradication of certain transmissible spongiform encephalopathies OJ L 147/1

⁸⁰ For example, Regulation (EC) No 853/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific hygiene rules for food of animal origin OJ L 139/55, Regulation (EC) No 854/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific rules for the organisation of official controls on products of animal origin intended for human consumption OJ L 139/ 206 and Commission Implementing Regulation (EU) 2015/1375 of 10 August 2015 laying down specific rules on official controls for *Trichinella* in meat OJ L 212/7 – regulations which cover measures for the detection of parasitic contamination of meat

⁸¹ Regulation (EU) 2016/429 of the European Parliament and of the Council of 9 March 2016 on transmissible animal diseases and amending and repealing certain acts in the area of animal health (‘Animal Health Law’) (1) [2016] OJ L 84

⁸² European Commission, ‘The EU Animal Health Law’, <http://ec.europa.eu/food/animals/health/regulation_en> accessed 20 May 2022

⁸³ National Audit Office, ‘The 2001 Outbreak of Foot and Mouth Disease’, Report by the Comptroller and Auditor General, HC 939, Session 2001-2002 (21 June 2002). In 2001, the United Kingdom’s foot

of concern regarding the safety of the food they eat. In 2010, 60% of respondents to an EU food safety survey were concerned about 'new viruses found in animals'; consumers were also found to be worried about bacterial food poisoning (for example, listeriosis or salmonellosis), antibiotic residues and animal cloning⁸⁴. Approximately 75% of new human diseases which have emerged over the last decade have been induced by pathogens arising from animals or their by-products⁸⁵ and it is clear that the European consumer is now acutely aware of the potential for zoonotic disease.

1.3.3 Twenty First Century Veterinary Public Health and Agriculture

In 2002, the World Health Organisation (WHO) defined Veterinary Public Health (VPH) as 'the sum of all contributions to the physical, mental and social well-being of humans through an understanding and application of veterinary science'⁸⁶. Protection of public health is also one of the primary objectives of today's European Union⁸⁷ - the TFEU states that 'a high level of human health protection shall be ensured in the definition and implementation of all Community policies and activities'⁸⁸ - and VPH safeguards many areas of human / animal interaction, including biomedical research, control of animal populations (both wild and domesticated), emergency response to disease outbreaks and environmental management⁸⁹. In terms of the evolution of EU animal welfare legislation, however, the two key areas of VPH have been:

- Control of zoonoses (diseases of animals transmissible to humans⁹⁰)
- Food safety through meat hygiene and meat inspection science

and mouth disease outbreak saw 6.5 million infected and in-contact animals slaughtered via an eradication policy (the UK does not vaccinate against FMD virus) – the total economic cost was estimated at around 13 billion US dollars: S.M. Jamal and G.J. Belsham, 'Foot and Mouth Disease: Past, Present and Future' (2013) 44 *Veterinary Research* 116. For discussion of the 2001 Foot and Mouth Disease outbreak and its effects on rural communities, see A. Scott, M. Christie and P. Midmore, 'Impact of the 2001 Foot and Mouth Disease outbreak in Britain: implications for rural studies' (2004) 20 *Journal of Rural Studies* 1

⁸⁴ European Commission, Special Eurobarometer 354: Food Related Risks (2010 Brussels)

⁸⁵ World Health Organisation (WHO), 'Future Trends in Veterinary Public Health, Report of a WHO Study Group', Technical Report Series 907 (Geneva, 2002)

⁸⁶ *ibid*, 4

⁸⁷ For example, in October 2007 the EU Commission adopted a new, common approach to public health, in their white paper: European Commission, 'Together for Health: A Strategic Approach for the EU 2008-2013' (White Paper) COM (2007) 630 final, 23 October 2007

⁸⁸ Consolidated version of the Treaty on the Functioning of the European Union [2008] OJ C115/47 (TFEU), Article 168 provides the legal basis for Community Public Health Legislation

⁸⁹ WHO (n 85)

⁹⁰ Usually from a vertebrate animal to a human; D.C. Blood and V.P. Studdert, *Saunders Comprehensive Veterinary Dictionary* (Second Edition, WB Saunders 1999) 1242

As European farming systems have intensified, massively increasing productivity, the market for animal goods has expanded significantly and the relationship between human and animal health has become closer than ever before – the majority of our animal produce is derived from mammalian (and fish) species which can host organisms harmful to themselves and also to man. Zoonotic disease is an ever-present threat to public health and has close ties to intensive farming.

1.3.4 Animal and Human Health, Novel Coronavirus 2019

In December 2019, the world experienced an outbreak of pandemic respiratory disease, caused by a novel strain of coronavirus⁹¹, with structural similarities to the virus responsible for SARS, severe acute respiratory syndrome⁹². A major public health crisis ensued during 2020 and, as a result of the COVID-19 virus's suspected origins in a Chinese wildlife market⁹³, intensive animal production systems found themselves in the spotlight of both scientific and media scrutiny. It could be argued that this crisis was inevitable, given that scientists now estimate six in every ten human infectious diseases can be transmitted from animals and 75% of new / emerging human diseases originate from animals⁹⁴. Eric Fevre, Chair of Veterinary Infectious Diseases at the University of Liverpool, has suggested that it is necessary for intensive farming methods to be better investigated with respect to future pandemics; he has highlighted concerns that when farm animals are selectively bred for specific traits (improved milk or muscle production) we create species-specific populations that are very genetically similar, usually living under intensive conditions. With respect to disease emergence, this is a highly risky practice, because when a large number of genetically uniform animals are susceptible to a new disease, a virus can spread very

⁹¹ 2019-nCoV acute respiratory disease or COVID-19

⁹² A.S. Fauci, H. Clifford Lane and R.R. Redfield, 'Covid-19, Navigating the Uncharted' (2020) 382 *New England Journal of Medicine*, 1268

⁹³ The exact origins of SARS-COVID 19 are unknown, however, substantial evidence exists to support the theory that the virus originated in food market in Wuhan, China. The market where COVID-19 is suspected to have originated is a 'wet' market (a market where cold water is poured onto produce, in an attempt to keep it cool and clean), however the 'wet' aspect is less concerning to public health scientists than the storage and sale of bats and other wild animals on the premises. During previous disease pandemics, bats have been essential for transmission of disease to other animals or humans and the high possibility for close contact between bats and humans is a major public health risk, with respect to virus transmission. For a detailed discussion of this issue, see A. Alonso Aguirre, R. Catherina, H. Frye and L. Shelley, 'Illicit Wildlife Trade, Wet Markets, and COVID-19: Preventing Future Pandemics' (2020) 12 *World Medical and Health Policy* 256

⁹⁴ Centers for Disease Control and Protection (CDC) Zoonotic Diseases, <<https://www.cdc.gov/onehealth/basics/zoonotic-diseases.html>> accessed 1 May 2022

rapidly, with potentially devastating consequences⁹⁵. Of particular note, with respect to European intensive farming, is the recently discovered phenomenon of silent circulation of coronavirus, in pigs. Northern Italy is a major producer of pig meat⁹⁶ (notably Parma ham, but also bresaola, pancetta and mortadella) and in 2018, a study facilitated sampling of pigs, in four intensive farms in the region, for the presence of coronaviruses⁹⁷. Despite all the animals sampled being asymptomatic, pigs on three of the four farms were positive for coronaviruses with between 9.7% and 12.5% positivity within their group. This situation carries serious implications for human health because it suggests the presence of these coronaviruses would be missed on routine veterinary assessment, given that none of the infected animals display clinical symptoms. When combined with the potential for zoonotic transmission, the health problems associated with keeping these large groups of genetically similar, immunologically vulnerable animals should be a major concern for everyone involved in safeguarding public health.

1.3.5 Novel Coronavirus in Farmed Mink

A further, deeply concerning discovery in 2020 was the emergence of a mutated variant of the COVID-19 virus which spread through Danish mink farms and was found to be zoonotic⁹⁸. Between June and November 2020, 12 of the 214 cases of COVID-19 reported in Denmark were identified as being caused by a unique variant⁹⁹ which was believed to demonstrate reduced sensitivity to antibodies produced by the infected individual's immune system¹⁰⁰. Further research in late 2020 provided some reassurance that the mutations were not, at that stage, connected with increased human morbidity (rate of disease in a population) or mortality, but culling of the 17 million Danish farmed mink population was still recommended, in light of the uncontrolled and rapid spread of the virus through over 200 farms in a 5 month period

⁹⁵ John Vidal, 'What does more environmental damage: eating meat from the wild or a factory farm?' *The Guardian* (London, 26 May 2020) <<https://www.theguardian.com/environment/2020/may/26/ban-on-bushmeat-after-covid-19-but-what-if-alternative-is-factory-farming>> accessed 29 September 2020

⁹⁶ P. Di Ciccio, M.C. Ossiprandi, Emanuela Zanardi et al, 'Microbiological contamination in Three Large-Scale Pig Slaughterhouses in Northern Italy' (2016) 5 *Italian Journal of Food Safety* 6151

⁹⁷ S. Leopardi, C. Terregino and P. De Benedictis, OIE Collaborating Centre, 'Silent Circulation of Coronaviruses in Pigs' (2020) 186 *Veterinary Record* 323

⁹⁸ Owen Dyer, 'Covid-19: Denmark to kill 17 million minks over mutation that could undermine vaccine effort' (2020) *BMJ* 371:m4338

⁹⁹ Named as the 'cluster 5 variant'

¹⁰⁰ World Health Organization, 'SARS-CoV-2 mink-associated variant strain—Denmark', *Disease Outbreak News*, November 6, 2020. <<https://www.who.int/csr/don/06-november-2020-mink-associated-sars-cov2-denmark/en>> accessed 19 November 2020

(a massive reservoir of virus which could infect the human population)¹⁰¹. By November 2020, researchers had identified the presence of 170 coronavirus variants from 40 mink farms and had confirmed virus variants from mink in 300 people. By 18th November 2020, approximately 20 weeks after the presence of COVID-19 in Danish mink farms had been reported, seven countries had confirmed the presence of mink-related COVID-19 mutations in human patients¹⁰² with more expected to be identified. Denmark was the first country to order a nationwide cull of its farmed mink population, but many countries will likely follow the Danish example, given the risk to human health from such a large virus reservoir.

The COVID-19 pandemic stimulated public interest in the risks that intensive, single-species animal production systems pose to humans via the food chain, and numerous articles were written on the topic¹⁰³. A Humane Society International White Paper¹⁰⁴, published in September 2020, examined the link between intensive animal production systems, zoonotic disease and human health, confirming the link between human and animal health and warning that the emergence of zoonotic disease will occur where animal welfare is compromised, via confinement systems, transportation or where there is encroachment on wildlife territories by farming facilities. The report gives a stark warning:

'While COVID-19 was not explicitly predicted, pandemics are expected, albeit with an undefined timeline and place of origin. The intensification and industrialization of

¹⁰¹ The more the virus is able to spread within the mink population, the greater the chance of viral mutation. There are approximately three times the number of mink in Denmark than there are people – see S. Mallapatty, 'Covid mink analysis shows mutations are not dangerous – yet' (2020) 587 Nature 340 – therefore the large presence of mink farms means potential risk of exposure of the population to disease from the animals is high

¹⁰² The Netherlands, Switzerland, Russia, South Africa, the Faroe Islands, United States of America and Denmark. See Sophie Kevany and Tom Carstensen, 'Covid-19 mink variants discovered in humans in seven countries', *The Guardian* (London, 18 November 2020)

< <https://www.theguardian.com/environment/2020/nov/18/covid-19-mink-variants-discovered-in-humans-in-seven-countries>> accessed 20 November 2020

¹⁰³ See, for example, Troy Vettese and Alex Blanchette, ' Covid-19 shows factory food production is dangerous for animals and humans alike' *The Guardian* (London, 8 September 2020)

<<https://www.theguardian.com/commentisfree/2020/sep/08/meat-production-animals-humans-covid-19-slaughterhouses-workers>> accessed 10 October 2020 and Jane Dalton, 'Coronavirus: World leaders must urgently phase out factory farming to cut future pandemics risk, says report', *The Independent*, London, 6 October 2020, <<https://www.independent.co.uk/news/health/coronavirus-factory-farming-animal-diet-meat-plant-based-humane-society-b813899.html>> accessed 19 November 2020

¹⁰⁴ Humane Society International, 'An HSI report: The connection between animal agriculture, viral zoonoses, and global pandemics', September 2020, <<https://blog.humanesociety.org/wp-content/uploads/2020/10/Animal-agriculture-viral-disease-and-pandemics-FINAL-4.pdf>> accessed 19 November 2020

*animal agriculture creates a large, susceptible antigenically naive population, which nature will exploit*¹⁰⁵. The battle with COVID-19, ongoing at the time of writing, demonstrates the incredibly close relationship between animal husbandry, food production and public health.

As was explained with reference to foot and mouth disease, movement of animals from one facility to another for fattening or slaughter can play a significant role in disease transmission. The modern European Union internal market, with its associated free movement of goods, facilitates the long-range transportation of not just animal products but also live animals. Between 2005 and 2015, intra-EU trade of live animals increased from 25.4 million animals in 2005 to 41.4 million in 2015¹⁰⁶ – yet veterinary science research has consistently proven that the stress of transportation significantly increases the shedding of zoonotic bacteria by animals¹⁰⁷, and the potential for rapid and widespread transmission of infectious disease (between animals and also to people) is widely acknowledged¹⁰⁸. It would seem that the problems observed during the Rinderpest outbreaks of 1785 remain a risk today. In addition, intensive production systems have also been shown to increase shedding of zoonotic pathogens, posing a risk to farm personnel as well as consumers¹⁰⁹.

As a result of the numerous opportunities for animal disease to negatively impact on human health, it has been necessary for contemporary VPH to develop as a multi-faceted, broad-ranging scientific discipline. The origins of public health science and

¹⁰⁵ *ibid*, 45

¹⁰⁶ Eurogroup for Animals, F. Porta (based on a technical report by AgraCEAS Consulting): 'A strategy to reduce and replace live animal transport: Towards and meat and carcasses only trade', 18th November 2019, Eurogroup for Animals, p.9

<<https://www.eurogroupforanimals.org/sites/eurogroup/files/2020-02/A-strategy-to-reduce-and-replace-live-animal-transport.pdf>> accessed 19 November 2020

¹⁰⁷ There is a large body of research on zoonotic disease associated with live animal transportation, for some examples, see: A.R. Barham, B.L. Barham, A.K. Johnson et al, 'Effects of the transportation of beef cattle from the feed yard to the packing plant on prevalence levels of Escherichia coli O157 and Salmonella spp.' (2002) 65 Journal of Food Protection (2) 280, and A.M. Seimenis, 'The spread of zoonoses and other infectious diseases through the international trade of animals and animal products' (2008) Veterinaria Italiana 44 (4) 591. See also R. Espinosa, D. Tago and N. Treich, 'Infectious Diseases and Meat Production' (2020) 76 Environmental and Resource Economics 1019

¹⁰⁸ M. Greger, 'The Long Haul: Risks Associated with Livestock Transport' (2007) 5 Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science 301

¹⁰⁹ B.A. Jones, D. Grace et al, 'Zoonosis emergence linked to agricultural intensification and environmental change' (2013) 110 Proceedings of the National Academy of Sciences of America (PNAS) (21) 8399. See also J.P. Graham, J.H. Leibler et al, 'The Animal-Human interface and Infectious disease in Industrial Animal Food Production: Rethinking Biosecurity and Biocontainment' (2008) 123 Public Health Reports 282, and J.D. Collins and P.G. Wall, 'Food safety and Animal Production Systems: Controlling Zoonoses at Farm Level' (2004) 23 Scientific and Technical Review of the Office International des Epizooties 685

the associated desire to understand and control zoonotic disease can be traced back to earliest times. In turn, as the European agricultural sector has expanded, the European Union has incorporated VPH into its legislative system; in March 2016 the ‘Animal Health Law’¹¹⁰ was adopted which acknowledges, inter alia, the deleterious impact of transmissible animal disease on food safety and public health¹¹¹.

Veterinary Public Health has also played a significant role in providing research data for areas of EU animal welfare policymaking with respect to animal stocking densities, conditions during transportation of livestock and slaughter procedures. Given the ever-expanding market for animal produce and livestock, advances in VPH science will inevitably continue to inform EU animal welfare legislation in the coming years.

1.4 The evolution of animal welfare science

Whilst agricultural and VPH sciences focused on the physical health of animals, their diseases, husbandry and meat hygiene, the early days of agricultural intensification prioritised production yield and maintenance of food supply, with little consideration of the well-being or behavioural needs of farm animals.

Before the 1960s, ‘animal welfare’ was primarily a philosophical, moral concept but in more recent times, a specific scientific methodology has been developed which better allows us to evaluate an animal’s quality of life and experiences. Donald Broom, Professor of Animal Welfare at the University of Cambridge, has stressed the importance of separating the two strands – (i) scientific analysis of animal welfare and (ii) the process of moral decision-making with respect to an animal’s husbandry and care¹¹². This is important because human definitions of moral and non-moral behaviour have remained relatively inflexible over many centuries (following established cultural or religious tenets)¹¹³, whilst the great advances made in biological sciences over the last two centuries (in particular in the last fifty years) have provided humankind with demonstrable, objective evidence of the negative physiological (and psychological) effects that poor animal husbandry inflicts. In a world where billions of food animals are kept within intensive production systems, it is reasonable that

¹¹⁰ Regulation (EU) 2016/429 (n 81)

¹¹¹ *ibid*, I (2)

¹¹² D.M. Broom, *Sentience and Animal Welfare*, (CAB International 2014) 22

¹¹³ D. M. Broom, ‘A history of animal welfare science’ (2011) 59 *Acta Biotheoretica* 121

contemporary scientific evidence demonstrating their ability to suffer takes precedence over our individual or cultural subjective moral judgements about their experiences. Considering factual evidence out-with the sphere of our personal values allows identification of problems within production systems and can provide justification for creating legislation to address them. Given the appropriate platform¹¹⁴, animal welfare science can also encourage society to accept that animals are worthy of moral consideration and to identify what responsibilities we have to treat other species in an ethical and compassionate manner, in order to prevent suffering. In recent years, some moral judgements (independent of welfare science) have led to better animal protection, with legislation being introduced on the basis of citizen's concerns rather than hard data; however, a subjective foundation for policymaking brings various challenges, a subsequent chapters will explain.

1.4.1 Early animal welfare science

It is difficult to pinpoint a specific moment when animal welfare science became an acknowledged discipline in its own right. The 19th and early 20th centuries saw development of ethology, 'the scientific study of animal behaviour, particularly in [their] natural state'¹¹⁵. Psychologists began to challenge the traditional view that gross-anatomical study and assumptions about biological capacity were sufficient to explain the means by which humans and non-humans functioned¹¹⁶. It gradually became accepted that conscious perception, experience and brain function are best understood through observations of behaviour or physiological parameters (such as alterations in hormones or enzymes) and that assertions regarding the mental processes of living organisms should not be made without experimental or observational proof. In 1951, the Dutch biologist Nikolaas Tinbergen published his influential book 'The Study of Instinct'¹¹⁷, a landmark publication in the field of ethology which focused on spontaneous animal behaviour which took place in the absence of

¹¹⁴ The development of animal welfare science is not simply a matter for legislators or animal welfare campaigners – it now plays a role as part of the veterinary curriculum in many universities: C.J. Hewson et al, 'Approaches to teaching animal welfare at schools worldwide' (2005) 32 *Journal of Veterinary Medical Education* 422; in schools: R.L. Zasloff, L.A. Hart and H. DeArmond, 'Animals in Elementary School Education in California' (1999) 2 *Journal of Applied Animal Welfare Science* 347; and in the education of farmers and agricultural workers: C. Hubbard, M. Bourlakis and G. Garrod, 'Pig in the middle: farmers and the delivery of farm animal welfare standards' (2007) 109 *British Food Journal* 919

¹¹⁵ D. C. Blood and V. P. Studdert (n 90) 418

¹¹⁶ Broom (n 112) 23

¹¹⁷ N. Tinbergen, '*The Study of Instinct*' (Clarendon Press 1951)

learning. Tinbergen's 1963 paper 'On aims and methods of ethology'¹¹⁸ devised 'four questions' necessary for understanding animal behaviour: what is the physiological cause of the behaviour, what is the behaviour's function, how has the behaviour evolved over generations and how did it develop over the lifetime of the animal?. His work remains well respected in the field of behavioural science. In 1973 Tinbergen shared a Nobel physiology / medicine prize (with Konrad Lorenz and Karl von Frisch) for animal behaviour discoveries¹¹⁹. Tinbergen and Lorenz are credited with establishing European ethology as a study of animal behaviour within the context of natural environments.

1.4.2 David Wood-Gush: poultry and pig behaviour pioneer

Tinbergen's work greatly influenced the research of another notable ethologist, David Wood-Gush, who led the behaviour group of Edinburgh University's Poultry Research Centre (PRC), becoming Head of Ethology in 1952 – he has been hailed as 'one of the forerunners of applied ethology and animal welfare'¹²⁰. During his time at the PRC, Wood-Gush pioneered research into chicken behaviour and was one of the first ethologists to acknowledge the need to assess the response of chickens to intensive production systems. His most influential research, recognised internationally, examined pig behaviour¹²¹; Wood-Gush believed that the most effective way of assessing domesticated animals' preferred living conditions was to study them in natural, free-range conditions; having constructed a 'pig-park' in the Pentland Hills, he was able to demonstrate that domesticated pigs retain much of the behaviour of their wild ancestors¹²². On the basis of his observations of free-range pigs, Wood-Gush devised a housing system which permitted normal social behaviour and free movement – housing that was humane yet viable from an economic perspective. His revolutionary theory that the social behaviour of production animals should be central

¹¹⁸ N. Tinbergen, 'On aims and methods of ethology' (1963) 20 *Zeitschrift für Tierpsychologie* 410

¹¹⁹ P. Bateson and K.N. Laland, 'Tinbergen's Four Questions: an appreciation and an update' (2013) 28 *Trends in Ecology and Evolution* 712

¹²⁰ V. Sandilands, 'David Wood-Gush, The Biography of an Ethology Mentor' (2004) 87 *Applied Animal Behaviour Science* 173

¹²¹ Wood-Gush co-authored many articles on the topic of pig behaviour, see for example, R.C. Newberry, D.G.M. Wood-Gush and J.W. Hall, 'Playful Behaviour of Piglets'(1988) 17 *Behavioural Processes* 205 and R.C.M. Hutton and D.G.M. Wood-Gush 'The development of social behaviour in piglets' (1982) 9 *Applied Animal Ethology* 86

¹²² A. Stolba and D.G.M. Wood-Gush 'The behaviour of pigs in a semi-natural environment' (1989) 48 *Animal Science* 419. See also D. Wood-Gush 'Animal Welfare in Modern Agriculture' (1973) 129 *British Veterinary Journal* 167

to the design of husbandry systems greatly influenced not only the ethologists of his generation but also many agriculturalists and veterinary surgeons¹²³.

1.4.3 Rachel Carson, Ruth Harrison and the Brambell Committee

As animal welfare science and the intensification of agriculture developed, a parallel movement was evolving, which adopted a more holistic approach to the human-animal relationship and the natural world. In 1962, Rachel Carson's 'Silent Spring'¹²⁴ chronicled the problems of chemical pesticides, highlighting the importance of the relationship between man and the rest of the natural world and asserting our moral responsibility to non-human life¹²⁵. In 1964, Ruth Harrison published her seminal work, 'Animal Machines'¹²⁶, which is widely acknowledged as marking the beginning of the farm animal welfare movement in Europe¹²⁷. Translated into seven languages, 'Animal Machines' was written in a scientific and dispassionate manner, bringing information about intensive farm production systems ('factory farming') into the public domain. The book discussed veal crates, battery cages and sow stalls and led to the British government's creation of the Brambell Committee in 1965¹²⁸. The committee's purpose was to report on the animal welfare concerns raised by Harrison's book. W.H. Thorpe, an ethologist (and committee member), and the Brambell Committee's subsequent report¹²⁹, acknowledged the needs of farm animals (both biological and behavioural) and stressed the importance of meeting these basic needs within any production environment. The conclusions of the Committee ultimately formed the basis of the globally-recognised Five Freedoms: five fundamental principles for the welfare of animals under human control¹³⁰ which remain relevant and applicable today:

¹²³ Aubrey Manning, 'David Grainger Marcus Wood-Gush' (obituary) *The Scotsman*, Edinburgh, 8 December 1992 <https://www.rse.org.uk/wp-content/uploads/2017/11/wood-gush_david.pdf> accessed 20 November 2020

¹²⁴ Rachel Carson, *Silent Spring*, (Houghton Mifflin 1962)

¹²⁵ M. Stewart, 'Rachel Carson: Humanizing Nature' (2014) 4 *Earth Common Journal* 1

¹²⁶ Ruth Harrison, *Animal Machines*, (Vincent Stuart 1964)

¹²⁷ J.L. Albright, 'History and Future of Animal Welfare Science' (1998) 1 *Journal of Applied Animal Welfare Science* 145

¹²⁸ The Committee members were Prof. F.W. Rogers Brambell (Chairman), D.S. Barbour, Lady Barnett, Prof. T.K. Ewer, Alec Hobson, H. Pitchforth, Walter R. Smith, Dr. W.H. Thorpe and F.J.W. Winship. The committee offered a range of expertise from agriculture, zoology, veterinary and behavioural sciences.

¹²⁹ Report of the Technical Committee to Enquire into the Welfare of Animals kept under Intensive Livestock Husbandry Systems, December 1965 (London, HMSO)

¹³⁰ S.P. McCulloch, 'A Critique of FAWC's Five Freedoms as a Framework for the Analysis of Animal Welfare' (2012) 26 *Journal of Agricultural and Environmental Ethics* 959, 960

The five freedoms were later expanded to include five provisions (in italics, below). This enabled clarification of how the needs were to be met and this guidance was included in codes of practice to improve farm animal welfare¹³¹

- Freedom from hunger and thirst (*by providing ready access to fresh water and a diet to maintain full health and vigour*)
- Freedom from discomfort (*by providing an appropriate environment including shelter and a comfortable resting area*)
- Freedom from pain, injury and disease (*by prevention or rapid diagnosis and treatment*)
- Freedom to behave normally (*by ensuring conditions and treatment which avoid mental suffering*)
- Freedom from fear and distress (*by providing sufficient space, proper facilities and company of the animal's own kind*)

Ruth Harrison served on the UK Farm Animal Welfare Advisory Committee¹³² as an advisor on animal husbandry and welfare; her contribution led to the creation of a new farm animal welfare law: the United Kingdom's 1968 Agriculture (Miscellaneous Provisions) Act¹³³. Harrison also assisted the WSPA¹³⁴ within the Council of Europe where her detailed research of production systems and logical arguments for reform were well-respected and influential – largely as a result of her recommendations, the European Convention for the Protection of Animals Kept for Farming Purposes¹³⁵ was adopted¹³⁶.

In 1965, Elspeth Huxley wrote 'Brave New Victuals'¹³⁷ which also examined the intensification of farming. Huxley explored the use of chemicals on the land, mechanisation of farm animal production and the use of hormones and drugs in modern farming systems. The aim of Huxley's book was to encourage the reader to

¹³¹ D.J. Mellor, 'Updating Animal Welfare Thinking: Moving beyond the 'Five Freedoms' towards 'A Life Worth Living' (2016) 6 Animals 3, 21

¹³² Later renamed as the Farm Animal Welfare Council

¹³³ Agriculture (Miscellaneous Provisions) Act 1968 (Eliz. 2 c34)

¹³⁴ World Society for the Protection of Animals, now World Animal Protection

¹³⁵ Founded in 1976 by the Council of Europe: European Convention for the Protection of Animals kept for Farming Purposes, Strasbourg, 10.III.1976, ETS No.087

¹³⁶ For a biography of Ruth Harrison's life and professional career, see H. van de Weerd and V. Sandilands, 'Bringing the issue of animal welfare to the public: A biography of Ruth Harrison (1920–2000)' (2008) 113 Applied Animal Behaviour Science 404

¹³⁷ Elspeth Huxley, *Brave New Victuals: an Inquiry into Modern Food Production*, (Chatto and Windus 1965)

consider not only the detrimental effects of modern farm animal production on the animal, but also on the quality of food being produced and on human health.

1.4.4 Applied ethology and motivational behaviour

Psychologists and ethologists, undoubtedly motivated by Harrison and Huxley's writings, continued to explore and develop their understanding of animal behaviour and in the 1970s and 1980s, significant advances were made in the area of motivation systems¹³⁸. These studies analysed how animals made decisions – they demonstrated that, in stark contrast to the commonly-held (and subsequently disproven) view that animals were driven by instinct, they are in fact highly sophisticated in their ability to make decisions, when striving to meet their basic biological needs¹³⁹. Key figures in this field, such as Ian Duncan (who identified motivations of animals frustrated by an inability meet their needs, and also demonstrated the biological foundation of these needs)¹⁴⁰, Piet Wiepkema¹⁴¹, Klaus Vestergaard¹⁴² and Donald Broom¹⁴³, moved the focus of their research to applied ethology – the study of the behaviour of animals managed by man – and began to develop a new discipline: animal welfare science.

In addition to advances in motivation science during the 1970s and 1980s, novel research also challenged the previously held belief that domestic animals were so behaviourally and genetically altered by mankind, they therefore bore no similarity to their counterparts in the wild. Following detailed studies of domestic versus wild / feral animal groups, many ethologists reached the conclusion that farm animal behaviour was largely analogous to that of their wild ancestors and that in fact, the only significant changes induced by the human selection of animals are the ability to thrive in less than

¹³⁸ Broom (n 112) 24

¹³⁹ D.M. Broom, 'Animal Welfare; Concepts and Measurement', (1991) 69 *Journal of Animal Science* 4167

¹⁴⁰ Ian Duncan's career has spanned decades – examples of his work include: I.J.H. Duncan and V.G. Kite 'Some investigations into motivation in the domestic fowl' (1987) 18 *Applied Animal Behaviour Science* 387 and B.O. Hughes and I.J.H. Duncan 'Behavioural Needs – Can they be explained in terms of motivational models' (1988) 19 *Applied Animal Behaviour Science* 352

¹⁴¹ Piet Wiepkema, Honorary Fellow of the International Society for Applied Ethology, former professor at the Agricultural University in Wageningen, is acknowledged for his central role in forming a bridge between pure and applied ethology. Whereas pure ethology is the science of animal behaviour, applied ethology is the branch of science that takes a practical role in assessing animal welfare within specific animal husbandry systems.

¹⁴² Klaus Vestergaard, 1944-1999, Associate Professor of Ethology at The Royal Veterinary and Agricultural University of Copenhagen (1982-1999)

¹⁴³ Donald Broom, Emeritus Professor of Animal Welfare, Centre for Anthrozoology and Animal Welfare, University of Cambridge

optimal conditions and a slightly increased tolerance to the proximity of human beings¹⁴⁴.

In 1971, the UK organisation UFAW (The Universities Federation for Animal Welfare) created its first handbook on the Care and Management of Farm Animals. Founded in the 1920s, UFAW's mission is to promote and support '*a scientific approach aimed at finding ways to gain insight into what matters to animals, assessing their welfare and improving the quality of their lives through practical developments in all aspects of their care*'¹⁴⁵. 1979 saw the foundation of the British Farm Animal Welfare Council (FAWC, now the Farm Animal Welfare Committee) a governmental advisory body, whose membership comprises veterinary surgeons, biologists, farmers and animal welfare scientists. As the number of advisory animal interest groups has increased, public awareness and concerns about animal welfare have intensified; as a result, policy makers have progressively responded to these concerns by creating legal instruments through which animal welfare may be improved¹⁴⁶.

It is interesting in this context to note the role of veterinary universities in animal welfare science. During the 1980s, the majority of scientists working in animal welfare research were zoologists or those concerned with animal production, not veterinary surgeons. At that time, the focus of veterinary practice and the university veterinary curriculum, was prevention, treatment or cure of animal disease – although this would, inevitably, improve an animal's welfare, there was no consideration of welfare as a scientific discipline to be considered or studied in its own right. In some ways, an analogy can be made with human medicine – for many years, issues of mentation and behaviour were viewed as incidental and peripheral in comparison with the more pressing physical and physiological concerns¹⁴⁷. However, with the development of

¹⁴⁴ There is a large body of research which has demonstrated that although domesticated farm animals show some behavioural divergence from their 'wild' or 'feral' counterparts, these adaptations (both behavioural and internal[endocrine]) are primarily the result of changes in habitat or interaction with humans rather than being due to any fundamental genetic selections. For an interesting overview of some recent research, see S. Kaiser, M.B. Hennessy and N. Sachser, 'Domestication affects the structure, development and stability of biobehavioural profiles' (2015) *Frontiers in Zoology*, 12:S19 doi: 10.1186/1742-9994-12-S1-S19

<<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5385816/>> accessed 21 November 2020

For a detailed examination of the subject, see E.O. Price, *Animal Domestication and Behaviour* (CAB International 2002)

¹⁴⁵ UFAW <<https://www.ufaw.org.uk/our-work/ufaws-work>> accessed 27 November 2020

¹⁴⁶ P.T.M. Ingenbleek, V.M. Immink, H.A.M. Spoolder et al, 'EU animal welfare policy: Developing a comprehensive policy framework' (2012) 37 *Food Policy* 690, 691

¹⁴⁷ Broom (n 112) 26

animal welfare science as a discipline in its own right, many veterinary universities now offer welfare courses¹⁴⁸ (which address more than simply animal production or health). Although there is still significant variation in the content of the courses available, such studies clearly facilitate greater consideration of animal welfare by the veterinary surgeons of the future.

1.4.5 Defining Animal Welfare

Although ‘animal welfare’ is a term now in common parlance, defining it has proved extremely challenging¹⁴⁹, even within the scientific community itself. Various methods of assessing animal welfare have been developed but there is still some disagreement regarding the definition of welfare; however, nowadays, Donald Broom’s classic, basic definition is accepted by the majority of welfare scientists: ‘*the welfare of an individual is its state as regards its attempts to cope with its environment*’¹⁵⁰. In 2011 the World Organisation for Animal Health (OIE) provided a more detailed interpretation of animal welfare, based on Broom’s definition:

*‘Animal welfare means how an animal is coping with the conditions in which it lives. An animal is in a good state of welfare if (as indicated by scientific evidence) it is healthy, comfortable, well nourished, safe, able to express innate behaviour and if it is not suffering from unpleasant states such as pain, fear and distress. Good animal welfare requires disease prevention and veterinary treatment, appropriate shelter, management, nutrition, humane handling and humane slaughter / killing. Animal welfare relates to the state of the animal; the treatment that an animal receives is covered by other terms such as animal care, animal husbandry and humane treatment*¹⁵¹’.

Although the above statement appears reasonable, perhaps even obvious, to many non-scientists, significant disagreement within the welfare science community persists with regard to the details of each individual factor for assessing animal welfare¹⁵². The

¹⁴⁸ Hewson (n 114)

¹⁴⁹ C.J. Hewson, ‘What is animal welfare? Common definitions and their practical consequences’ (2003) 44 *The Canadian Veterinary Journal* 496

¹⁵⁰ D. M. Broom, ‘Indicators of Poor Welfare’ (1986) 142 *British Veterinary Journal* 524

¹⁵¹ OIE (World Organisation for Animal Health) *Terrestrial Animal Health Code 2019, Volume I*, (28th edn, OIE, 2019) S7. Chapter 7.1

¹⁵² For example, amongst the wide range of housing systems available for beef cattle, how do we identify what is ‘appropriate shelter’? For a discussion of welfare indicators, methods of assessing

provisions are useful but leave much to be established – terms such as ‘appropriate management’ or ‘appropriate shelter’ provide little guidance; the statement provides a good starting point, but behind each of the given principles lies volumes of research and opposing opinions which are yet to be reconciled. At present, no single system for welfare assessment has been universally adopted; however, three overarching frameworks have been proposed:

- Functional assessment (based on observed physiological parameters such as reproductive ability, disease and mortality),
- Naturalistic assessment (based on motivation studies and comparison of wild / captive animals’ behaviour)
- Subjective Experience assessment (which considers the animal’s feelings and examines indicators of distress, pain and fear)¹⁵³.

Each framework focuses on different parameters, some easier to quantify scientifically than others, and a great deal of future research will be required to formulate a universally accepted system for assessment of an animal’s welfare. It is unclear whether this is even a realistic goal. There are many subjective and cultural factors which can influence the willingness (or reluctance) of scientists and researchers to accept or adopt a particular assessment model and it has been argued that this inflexible approach has set animal welfare understanding back by decades¹⁵⁴, Historically, there has been great reluctance to accept that animals have emotional lives, for the simple reason that if animals are known to experience similar emotions to people, it becomes much harder to justify the current husbandry and slaughter practices currently permitted. If animals are ‘just like us’ then we *can* imagine how they feel at the slaughterhouse and this is a difficult concept for many people to embrace¹⁵⁵. There is an additional lack of consensus amongst scientists out-with the field of animal

welfare and scientific approaches, see V. Sejian, J. Lakritz et al, ‘Assessment Methods and Indicators of Animal Welfare’ (2011) 6 Asian Journal of Animal and Veterinary Advances 301

¹⁵³ D. Fraser, ‘Assessing animal welfare, different philosophies, different scientific approaches’ (2009) 28 Zoo Biology 507. For an interesting discussion of welfare assessment which can incorporate affective states (longer lasting feeling emotion or mood states that result from cumulative experiences) and biological functioning, see P.H. Hemsworth, D. J. Mellor, G.M. Cronin and A. J. Tilbrook, ‘Scientific assessment of animal welfare’ (2015) 63 New Zealand Veterinary Journal 24

¹⁵⁴ Ecologist Dr Carl Safina is an ecologist has written extensively on this issue – for an overview see C. Safina, ‘Animals Think and Feel’ (2016) 1 Animal Sentience 2

¹⁵⁵ A fascinating overview of this issue, with discussion of Panksepp’s seven core emotions applied in a zoo-animal context, can be found in: T. Grandin ‘My Reflections on Understanding Animal Emotions for Improving the Life of Animals in Zoos’ (2018) 21 Journal of Applied Animal Science 12

welfare¹⁵⁶ and significant confusion also surrounds the definition of animal welfare in the minds of the general public / consumer¹⁵⁷. Whilst consumers express concern about animal welfare and aspire to purchase 'welfare-friendly' produce, they do not necessarily understand the welfare claims made by producers and are often unable to source adequate information about assessing animal welfare and the various production systems used / their welfare potential¹⁵⁸.

The evolution of animal welfare science has brought society to a point where there is a stronger understanding of the needs of animals and their experiences in intensive husbandry systems. The science has informed researchers, but also provided objective evidence to support many of the criticisms levelled against intensive animal production by welfare campaigners. Animal welfare science has also been used in recent times to inform policy makers and this is the focus of subsequent chapters.

In 21st century Europe, animal welfare is often discussed in conjunction with animal rights and although not the focus of this thesis, it is nonetheless helpful to consider the relevance of animal rights in the welfare debate.

1.5 The philosophy and ethics of animal rights

Animal welfare and animal rights are two separate concepts¹⁵⁹ and any detailed discussion of animal rights lies beyond the scope of this thesis. However, certain ethical concepts and principles derived from the animal rights movement have been central to the progress made in terms of European animal welfare, and therefore it is

¹⁵⁶ For a detailed account of differing opinions on animal welfare, which provides the view of a panel of ethologists, veterinary surgeons, toxicologists, physicians and other professionals on the ethics of using animals in biomedical research, see Jane A Smith and Kenneth M Boyd (eds) '*Lives in the Balance: The Ethics of Using Animals in Biomedical Research: The Report of a Working Party of the Institute of Medical Ethics*' (Oxford University Press 1991)

¹⁵⁷ See for example, K.M. Abrams, C.A. Meyers and T.A. Irani, 'Naturally Confused: consumers' perceptions of all natural and organic pork products' (2010) 27 *Agriculture and Human Values* 365, and T.M. Ngapo, E. Dransfield et al, 'Consumer Perceptions: Pork and pig production. Insights from France, England, Sweden and Denmark' (2004) 66 *Meat Science* 125

¹⁵⁸ European Commission, 'Report from the Commission to the European Parliament, The Council, The European Economic and Social Committee and the committee of the regions: Options for animal welfare labelling and the establishment of a European Network of Reference Centres for the protection and welfare of animals' (2009) COM 584 final, 12

¹⁵⁹ L.W. Sumner, 'Animal welfare and Animal rights' (1988) 13 *Journal of Medicine and Philosophy* 159

useful to briefly consider some relevant philosophical views regarding the moral value and ethical treatment of animals.

1.5.1 History: Early thinking and Medieval Views

For centuries, many Eastern cultures and religions, such as Buddhism, Shintoism and Jainism, have acknowledged the ability of animals to suffer, and stressed the importance of non-violence ('ahimsa' in Hindu) towards all living beings¹⁶⁰. European attitudes towards animal sentience were historically very different. Traditional European opinions about animals were based on predominantly Judeo-Christian and ancient Greek ideologies, which promoted the concept of man's dominion over all other creatures. Derived from Aristotelian thinking, the 'Great Chain of Being', presented the natural world as a feudal order, with God at the summit with all beneath him - angels, then men, then animals, plants and minerals in that given order¹⁶¹. Jews and Muslims historically believed that God gave man control of other species and the Christian bible proclaims "Let us make mankind in our image.... so that they may rule over the fish in the sea and the birds in the sky, over the livestock and all the wild animals, and over all the creatures that move along the ground"¹⁶².

Little consideration was given to animal sentience or wellbeing during the medieval and Renaissance periods – animals were viewed as objects, the purpose of which was to be of service to mankind. Indeed, the attitudes held by religious leaders of the period, that every creature existed solely to provide a usable benefit or ethical lesson for mankind, have been described as 'breath-takingly anthropocentric'¹⁶³. Thomas Aquinas stated 'He that kills another's ox sins, not through killing the ox but through injuring another man in his property'¹⁶⁴. Although many people today would find this approach lacking in empathy or compassion, it in fact reflects the contemporary legal status of animals in most countries across the world, as mere chattels or property¹⁶⁵.

¹⁶⁰ C.G. Framarin, 'The value of nature in Indian (Hindu) traditions' (2011) 47 *Religious Studies*, 285 – the term ahimsa has become synonymous with Jainism, but originated in Hindu texts and has also been adopted in Buddhism

¹⁶¹ Richard D. Ryder, *Animal Revolution: Changing Attitudes Towards Speciesism* (Berg Publishing 2000) 35

¹⁶² Holy Bible (n 46) Genesis 1:26

¹⁶³ Keith Thomas, *Man and the Natural World: Changing attitudes in England 1500-1800* (Allen Lane Publishers 1983) 164

¹⁶⁴ Thomas Aquinas, *Summa Theologiae*, IIa-IIae, q.64 a.1, o.3

¹⁶⁵ For a discussion of the legal status of companion animals in the United States of America see N.R. Pallotta, 'Chattel or Child: The Liminal Status of Companion Animals in Society and Law' (2019) 8 *Social Sciences* 158. For an analysis of the legal status of cats in the United Kingdom, see A. Nurse

As will be discussed in Chapter Two, the European Union has taken some tentative steps to remedy this situation by acknowledging the sentience of animals.

The exploitative view that animals existed for our own purposes was often justified with reference to Descartes' theory that animals were simply automata which, despite giving the appearance of possessing consciousness, were in fact, like machines, devoid of sentience, desires and emotions¹⁶⁶. However, some evidence has been found of early British attitudes which showed more compassion: Thomas Tyron, a Gloucester shepherd, is the first known individual to apply the concept of 'rights' to a non-human subject in 1683¹⁶⁷ - he later wrote that 'violence and killing either man or beasts is as contrary to the Divine Principle as light is to darkness'¹⁶⁸. Two philosophers of the seventeenth century explored ideas of animal sentience and their ability to suffer - Henry More (1614-87) believed that animals had immortal souls similar to mankind and John Locke (1632-1704) promoted compassion and kindness to all living creatures in his thesis 'Thoughts on Education' – "I think people from their cradle should be tender to all sensible creatures"¹⁶⁹.

1.5.2 17th and 18th Century Enlightenment

By the early eighteenth century, several groups were acknowledged as champions of compassion for animals¹⁷⁰. The Methodists, whose founder opposed blood sports, and the Quakers (Religious Society of Friends), whose founder George Fox, opposed hunting, both demonstrated concern for the plight of animals. One stated aim of the Quakers was to "show a loving consideration for all creatures and seek to maintain the beauty and variety of the world"¹⁷¹. Although in the minority, humanitarian thinkers

and D. Ryland, 'Cats and the Law: Evolving Protection for Cats and Owners' (2014) *Journal of Animal Welfare Law* (December Issue) 1

¹⁶⁶ P. Harrison, 'Descartes on Animals', (1992) 42 *The Philosophical Quarterly* (167) 219

¹⁶⁷ Thomas Tyron, *The Country-Man's Companion, Or, a New Method of Ordering Horses & Sheep So as to Preserve Them Both from Diseases and Causalties [Sic], Or, to Recover Them If Fallen Ill and Also to Render Them Much More Serviceable and Useful to Their Owners'* (Andrew Sowle 1684) 140

¹⁶⁸ Thomas Tyron, *'Wisdom's dictates, or, Aphorisms & rules, physical, moral, and divine, for preserving the health of the body, and the peace of the mind ... to which is added a bill of fare of seventy five noble dishes of excellent food, for exceeding those made of fish or flesh'* (Printed for Thomas Salisbury 1691) 94

¹⁶⁹ John Locke, *Thoughts on Education* (A & J Churchill 1693) republished in *The Works of John Locke, A New Edition* (Printed for Thomas Tegg 1823) IX, 112

¹⁷⁰ Ryder (n 161) 55

¹⁷¹ George Fox, *Advice and Queries*, 42 (1656) in *Quaker Faith and Practice: the book of Christian discipline of the Yearly Meeting of the Religious Society of Friends (Quakers) in Britain* (5th Edn, The Yearly Meeting of the Religious Society of Friends (Quakers) in Britain 2013)

were found across Europe: Voltaire (1744-1778) noted the physiological similarities of man and beast and poured scorn on the notions of the time that animals were incapable of pain or suffering¹⁷². In 1775, notably ahead of his time, Jean Jacques Rousseau wrote 'if I am bound to do no injury to my fellow creatures, this is less because they are rational than because they are sentient beings'¹⁷³.

1.5.3 Jeremy Bentham and animal rights

Jeremy Bentham, the philosopher and founder of modern utilitarianism, is widely acknowledged as one of the first proponents of animal rights. Although he wrote relatively little on the subject (and did not take the radical position often attributed to him in recent times), he was the first philosopher in the Western world to propose equal consideration to animals, and championed animal welfare legislation¹⁷⁴. In 1780, Bentham famously wrote 'The question is not, can they reason? Nor, can they talk? But *can they suffer?* Why should the law refuse its protection to any sensitive being? The time will come when humanity will extend its mantle over everything which breathes'.¹⁷⁵ It is notable that the utilitarian argument (specifically regarding benefits for the *greatest number*) has recently been highlighted in the plea to acknowledge farm animal welfare as a significant and pressing moral concern: the combined mass of the seven billion human beings currently on earth is approximately 300 million tonnes whilst domesticated farm animals represent a mass of around 700 million tonnes: welfare is truly an issue for the majority of the world's creatures¹⁷⁶. However, in the same year as Bentham was arguing for sentience over intellectual rationality or religious belief as the benchmark for man's treatment of animals, the German philosopher Immanuel Kant, by contrast, expounded the inferior status of 'irrational animals, with which one may deal and dispose at one's discretion'¹⁷⁷ and it was clear that the advancement of animal sentience was to be a long road.

¹⁷² Voltaire, *Dictionnaire philosophique* (Paris 1775) Bêtes

¹⁷³ Jean-Jacques Rousseau, *Discourses on the Origin of Inequality* (Marc-Michel Rey 1755) Preface

¹⁷⁴ J. Kniess, 'Bentham on Animal Welfare' (2018) 27 *British Journal for the History of Philosophy* 556. Bentham opposed needless cruelty although he had no objection to the killing or use of animals, as long as they did not unnecessarily suffer

¹⁷⁵ Jeremy Bentham, *Introduction to the Principles of Morals and Legislation*, (1789) 311

¹⁷⁶ Yuval Noah Harari, *Sapiens, A Brief History of Humankind*, (Vintage Books 2011) 392

¹⁷⁷ Immanuel Kant, *The Groundwork for the Metaphysics of Morals* (1785) M.J. Gregor and J. Timmermanns (eds) (Cambridge University Press 2014)

1.5.4 Nineteenth century progress

It is generally accepted that by the close of the eighteenth century, the basic tenets of the modern animal welfare movement had been established in the United Kingdom, in no small part due to philosophical debate on the subject of conferring rights upon animals. Academics began to embrace the idea that animals can suffer pain and that their sentience affords them moral and legal rights¹⁷⁸. During the nineteenth century, politicians, philosophers and educationalists became motivated to educate the broader population and encourage an understanding of the similarities rather than differences between the species. In the United Kingdom, a new animal welfare era began: 1822 saw the ratification via democratic parliamentary process of the world's first legislation devoted entirely to preventing animal cruelty, The Cruel Treatment of Cattle Act¹⁷⁹. Two prominent animal welfare campaigners, Thomas Erskine and Richard Martin, dismayed by the wanton cruelty of bull-running and bull-baiting, campaigned tirelessly over a period of thirteen years for this legislation to be passed¹⁸⁰. In 1824, the Royal Society for the Prevention of Cruelty to Animals was founded by William Wilberforce, Richard Martin and the Reverend Arthur Broome (originally known as the SPCA, Royal patronage being confirmed in the title in 1840)¹⁸¹ and in 1876 the Cruelty to Animals Act¹⁸² was passed, regulating the treatment of live animals used in scientific research¹⁸³. The development of animal welfare legislation during this period is remarkable and is a reflection of the consideration of animals' rights and their intrinsic value. The passing of legislation is especially notable because at this time, there was no science available to definitely prove that animals were sentient or to allow understanding of their cognitive experiences – legislators acted primarily on the basis of subjective observation and assumption. Yet in doing so, their leap of faith improved and protected the welfare of thousands of animals.

Elsewhere in Europe, organisations in opposition to vivisection and devoted to ending cruelty to animals were being created: in Stuttgart (1837), Berlin (1841), Paris (1845)

¹⁷⁸ Ryder (n 161) 72

¹⁷⁹ The Cruel Treatment of Cattle Act 1822 (3 Geo. IV c. 71)

¹⁸⁰ *ibid*, 82

¹⁸¹ G. Hughes and C. Lawson, 'RSPCA and the criminology of social control' (2011) 55 *Crime Law and Social Change* 375, 381

¹⁸² Cruelty to Animals Act 1876 (39 & 40 Vict. c77)

¹⁸³ J.E. Hampson, 'History of animal experimentation control in the U.K.' (1981) 2 *International Journal for the Study of Animal Problems* 237

and Geneva (1868)¹⁸⁴. In 1871 the recently unified Italy saw the foundation of the SPA (Società Protettrice degli Animali), in 1881, Deutscher Tierschutzbund - the German Animal Welfare Federation - was founded, as an umbrella organisation, joining together smaller animal welfare societies in Germany¹⁸⁵ and in 1882, Sweden founded its first animal protection society¹⁸⁶.

1.5.5 Charles Darwin

Charles Darwin's theories on evolution¹⁸⁷ introduced the theory of a shared evolutionary affinity of all animals – the British psychologist and animal rights advocate, Richard Ryder, has stated that Darwinism presented three significant considerations for all intelligent laypersons (non-scientists)¹⁸⁸:

1. An implied lack of divine purpose in creation and existence; Darwinism had no place for theological assumptions that man had a superior place in God's scheme and challenged the religious theory that man possessed dominion over all other creatures.
2. The concept of 'survival of the fittest' proposed that the stronger, more vigorous species and individuals would dominate and destroy the weaker –again challenging the idea man's domination was an entitlement as part of God's divine scheme.
3. Most significantly, Darwin highlighted the kinship that exists between humans and other animals – the idea that the human race had evolved from an animal ancestor suggested that many similarities would remain.

Whilst it might be expected that Darwin's evolutionary theories would significantly advance anti-speciesism at the dawn of the twentieth century, this was regrettably not the case¹⁸⁹. Despite the challenges Darwin's research now brought to the Victorian

¹⁸⁴ Sabrina Tonutti, European Animal Protection, in Andrew Linzey (ed) *The Global Guide to Animal Protection* (University of Illinois Press 2013) 12

¹⁸⁵ Deutscher Tierschutzbund, <<https://www.tierschutzbund.de/organisation/ueber-uns>> accessed 5 December 2020

¹⁸⁶ Djurens Rätt (Animal Rights Sweden) was originally formed with the aim of ending painful animal experimentation; <<http://www.djurensratt.se/english>> accessed 5 December 2020

¹⁸⁷ Darwin's *On the Origin of Species* was published in 1859, followed by the *Descent of Man* in 1871. See Charles Darwin *On the Origin of Species by Means of Natural Selection or the preservation of favoured races in the struggle for life* (John Murray 1859) and Charles Darwin, *The Descent of Man and Selection in relation to sex* (John Murray 1871)

¹⁸⁸ Ryder (n 161) 156

¹⁸⁹ *ibid* 159

human-animal boundary, the concept of man's domination over the animal species was retained¹⁹⁰. Animals and nature were viewed as representative of the various issues and struggles which man encountered¹⁹¹ and although animals were generally viewed as inferior creatures, in art and literature the Victorians adopted an often sentimental and anthropocentric approach, especially where domesticated pets were concerned¹⁹². Anna Sewell's novel 'Black Beauty' was published in 1877¹⁹³ and was notably written from the horse's perspective; in 1902 Beatrix Potter published 'The Tale of Peter Rabbit', the first of her numerous anthropomorphic children's stories about animals¹⁹⁴. Although Darwin's theories failed to facilitate notable change in the perceived status of animals, they nonetheless proposed concepts of animal experience which were supported by scientific observation and therefore encouraged public consideration of the place of animals in society.

1.5.6 The rejection of sentience

The 1890s saw the birth of modern experimental psychology which proved to be a retrograde step for theories of animal sentience, with strong rejection of perceived 'anthropomorphism' – the attribution of human characteristics to animals in the absence of absolute proof¹⁹⁵. By the early 1900's, it had become accepted that scientists' subjective experiences when assessing the experiences of animals lacked proof and were therefore of no scientific value. The resulting trend for scientists to reject animal sentience and consciousness at this time is epitomised by Ivan Pavlov who opined in 1927 that the study of animals was one of 'physiological facts' with no need 'to resort to fantastic speculations as to the existence of any possibly subjective states....which may be conjectured as an analogy with ourselves'¹⁹⁶.

¹⁹⁰ For an overview of opinions of the time, see C.C. McKechnie and J. Miller, 'Victorian Animals' (2012) 17 *Victorian Culture* 436

¹⁹¹ Harriet Ritvo, *The Animal Estate: The English and Other Creatures in the Victorian Age*, (Harvard University Press 1987) 3

¹⁹² See, as an example, the discussion of the role of nature in the poetry of Victorian women, in Fabienne Moine, 'Manipulating the Animal' in *Women Poets in the Victorian Era: Cultural practices and nature poetry* (Routledge 2015) 151

¹⁹³ Anna Sewell, *Black Beauty* (Jarrold and Sons 1877)

¹⁹⁴ Beatrix Potter, *The Tale of Peter Rabbit* (F Warne & Co. 1902)

¹⁹⁵ One example of this thinking is Wilhelm Wundt, who commented in *Lectures on Human and Animal Psychology* (Swann Sonnenschein 1894) 344, that when scientists proclaimed the touching of antennae by colonies of ants as salutations of their queen, this was nothing more than simple imaginings on the part of the watcher!

¹⁹⁶ Ivan Pavlov, *Conditioned Reflexes: An Investigation of the Physiological Activity of the Cerebral Cortex* (Oxford University Press 1927) – for discussion, see Randall Lockwood, 'Anthropomorphism is

The Edwardian era in the United Kingdom was, however, notable for advances made in terms of attitudes to animal suffering during experimentation; a growth in public awareness of both the massive increase in animal experimentation¹⁹⁷ and the attitudes of scientists such as Pavlov led to a flourishing anti-vivisection movement. The notorious ‘Brown Dog Affair’ was an English controversy which ran between 1903 and 1910¹⁹⁸: two Swedish anti-vivisectionists, Lizzy Schartau and Leisa Lind af Hageby infiltrated an illegal vivisection carried out on a terrier dog at the University of London, leading to protests, battles between the police, anti-vivisectionists and medical students and culminating in a Royal Commission investigation¹⁹⁹ of animal experimentation.

1.5.7 Modern Views on Sentience

From the 1950s, the animal rights movement has experienced a surge of interest with much of the contemporary discussion originating from the writings of two philosophers, Peter Singer and Tom Regan. Singer’s most celebrated publication, ‘Animal Liberation’²⁰⁰ espouses Bentham’s theory that animals are capable of suffering, and therefore worthy of moral consideration. Singer explored the concept of ‘speciesism’ (the advancement of one’s own species at the expense of another, by over-riding their greater interests), which Singer argues is analogous to racism²⁰¹. Tom Regan, in his ‘Case for Animal Rights’ promotes the concept that non-human animals bear inherent moral rights in the same way as humans²⁰².

not a Four Letter Word’, in M.W. Fox and L.D. Mickley (eds) *Advances in Animal Welfare Science Volume 2* (Springer 1986) 187

¹⁹⁷ Ryder (n 161) 164 – the number of licensed animal experiments in the UK increased from 70,000 in 1920 to one million annually in 1940 in the UK

¹⁹⁸ B. Garlick, ‘Not all Dogs go to Heaven; some go to Battersea: sharing suffering and the “Brown Dog Affair”’ (2015) 16 *Social and Cultural Geography*, 798. See also P. Mason, *The Brown Dog Affair: the Story of a Monument the Divided the Nation* (Two Sevens Publishing 2005)

¹⁹⁹ The Second Royal Commission on Vivisection, 1906-1912; for an overview, see E.M. Tansey, ‘“The Queen has been dreadfully shocked” : Aspects of Teaching Experimental Psychology using animals in Britain, 1876-1986’ (1998) 19 *Advances in Physiological Education* 1, 23

²⁰⁰ Peter Singer, *Animal Liberation: A new ethics for our treatment of animals* (Harper Collins 1975)

²⁰¹ E. Dardenne, ‘From Jeremy Bentham to Peter Singer’ (2010) *Revue d’études benthamiennes* 7 < <https://journals.openedition.org/etudes-benthamiennes/204>> accessed 4 December 2020

For an alternative interpretation of Singer and utilitarianism, see R. Llorente, ‘The Moral Framework of Peter Singer’s Animal Liberation: an alternative to Utilitarianism’ (2009) 16 *Ethical Perspectives* 61

²⁰² Tom Regan, *The Case for Animal Rights*, (University of California Press 2004): Regan argues that the common human attribute is the existence of a life that matters to that individual person – i.e. That individual experiences being the ‘subject of a life’. Regan argues that this experience can be human and non-human, and therefore believes that this inherent value must be attributed to all creatures who are the subject of a life.

The philosophical and ethical debate surrounding the sentience and moral rights of animals continues. The last three decades have seen an exponential surge in the field of animal-rights-related philosophy which has informed discussion with scientists and, more recently, policymakers. In 2006, The Oxford Centre for Animal Ethics was founded by Professor Andrew Linzey; the organisation's aim is to 'pioneer ethical perspectives on animals through teaching, research and publication'²⁰³. In Zurich, Stiftung für das Tier im Recht (Foundation for Animals in the Law) was the first European non-governmental organisation to champion the creation of legislation pertaining solely to animal welfare and several European universities now offer the opportunity to study and develop theories of animal welfare, law and ethics²⁰⁴. 'Animal law' has become a specialist subject and its study includes philosophical, ethical and moral elements of our treatment of animals and the protection they can receive in law.

Over the last ten years, the massive expansion of the internet and social media as global platforms for education, debate and discussion²⁰⁵ has led to an increased awareness of animal rights amongst the peoples of Europe and encouraged lively debate on the role and value of animals in modern European society. The moral value of animals is no longer the preserve of scholars but is now a subject of interest and concern across all tiers of society²⁰⁶; whilst the predominant view that human life is of greater value than animal remains (thereby deeming the killing of animals and consumption of animal products morally acceptable), the work of animal rights campaigners has contributed greatly to society's acceptance of animal sentience and in modern Europe, a social movement now surrounds animal welfare, composed of citizens, charities and NGOs.

²⁰³ Oxford Centre for Animal Ethics <<http://www.oxfordanimaethics.com/>> accessed 5 December 2020; the centre has an extensive body of fellows and honorary fellows and the centre aims to place ethical debate on animals in the spotlight as they consider 'the rational case for animals is frequently understated within academia and misrepresented in the media'

²⁰⁴ Animal Welfare courses are offered in numerous university locations including Basel, Barcelona, Edinburgh and Liverpool John Moores

²⁰⁵ J. Lu, K. Bayne and J. Wang 'Current Status of Animal Welfare and Animal rights in China' (2013) 41 *Alternatives to Laboratory Animals* 351. See also W.G. Mangold and D.J. Faulds, 'Social Media: The new hybrid element of the promotion mix' (2009) 52 *Business Horizons* 357

²⁰⁶ Steven C. Tauber '*Navigating the Jungle: Law, Politics and the Animal Advocacy Movement*' (Routledge 2016) 55

1.6 Contemporary production systems and associated welfare concerns

Having considered the evolution of intensive farming and the development of veterinary public health, animal welfare science and the philosophy of animal rights, this sub chapter will now examine the major intensive European husbandry systems: chicken farming (meat and egg production), pig farming, bovine dairy production, and bovine meat production. It is out-with the scope of this thesis to examine every intensive system, but the following species-specific examples will provide a brief overview of each current intensive-production system, basic husbandry and behavioural requirements of the animal and discussion of some key welfare and health problems that result from the systems' failure to fulfil these requirements. The systems being discussed were chosen for two reasons: they are systems regulated, to a greater or lesser extent, by the European framework and each system is associated with serious, negative welfare outcomes for animals.

The majority of modern European intensive systems are year-round, primarily indoor systems, designed to maximise yield and profit at the lowest possible cost to producer and consumer.

1.6.1 Broiler Birds and Battery Hens

The traditional farmyard scene, often portrayed in art or described in literature, presents an image of lively, brightly feathered chickens roaming free around the farmhouse and foraging on the surrounding land. Whilst free range systems were standard prior to the Second World War, increased demand for eggs and meat led to the development of intensive systems. A wide range of domesticated chicken breeds exist²⁰⁷, but today's intensive poultry industry has bred and developed strains known as commercial hybrids²⁰⁸, genetically selected to provide optimum meat or egg yield for minimum economic input.

²⁰⁷ For an assessment of modern chicken breeds and the genetic relationship to their ancestor, the Red Jungle Fowl, see I.G. Moiseyeva, M.N. Romanov, A.A. Nikiforov and A.A. Sevastyanova 'Evolutionary Relationships of Red Jungle Fowl and chicken breeds' (2003) 35 *Genetics Selection Evolution* 403, 406

²⁰⁸ C.W. Tallentire, I. Leinonen and I. Kyriazakis, 'Breeding for efficiency in the broiler chicken: a review' (2016) 36 *Agronomy for Sustainable Development* 66

1.6.1.1 Meat chickens (broilers) and turkeys

In 1960s Great Britain, most people consumed an average of one chicken per year (approximately 1kg) – by 2003, around 2kg per month per capita was being consumed: 23kg per capita per annum on average²⁰⁹. This statistic is reflective of a pan-European trend: in 2017, over 7.2 billion broiler chickens were slaughtered for meat in the EU²¹⁰ (an average consumption of 24.1kg per capita per annum)²¹¹.

- Modern Intensive System

Within the EU, the majority of broiler chickens (over 90%) are now reared in intensive production systems: birds have been bred and genetically selected for fast growth and are usually housed in flocks of 50,000 birds or more²¹². Housing is typically without windows or natural light, with simple litter on the floor and continuous access to feed and water²¹³. As well as being dense in nutrients, their feed also contains a combination of anti-parasiticides (specifically to treat coccidiosis) and synthetic amino acids²¹⁴. Although the natural life span of a chicken can be six years, most broilers are slaughtered at an average six weeks of age (between 35 and 49 days)²¹⁵. A small number of higher welfare systems are also used within the EU, such as those which provide higher indoor welfare, organic systems and more extensive, free-range housing systems.

Approximately 240 million turkeys are slaughtered annually in Europe²¹⁶; these birds are kept in housing systems similar to those detailed for broiler chickens, above, with

²⁰⁹ M. Miele, 'The taste of happiness: free-range chicken' (2011) 43 *Environment and Planning A: Economy and Space* 2076, 2080

²¹⁰ FAO (2018) FAOSTAT: Production –Livestock Primary, Chicken Meat and Canned Chicken meat, 2017 <<http://FAOSTAT.fao.org>> accessed 1 December 2020

²¹¹ Association of Poultry Processors and Poultry Trade in the EU Countries Annual Report 2018. <<http://www.avec-poultry.eu/wp-content/uploads/2018/10/8.-WF-28-09-2018-AVEC-annual-report-2018.pdf>> accessed 19 November 2020

²¹² For some examples of broiler numbers in typical European flocks, see T. Van Limbergen, J. Dewulf et al, 'Scoring biosecurity in European conventional broiler production' (2018) 97 *Poultry Science* 74

²¹³ H.J. Blokhuis, 'Intensive Production Units and Welfare: Domestic Fowl' (1994) 13 *Scientific and Technical Review of the Office International des Epizooties* 67

²¹⁴ R.K. Wheelhouse, B.I. Groves et al, 'Effects of coccidiostats and dietary protein on performance and water consumption in broiler chickens' (1985) 64 *Poultry Science* 979

²¹⁵ Note that some research has been conducted into extending the current industry average slaughter age of 42 days, however significant detriment to welfare accompanies the increased meat yield – see E. Baéza, C. Arnould et al, 'Influence of increasing slaughter age of chickens on meat quality, welfare and technical and economic results' (2013) 90 *Journal of Animal Science* 2003

²¹⁶ Compassion in World Farming, Turkeys, <<https://www.ciwf.org.uk/farm-animals/turkeys/>> accessed 1 December 2020

the majority being kept in broiler-style sheds. Similar to modern chicken breeds, today's turkeys have been bred for optimal growth and enhanced production of breast-meat; in fact, artificial insemination has been routinely used in commercial turkey farming for many years, because today's male turkeys have been bred to develop such extreme, massive pectoral muscles, they cannot physically complete the mating process with the hen²¹⁷, for whom the risk of injury is too great to risk natural procreation. Most turkeys are slaughtered between 8 and 24 weeks of age, weighing 5-20 kg²¹⁸.

1.6.1.2 Egg production chickens: Laying Hens

Prior to the invention of the battery cage, laying hens were traditionally kept outdoors, free to roam. In recent years, there has been an upsurge in backyard poultry keeping²¹⁹, but the majority of European citizens still obtain their eggs from a commercial source.

- Modern intensive system

Cages designed in the 1940s were initially created with the positive intention to limit the spread of infectious agents and improve hygiene. Although the original system housed one bird per cage, the growth of mechanised farming systems and increased demand for eggs soon led to an increase in the number of birds housed per cage and a consequent decrease in the space allocated per bird. The poultry industry designed large battery farms, with a single barn holding up to 30,000 birds. The farms were named 'batteries' due to the physical appearance of the rows of cages, which share common walls, resembling the cells of batteries²²⁰.

In the European Union in 2007, 389 million laying hens were kept and approximately 68% of these hens were housed in battery systems. The entire battery cage was constructed from wire mesh, including the floor, and the environment was barren, with

²¹⁷C.E. Stotts and M.I. Darrow, 'Application of Artificial Insemination in turkey breeder flocks' (1955) 34 Poultry Science 508

²¹⁸ Younger turkeys are slow to grow muscle and fat tissue, meaning that slaughter at around 16-20 weeks is most common: D. Murawska, 'Age-related changes in the percentage content of edible and nonedible components in turkeys' (2013) 92 Poultry Science 255, 262

²¹⁹ Jojo Tulloh, 'The zen of hens: the rise and rise of chicken keeping' *The Guardian* (London 18 March 2018) <<https://www.theguardian.com/lifeandstyle/2018/mar/18/zen-of-hens-rise-of-chicken-keeping>>accessed 1 December 2020

²²⁰ M.C. Appleby, 'The EU ban on battery cages: History and prospects' in D.J. Salem and A.N. Rowan (eds) *The state of the animals II: 2003* (Humane Society Press 2003) 159

no provision of a perch or nesting materials. Each cage housed four or five birds, giving each bird an area of space smaller than an A4 sheet of paper (550cm²)²²¹.

Scientific and consumer criticism of battery hen production systems began as early as the 1960s and since the 1990s the impetus for change has been driven by concerned citizens ²²². Following decades of consumer pressure and political campaigns, in 1999 the Council of the European Union, via Council Directive 1999/74/EC²²³ banned battery cages across the EU. From 1st January 2003, no new cages were to be installed and by 1st January 2012, all original cages had to be replaced with ‘enriched’ cages. However, in reality, these new, enriched cages offer only minimal improvement – hens are provided with an area for movement as well as a nest box; however, overall, the extra space provided is approximately 50cm² (the size of a coaster) and normal behaviour is still greatly restricted²²⁴.

- Behavioural requirements and welfare problems

The poultry industry has demonstrated some interest in the balance between production yield and animal welfare, leading to extensive research into chicken behaviour. Numerous studies²²⁵ have established that the fulfilment of certain fundamental behavioural and environmental needs are necessary to preserve the welfare of housed birds²²⁶. The behavioural requirements listed below refer to broilers,

²²¹ Compassion in World Farming, ‘About Egg Laying Hens’ < <https://www.ciwf.org.uk/farm-animals/chickens/egg-laying-hens/>> accessed 10 September 2017

²²² G. Scrinis, C. Parker and R. Carey, ‘The Caged Chicken or the Free-Range Egg? The Regulatory and Market Dynamics of Layer-Hen Welfare in the UK, Australia and the USA’ (2017) 30 *Journal of Agricultural and Environmental Ethics* 783

²²³ Council Directive 1999/74/EC of 19 July laying down minimum standards for the protection of laying hens [1999] OJ L 203/53

²²⁴ For a comparison of conventional and enriched cages, see G.B. Tactacan, W. Guenter, N.J. Lewis, J.C. Rodriguez-Lecompte, and J.D. House, ‘Performance and welfare of laying hens in conventional and enriched cages’ (2009) 88 *Poultry Science* 698

²²⁵ See, for example: C. Beaumont, E. Lebihan-Duval, S. Mignon-Grasteau and C. Leterrier, ‘The European experience in poultry welfare – A decade ahead’ (2010) 89 *Poultry Science* 825, and S. Buijs, L.J. Keeling, C. Vangestel, B. Jeroen, J. Vangeyte and F.A.M. Tuytens, ‘Resting or hiding? Why broiler chickens stay near walls and how density affects this’ (2010) 124 *Applied Animal Behaviour Science* 97. See also N.L. Tablante, J.P. Vaillancourt, S.W. Martin, M. Shoukri M and I. Estevez, ‘Spatial distribution of cannibalism mortalities in commercial laying hens’ (2000) 79 *Poultry Science* 705

²²⁶ A. Mishra, P. Koene, W. Schouten, B. Spruijt, P. van Beek and J.H.M. Metz, ‘Temporal and sequential structure of behavior and facility usage of laying hens in an enriched environment’ (2005) 84 *Poultry Science* 979

broiler breeders and egg laying chickens (and are also applicable to turkey welfare); regrettably they are often compromised or absent in intensive systems.

1. Nesting

This behaviour is independent of the external environment, being an internally-driven (physiological) motivation; the bird conducts a search for a suitable site for oviposition (laying). If this behaviour cannot be fulfilled, for example due to the lack of suitable nesting area or substrate for construction of a nest, frustration is observed as vocalization (gakel-call²²⁷), extreme movement / locomotor activity and egg retention²²⁸.

2. Foraging / scratching:

Pecking at litter or scratching litter with the feet to find food is a normal behaviour and an essential welfare indicator – it has been demonstrated that the greater the incidence, intensity and duration of this behaviour, the better the bird's welfare²²⁹. Birds frustrated in their attempts to forage (due to overcrowding or lack of substrate) often turn to feather pecking – self mutilation or pecking other birds in the flock²³⁰, which can result in cannibalism²³¹. To address this problem (which is influenced by genetic as well as environmental factors) beak-trimming is routinely carried out – acknowledged welfare concerns associated with this procedure (carried out without analgesia) include acute and chronic pain, reduced beak function, scar tissue and damage to the tongue and nares (nostrils)²³².

3. Movement / Locomotion:

The ability to perch and move freely within the environment are important for welfare²³³. Time spent walking (especially during the flock's last weeks when

²²⁷ See P.H. Zimmerman, P. Koene and J.A. van Hooff, 'Thwarting of behaviour in different contexts and the gakel-call in the laying hen' (2000) 69 *Applied Animal Behavior Science* 255

²²⁸ B.O. Hughes, A.B. Gilbert and M. F. Brown, 'Categorization and causes of abnormal egg shells: Relationship with stress' (1986) 27 *British Poultry Science* 325

²²⁹ M.B.M Bracke and H. Hopster, 'Assessing the importance of natural behavior for animal welfare' (2006) 19 *Journal of Agricultural and Environmental Ethics* 77

²³⁰ B. Huber-Eicher and B. Wechsler, 'The effect of quality and availability of foraging materials on feather pecking in laying hen chicks' (1998) 55 *Animal Behaviour* 861

²³¹ J. van Rooijen, 'Is feather pecking in laying hens a by-product of artificial selection?' (2010) 122 *Applied Animal Behavior Science* 133

²³² W. J. Kuenzel, 'Neurobiological Basis of Sensory Perception: Welfare Implications of Beak Trimming' (2007) 86 *Poultry Science* 1273

²³³ Bracke (n 229)

muscle growth is optimised) has been shown to be decreased at higher stocking densities²³⁴. Higher stocking densities are also linked with foot-pad dermatitis, bruising, feather damage, physiological stress²³⁵ and increased mortality²³⁶. Osteoporosis is also observed, especially in laying stock, as physical inactivity accelerates the structural loss of bone associated with the egg production period²³⁷.

1.6.2 Intensive Pig Production

The European pig is a domestic descendent of The Eurasian wild boar²³⁸ and modern pig farming has nearly 6,000 years of history. As a free ranging animal, pigs traditionally played several roles: consuming unwanted produce, fertilising the land and providing a source of meat²³⁹. In the 18th and 19th centuries, various Chinese and Asian breeds of pig were introduced to Europe and from these, the modern commercial breeds were developed²⁴⁰. Although rural dwellers traditionally reared pigs in their gardens, over the last few decades this practice has declined; however pigs will adapt to various environments - intensive indoor units, free range extensive enterprises or in domestic gardens / pens – and all of these systems remain in practice in the EU.

Around 250 million pigs are slaughtered for meat each year in the EU²⁴¹, with the majority of animals being reared in intensive systems. In 2014, twelve EU member states²⁴² reared 90% of their fattening pigs (pigs for slaughter) in large herds of 400 animals or more, although in Romania and Poland only 33% of units held herds of

²³⁴ Buijs (n 225)

²³⁵ R.A. Heckert, I. Estevez, E. Russek-Cohen, and R. Pettit-Riley, 'Effects of density and perch availability on the immune status of broilers' (2002) 81 Poultry Science 451

²³⁶ See I. Estevez, 'Density Allowances for Broilers: Where to set the limits?' (2007) 86 Poultry Science 1265 - research consistently confirms that broiler welfare and health will be compromised if space allowances drop to under 0.0625 to 0.07 m²/bird

²³⁷ C.C. Whitehead and R.H. Fleming, 'Osteoporosis in cage layers' (2000) 79 Poultry Science 1033

²³⁸ E. Giuffra, J.M.H. Kijas et al, 'The Origin of the Domestic Pig: Independent Domestication and Subsequent Introgression' (2000) 154 Genetics 1785

²³⁹ James Serpell, *In the Company of Animals: A study of Human-Animal Relationships*, (Cambridge University Press 1986) 5

²⁴⁰ Giuffra (n 238)

²⁴¹ In 2011 252,643,820 pigs were slaughtered in the EU – Compassion in World Farming, Statistics (Pigs) <<https://www.ciwf.org.uk/media/5235115/Statistics-pigs.pdf>> accessed 7 December 2020

²⁴² Belgium, Czech Republic, Denmark, Estonia, Ireland, Spain, France, Italy, Cyprus, the Netherlands, Sweden and the United Kingdom

more than 400 animals²⁴³. Smaller pig farms still predominate in Eastern European countries such as Croatia, Lithuania and Bulgaria.

Weaning and fattening pigs are held separately in production units but the husbandry systems and housing are similar for all pigs. The majority of pig housing is barren concrete with slatted floors, and provides no bedding material or straw although some free-range, outdoor systems exist. For decades in Europe (and in many areas of the world today) pregnant sows were kept in 'sow stalls' – metal cages / crates which did not allow the sow to stand up or move around, the aim of which was to prevent sows fighting and becoming injured whilst pregnant. Sows were subsequently moved to 'farrowing crates', another type of cage, which still restricted movement but were slightly wider, enabling them to feed their piglets while still designed to negate the risk of piglets being crushed²⁴⁴. Commission Directive 91/630/EEC²⁴⁵ prohibited tethering of sows (from 2006) and banned the construction of new sow stalls from January 2003. Existing sow stalls were banned from use after January 2013. However, farrowing crates remain legal and although bedding is now to be provided for farrowing sows, along with forms of environmental enrichment for fattening pigs, many veterinary surgeons and welfare scientists believe that intensive pig management systems fail to acknowledge and address numerous, severe welfare problems which remain²⁴⁶

- Behavioural requirements and welfare problems

Pigs are intelligent animals and several of the husbandry practices they encounter within intensive production units are associated with various welfare problems.

²⁴³ Eurostat, 'Pig Farming Sector - Statistical Portrait 2014, Pig Farming in the EU: considerable variations from one member state to the next', <https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Archive:Pig_farming_sector_-_statistical_portrait_2014> accessed 10 May 2022

²⁴⁴ For a detailed discussion of sow farrowing systems and welfare considerations, see E. M. Baxter, A. B. Lawrence and S. A. Edward, 'Alternative farrowing accommodation: welfare and economic aspects of existing farrowing and lactation systems for pigs' (2012) 6 *Animal* 96

²⁴⁵ Commission Directive 2001/93/EC of 9 November 2001 amending Directive 91/630/EEC laying down minimum standards for the protection of pigs, OJ L 316/36
Council Directive 2008/120/EC (the Pigs Directive) codifies Council Directive 91/630/EEC as amended in 2001

²⁴⁶ A. Kittawornrat and J.J. Zimmermann, 'Toward a better understanding of pig behaviour and pig welfare' (2010) 12 *Animal Health Research Reviews* 25

1. Foraging:

As discussed, above, research carried out by David Wood-Gush²⁴⁷ demonstrated that domesticated pigs retain most of the behavioural traits of their feral ancestors. Feral pigs devote approximately seventy five per cent of their active time to carrying out foraging activities with their snout, such as exploring, rooting and chewing²⁴⁸; pigs in commercial systems attempt to continue to express these behaviours (despite the absence of suitable substrate and presence of continuous provision of feed) and experimentally, pigs will preferentially choose pens which offer new objects to forage and investigate²⁴⁹. Environments lacking in suitable foraging materials can result in redirection of exploratory behaviour²⁵⁰, leading to tail biting of pen-mates. As well as biting being an indicator of poor welfare, tail biting injuries can also result in other welfare problems such as infection, pain and spinal abscesses²⁵¹. Routine tail docking of pigs has been banned in the EU²⁵², however the regulation permits docking if no other methods have prevented tail-biting and at present it is estimated that 99% of pigs in most EU countries are docked²⁵³. Tail docking is routinely carried in the first week of life²⁵⁴, without the use of anaesthesia or analgesia, and is associated with problems such as acute and chronic pain and neuroma formation²⁵⁵; the presence of tail lesions also appears to be a stimulus for further biting²⁵⁶. Enrichment of pigs'

²⁴⁷ Wood-Gush (n 121)

²⁴⁸ A. Stolba and D.G.M. Wood-Gush, 'The identification of behavioural key features and their incorporation into a housing design for pigs' (1984) 15 *Annales de Recherches Veterinaires* 287

²⁴⁹ D.G.M. Wood-Gush M and K. Vestergaard, 'The seeking of novelty and its relation to play' (1991) 42 *Animal Behaviour* 599

²⁵⁰ M. Studnitz, M.B. Jensen and L.J. Pedersen, 'Why do pigs root and in what will they root? A review on the exploratory behaviour of pigs in relation to environmental enrichment' (2007) 107 *Applied Animal Behaviour Science* 183

²⁵¹ M. Heinonen, T. Orro et al, 'Tail biting induces a strong acute phase response and tail-end inflammation in finishing pigs' (2010) 184 *Veterinary Journal* 303

²⁵² Council Directive 2008/120/EC of 18 December 2008 laying down minimum standards for the protection of pigs (codified version) [2009] OJ L47/5 (Pig Directive)

²⁵³ E. Nannoni, T. Valsami, L. Sardi and G. Martelli, 'Tail docking in pigs: a review on its short- and long- term consequences and effectiveness in preventing tail biting' (2014) 13 *Italian Journal of Animal Science* 98. See also A. Valros and M. Heinonen, 'Save the Pig's Tail' (2015) 1 *Porcine Health Management* 2

²⁵⁴ Under the Pig Directive (n 252) Annex I, Chapter I, any tail docking or castration deemed necessary after seven days of age should only be done by a vet, under anaesthesia with pain relief, This provision is illogical since animals are born with functioning pain sensation – they do not suddenly develop the ability to feel pain after a week.

²⁵⁵ M.S. Herskin, K. Thodberg and H.E. Jensen, 'Effects of tail docking and docking length on neuroanatomical changes in healed tail tips of pigs' (2015) 9 *Animal* 677

²⁵⁶ EFSA Scientific Panel on Animal Health and Welfare, 'The risks associated with tail biting in pigs and possible means to reduce the need for tail docking considering the different housing and husbandry systems'(2007) 611 *EFSA Journal* 1, 11

environment has been demonstrated to reduce the incidence of tail biting behaviour²⁵⁷ but the issue is complex and multifactorial in cause.

2. Nest Building / Foraging for Sows:

In common with their feral ancestors, sows retain an instinct to nest build prior to farrowing²⁵⁸ and sows in extensive systems will display near-identical behaviour to their wild-boar counterparts²⁵⁹. Modern pigs have been bred to produce large litters of piglets and farrowing crates were developed to minimise piglet deaths via maternal crushing. Even in these barren crates with concrete floors, sows stand up frequently, attempt to 'root' and paw the concrete with their front hooves²⁶⁰ – their desire to orally gather nesting materials manifests as mouthing crate items such as water-feeders²⁶¹. Farrowing in crates is more stressful than in pens²⁶² and frustrated behavioural requirements can result in injury and apparent sow exhaustion²⁶³.

3. Pre-weaning piglet behaviour:

Piglets are born with eight sharp incisor teeth²⁶⁴, an evolutionary adaptation used to compete with littermates for access to the sow's teats²⁶⁵. Although EU legislation²⁶⁶ prohibits routine tooth trimming, the practice continues, with the purported objective of reducing injury to the sow and other piglets. Tooth clipping

²⁵⁷ V.E. Beattie, N. Walker and I.A. Sneddon, 'An investigation of the effect of environmental enrichment and space allowance on the behaviour and production of growing pigs' (1996) 48 *Applied Animal Behaviour Science* 151

²⁵⁸ D. Wischner, N. Kemper and J. Krieter, 'Nest-building behaviour in sows and consequences for pig husbandry' (2009) 124 *Livestock Science* 1

²⁵⁹ M. Gustafsson, P. Jensen et al, 'Maternal behaviour of domestic sows and crosses between domestic sows and wild boar' (1999) 65 *Applied Animal Behaviour Science* 29

²⁶⁰ K. Thodberg, K.H. Jensen, M.S. Herskin, E. Jorgensen, 'Influence of environmental stimuli on nest-building and farrowing behaviour in domestic sows' (1999) 63 *Applied Animal Behaviour Science* 131

²⁶¹ T.G. Hartsock and R.A. Barczewski, 'Prepartum behaviour in swine: effects of pen size' (1997) 75 *Journal of Animal Science* 2899

²⁶² S. Jarvis, B.J. Van der Vegt et al, 'The effect of parity and environmental restriction on behavioural and physiological responses of pre-parturient pigs' (2001) 71 *Applied Animal Behaviour Science* 203

²⁶³ K.E. Hansen and S.E. Curtis, 'Prepartal activity of sows in stall or pen' (1980) 51 *Journal of Animal Science* 456

²⁶⁴ M. Hansson and N. Lundehein, 'Facial lesions in piglets with intact or grinded teeth' (2012) 54 *Acta Veterinaria Scandinavica* 23

²⁶⁵ American Veterinary Medical Association (AVMA) Literature Review on the Welfare Implications of Teeth Clipping, Tail Docking and permanent identification of piglets' (July 15, 2014)

<<https://www.avma.org/resources-tools/literature-reviews/welfare-implications-teeth-clipping-tail-docking-and-permanent-identification-piglets>> accessed 20 March 2022

²⁶⁶ Commission Directive 2001/93/EC (n 243) Tooth trimming is stated as being permitted provided that all other possible methods to reduce trauma have been considered; in reality, tooth trimming, like tail docking, is carried out as standard in the majority of units due to risks of harm from abnormal behaviours, arising from over-stocked housing

is carried out before the seventh day of life, without analgesia or anaesthesia, and has been demonstrated to be distressing to piglets²⁶⁷ as well as causing painful pulp cavity exposure, gingivitis and damage to the lips²⁶⁸. Male fattening pigs are routinely castrated in most European countries – to reduce aggression (often heightened by high stocking densities), remove sexual behaviours and minimise ‘boar taint’, a distinct odour released during the cooking of meat from uncastrated male pigs²⁶⁹. Acknowledged as a painful procedure²⁷⁰, castration is usually carried out on piglets under seven days of age without analgesia or anaesthesia²⁷¹.

1.6.3 Bovine Dairy production

The bovine dairy industry is of huge significance to the European Union – every member state is a producer of milk²⁷² and the EU plays a major role worldwide as the leading exporter of dairy produce, primarily cheeses. In 2013, EU milk production was estimated at approximately 159 million tonnes. In 2013, there were around 23 million dairy cows in the EU dairy herd, with each animal producing an average 6500 kg of milk per annum²⁷³

Although there are many different breeds of dairy cattle found in the EU, the Holstein-Friesian is the most common, due to its efficient production of high volumes of milk²⁷⁴. Prior to intensification of farming, one breed of cattle would have been reared for both milk and beef production; however, the development of genetic selection and the desire for higher yielding animals has led to the creation of specific dairy breeds²⁷⁵.

²⁶⁷For a discussion of piglet behaviour during porcine surgical mutilations, see G.J. Noonan, J.S. Rand et al, ‘Behavioural observations of piglets undergoing tail docking, teeth clipping and ear notching’ (1994) 39 *Applied Animal Behaviour Science* 203

²⁶⁸ M. Hay, J. Rue, C. Sansac et al, ‘Long-term detrimental effects of tooth clipping or grinding in piglets: a histological approach’ (2004) 13 *Animal Welfare* 27

²⁶⁹ F.A.M. Tuytens, F. Vanhonacker, K. Langendries et al, ‘Effect of information provisioning on attitude toward surgical castration of male piglets and alternative strategies for avoiding boar taint’ (2011) 91 *Research in veterinary science* 327

²⁷⁰ A.A. Taylor and D.M. Weary, ‘Vocal responses of piglets to castration: identifying procedural sources of pain’ (2000) 70 *Applied Animal Behaviour Science*, 17. See also A. Prunier, M. Bonneau et al, ‘A review of the welfare consequences of surgical castration in piglets and the evaluation of non-surgical methods’ (2006) 15 *Animal Welfare* 277

²⁷¹ As explained above (n 254) castration after seven days should only be performed by a vet, using anaesthesia and analgesia

²⁷² European Commission, Agricultural and Rural Development, Milk and milk products, <http://ec.europa.eu/agriculture/milk/index_en.htm> accessed 10 May 2022

²⁷³ *ibid.* By 2018 the average yield had increased to 7000kg milk per cow

²⁷⁴ E.P. Cunningham, ‘Structure of Dairy Cattle Breeding in Western Europe and comparisons with North America (1983) 66 *Journal of Dairy Science* 1579

²⁷⁵ *ibid*

Whilst female dairy calves are kept in the herd, to be reared for milk production, male calves (being of a dairy breed) are unsuitable for beef production and are sent onto veal units or, primarily in the UK, killed immediately after birth although some British schemes have been set up to raise these male calves for ‘rosé’ veal²⁷⁶.

1.6.3.1 Veal Production

In 2015 the European Union dairy bovine herd numbered 23.4 million animals, with three quarters of total EU bovine milk production coming from seven countries including the UK and Ireland²⁷⁷. In many European countries (although not in the United Kingdom), veal consumption is widespread and veal farms are commonplace. The dairy industry is closely connected to the veal industry – male dairy calves are an ‘unwanted’ by-product of dairying, since they have no potential to produce milk, and are therefore the primary source of young-stock for veal production²⁷⁸. Usually slaughtered by eight months of age, around six million veal calves per year are reared in Europe and at present, France, Italy and the Netherlands account for 80% of veal production / slaughter²⁷⁹.

As intensive production systems grew following the Second World War, farmers introduced the veal crate system, designing housing which confined each calf to a small pen and almost totally restricted normal movement in order to minimise muscle mass and ensure soft meat. Calves, often tethered at the neck, were unable to turn around after the age of about two weeks and were fed a milk only, fibre free, iron-deficient diet to ensure production of pale-coloured muscle²⁸⁰. This system, still used in the United States, was banned in the United Kingdom in 1990, following a strong

²⁷⁶ Rosé veal is meat derived from male dairy calves (up to 12 months of age) which have been fed a complete diet and raised in more extensive housing than their European crated counterparts. For a discussion of the topic, see E.P.G. Skelhorn, A. Garcia-Ara, R.J. Nova, H. Kinston and W. Wapenaar, ‘Public opinion and perception of rosé veal in the UK’ (2020) 167 *Meat Science* 108032

²⁷⁷ Germany, France, UK, Netherlands, Poland, Italy and Ireland - the remaining member states only produce 25% of EU cows’ milk. See European Parliamentary Research Service, Parliamentary briefing: Marie-Laure Augère-Granier ‘The EU Dairy Sector: Main features, challenges and prospects’ (2018) 2

²⁷⁸ R. M. Kirkland, T. W. J. Keady, D. C. Patterson and D. J. Kilpatrick, ‘The effect of slaughter weight and sexual status on performance characteristics of male Holstein-Friesian cattle offered a cereal-based diet’ (2006) 82 *Animal Science* 397

²⁷⁹ In the EU, veal production represents 12-15% of total meat production. See European Commission, I.D. - D.L.O. – Institute for Animal Science and Health, Netherlands, ‘Chain management of veal calf welfare’ (1997-2000) < <https://cordis.europa.eu/project/id/FAIR962049> > accessed 10 December 2020

²⁸⁰ P. Stevenson, ‘Farm Animal Law: Reflections from the EU’ (2011) 6 *Australian Animal Protection Law Journal* 105

campaign by Compassion in World Farming²⁸¹ and in January 2007 the veal crate system was banned throughout the EU, under Council Directive 2208/119/EC²⁸² in light of animal welfare concerns.

At present, the European desire for 'white veal' remains and unfortunately so do many controversial husbandry methods. Calves can now no longer be kept individually confined after eight weeks of age and their food must contain sufficient iron and roughage and an appropriate minimum daily ration must be provided²⁸³. Tethering is prohibited²⁸⁴ and the current EU legislation sets out minimum dimensions for pens housing groups of calves²⁸⁵. However, beyond two weeks of age there are no bedding requirements, with many animals standing for long periods (or lying down) on wooden slatted floors, and there is significant concern that the minimum iron requirement is insufficient for proper health and wellbeing²⁸⁶.

1.6.3.2 Dairy Herds

Various types of accommodation exist for adult dairy cattle in Europe – large groups of cattle can be housed in expansive indoor sheds, sheds with cubicle housing or straw yards²⁸⁷ and at present, most cattle are still able to graze extensively for at least part of the year. In the last decade, however, interest has grown in the American-style 'super-dairies': zero-grazing, intensive indoor housing for dairy cattle²⁸⁸ which allow more frequent milking of cattle and higher milk yield. These production systems may yet prove to be the future for the dairy industry in Europe.

²⁸¹ *ibid*

²⁸² Council Directive 2008/119/EEC of 18 December 2008 laying down minimum standards for the protection of calves [2009] OJ L 10/7

²⁸³ *ibid*, Annex I (11)

²⁸⁴ There are some exceptions in the Directive with respect to tethering – *ibid*, Annex I

²⁸⁵ Council Directive 2008/119/EEC (7)

²⁸⁶ For discussion of the current iron requirement, see B. Pardon, B. Catry, R. Boone et al, 'Characteristics and challenges of the modern Belgian veal industry' (2014) 83 *Vlaams Diergeneeskundig Tijdschrift* 155

²⁸⁷ Some examples of approved housing for beef and dairy cattle in the UK can be found in DEFRA's 'Code of Recommendations for the Welfare of Livestock: Cattle' (2003) 17

²⁸⁸ Jon Henley, 'The Battle for the Soul of British Milk' *The Guardian* (London, 2nd October 2014) <<http://www.theguardian.com/uk-news/2014/oct/02/-sp-battle-soul-british-milk>> accessed 10th August 2015

Whilst cattle have been known to live for 20 years, the average lifespan of a European dairy cow is 4-5 years, primarily due to the high physiological demands of the modern dairy industry²⁸⁹.

- Behavioural Requirements and Welfare Problems

1. Exercise and Foraging:

Cattle have evolved as preferential grazers - when kept in extensive free-range systems they spend more than nine hours per day foraging and grazing, taking over 72,000 'bites' of food²⁹⁰. Intensively housed dairy cattle are fed concentrate pelleted rations with access to roughage such as grass or silage²⁹¹, however food delivered via automated systems may distort normal eating patterns and predominately high concentrate diets prevent normal foraging behaviour, often leading to abnormal stereotypies²⁹². Diets rich in carbohydrate and low in fibre have been demonstrated to cause ruminal acidosis (often sub-clinical) which can result in welfare problems such as reduced feeding, liver abscessation, laminitis²⁹³ and diarrhoea²⁹⁴.

2. Pasture access and its association with lameness (multifactorial):

Studies have demonstrated cattle which lack access to pasture will experience a higher incidence of health problems, including metritis²⁹⁵, hock / leg injuries²⁹⁶,

²⁸⁹ S. Brotherstone, R.F. Veerkamp and W. G. Hill, 'Genetic parameters for a simple predictor of the lifespan of Holstein-Friesian dairy cattle and its relationship to production' (1997) 65 *Animal Science* 31

²⁹⁰ R. Bergeron, A.J. Bandell-Waters, S.Lambton, 'Stereotypic Oral Behaviour in Captive Ungulates: Foraging, Diet and Gastrointestinal Function' in Georgia Mason and Jeffrey Rushen (eds) '*Stereotypic Animal Behaviour, Fundamentals and Applications to Welfare*' (CABI 2006) 24

²⁹¹ M. L. Eastridge, 'Major Advances in Applied Dairy Cattle Nutrition' (2006) 89 *Journal of Dairy Science* 1311

²⁹² I. Redbo, M. Emanuelson, K. Lundberg and N. Oredsson, 'Feeding level and oral stereotypies in dairy cows' (1996) 62 *Animal Science* 199

²⁹³ Inflammation of the soft tissue structures within the foot / hoof which can lead to severe pain and bone instability

²⁹⁴ Ruminal acidosis is a condition during which the pH (acidity) of the rumen falls, usually following ingestion of diet rich in fast fermenting carbohydrates – sequalae for the animal can range from inappetence to death. For an overview, see J. C. Plaizier, D. O. Krause, G. N. Gozho and B. W. McBride, 'Subacute ruminal acidosis in dairy cows: the physiological causes, incidences and consequences' (2008) 176 *The Veterinary Journal* 21; see also J.E. Nocek, 'Bovine Acidosis: Implications on Laminitis' (1997) 80 *Journal of Dairy Science* 1005

²⁹⁵ Metritis is inflammation of the uterine wall. See J. Bruun, A.K. Ersbøll and L. Alban, 'Risk factors for metritis in Danish dairy cows' (2002) 54 *Preventive Veterinary Medicine* (2) 179

²⁹⁶ K.M.D. Rutherford, F.M. Langford et al, 'Hock injury prevalence and associated risk factors on organic and non-organic dairy farms in the United Kingdom' (2008) 91 *Journal of Dairy Science* 2265

salmonella infections²⁹⁷ and mastitis²⁹⁸. Lameness is a multifactorial problem, but some common causes of lameness include prolonged standing on a concrete surface or slipping on concrete / slatted floors²⁹⁹, dermatitis due to wet or unhygienic housing conditions³⁰⁰, excessive concentrate feeding and suboptimal claw trimming. It has been estimated that 90% of lameness in dairy cattle is caused by painful foot lesions³⁰¹, the primary cause of which are failings in husbandry practices.

3. Social Interactions:

Cattle are social animals and within any group, a natural hierarchy becomes established³⁰²; intensive housing systems can lead to abnormal social interactions due to increased stocking densities of animals. In particular, altered feeding behaviour is noted, with greater displacement of cattle from feeding areas and decreased feeding time per cow³⁰³. Decreased space in intensive systems can also lead to increased aggressive behaviours, such as head/horn butting³⁰⁴ – disbudding (removal of the horn buds in calves) is routinely carried out in the dairy industry, to reduce the risk of injury to staff and cattle in the herd and is performed using scoop amputation or heat cauterisation. Disbudding is a painful procedure and despite studies which have demonstrated that sedation, local anaesthesia and anti-inflammatory analgesia should be used³⁰⁵ such practices which improve welfare are not always observed.

²⁹⁷ J. Veling, H. Wilpshaar, K. Frankena, C. Bartels and H.W. Barkema, 'Risk factors for clinical salmonella enterica subsp. enterica serovar Typhimurium infection on Dutch dairy farms' (2002) 54 Preventive Veterinary Medicine, 157

²⁹⁸ S. Waage, S. Sviland and S.A. Ødegaard, 'Identification of risk factors for clinical mastitis in dairy heifers' (1998) 81 Journal of Dairy Science 1275

²⁹⁹ EFSA Scientific Panel on Animal Health and Welfare, 'Report on the effects of farming systems on dairy cow welfare and disease' (2009) Annex to The EFSA Journal 1143:1, s.9

³⁰⁰ A. Brizzi, 'Bovine digital dermatitis' (1993) 10 Bovine Practitioner 33

³⁰¹ R.D. Murray, D.Y. Downham, M.J. Clarkson et al, 'Epidemiology of lameness in dairy cattle: description and analysis of foot lesions' (1996) 138 Veterinary Record 586

³⁰² S. Kondo and J.F. Hurnik, 'Stabilization of Social Hierarchy in Dairy Cows' (1990) 27 Applied Animal Behaviour Science 287

³⁰³ J.M. Huzzey, T.J. DeVries, P. Valois and M.A.G. von Keyserlingk, 'Stocking density and feed barrier design affect the feeding and social behavior of dairy cattle' (2006) 89 Journal of Dairy Science 126

³⁰⁴ Studies have shown that increasing available bunk space to cows will decrease aggression, see T.J. DeVries and M.A.G. von Keyserlingk, 'Feed Stalls Affect the Social and Feeding Behaviour of Lactating Dairy Cows' (2006) 89 Journal of Dairy Science 3522

³⁰⁵ K.J. Stafford and D.J. Mellor, 'Dehorning and disbudding distress and its alleviation in calves' (2005) 169 Veterinary Journal 337; See also G. Stilwell, M.S. Lima and D.M. Broom, 'Comparing the

4. Social Structure and Maternal Behaviour:

Dairy calves are separated from their mothers within the first 24 hours of birth, to allow collection of milk for consumers (a valuable economic resource) as soon as possible. Separation has been demonstrated to be an extremely stressful and distressing experience for both cow and calf³⁰⁶ and despite the fact that it has been shown to be beneficial for calf development to remain with the dam³⁰⁷, the practice of separation a few hours after birth is standard.

5. Lactation:

Improved nutrition and genetic selection have led to a generation of dairy cows yielding massive volumes of milk – even an ‘average’ daily milk yield of 28kg requires the udder’s suspensory ligaments to support milk and soft tissue, weighing over 70kg³⁰⁸. With age, these ligaments stretch, leading to pendulous udders which can become injured and are at greater risk of mastitis. Mastitis is the most prevalent dairy production disease worldwide³⁰⁹; it is a painful, debilitating condition³¹⁰ which, like lameness, is a multifactorial disease but has similar environmental factors proven to increase its incidence including lack of access to pasture³¹¹, failures in housing and calving pen hygiene³¹² and overcrowding³¹³.

effect of three different disbudding methods on behaviour and plasma cortisol of calves’ (2007) 102 *Revista Portuguesa de Ciências Veterinárias* 281

³⁰⁶ D.M. Weary and B. Chua, ‘Effects of early separation on the dairy cow and calf: 1. Separation at 6 h, 1 day and 4 days after birth’ (2000) 69 *Applied Animal Behaviour Science* 177. See also I.

Stěhulová, L. Lidfors and M. Špinká, ‘Response of dairy cows and calves to early separation: Effect of calf age and visual and auditory contact after separation’ (2008) 110 *Applied Animal Behaviour Science* 144

³⁰⁷ P. Kišac, J. Brouček, M. Uhrinčat, A. Hanus, ‘Effect of weaning calves from mother at different ages on their growth and milk yield of mothers’ (2011) 56 *Czech Journal of Animal Science* 261

³⁰⁸ EFSA (n 299) 150

³⁰⁹ H. Seegers, C. Fourichon and F. Beaudeau, ‘Production effects related to mastitis and mastitis economics in dairy cattle herds’ (2003) 34 *Veterinary Research* 475

³¹⁰ C.E. Fitzpatrick, N. Chapinal et al, ‘The effect of meloxicam on pain sensitivity, rumination time, and clinical signs in dairy cows with endotoxin-induced clinical mastitis’ (2013) 96 *Journal of Dairy Science* 2847

³¹¹ EFSA (n 299) 155

³¹² M.J. Green, A.J. Bradley, G.F. Medley and W.J. Browne, ‘Cow, farm, and management factors during the dry period that determine the rate of clinical mastitis after calving’ (2007) 90 *Journal of Dairy Science* 3764

³¹³ Overcrowding of stock can lead to increased faecal / pathogenic contamination of the legs and udder, increasing the risk of mastitis – see D.A. Schreiner and P.L. Ruegg, ‘Relationship Between Udder and Leg Hygiene Scores and Subclinical Mastitis’ (2003) 86 *Journal of Dairy Science* 3460

1.6.4 Rabbit and Fish Farming

Whilst chickens, pigs and cattle are perhaps the most widely recognised farmed-animal species in Europe, it is important to briefly acknowledge two other intensive production systems which (numerically) represent a significant percentage of the total number of animals farmed in the EU – rabbit farming and fish farming.

1.6.4.1 Rabbit Farming

As the second largest meat-rabbit producer worldwide³¹⁴, the EU27 farm 180 million rabbits for meat per annum, with 83% of EU production based in Spain, France and Italy³¹⁵. Approximately two thirds of rabbits are housed in commercial units with the remainder reared and slaughtered via backyard enterprises³¹⁶. At present, the majority of farmed rabbits are reared in barren, wire cages with no solid flooring; cages are either bicellular (with two rabbits) or house 4-6 animals, with cage-space per animal being approximately the size of a sheet of A4 paper³¹⁷. Rabbits in these systems are unable to express normal behaviour or movement such as exploring, hopping or alerting³¹⁸; breeding females (does) have to be caged singly, due to the risk of injury from fighting over nest areas³¹⁹. Single housing of rabbits (social animals) tends to cause development of behavioural stereotypies such as gnawing at their cage or overgrooming³²⁰. Whether reared in groups or in isolation, social interactions and behaviours are distorted by the production environment, leading to altered stress levels and consequent deleterious effects on immune response and growth / health³²¹. Rabbits within conventional cage systems experience a variety of problems – heat stress, restriction of movement, prolonged hunger or thirst; their environment can also cause numerous health problems such as pododermatitis (foot lesions from standing on wire mesh). At present, there is no EU specific legislation in place to protect the

³¹⁴ China is the world's largest producer of meat-rabbits

³¹⁵ EFSA Panel on Animal Health and Welfare, Scientific Opinion, 'Health and welfare of rabbits farmed in different production systems' (2020) 18 EFSA Journal 1:5944, 14

³¹⁶ *ibid*, 14

³¹⁷ A. Trocino, E. Filiou, M. Tazzoli, D. Bertotto, E. Negrato and G. Xiccato, 'Behaviour and welfare of growing rabbits housed in cages and pens' (2014) 167 *Livestock Science* 305, 306

³¹⁸ The typical rabbit posture of sitting upright with ears erect, looking out for danger

³¹⁹ For a detailed discussion of the effects of intensive production systems on rabbit welfare see M. Verga, F. Luzi and C. Carenzi, 'Effects of husbandry and management systems on physiology and behaviour of farmed and laboratory rabbits' (2007) 52 *Hormones and Behaviour* 122

³²⁰ L.T. Hansen and H. Berthelsen, 'The effect of environmental enrichment on the behaviour of caged rabbits (*Oryctolagus cuniculus*) (2000) 68 *Applied Animal Behaviour Science* 163

³²¹ Trocino (n 317) 306

welfare of farmed animals, although Council Directive 98/58/EC³²² provides minimum standards for the protection of farm animals, which includes rabbits. For this reason, in 2018, the AGRI committee of the European Parliament requested an updated scientific opinion from the EFSA on meat-rabbit health and welfare³²³.

1.6.4.2 Fish Farming

In comparison with agriculture, aquaculture (rearing of aquatic animals, or plants, under controlled conditions) is a relatively new European economic enterprise, but it is worthy of mention in the context of EU animal welfare, due to the large number of individuals reared and slaughtered: it has been estimated that in 2017, between 560 million and 1.7 billion farmed fish were slaughtered in the EU³²⁴. Between 2000 and 2014 the EU invested €1.17 billion in aquaculture, with the intention to create a successful and more globally competitive sector which offers eco-friendly production of fish and high food safety standards³²⁵. Over 90% of the EU's aquaculture production comes from six species: salmon, oysters, trout, gilthead seabream, seabass and mussels; in 2017 five member states produced 75% of EU aquaculture output – Spain, United Kingdom, France, Italy and Greece³²⁶.

Fish welfare became a field of scientific exploration in the 1990s; before this period, fish keeping and fish farming received minimal, if any, consideration with respect to ethical treatment or welfare³²⁷. This might be attributed to the relative lack of interaction that takes place between humans and aquatic species – the environment and their essentially wild nature mean that there is less chance to form an attachment or emotional bond with them, in comparison with domesticated mammals and birds. It

³²² Council Directive 1986/609/EEC of 20 July 1986 concerning the protection of animals kept for farming purposes [1986] OJ L 221/23

³²³ EFSA (n 315)

³²⁴ The number of individuals can only be estimated according to average weight, as the annual F.A.O. data only measures fish per tonne. See a detailed table of statistics at Fishcount: <http://fishcount.org.uk/studydatascreens2/2017/numbers-of-farmed-fish-B0-2017.php?***%20EU28%20***> accessed 20 February 2021

³²⁵ J. Guillen, F. Asche, N. Carvalho, J.M. Fernández Polanco, I. Llorente, R. Nielsen, M. Nielsen, Sebastian Villasante, 'Aquaculture subsidies in the European Union: Evolution, impact and future potential for growth' (2019) 104 Marine Policy 19

³²⁶ EUROSTAT: Aquaculture in the EU: <<https://ec.europa.eu/eurostat/web/products-eurostat-news/-/EDN-20191015-2>> accessed 5 March 2021

³²⁷ Kristiansen, T.S. and Bracke M.B.M. 'A Brief Look into the Origins of Fish Welfare Science' in Kristiansen T, Fernö A, Pavlidis M, van de Vis, H. (eds) *The Welfare of Fish, Animal Welfare, vol. 20* (Springer 2020) 1

is acknowledged in welfare research that fish have long been deemed ‘too different’ from human beings to engender sympathy³²⁸. However, for many welfare scientists and campaigners, confirmation of a creature’s sentience is viewed as justification for application of moral concern³²⁹ and over the last twenty years, a large volume of research into the cognitive and emotional experiences of fish has demonstrated that they are creatures with complex social behaviour³³⁰ who experience fear, psychological stress and pain³³¹.

As sentient beings³³², the welfare of fish should be given full regard under Article 13 of the TFEU³³³ however at present there is no species specific legislation governing their husbandry or slaughter, although some minimum standards are laid down in EU Council Directive 98/58/EC³³⁴. Progress was made in 2008 when the Commission instructed the Animal Health and Welfare Panel (AHAW) of EFSA to assess the welfare of husbandry systems for the principal farmed fish species in the EU³³⁵ and in 2009 the AHAW Panel adopted an opinion on a general approach to the welfare of fish³³⁶. Much research is needed, however, to investigate species-specific behavioural and environmental requirements of farmed fish.

European extensive aquaculture is either conducted in freshwater or brackish water systems and is a traditional farming practice still found in many regions. Freshwater ponds and lagoons with extensive vegetation permit a more natural

³²⁸ R. Message and B. Greenhough, ‘But It’s Just a Fish”: Understanding the Challenges of Applying the 3Rs in Laboratory Aquariums in the UK’ (2019) 9 *Animals* 1075

³²⁹ V. Lund, C.M. Mejdell et al, ‘Expanding the moral circle: farmed fish as objects of moral concern’ (2007) 75 *Diseases of Aquatic Organisms* 109

³³⁰ C. Brown, ‘Fish Intelligence, sentience and ethics’ (2015) 18 *Animal Cognition* 1

³³¹ K.P. Chandroo, I.J.H. Duncan and R.D. Moccia, ‘Can fish suffer?: Perspectives on sentience, pain, fear and stress. (2004) 86 *Applied Animal Behaviour Science* 225. For a discussion of understanding pain, see L.U. Sneddon, ‘Pain in aquatic animals’ (2015) 218 *Journal of Experimental Biology* 967

³³² EFSA Scientific Panel on Animal Health and Welfare, Scientific Opinion, ‘General approach to fish welfare and to the concept of sentience in fish’ (2009) 954 *EFSA Journal* 1

³³³ TFEU (n 88)

³³⁴ Council Directive 98/58/EC (n 322)

³³⁵ EFSA Scientific Panel on Animal Health and Welfare Opinions: (i) ‘Species-specific welfare aspects of the main systems of stunning and killing of farmed fish: Rainbow Trout’ (2009) 1013 *The EFSA Journal* 1; (ii) ‘Species-specific welfare aspects of the main systems of stunning and killing of farmed carp’ (2009) 1013 *EFSA Journal* 1; (iii) Species specific welfare aspects of the main systems of stunning and killing farmed eels’ (2009) 1014 *The EFSA Journal* 1 and (iv) ‘Species-specific welfare aspects of the main systems of stunning and killing of farmed seabass and seabream’ (2009) 1010 *The EFSA Journal* 1

³³⁶ EFSA Scientific Panel on Animal Health and Welfare, Scientific Opinion, ‘Food Safety considerations of animal welfare aspects of husbandry systems for farmed fish’ (2008) 867 *EFSA Journal* 1

environment – they also involve the presence of other species and have been recognised as a positive force in the preservation of biodiversity³³⁷. Modern intensive fish farming, however, is very different and has been the subject of much controversy in recent years. The most commonly known example of fish farming is use of sea cages³³⁸, but ponds and tanks are also used. Intensive aquaculture involves management of various life stages from eggs / brood stock to adult. Indoor tanks are usually used as hatcheries, in order to manage and control parameters vital for growth such as temperature and water current. Most fish are transferred to outdoor cages (or ponds in the case of freshwater fish) for growth and finishing, although there are some species that remain in tanks for their entire life³³⁹. Cages and tanks cannot provide a natural environment for fish and do not give individuals appropriate space or allow normal movement; it has been estimated that caged salmon, which can be 75cm in length, have only the equivalent space and water volume of a typical bathtub³⁴⁰. Species such as salmon are migratory and often swim very long distances in the wild; a cage environment is therefore a stark contrast to natural conditions.

Various welfare problems arise within intensive aquaculture systems³⁴¹. Parasites and infectious agents tend to be naturally present in waters; however, stress is a major factor in the development of disease; stressors within the environment are multiple but can include high density stocking³⁴² (with resultant inter-fish aggression and trauma), fluctuations in water current, inappropriate lighting / temperature, insufficient oxygen density and handling³⁴³. As with intensively farmed poultry, discussed above, large numbers of fish are contained in a restrictive environment and increased levels of mortality are regularly seen³⁴⁴; disease is common and probably the most-recognised

³³⁷ M. Giménez-Candela, J.L. Saraiva and H. Bauer, 'The legal protection of farmed fish in Europe: analysing the range of EU legislation and the impact of international animal welfare standards for the fishes in European aquaculture' (2020) 11 *Derecho Animal* (Forum of Animal Law Studies) 65, 69

³³⁸ *ibid*, 70

³³⁹ M. Føre, K. Frank, T. Norton et al, 'Precision Fish Farming: A new framework to improve production in aquaculture' 173 (2018) *Biosystems Engineering* 176, 177

³⁴⁰ Compassion in World Farming, Rethink Fish, <<https://www.ciwf.org.uk/our-campaigns/rethink-fish/>> accessed 26 March 2021

³⁴¹ For an excellent, detailed overview of welfare indicators in fish, see C.I.M. Martins, L. Galhardo et al, 'Behavioural indicators of welfare in farmed fish' (2012) 38 *Fish Physiology and Biochemistry* 17

³⁴² Whilst some fish species move in shoals, there are also fish species that prefer solitary existence

³⁴³ F.S. Conte, 'Stress and the Welfare of Cultured Fish' 86 *Applied Animal Behaviour Science* 205, 210

³⁴⁴ Giménez-Candela (n 337)

pathogen is sea lice in farmed salmon, which not only cause lesions and illness in the farmed fish population but can also spread out into the environment.

Fish welfare is, therefore, a developing scientific field which will inform EU policy making in the future; although not the focus of this thesis, it is another example of welfare science that is of interest to consumers and welfare campaigners.

Having examined the common EU intensive animal production systems, the chapter will close with a short overview of the role of citizens and NGOs who have been primarily responsible for the widespread dissemination of information on factory farming in Europe.

1.7 Consumer Concerns, the role of Non-Governmental Organisations

In addition to the development of animal welfare science, veterinary public health science and animal rights philosophy, there is one further factor involved in the creation of animal welfare legislation which may prove to be the most significant influencer of all – the European citizen. Welfare concerns associated with intensive production systems have usually been brought to the attention of citizens via animal charities' literature and media campaigns, and this sub-chapter will briefly examine the role of these charities in the establishment of EU animal welfare legislation.

1.7.1 Animal Charities and NGOs

The primary aim of non-governmental organisations (NGOs) concerned with improving farm animal welfare in the EU is replacement of intensive animal production with more extensive, sustainable, compassionate farming systems³⁴⁵. Included within this aim are a ban on painful surgical mutilations and an end to the transportation of live animals. The most successful campaigns generally cite welfare science findings³⁴⁶. Paradoxically, despite the ever-increasing European (and worldwide) desire for animal goods (as well as increased availability of meat, dairy produce and eggs), there has been a concurrent growth in negative public opinion regarding 'factory

³⁴⁵ D.B. Wilkins, C. Houseman et al, 'Animal Welfare: the role of non-governmental organisations' (2005) 24 Scientific and Technical Review of the Office International des Epizooties 625

³⁴⁶ The aim of the EU is to ensure that science forms the basis of animal welfare standards and therefore it is sensible for welfare charities and NGOs to cite scientific findings supportive of their claims

farming' and on the European continent there is significant consumer concern that production of their food has not led to animal suffering³⁴⁷.

As mentioned earlier in the chapter, the last thirty years have seen several farm-animal related, public-health crises which have had extremely detrimental effects upon not only the European farm animal population, but also on consumer confidence in food safety³⁴⁸. In 1986, the Bovine Spongiform Encephalopathy (BSE) catastrophe highlighted failings in EU / member states' governance of animal health and food safety³⁴⁹ and in response to the crisis, the EU ultimately created the EFSA, European Food Safety Agency³⁵⁰. Similar crises, such as the Foot and Mouth Disease (FMD) Virus outbreak in the United Kingdom, Avian Influenza (with concerns of zoonotic spread from farmed poultry to human populations)³⁵¹ and repeated salmonella outbreaks³⁵² have been widely reported by the media. This has understandably resulted in greater EU citizen awareness of intensive farming techniques and concern regarding factors such as animal welfare³⁵³.

1.7.2 Consumer Concerns

Since the 1990s, consumer confidence in intensive farming has decreased – whilst scientific development has heralded a new era of genetics, cloning and intensive farm animal production, many consumers consistently express the desire to return to more traditional farming practices: in 2003, one study suggested that between twenty five and thirty three percent of consumers in the EU felt that 'price, taste and quality of food as well as farming methods, nutrition and safety have deteriorated over time'³⁵⁴. A

³⁴⁷ D.M. Broom, 'Animal Welfare: An aspect of care, Sustainability and Food Quality required by the Public' (2010) 37 *Journal of Veterinary Medical Education* 83

³⁴⁸ As a result of public concern about bird flu and BSE, the EU funded the Welfare Quality Project which took input from consumers and scientists, in order to create a welfare framework at farm and slaughterhouse. See M. Miele, I. Veissier, A. Evans and R. Botreau, 'Animal Welfare – establishing a dialogue between science and society' (2011) 20 *Animal Welfare* 103

³⁴⁹ The Phillips Report (n 76)

³⁵⁰ A key reason for the creation of the EFSA was to ensure that scientific data would be used more effectively by the Commission and Member States; see K. Vincent, 'Mad Cows and Eurocrats – Community Responses to the BSE crisis' (2004) 10 *European Law Journal* 499

³⁵¹ European Centre for Disease Prevention and Control, Technical Report, Avian Influenza Portfolio (June 2006)

³⁵² The European Food Safety Authority reports that each year in the EU, over 91,000 human cases of salmonella infection are reported - <<http://www.efsa.europa.eu/en/topics/topic/salmonella>> accessed 1st March 2021

³⁵³ Miele (n 348)

³⁵⁴ C. Poppe and U. Kjaernes, 'Trust in Food in Europe, A Comparative Analysis' (National Institute for Consumer Research 2003) Professional Report No. 5, 81

Eurobarometer consumer survey conducted in 2010 demonstrated that only 8% of respondents had no concerns about the welfare of farmed animals – 21% were ‘very worried’ and 43% percent were ‘quite worried’³⁵⁵ – a previous study in 2005 confirmed that 82% of respondents believed that ‘humanity has a duty to protect the rights of animals, whatever the cost’³⁵⁶. However, despite citizens’ concerns about animal welfare, it has also been demonstrated that certain barriers prevent the establishment of consistent, ethically-driven purchasing by consumers: financial constraints, lack of understanding of welfare concepts and product availability (for example in remote regions)³⁵⁷.

There is also considerable evidence that contemporary consumer concerns about animal welfare can not only initiate changes in production methods but also in the law³⁵⁸ and the influence of ‘public morality’ is a recurring theme within this thesis. The strength of ‘consumer power’ is demonstrated by the multitude of products and production methods that are now available to European consumers³⁵⁹.

1.7.3 Farm Assurance Schemes

Many member state retail chains now offer their own higher welfare standard food ranges and successful national voluntary schemes have also been introduced³⁶⁰. The subject of assurance schemes is vast and complex; a few examples are provided, below.

In 1988, five German animal welfare / environmental / agricultural groups formed Neuland³⁶¹, with a view to promoting farming methods which were respectful to the environment and animals. At present, the produce of approximately 200 farmers

³⁵⁵ Special Eurobarometer 354 (n 84) 18

³⁵⁶ European Commission, Special Eurobarometer 225: Social values, Science & Technology (2005 Brussels) 26

³⁵⁷ M.J. Schröder and M.D. McEachern, ‘Consumer value conflicts surrounding ethical food purchase decisions: a focus on animal welfare’ (2004) 28 *International Journal of Consumer Studies* 168, 172

³⁵⁸ The European Commission itself has stated that: ‘...**over** the past 40 years, EU animal welfare legislation has evolved on the basis of sound scientific knowledge, improving the quality of animals’ lives *in accordance with citizens’ expectations* and market demands’, European Commission, Main Achievements in Animal Welfare <http://ec.europa.eu/food/animals/welfare/main_achievements_en> accessed 15 May 2022

³⁵⁹ L.E. Mayfield, R. Bennett, R. Tranter and M.J. Woolridge, ‘Consumption of Welfare-Friendly Food Products in Great Britain, Italy and Sweden and how it may be influenced by consumer attitudes to, and behaviour towards, animal welfare attributes’ (2007) 15 *International Journal of Sociology of Food and Agriculture* 59

³⁶⁰ L. Fulponi, ‘Private voluntary standards in the food system : the perspective of major food retailers in OECD countries’ (2006) 31 *Food Policy* 1

³⁶¹ Neuland: <<https://www.neuland-fleisch.de/>> accessed 1 March 2021

carries the Neuland label, which confirms that the producer is compliant with the organisation's principles of animal welfare³⁶². Consumers have also influenced changes in retailers' product lines; in the United Kingdom, in June 2016, following a 14 year old schoolgirl's campaign (whose online petition gathered over 280,000 signatures), the supermarket chain Tesco announced its decision to cease sourcing eggs from caged hens by 2025³⁶³ - apparently in direct response to consumer opinion.

In France, the Thierry Schweitzer label promotes its own animal-welfare-friendly production system whilst the voluntary 'Label Rouge' is a state regulated system, offering greater welfare options to the consumer – in 2007 Label Rouge achieved a 62% share of total national sales of whole chicken³⁶⁴. Since 1997, Peter's Farm in the Netherlands has marketed veal with the primary emphasis on animal welfare, and the husbandry benefits have been endorsed by the Dutch Society for the Protection of Animals³⁶⁵. In the United Kingdom, the Royal Society for the Protection of Animals has a produce-labelling, farm assurance scheme, 'RSPCA Assured', based on the Five Freedoms concept of welfare³⁶⁶. It is notable that under the Freedom Food scheme, (and other British farm assurance schemes³⁶⁷), welfare standards are not limited to improved housing or nutrition - surgical castration of piglets is a practice that the scheme does not permit. The German Neuland³⁶⁸ brand does allow piglet castration, but only if anaesthesia and analgesia are used³⁶⁹. These examples demonstrate that food retailers are taking steps to incorporate improved animal welfare as part of their 'brand', and that sections of the farming community are also willing to adapt or

³⁶² H. Grethe, 'High animal welfare standards in the EU and International Trade- how to prevent potential "low animal welfare havens"' (2017) 32 Food Policy 315

³⁶³ E. Steafel, 'Meet the fourteen year old girl who persuaded Tesco to stop selling 'caged eggs' – and isn't stopping there' *The Daily Telegraph* (London, 26 June 2016) <<https://www.telegraph.co.uk/women/life/meet-the-14-year-old-girl-who-convinced-tesco-bosses-to-stop-sel/>> accessed 10 May 2022

³⁶⁴ K. Walley, P. Parrott, P. Custance, P. Meledo-Abraham and A. Bourdin, 'A review of French consumers purchasing patterns, perceptions and decision factors for poultry meat' (2015) 71 *World's Poultry Science Journal* 5

³⁶⁵ Peter's Farm – the Premium Veal <<http://www.petersfarm.com>> accessed 10 May 2022

³⁶⁶ M.G. McEachern, M.J.A. Schröder et al, 'Exploring ethical brand extensions and consumer buying behaviour: the RSPCA and the "Freedom Food" brand' (2007) 16 *Journal of Product and Brand Management* 168

³⁶⁷ Soil Association and Red Tractor are two further examples of UK assurance schemes

³⁶⁸ Neuland (n 361)

³⁶⁹ F. Lundmark, C. Berg et al, 'Intentions and Values in Animal Welfare Legislation and Standards' ((2014) *Journal of Agricultural and Environmental Ethics* 991, 1008

abandon traditional practices for the sake of their livestock, at the same time as enhancing the value of their produce.

1.7.4 Public Trust and Politics

Whilst the general public can rely, to a certain extent, upon retailers and welfare scheme inspectors to promote higher husbandry standards for production animals, a survey in 2007 found that in the face of acute animal welfare crises, when information is needed about animal health and public safety, consumers actually place the most trust in experts and NGOs, followed by public authorities and finally politicians and market players, who are trusted the least³⁷⁰.

Interestingly, despite the perceived lack of trust in politicians, 2014 saw seven animal protection parties emerge to contest the European Union parliamentary elections. The 'Euro Animal 7' represented voters in the Netherlands, UK, Germany, Portugal, Spain, Cyprus and Sweden, with two MEPs being returned to the parliament, one by Germany and one by the Netherlands³⁷¹. The presence of these groups is further evidence of the growing importance of animal welfare in the minds of the European population and the desire to influence governmental and legislative processes relating to animal production.

At present, however, consumers generally look to NGOs to provide them with information about farm animal production systems and to explore welfare concerns³⁷². Within the European Union, the umbrella organisation, Eurogroup for Animals³⁷³ leads the campaign for improved animal welfare. Its numerous members include the British charities, Compassion in World Farming³⁷⁴ and World Horse Welfare³⁷⁵, The French

³⁷⁰ Welfare Quality, U. Kjaernes, M. Miele and J. Roex (eds), 'Attitudes of Consumers, Retailers and Producers to Farm Animal Welfare' (2007) Welfare Quality Reports No.2, Part 1, 24. For an interesting discussion on the role of experts with respect to environmental law and public trust, see J. Hawkins, 'We Want Experts': Fracking and the Case of Expert Excess' (2020) 32 *Journal of Environmental Law* (1) 1

³⁷¹ Euro Animal Seven <<https://www.animalwelfareparty.org/euro-animal-7/>> accessed 1 March 2021

³⁷² Kjaernes (n 370)

³⁷³ Eurogroup for Animals <<https://www.eurogroupforanimals.org/>> accessed 13 March 2021

³⁷⁴ Compassion in World Farming (CIWF) <<https://www.ciwf.org.uk/>> accessed 13 March 2021. CIWF was founded in the UK in 1967 by Peter Roberts, a dairy farmer, who was fundamentally opposed to the development of modern, intensive farm animal production. The group campaigns include bringing an end to caged animals, a ban on transportation of live animals, honest labelling of animal produce to better inform consumers and improved fish welfare.

³⁷⁵ World Horse Welfare <<https://www.worldhorsewelfare.org/>> accessed 13 March 2021

Welfarm production animal welfare charity³⁷⁶, Animal Friends, Croatia³⁷⁷ and Germany's Animal Welfare foundation³⁷⁸. Eurogroup for Animals also provides the secretariat for the European Parliament's Intergroup on the Welfare and Conservation of Animals³⁷⁹, a collective of member state representatives (MEPs) and NGOs, which meets on a monthly basis to discuss current animal welfare issues, working with the Council of Ministers, European Parliament and the European Commission in an advisory capacity.

Over the last fifty years, NGOs campaigning for improved animal welfare have moved beyond education of the general public to focus on lobbying – influencing legislators and members of parliament to enact laws which will improve the welfare of animals. It is evident that without legislative change, in the face of economic concerns and traditional views on animal sentience, simply exhorting farmers and producers to improve animal welfare is inadequate – in the same way as expecting every consumer to purchase entirely welfare-friendly produce. Charities and NGOs have realised the benefits of harnessing consumer concerns regarding the welfare of farmed animals and campaigning for change with these concerns at the fore – achieving victories for animal welfare such as bans on the use of driftnets, battery cages and veal crates, as well as amended transport regulations for farm animals and revision of slaughter directives³⁸⁰. In light of the progress made over the last thirty years, it seems reasonable to suggest that future improvements in EU animal welfare are likely to arise through the creation of further legislation based upon citizen's concerns and campaigning by non-governmental organisations.

1.8 Chapter Conclusion

The last fifty years have seen great advances in European animal production systems which have brought many benefits to the human population – widely available, cheap produce for consumers and reliable steady income for producers. At the same time,

³⁷⁶ Welfarm <<https://welfarm.fr/>> accessed 13 March 2021

³⁷⁷ Animal Friends Croatia <<https://www.prijatelji-zivotinja.hr/index.en.php>> accessed 13 March 2021

³⁷⁸ Animal Welfare Foundation < <https://www.animal-welfare-foundation.org/>> accessed 13 March 2021

³⁷⁹ Intergroup on the Welfare and Conservation of Animals <<https://www.animalwelfareintergroup.eu/>> accessed 13 March 2021

³⁸⁰ For an overview of some European Animal welfare achievements, see Eurogroup for Animals, <<https://www.eurogroupforanimals.org/who-we-are/achievements>> accessed 13 March 2021

animal welfare science has developed, providing empirical evidence that these intensive production systems can be detrimental to animals, causing considerable pain and distress. Consumer concerns regarding the welfare of animals in these production systems have increased, in light of public health crises, greater philosophical discussion of animal rights, and campaigns by animal groups and NGOs; the European Union has attempted to address consumer concerns by acknowledging the findings of animal welfare science and incorporating key concepts into certain areas of union law. The examples of species-specific, intensive production systems detailed, above, demonstrate that animal welfare problems persist despite current legislation, indicating the need to explore why the current legislative system fails to fully protect animal welfare and what factors might influence creation of stronger welfare legislation in future. The second chapter of this thesis will examine the contemporary European Union animal welfare legislative framework, explain which policy elements have been successful in improving the lives of farmed animals and identify areas where current legislation fails to protect animal welfare.

'It is often forgotten that the European Union is a trading body. Though it has grown in breadth and depth, one of its primary roles remains to assure the single market and to ensure free trade in goods and in services. One of the first groups of commodities traded was agricultural goods—of which animals and animal products are an important part' ¹

'The world is not a factory and animals are not products for our use'²

2

Contemporary EU Animal Welfare Legislation and Case Law

2.1 Introduction

In order to fully assess the role played by welfare science in contemporary EU farm animal legislation, it is important to first understand both the European regulatory framework and the socio-economic environment in which it operates, before considering where science is placed in the policymaking process and the degree of influence it can wield. Numerous commercial, political and cultural considerations are at play whenever novel animal welfare legislation is being created or existing legislation is being challenged. Parties who wish to improve farm animal husbandry, by citing welfare science, regularly encounter strong opposition from various factions with conflicting interests.

The following chapter provides an overview of the current framework of European animal welfare law and considers primary legislation, the significance of the principle of animal welfare, sentience, and the legal status of farm animals within the European Union. Relevant case law pertaining to primary legislation is examined and the approach of the Court of Justice of the European Union (CJEU), when interpreting and applying general principles of the internal market and harmonisation, is also reviewed. The chapter then assesses the efficacy and scope of various secondary legislative instruments, with specific reference to their practical application and scientific basis.

¹ J. Moynagh, 'EU regulation and consumer demand for animal welfare' (2000) 3 The Journal of Agrobiotechnology Management & Economics (2&3)

² Attributed to Arthur Schopenhauer

Finally, some examples of scientifically-demonstrated welfare concerns which persist, despite the presence of legislation, are explored.

2.2 Current framework of EU Legislation

At present, the European Union does not have a precisely defined title on animal welfare and, in some senses, lacks clear competence in terms of animal welfare; EU agricultural policy has been the driving force behind the creation of legislation, its primary aim being to set down minimum standards of animal welfare and protection³. However, the Treaty on the Functioning of the European Union⁴ now features animal welfare as a general principle and provides various articles which apply where animal production plays a role in the functioning of the Union, such as agriculture and trade. The Union's basis for regulation of farm animal welfare is derived mainly from Directives, which establish minimum husbandry requirements for certain named species of farm animals⁵ as well as providing some overarching minimum standards of welfare.

2.3 Treaty on the Functioning of the European Union

The following subchapter provides an overview of EU primary legislation relating to animal welfare and examines relevant Treaty case law.

2.3.1 Article 13 TFEU

The introduction of Article 13 in Title II of the Treaty on the Functioning of the European Union (TFEU)⁶, in 2009, has ensured that animal welfare and the acknowledgement of animal sentience no longer lie at the periphery of European law – this primary legislation has ensured that animal welfare is now one of several 'provisions having

³ D. Ryland, 'Animal Welfare in the Reformed Common Agricultural Policy: Wherefore Art Thou?' (2015) 17 Environmental Law Review 23

⁴ Consolidated version of the Treaty on the Functioning of the European Union [2008] OJ C115/47 (TFEU)

⁵ Currently, species-specific legislation exists with regard to the welfare of broiler chickens, laying hens, pigs and calves. However, rabbits, dairy cattle, ducks, geese and fish lack legislation to protect their welfare – see D.M. Broom, 'Animal Welfare in the European Union' (2017) Study for the PETI Committee (Directorate General for Internal Policies, Policy Department Citizen's Rights and Constitutional Affairs) 47

⁶ TFEU (n 4)

general application', such as environmental and consumer protection, gender equality and non-discrimination⁷. The provision does not constitute a legal basis upon which the EU can act with respect to animal welfare, and does not identify all policy-areas where animal welfare is applicable; however, introducing the requirement to take animal welfare into account when creating EU legislation is a notable step. At present, consideration of animal welfare is stated to be required in union policy areas of agriculture and the internal market, but it is unclear if this principle is also to be applied in other areas of union competence, such as external trade.

Although the introduction of Article 13 is, arguably, beneficial to the cause of animal welfare, there are subtle differences between the Treaty's general provisions in terms of the force of their application. Whilst environmental protection '*must*' be incorporated in EU policy, the union and its member states are only required to '*pay full regard*' to animal welfare, a subtle indication that animal welfare may carry less influence in law-making, than some of the other provisions:

*'In formulating and implementing the Union's agriculture, fisheries, transport, internal market, research and technological development and space policies, the Union and the Member States shall, since animals are sentient beings, pay full regard to the welfare requirements of animals, while respecting the legislative or administrative provisions and customs of the Member States relating in particular to religious rites, cultural traditions and regional heritage*⁸.

There is also a fundamental inconsistency in the TFEU with respect to animals, which is also encountered in other legislation and case law; whilst Article 13 acknowledges animals as sentient, Article 38(1) identifies them as 'products', stating that 'agricultural products' are 'the products of the soil, of stock-farming and of fisheries and products of first-stage processing directly related to these products'⁹. This is a recurring conflict of interest, present in every area of EU law discussed within this thesis – the difficulty associated with granting animals sentience within a legal framework where they are primarily viewed as goods.

⁷ *ibid*, Title II, Articles 11,12 and 10 respectively

⁸ TFEU (n 4) Article 13

⁹ *ibid*, Article 38 (1) Article 38 is discussed later in the chapter

2.3.1.1 Article 13 derogations

Article 13 not only lacks a clear imperative to incorporate animal welfare into union policy, it is also the only provision of general application which permits derogations. One such derogation, for religious rites¹⁰, is the subject of ongoing controversy in Europe¹¹, as it permits, inter alia, religious slaughter traditions¹². A large volume of veterinary research has demonstrated that certain contemporary religious slaughter methods, where exsanguination is carried out without first inducing unconsciousness via stunning, are detrimental to animal welfare¹³, yet these practices have traditionally been permitted under the religious rites derogation¹⁴. Dr Jill MacKay, of the Royal (Dick) School of Veterinary Studies in Edinburgh has highlighted the fact that whilst cultural attitudes towards animals can vary greatly, the scientifically-demonstrated welfare requirements of the animal do not change¹⁵ - for example, a broiler chicken

¹⁰ The Union is required to pay full regard to animal welfare 'while respecting the legislative or administrative provisions and customs of the Member States relating in particular to religious rites, cultural traditions and regional heritage'

¹¹ In Islamic and Jewish faiths, specific religious slaughter rituals are required to be observed before meat is declared fit for consumption. In the last decade, migration of large numbers of Muslims into Europe has led to increased demand for Halal meat and the European media and animal welfare groups have repeatedly spoken out against religious slaughter practices. Increased awareness of export of live animals from Europe to Middle Eastern countries is also a focus of concern for animal welfare groups. For a detailed explanation of the current controversy, see M. Haluk Anil, 'Religious Slaughter: A current controversial animal welfare issue' (2012) 2 (3) *Animal Frontiers* 64

¹² See Council Regulation (EC) No 1099/2009 of 24 September 2009 on the protection of animals at the time of killing [2009] OJ L 303/1. Derogation from stunning in cases of religious slaughter taking place in slaughterhouses was granted by Council Directive 93/119/EC of 22 December 1993 on the protection of animals at the time of slaughter or killing (1993) OJ L 340/21 (18): '*Since Community provisions applicable to religious slaughter have been transposed differently depending on national contexts, and considering that national rules take into account dimensions that go beyond the purpose of this Regulation, it is important that derogation from stunning animals prior to slaughter should be maintained, leaving, however, a certain level of subsidiarity to each Member State. As a consequence, this Regulation respects the freedom of religion and the right to manifest religion or belief in worship, teaching, practice and observance, as enshrined in Article 10 of the Charter of Fundamental Rights of the European Union*'

¹³ There is a wealth of research on the topic; see, for example, N.G. Gregory, M. von Wenzlawowicz, et al, 'False Aneurysms in carotid arteries of cattle and water buffalo during shechita and halal slaughter' (2008) 79 *Meat Science* 285 which presents evidence that religious slaughter methods (involving animals which receive no stunning prior to exsanguination) can lead to the development of false aneurysms which, in combination with collateral routes of circulation, lead to periods of sustained consciousness during slaughter. See also T.J. Gibson, N. Dadios and N.G. Gregory, 'Effect of neck cut position on time to collapse in Halal slaughtered cattle without stunning' (2015) 110 *Meat Science* 310

¹⁴ The derogation is also made with respect to the Charter of Fundamental Rights of the European Union [26 October 2012] OJ C 326/391 Article 10 (1) - *Everyone has the right to freedom of thought, conscience and religion. This right includes freedom to change religion or belief and freedom, either alone or in community with others and in public or in private, to manifest religion or belief, in worship, teaching, practice and observance*

¹⁵ Dr Jill Mackay, 'Animal Welfare and Cultural Differences', Animal Behaviour and Welfare Course: <<https://www.coursera.org/learn/animal-welfare/lecture/WFXXf/animal-welfare-and-cultural-differences-interview-with-dr-mackay>> accessed 1 May 2022

bred for meat production and a European Champion Poulet kept as a pet both have identical welfare needs, irrespective of the cultural value or function that their keeper accords them. In the same way, irrespective of their keepers' religious or cultural beliefs, every cow, sheep, goat or chicken presented for slaughter will have the same fundamental welfare requirements. Nonetheless, at present, the derogation for cultural and religious traditions permits practices which have been repeatedly demonstrated (in veterinary and scientific research projects) to compromise animal welfare¹⁶.

There is, however, a different way to approach these derogations, which could potentially enable stronger welfare provisions. The somewhat ambiguous language of Article 13 could be interpreted in a more positive, pro-active way, with respect to cultural traditions. Whilst some commentators have argued that this derogation weakens the provision¹⁷ (for example, by facilitating cultural traditions such as bullfighting or production methods like foie-gras) an alternative interpretation might be that Article 13 could reinforce the cultures of member states with a tradition of stronger animal welfare and higher regard for the rights of non-human species¹⁸. In fact, one country in particular – Belgium - has recently taken steps to ensure full protection of animal welfare at slaughter, in line with the wishes of its citizens¹⁹ and the case law relating to Belgium's religious slaughter debate provides an interesting insight into the EU's application of Article 13.

¹⁶ It is interesting to note that whilst Jewish communities generally adhere to the slaughter methods prescribed by their religion, Muslim communities in some European countries, especially the United Kingdom, have adopted and accepted pre-slaughter stunning in many abattoirs: see James Meikle, 'What exactly does the Halal method of slaughter involve?', *The Guardian* (London 8 May 2014) <<https://www.theguardian.com/lifeandstyle/2014/may/08/what-does-halal-method-animal-slaughter-involve>> accessed 1 May 2022 which cites an estimated figure of 88% of Halal slaughtered animals in the UK currently being stunned prior to exsanguination.

¹⁷ R. Ludwig and R. O'Gorman, 'A Cock and Bull Story – Problems with the Protection of Animal Welfare in EU Law and Some Proposed Solutions' (2008) 20 (3) *Journal of Environmental Law* 363

¹⁸ The UK, Austria and The Netherlands have been recognised by World Animal Protection (UK) as having some of the highest animal welfare standards in the world, where governments prioritise welfare – see 'Index ranks countries on animal welfare standards' (2015) 176 *Veterinary Record* 5 (no author cited)

¹⁹ Wojciech Kość, 'Nine out of 10 EU citizens oppose animal slaughter without stunning, poll finds' *The Guardian* (London, 9 October 2020) <<https://www.theguardian.com/environment/2020/oct/09/nine-out-of-10-eu-citizens-oppose-animal-slaughter-without-stunning-poll-finds>> accessed 15 March 2021

2.3.1.2 Case Law Before and After Article 13

The degree of influence wielded by Article 13 is yet to be fully established, however, since 2018, the Court of Justice of the European Union (CJEU) has been asked to adjudicate three times on the balance between religious freedom (under the Charter of Fundamental Rights) and animal welfare under Article 13²⁰, with respect to Member State legislation.

Prior to 2018, the principal case which indicated the Court's approach to the relative significance of animal welfare, with respect to economic, trade and cultural interests, was *Jippes*²¹. It must be noted that *Jippes* was considered twenty years ago, before Article 13 was enshrined in EU law; but, at that time, the first step towards incorporation of the general principle of animal welfare in EU law had already been taken, with the Protocol on Protection and Welfare of Animals, annexed to the 1997 Treaty of Amsterdam²².

Jippes concerned the EU approach to a foot and mouth disease pandemic affecting Europe at that time and the applicants (including Ms Jippes who kept pet sheep) opposed the EU's legal approach to management of the disease. The EU elected to ban vaccination and introduce compulsory slaughter²³ which was challenged in the

²⁰ Court of Justice of the European Union, Press Release, No. 163/20, Luxembourg, 17 December 2020, Judgement on Case C-336/19 < <https://curia.europa.eu/jcms/upload/docs/application/pdf/2020-12/cp200163en.pdf>> accessed 10 March 2021 The court was asked to consider whether a Member state could preserve animal welfare in the face of religious slaughter by requiring a (reversible) stunning method.

²¹ C-189/01 *H. Jippes, Afdeling Groningen van de Nederlandse Vereniging tot Bescherming van Dieren and Afdeling Assen en omstreken van de Nederlandse Vereniging tot Bescherming van Dieren v Minister van Landbouw, Natuurbeheer en Visserij* [2001] EU:C:2001:420

²² Treaty of Amsterdam Amending the Treaty on European Union, the Treaties Establishing the European Communities and certain related acts - Protocol on protection and welfare of animals [1997] Official Publications of the European Communities. The Treaty stated that: '.....the following provision which shall be annexed to the Treaty establishing the European Community, In formulating and implementing the Community's agriculture, transport, internal market and research policies, the Community and the Member States shall pay full regard to the welfare requirements of animals, while respecting the legislative or administrative provisions and customs of the Member States relating in particular to religious rites, cultural traditions and regional heritage'

²³ Council Directive 85/511/EEC of 18 November 1985 introducing Community measures for the control of foot-and-mouth disease [1985] OJ L 315/11 as amended by Council Directive 85/511/EEC of 18 November 1985 introducing Community measures for the control of foot-and-mouth disease [1985] OJ L 315/11, as amended by Council Directive 90/423/EEC of 26 June 1990 OJ L 224/13. Also Commission Decision 2001/246/EC of 27 March 2001 laying down the conditions for the control and eradication of foot-and-mouth disease in the Netherlands in application of Article 13 of Directive 85/511 [2001] OJ L 88/21 as amended by Commission Decision 2001/279/EC of 5 April 2001, OJ L 96/19

Court as being contrary to the general principle in EU law, to guarantee animal welfare and prevent pain and suffering²⁴.

With respect to the applicants' argument that the principle of animal welfare should not be overridden, unless in exceptional circumstances, and that the slaughter directive contravened this principle, the Court ruled that the Protocol on Protection and Welfare of Animals did not enshrine animal welfare as a general principle of Community Law. The Court stated that animal welfare was not one of the objectives held as central to the EC treaty but, rather, the Protocol simply required that animal welfare be taken fully into consideration; the Court stated that 'this is not sufficient to warrant the conclusion that those provisions express any general principle of Community law'²⁵. The justification for the ruling was the fact that neither Common Agricultural Policy nor Treaty texts mentioned animal welfare as an objective, therefore the existence of a general principle could not be demonstrated²⁶. Similar cases prior to Article 13²⁷ saw the Court anticipating the ruling in *Jippes* and until more recently, post-Article 13, animal welfare has only been considered peripherally, although in two cases welfare was acknowledged as a legitimate, public interest objective²⁸.

Case Law Since 2018

In May 2018, the Court considered a Flemish law²⁹ (passed in 2015 and challenged by Muslim associations) which requires all religious slaughter to be carried out in slaughterhouses approved by the Ministry of Agriculture, and prohibits creation of temporary slaughterhouses, often used at the time of religious festivals. The temporary slaughterhouses were associated with inadequate killing techniques and poor welfare³⁰. The Court was asked to consider whether EU Slaughter Regulation

²⁴ C-189/01 *Jippes* (n 21) para 36

²⁵ *ibid*, para 63

²⁶ Spaventa, E. 'Case C-189/01, H. Jipp es, Afdeling Groningen van de Nederlandse Vereniging tot Bescherming van Dieren, Afdeling Assen en omstreken van de Nederlandse Vereniging tot Bescherming van Dieren v. Minister van Landb ouw, Natuurb eheer en Visserij' (2002) 39 Common Market Law Review 1159

²⁷ C-219/07 *Nationale Raad van Dierenkwekers en Liefhebbers VZW and Andibel VZW v Belgische Staat* [2008] ECR I- 004475 and Joined Cases C-37/06 and C-58/06 *Viamex Agrar Handels GmbH and Zuchtvieh-Kontor GmbH (ZVK) v Hauptzollamt Hamburg-Jonas* [2008] ECLI 118

²⁸ C-101/12 *Herbert Schaible v Land Baden-Württemberg* [2013] ECLI 661 and C-424/13 *Zuchtvieh-Export GmbH v Stadt Kempten, Landesrechtsanwaltschaft Bayern* [2015] ECLI 259

²⁹ Article 16(2) of the Loi du 14 août 1986 relative à la protection et au bien-être des animaux

³⁰ Case C-426/16 *Liga van Moskeeën en Islamitische Organisaties Provincie Antwerpen, VZW and Others v Vlaams Gewest* [2018] ECLI 335

1099/2009³¹, Article 4 (4), which requires that killing of meat animals takes place in a slaughterhouse³², is a barrier to religious freedom³³. Having considered the validity of the regulation, when read together with the Charter of Fundamental Rights and Article 13, the Court found no evidence that it compromised religious freedom – religious slaughter was still permitted, there was simply a general requirement that all meat producers carried out killing in an approved slaughterhouse³⁴. This is an important judgment, because it confirmed that, under EU law, the Belgian authorities were entitled to enforce utilisation of appropriate slaughter facilities during religious festivals and prevent at-home killing of animals (by potentially untrained individuals) using inappropriate slaughter instruments, in order to protect their welfare.

A second case involving application of Article 13 was considered by the CJEU in 2019³⁵. In this case, the Court was asked to give a preliminary ruling on French animal welfare charity OABA's³⁶ request for a ban on marketing and advertising of beef products displaying 'organic farming' and certified as 'halal'. OABA believed that halal slaughter, and its associated welfare compromises, were inconsistent with organic principles. The Court considered EU organic production, labelling and slaughter regulations³⁷ in light of Article 13 and, in February 2019, ruled that meat from animals slaughtered without pre-stunning cannot be labelled with the European Union's organic produce logo. The court stated that whilst Regulation 1099/2009 allows a derogation for slaughter without pre-stunning, EU organic production rules require methods of husbandry which demonstrate a high level of animal welfare³⁸. The Court cited Case C-426/16³⁹ (above) and explained that the primary objective of the

³¹ Council Regulation (EC) No 1099/2009 of 24 September 2009 on the protection of animals at the time of killing [2009] OJ L303/1

³² *ibid*, Article 4(4) (there was, notably, no obligation to pre-stun animals, as long as killing took place in a slaughterhouse)

³³ The Belgian Minister of Agriculture cited Regulation 1099/2009 as the basis for the Belgian legislation prohibiting temporary slaughterhouses for religious festivals

³⁴ C-426/16 *Liga van Moskeeën* (n 30) para 61

³⁵ C-497/17 *Oeuvre d'assistance aux bêtes d'abattoirs (OABA) v Ministre de l'Agriculture et de l'Alimentation and Others* [2019] ECLI 137

³⁶ OEuvre d'Assistance aux Bêtes d'Abattoirs - <<https://oaba.fr/>> accessed 10 March 2021

³⁷ Council Regulation (EC) No 834/2007 of 28 June 2007 on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91 [2007] OJ L 189/1, Commission Regulation (EU) No 271/2010 of 24 March 2010 amending Regulation (EC) No 889/2008 laying down detailed rules for the implementation of Council Regulation (EC) No 834/2007, as regards the organic production logo of the European Union [2010] OJ L 84/19 and Council Regulation (EC) 1099/2009 (n 21)

³⁸ Articles 3 and 5 of Regulation (EC) No 834/2007 establish 'high animal welfare standards'

³⁹ C-462/16 *Liga van Moskeeën* (n 30)

slaughter regulation is to protect animal welfare ‘*as required by Article 13 TFEU pursuant to which, in formulating and implementing the European Union’s policies, the European Union and the Member States are to pay full regard to the welfare requirements of animals*’⁴⁰. Most significantly, the Court found that slaughter without pre-stunning cannot be consistent with the high animal welfare standards implied by the EU organic logo. This judgment is striking - the Court stated that a high level of animal welfare could not be attained during religious slaughter, and, notably, commented that the slaughter regulation sets down the principle of pre-stunning ‘*and goes so far as to establish this as an obligation*’⁴¹. Given that the slaughter regulation applies to all farm animals in Europe (not just those reared in organic schemes), the Court’s position appears to suggest that the religious derogation cannot be justified. Importantly, the Court did not state that welfare standards in organic systems were *higher* than those in other production systems⁴² - given that all animals have the same fundamental welfare needs at slaughter, having tiers of welfare at the time of killing would seem an inappropriate regulatory approach, however, at present this is exactly what exists in the EU. With this in mind, and on the basis of the Court’s ruling, policymakers and commentators will surely now consider whether the religious derogation in Article 13 is justifiable or reasonable.

In March 2017, the Belgian Walloon and Flemish parliaments voted to ban religious slaughter of animals (slaughter without pre-stunning)⁴³ and introduced a requirement for a reversible stunning technique for all animals undergoing religious slaughter⁴⁴. With the proposed legislation due to come into force in 2019, a preliminary ruling was sought from the CJEU by the Constitutional Court of Belgium⁴⁵. As with the two earlier

⁴⁰ C-497/17 OABA (n 35) para 44

⁴¹ *ibid*, OABA (n 35) para 47

⁴² C-497/17 OABA (n 35) para 7, The court refers to organic farming being based on principles that ensure ‘high animal welfare...’ and this phrase is repeated throughout the judgment but the Court never stated or implied that organic systems should offer a higher level of welfare than other systems.

⁴³ Decreet houdende wijziging van de wet van 14 augustus 1986 betreffende de bescherming en het welzijn der dieren, wat de toegelaten methodes voor het slachten van dieren betreft (decree amending the Law of 14 August 1986 on the protection and welfare of animals, regarding permitted methods of slaughtering animals) 7 July 2017 (Belgisch Staatsblad, 18 July 2017, p. 73317) <http://www.ejustice.just.fgov.be/mopdf/2017/07/18_1.pdf#Page49> accessed 10 March 2021

⁴⁴ The electronarcosis method (which passes an electric current through the brain) renders the animal unconscious for the time it takes to cut its throat, but could technically be reversible; in this way, it can be argued that it respects the religious tenet that an animal remains ‘alive’ to allow full exsanguination by the beating heart

⁴⁵ Case C-336/19 *Centraal Israëlitisch Consistorie van België and Others v Vlaamse Regering* [2020] ECLI 1031

cases discussed, above, the court was asked to interpret a specific element of EU legislation – Article 26(2)(c) of the slaughter Regulation⁴⁶ - in light of Article 13 and the Charter of Fundamental Rights. Two main issues were raised:

- Should Article 26(2)(c) of Regulation No 1099/2009, read in light of Article 10(1) of the Charter of Fundamental Rights and Article 13 TFEU, be interpreted as precluding Member State legislation which requires (during religious slaughter) a reversible stunning procedure that cannot result in death of the animal?
- Given that Regulation No 1099/2009 does not provide any regulation of the killing of animals during recreational fishing / hunting or during cultural or events, does it violate principles of non-discrimination, equality and cultural, religious and linguistic diversity under the Charter of Fundamental Rights?

The Court stated that the Regulation's pre-stunning requirement '*reflects an EU value, namely animal welfare, as now enshrined in Article 13 TFEU, according to which the European Union and the Member States must pay full regard to the welfare requirements of animals, when formulating and implementing animal welfare policy*⁴⁷ and ruled that there was nothing in Article 26(2)(c) that precluded a member state from introducing a requirement for reversible stunning during religious slaughter⁴⁸. Member States are entitled to set stricter national rules as they see fit. In response to the second point, the Court held that Regulation 1099/2009 does not disregard religious, cultural or linguistic diversity guaranteed under the Charter of Fundamental Rights; the regulation simply enables a conditional exception to pre-stunned slaughter (in the context of religious rites), '*while excluding from that regulation's scope, or exempting from the obligation of prior stunning laid down therein, the killing of animals during hunting, recreational fishing, and sporting and cultural events*⁴⁹. Arguably a distinction was drawn between the economic activity of meat production and the killing of animals during recreational fishing, hunting and cultural events. The issue of killing wild animals is revisited in Chapter Three, with respect to seal products.

⁴⁶ Council Regulation (EC) No 1099/2009 (n 31)

⁴⁷ Case C-336/19 (n 45) para 41

⁴⁸ Ibid, para 81

⁴⁹ Given the current strength of feeling in European countries, as the public understanding of welfare strengthens, it may well be that in years to come, recreational hunting and fishing are subject to some animal welfare protection measures

In its judgment, the Court cited European Food Standards Agency (EFSA) scientific opinion which demonstrated that, contrary to the beliefs of the religious groups, pre-stunning would not have an adverse effect on exsanguination⁵⁰; the Court also expressed the opinion that the Flemish legislature was within its rights to enact the decree on welfare as part of an *'evolving societal and legislative context, which is characterised.....by an increasing awareness of the issue of animal welfare'*⁵¹. This acknowledgement of public concern is significant, since the measure was introduced largely in response to citizens' opposition to religious, non-stun slaughter and recognises that public pressure may lead policymakers to act. In any dispute, the Court can only ever interpret and apply the given legislation, however, the repeated citing of scientific opinion regarding the detrimental effects of slaughter without pre-stunning appears to have been the mechanism by which the Court enabled the Member State authorities to act 'pay full regard to the welfare requirements of animals'. The Court effectively said that the available scientific evidence proved that Belgian legislators were acting in accordance with the provisions of the TFEU and complied with the spirit and requirements of Article 13.

This significant judgment has confirmed that Article 13 can play a central role in union policymaking, but, far more encouragingly, it has acknowledged scientific evidence as a mechanism by which Member States can ensure compliance with their Article 13 responsibilities to animal welfare.

The Court's acknowledgement of the role and significance of public opinion in policymaking is a positive sign for European animal welfare campaigners and consumers. Given the Court's judgment with respect to organic farming and pre-stunning at slaughter, it seems likely that welfare campaigners will now seize upon the paradox of an EU directive, which permits a religious slaughter derogation, deemed by the Union's own Court to be detrimental to animal welfare on the basis of the available science. In fact, since the scientific evidence and judicial branch of the EU are in agreement that slaughter without pre-stunning is detrimental to welfare and has

⁵⁰ Case C-336/19 (n 45) para 72. Similar conclusions were reached in the earlier Belgian case. It is important to note that in many European slaughterhouses, penetrating captive bolts are used. Here, the bolt enters the skull and destroys areas of the cerebrum and cerebellum but leaves the medulla (brainstem) intact ensuring that the heart continues to beat, allowing full exsanguination. If full exsanguination is the requirement of religious slaughter, it is hard to find justification for refusal to pre-stun with a captive bolt.

⁵¹ *ibid*, para 79

no deleterious effect on the exsanguination required for religious slaughter, the continued presence of the religious rites derogation appears to be on shaky ground. The role of public opinion in animal welfare policymaking is discussed in greater detail later in this thesis but, to date, it is becoming a powerful force in EU policymaking.

Although these three recent cases neither centred around Article 13, nor relied upon it to ensure a welfare solution in its own right, the principle was cited on numerous occasions in the case judgments. Whilst there is much to be discovered about the level of its authority, Article 13 can clearly play a strong role in upholding Member States' decisions to protect animal welfare. The European Commission has stated that '*Article 13 does not provide a specific legal basis for protecting animals in the EU. However, it recognises animals as sentient beings; hence all animals scientifically known to be able to feel pain are included in the scope of EU animal welfare policy imposing an obligation to ensure that their welfare needs are considered within the framework of EU policies*⁵². However, it is clear that the CJEU is willing to uphold member state legislation, based on science, which is created with the aim of upholding the principle. At present, therefore, Article 13 does not render animal welfare a mandatory element of all EU policy but there is much to be optimistic about with respect to its role as a general principle of animal welfare and its evolving significance for the general public; it appears that citizens can drive Member State intervention for animal protection measures which may then be deemed legitimate and justifiable.

2.3.1.3 Article 13, Brexit and Public Opinion

A final element worthy of consideration is the general public's perception of Article 13 and the significance of animal sentience in the mind of European consumers. As discussed in Chapter One, and considered in the judgment of Case C-336/19⁵³, above, consumer views and concerns hold considerable sway with policy makers and nowhere has this been more clearly demonstrated than during the recent withdrawal of the United Kingdom from the European Union, known as 'Brexit'. Although EU law is the focus of this thesis, the United Kingdom has always championed animal welfare,

⁵² European Commission, Commission Staff Working Paper, Impact Assessment, accompanying the document 'Communication from the Commission to the European Parliament, the Council and the European Economic and Social Committee, on the European Union Strategy for the Protection and Welfare of Animals 2012-2015, Brussels SEC (2012) 55 final, 10

⁵³ Case C-336/19 (n 45)

therefore the British approach to sentience, following the UK's departure from the EU, is relevant to this discussion.

In 2016, a slim majority of British citizens voted in favour of the United Kingdom leaving the European Union⁵⁴, after a decades-long political, economic and social relationship. As explained in Chapter One, the UK has a long history of creating animal protection legislation and, within the EU, was recognised as a vocal advocate for stronger animal welfare regulations. Approximately eighty percent of UK animal welfare laws were founded on EU rules, directive and regulations, with the Common Agricultural Policy shaping British farming since 1973⁵⁵. Since the foundational EU treaties recognised animals as sentient beings, there was great concern in many areas of British society that withdrawal from those treaties - and a subsequent failure to explicitly enshrine the EU animal welfare principles in British 'Brexit' law - could lead to a weakening of animal protection in the UK and consequently demote animals to being viewed as mere chattels or goods⁵⁶.

The period between 2017 and 2021 saw protracted political discussion on the 'Great Repeal Bill'⁵⁷, whose role was to transfer existing EU provisions into UK law when Britain's departure from the Union finally took place. The bill was repeatedly debated between the Houses of Commons and Lords, with much disagreement on many key issues; one issue in particular, however, led to a high profile, national media reaction – the vote to repeal the concept of animal sentience as enshrined in EU law⁵⁸. When the Bill was drafted, there was no provision to integrate the wording from Article 13 TFEU into UK law. Despite pressure at the Bill's committee stages, the government resisted inclusion of the Article 13 wording, instead electing to 'consider' methods by which sentience might be incorporated in wider UK legislation⁵⁹. At this point, press and social media actors began to raise concerns that the government might fail to

⁵⁴ A narrow majority of 51.9% voted to leave the EU over 48.1% to remain, in the June 2016 referendum

⁵⁵ S.P. McCulloch, 'Brexit and Animal Welfare Impact Assessment: Analysis of the Opportunities Brexit Presents for Animal Protection in the UK, EU, and Internationally' (2019) 9 *Animals* 877, 878

⁵⁶ A. Nurse, 'A Question of Sentience: Brexit, Animal Welfare and Animal Protection Law' (2019) 10 *Journal of Animal and Environmental Law* (2) 32, 34

⁵⁷ European Union (Withdrawal Agreement) HC Bill (2019) [1]

⁵⁸ J. Horton and J. Merritt, 'Show me your horse and I will tell you who you are: Brexit, a chance to acknowledge animal sentience in law' (2019) 31 *Denning Law Journal* 5, 6

⁵⁹ House of Commons Library, Briefing Paper Number 8155, Elena Ares, '*Animal Sentience and Brexit*' (8 July 2018) <<https://researchbriefings.files.parliament.uk/documents/CBP-8155/CBP-8155.pdf>> accessed 10 May 2021

incorporate sentience in UK law, or, incorporate it, but with less significance than that granted in the EU Treaty.

The public backlash against defeat of the proposal to replace Article 13 with a similar UK legislative provision was swift and extremely vocal. Many consumers, already troubled by the wider-ranging implications of Brexit, were concerned that the departure from the EU would lead to a lowering of animal protection standards and a loosening of welfare regulations under free-trade agreements⁶⁰. In some quarters, there was already some concern regarding the approach of the UK administration to sentience with respect to the 2006 Animal Welfare Act⁶¹; Article 1 of the act enables government ministers to extend protection to species additional to those currently protected, if they are satisfied scientific evidence demonstrates that they are capable of experiencing pain and suffering⁶². Despite a large volume of scientific research supporting sentience in cephalopods (e.g. octopus and squid) and decapod crustaceans (e.g. lobster and crayfish) no additional species have, to date, been added⁶³.

Newspaper and social media coverage of the government's position was uniformly critical; headlines such as 'MPs refuse to recognise that animals feel pain or emotion in Brexit bill vote'⁶⁴ were commonplace, and many leading charities and NGOs expressed dismay at the government's argument that sentience was already covered by the 2006 Animal Welfare Act⁶⁵. Online petitions were submitted to instigate debate around the issue⁶⁶, and the UK's veterinary bodies reported regularly on the requirement to enshrine animal sentience in UK law, post-Brexit⁶⁷.

⁶⁰ S.D. Brooman, 'Animal Sentience in UK Law: does the new clause need claws?' (2018) 2 UK Journal of Animal Law (1) 21, 22

⁶¹ Animal Welfare Act 2006 (Eliz. 2 c45)

⁶² *ibid*, Article 1 (3) to (5)

⁶³ McCulloch (n 55) 7

⁶⁴ Rachael Revesz, 'MPs refuse to recognise that animals feel pain or emotion in Brexit bill vote' *The Independent* (London, 20 November 2017) <<https://www.independent.co.uk/news/uk/home-news/brexit-bill-latest-animal-sentience-cannot-feel-pain-emotion-vote-mps-agree-eu-withdrawal-bill-michael-gove-a8064676.html>> accessed 11 May 2021

⁶⁵ 'MPs vote to reject inclusion of animal sentience in Withdrawal Bill', *Farming UK* (16 November 2017) <https://www.farminguk.com/news/mps-vote-to-reject-inclusion-of-animal-sentience-in-withdrawal-bill_47923.html> accessed 10 May 2021

⁶⁶ See for example, 'Repeal the Government decision to exclude animal sentience in the EU Withdrawal Bill', (222,204 signatories) <<https://www.change.org/p/uk-parliament-repeal-the-government-decision-to-exclude-animal-sentience-in-the-eu-withdrawal-bill>> accessed 11 May 2021, and 'Recognise animal sentience & require that animal welfare has full regard in law' (103,918 signatories) <<https://petition.parliament.uk/archived/petitions/242239>> accessed 11 May 2021

⁶⁷ The Veterinary Record, the weekly publication for the UK Veterinary profession, was particularly critical of the government's approach and the topic of sentience was regularly discussed and debated

Given that an RSPCA survey demonstrated 80% of respondents wanted maintenance or improvement of current animal welfare legislation after Brexit⁶⁸, it was probably unsurprising that this nation of animal-lovers reacted so negatively to the administration's position on sentience. In a move to appease the public, the Environment Secretary Michael Gove spoke on national radio, reassuring listeners that animal welfare was a priority for the government and stressing their intention to exceed the welfare standards currently mandated by the European Union⁶⁹, **Shortly after this interview, the first draft of the Animal Welfare (Sentencing and Recognition of Sentience) Bill 2017⁷⁰ was issued, with consultation and discussion between December 2017 and January 2018. Forming part of the UK government's Action Plan for Animal Welfare⁷¹, the Animal Welfare (Sentience) Act⁷² came into force in April 2022. The Act mandates creation of an animal sentience committee⁷³, members of which are appointed by the Secretary of State, tasked with writing reports for presentation to parliament which will assess to what extent the government has paid regard to animal sentience when legislating or in the formulation of new welfare policy. Notably, in common with the European position, the Act requires that Committee Recommendations should respect '*customs relating in particular to religious rites, cultural traditions and regional heritage*'⁷⁴.**

The UK's position on animal welfare is arguably now more explicit than the EU's current Article 13, in that Britain now has several pages of legislation devoted to the principle as well as the formation of a dedicated sentience committee, whereas the EU

over the period 2017-2021. Examples include: R. Fearon, 'Dismay as MPs reject Brexit Bill amendment recognising animal sentience' (2017) 181 *Veterinary Record* (21) 557 and G. Mills, 'Lords vote against animal sentience' (2018) 182 *Veterinary Record* (18) 501

⁶⁸ Holly Kernot, '80% of public wants post-Brexit animal welfare focus' *Vet Times* (4 January 2017) <<https://www.vettimes.co.uk/news/80-of-public-wants-post-brexit-animal-welfare-focus/>> accessed 11 May 2021

⁶⁹ Interview of Michael Gove MP by John Humphries, *The Today Programme*, BBC Radio Four, 24 November 2017 < <https://www.bbc.co.uk/programmes/b09fj9qp>> accessed 10 May 2018

⁷⁰ Animal Welfare (Sentencing and Recognition of Sentience) Draft HC Bill (2017) For discussion of the topic, see J. Loeb, 'Editorial: Recognition for Sentience at Last' (2021) 188 *The Veterinary Record* (10) 369

⁷¹ DEFRA, *Action Plan for Animal Welfare*, 12 May 2021

<<https://www.gov.uk/government/publications/action-plan-for-animal-welfare/action-plan-for-animal-welfare>> accessed 29 May 2021

⁷² Animal Welfare (Sentience) Act 2022 (Eliz. 2 c.22)

⁷³ *ibid*, 1

⁷⁴ Animal Welfare (Sentience) Act 2022, 2 (5). Interestingly, in comparison with the Agriculture Act 2020 (Eliz 2 c.21) s.19 (which requires presentation of a food security report to Parliament) the Sentience Act's provisions with respect to welfare are stronger; the Sentience Committee has a broader obligation to obtain relevant data, create a report and make recommendations with respect to minimising any potentially adverse effects of policy on animals as sentient beings.

has a single, over-arching general principle. In both cases, the reach of the legislation is lacking with respect to invertebrates and it remains to be seen if the presence of the UK bill has a significant effect on legislation which involves animal welfare. Nonetheless – and with great relevance to this thesis - the UK government’s swift response is further confirmation that animal welfare principles (such as those defined in Article 13 and the Animal Sentience Act) can, when considered in conjunction with strong public opinion, drive policymaking and lead to improved animal protection in law. In fact, given that the scientific evidence of sentience has been available for many years, it would appear that the factor to push policymaking ‘over the line’ with respect to Brexit, was public opinion.

2.3.2 Article 38 and The ‘dual identity’ of animals

In 1991, an Initial Declaration on the Welfare of Animals was ratified as an appendix to the Treaty on European Union⁷⁵, however, the legal status of animals remained solely as agricultural produce or goods. As discussed, above, in relation to *Jippes*, in 1997, the Treaty of Amsterdam introduced a Protocol annexed to the amended Treaty on European Union⁷⁶, under which ‘full regard’ was to be paid to the welfare of animals. In 2009, Article 13 came into force, confirming animals as sentient beings. However, it is important to note that whilst animals may have gained an *additional* status via Article 13 they remain firmly in the category of agricultural products, and are therefore subject to internal market rules and regulations, under Title III of the TFEU, Agriculture and Fisheries, Article 38⁷⁷:

“Agricultural products’ means the products of the soil, of stockfarming and of fisheries and products of first-stage processing directly related to these products’

Despite acknowledgement of sentience, since animals and their produce are traded between Member States, their classification in EU law remains as ‘goods’; this ensures that produce can be regulated, safe and suitable for consumers. It is important to note

⁷⁵ Treaty on European Union (Consolidated Version), Treaty of Maastricht, OJ C 325/5 [1992], see Declaration No. 24: ‘The Conference calls upon the European Parliament, the Council and the Commission, as well as the Member States, when drafting and implementing Community legislation on the common agricultural policy, transport, the internal market and research, to pay full regard to the welfare requirements of animals’

⁷⁶ The Treaty of Amsterdam, Amending the Treaty on European Union, The Treaties Establishing the European Communities and Related Acts [1997] OJ C 340/1

⁷⁷ TFEU (n 4) Article 38 (1)

that, as goods, they are subject to legislation which regulates Free Movement, and this has been the focus of recent case law, which is discussed later in this chapter.

In addition, Article 38 (2) confirms that the regulations for the functioning of the Internal Market apply to 'agricultural products', and therefore to animals, creating a potentially challenging conflict of priorities for policy makers, i.e. should economic / trade concerns or sentience / animal welfare form the basis of legislation pertaining to animals?

2.3.3 Article 39, Common Agricultural Policy and Article 43

As discussed in Chapter One, the post-war era in Europe saw a drive towards production of affordable food for all citizens as well as the guarantee of decent living standards for farmers⁷⁸. This food security objective led to the creation of the Common Agricultural Policy (CAP) in 1962, which over the last 59 years has evolved to accommodate food supply management, producer support, food quality and rural development programmes and, naturally, deals with animal production and husbandry methods. Article 39 TFEU states the CAP's principal objectives of increasing agricultural productivity as well as protecting producers' living standards and ensuring supply of agricultural produce⁷⁹. In addition, agriculture is identified as being 'closely linked with the economy as a whole'⁸⁰ but there is no mention of animal welfare in Article 39, which suggests that the focus of the agricultural policy is staunchly socio-economic. However, one important element of the CAP itself is Cross Compliance⁸¹; under this system, European farmers are encouraged to uphold certain standards for public health, land management and animal welfare⁸². Certain standards are mandatory for all farmers (whether they receive CAP support or not), such as observing statutory regulations, whilst others are applicable to farmers receiving CAP support. Financial penalties may result if a farmer is found, upon inspection, to be non-

⁷⁸ European Commission, '*The Common Agricultural Policy, A Story to Be Continued*' (2012) 3 Publications Office of the EU <<https://op.europa.eu/en/publication-detail/-/publication/a0311700-882e-4042-92e5-cb8b9246b3a5>> accessed 18 March 2021

⁷⁹ TFEU (n 4) Article 39, 1 (a, b and d)

⁸⁰ *ibid*, Article 39, 2 (c)

⁸¹ Institute for European Environmental Policy, Cross Compliance in the CAP, Conclusions of a Pan European Project 2002-2005 <<https://ieep.eu/uploads/articles/attachments/e66af26c-2bc4-497e-9e74-548a917abee7/conclusionsenglish.pdf?v=63664509697>> accessed 20 August 2019

⁸² European Commission, Common Agricultural Policy, Cross Compliance <https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/income-support/cross-compliance_en#gaec> accessed 10 September 2021

compliant with required standards and therefore the CAP has a role in incentivising better welfare⁸³.

In addition to Cross Compliance, farmers can also benefit from funding for additional commitments to animal welfare, which exceed the baseline requirements. The Animal Welfare Payments (AWP) scheme forms part of the Rural Development Programmes (RDP)⁸⁴ and farmers who exceed mandatory regulatory standards, by implementing additional animal welfare measures, can benefit from additional annual payments per livestock unit⁸⁵. However in 2012, two animal welfare NGOs wrote to the Commission, highlighting their concern that between 2007 and 2013, only 0.1% of the CAP €55 billion annual budget was being used to support improved animal welfare⁸⁶. In addition, some research has found that payments have been spent on modification that have proved detrimental to welfare – a German study demonstrated that 40% of pig housing alterations paid for by subsidies actually led to a lower standard of welfare⁸⁷; a detailed discussion of the payment scheme is out-with the scope of this thesis but current evidence suggests that greater funding and closer supervision would be required to ensure welfare standards were truly being improved.

Increased global food demand requires increased productivity and pressure to guarantee food supply; these will in turn lead to higher stocking densities, further genetic selection for faster growth and, therefore, animal welfare compromises - conflict between actors in this sector seems inevitable. Despite this, Article 43 TFEU⁸⁸,

⁸³ Financing, monitoring and management of the CAP is governed by Regulation (EU) 1306/2013 of the European Parliament and of the Council of 17 December 2013 on the financing, management and monitoring of the common agricultural policy and repealing Council Regulations (EEC) No 352/78, (EC) No 165/94, (EC) No 2799/98, (EC) No 814/2000, (EC) No 1290/2005 and (EC) No 485/2008, OJ L 347/549

⁸⁴ See Regulation (EU) No 1305/2013 of the European Parliament and of the Council on Support for Rural Development by the European Agricultural Fund for Rural Development (EAFRD) and Repealing Council Regulation (EC) No 1698/2005 [2013] OJ L 347/487. Article 33 sets out the provisions for Animal Welfare Payments

⁸⁵ A. Bergschmidt, S. March, K. Wagner and J. Brinkmann, 'A Results-Oriented Approach for the Animal Welfare Measure of the European Union's Rural Development Programme (2021) 11 Animals 1570

⁸⁶ Compassion in World Farming, 'Animal Welfare Article of the Treaty on the Functioning of the European Union is undermined by absence of access to justice' (December 2014) <<https://www.ciwf.org.uk/media/7427367/article-13-tfeu-undermined-by-lack-of-access-to-justice-december-2014.pdf>> accessed 20 September 2021

⁸⁷ A. Bergschmidt and L. Schrader L, 'Application of an animal welfare assessment system for policy evaluation: Does the Farm Investment Scheme improve animal welfare in subsidised new stables?' (2009) 59 Landbauforschung Volkenrode 95

⁸⁸ TFEU Article 43 (2) states '*The European Parliament and the Council, acting in accordance with the ordinary legislative procedure and after consulting the Economic and Social Committee, shall establish the common organisation of agricultural markets provided for in Article 40(1) and the other*

which provides for the creation and implementation of CAP policy, has provided the legal basis for the creation of many directives which include animal welfare provisions⁸⁹ - including, for example, Council Directive 2008/120/EC which lays down minimum standards for the protection of pigs⁹⁰, Council Directive 2008/119/EC setting down minimum standards for the protection of calves⁹¹ and Council Directive 1999/74/EC which provides minimum standards for the protection of laying hens⁹². However, whilst the creation of a body of directives setting out universal minimum welfare standards can be considered a positive step for farm animals, the legislation was created in the context of 'goods'⁹³ and the underlying motivation was a move towards uniformity of production standards and costs (although variations still exist, since Member States can introduce stricter welfare standards within their own territory⁹⁴) and therefore minimal market distortion⁹⁵. In fact, the introductory preambles of most animal welfare directives state that removal of barriers to trade is their primary goal⁹⁶ and this has proven problematic for animal protection measures.

2.3.4 Articles 26 and 114: The Internal Market and Harmonisation

From the European Coal and Steel Community in 1951, through the formation of the European Economic Community (which created a customs union and common market

provisions necessary for the pursuit of the objectives of the common agricultural policy and the common fisheries policy'

⁸⁹ Ryland (n 3) 24

⁹⁰ Council Directive 2008/120/EC of 18 December 2008 laying down minimum standards for the protection of pigs (codified version) [2009] OJ L47/5 (Pig Directive)

⁹¹ Council Directive 2008/119/EC of 18 December 2008 laying down minimum standards for the protection of calves [2009] OJ L 10/7

⁹² Council Directive 1999/74/EC of 19 July laying down minimum standards for the protection of laying hens [1999] OJ L 203/53

⁹³ In fact, in the Pig Directive (n 90) Recital (4) states that 'Pigs, being live animals, are included in the list of products set out in Annex I to the Treaty'

⁹⁴ The freedom for Member States to introduce higher welfare standards under EU directives allows administrations to legislate more positively for welfare and also enables individual producers and suppliers to offer higher welfare schemes and produce. See for example, S.J. More, A. Hanlon, J. Marchewka and L. Boyle, 'Private animal health and welfare standards in quality assurance programmes: a review and proposed framework for critical evaluation' (2017) 180 *Veterinary Record* 612

⁹⁵ D. Blandford and D. Harvey, 'Economics of Animal Welfare Standards: Transatlantic Perspectives' (2014) 13 *EuroChoices* (3) 35

⁹⁶ See, for example, Council Regulation (EC) No 1/2005 of 22 December 2004 on the protection of animals during transport and related operations and amending Directives 64/432/EEC and 93/119/EC and Regulation (EC) No 1255/97 [2005] OJ L 3/1 whose preamble (2) reads: 'the Council has adopted rules in the field of the transport of animals *in order to eliminate technical barriers to trade* in live animals and to allow market organisations to operate smoothly, while ensuring a satisfactory level of protection for the animals concerned'

for the six founding EU member states⁹⁷) to the contemporary political and economic union of 27 states, the primary focus of the EU has been trade – at the centre of which lies the Internal Market. Regarded as one of the Union’s greatest successes⁹⁸, the internal market provides citizens with access to 27 member states and a total population of over 450 million consumers⁹⁹.

Article 26 TFEU provides the legal basis for the internal market and four basic ‘free movement’ principles underpin its functioning - free movement of goods, persons, services and capital¹⁰⁰. As the legal basis for the internal market, it states that:

‘The internal market shall comprise an area without internal frontiers in which the free movement of goods, persons, services and capital is ensured in accordance with the provisions of the Treaties’¹⁰¹.

As agricultural products, farm animals are also classified as goods¹⁰² and are therefore subject to the rules of the internal market.

In order to ensure that Union trade operates in as smooth and uninhibited a manner as possible, Article 114 TFEU provides a legal basis for internal market measures for the approximation¹⁰³ – ‘harmonisation’ – of member state rules, with respect to the establishment and functioning of the internal market¹⁰⁴. The core function of Article 114 is to facilitate EU regulation of the aspects of private, national law which

⁹⁷ Belgium, Holland, Italy Luxembourg, France and West Germany

⁹⁸ College of Europe, S. Micossi, ‘30 Years of the Single European Market’ (2016) Bruges European Economic Policy Briefings 41/2016

<https://ec.europa.eu/economy_finance/publications/pages/publication784_en.pdf> accessed 10 March 2021

⁹⁹ European Commission, Internal Market, Industry Entrepreneurship and SMEs,

<https://ec.europa.eu/growth/single-market_en> accessed 28 March 2021

¹⁰⁰ TFEU (n 4) Article 26(2). For a discussion of the principles of free movement, see Stephen Weatherill, ‘Free Movement of Goods’ (2012) 61 International and Comparative Law Quarterly 541

¹⁰¹ TFEU (n 4) Article 26(2)

¹⁰² The definition of goods was confirmed in Case 7/68 *Commission v Italian Republic* [1968] EU:C:1968:51. Summary (2) ‘products which can be valued in money and which are capable, as such, of forming the subject of commercial transactions’

¹⁰³ Article 114 (1) states “*Save where otherwise provided in the Treaties, the following provisions shall apply for the achievement of the objectives set out in Article 26. The European Parliament and the Council shall, acting in accordance with the ordinary legislative procedure and after consulting the Economic and Social Committee, adopt the measures for the approximation of the provisions laid down by law, regulation or administrative action in Member States which have as their object the establishment and functioning of the internal market*”

¹⁰⁴ Approximation of laws is viewed by the EU as the requirement for countries within the union to ‘align their national laws, rules and procedures in order to give effect to the entire body of EU law contained in the *acquis communautaire*’ – see European Commission, Environment, ‘Introduction to the Approximation of Environmental Legislation’

<[http://ec.europa.eu/environment/archives/guide/part1.htm#\(2\)](http://ec.europa.eu/environment/archives/guide/part1.htm#(2))> accessed 3rd March 2017

create barriers to trade in the internal market. Via the application of Article 114, Union legislators can adopt measures for harmonisation in the Member States which seek to fully implement the single market model. Detailed analysis of harmonisation lies out-with the scope of this thesis although its relevance to animal welfare case law is explained, below. The spirit of harmonisation has generally been viewed as a balance between the smooth functioning of the internal market and accommodation of certain member state public interests. As already demonstrated in the context of Article 13, the EU is a territory of diverse legal and cultural traditions and therefore creating harmonised legislation that satisfies all the nations of the union can be extremely challenging, not least because it often asks Member States to relinquish their unique national standards. The degree of legal harmonisation can range from minimum to maximum / full. Full harmonisation adopts a wide-ranging approach and replaces diverse national provisions with a single Union standard¹⁰⁵. Minimum harmonisation sets a baseline standard but incorporates derogation clauses which permit individual Member States to enact stricter standards within their territory¹⁰⁶. The general pattern with respect to Article 114 is exhaustive harmonisation, especially in the area of goods, which inevitably means member states sense a loss of autonomy and legislative freedom¹⁰⁷. However, in the case of animal welfare, directives have, to date, generally set down minimum standards above which individual Member States can legislate if they wish.

Article 114 can form the legal basis to enact EU legislation only where a valid link has been established between the chosen measure and the removal of confirmed barriers to free trade. It does not confer a general competence for the EU to regulate on any functional aspect of the internal market¹⁰⁸. The focus of Article 114 is not simply the existence of differences between national private laws, but, rather, the detrimental effects these laws may have upon the internal market¹⁰⁹.

¹⁰⁵ For a detailed discussion of these concepts, see M. Dougan, 'Minimum Harmonization and the Internal Market' (2000) 37 *Common Market Law Review* 853

¹⁰⁶ For a discussion of harmonisation, see M. Klamert, 'What we talk about when we talk about Harmonisation' (2015) 17 *Cambridge Yearbook of European Legal Studies* 360

¹⁰⁷ S. Garben, 'Confronting the Competence Conundrum: Democratizing the European Union through an Expansion of its Legislative Powers' (2015) 35 *Oxford Journal of Legal Studies* 55, 63

¹⁰⁸ Case C-376/98 *Germany v European Parliament and Council* [2000] ECR I-8419 para. 83 (known as the Tobacco Advertising Case)

¹⁰⁹ European Parliamentary Research Service Rafal Mańko, 'EU Competence in Private Law: The Treaty framework for a European private law and challenges for coherence' PE 545.711 (2015)

In recent years, Article 114 has been a focal point of conflict between internal market and non-trade objectives, leading to questions about the reasonable scope of EU competence¹¹⁰. Inevitably, animal welfare legislation has played a role in such discussion and harmonisation and a small body of case law has demonstrated the approach of the CJEU to the subject. Those in favour of stronger animal welfare legislation have argued that the European approach to harmonisation is designed to create an efficiently functioning market – and profit – rather than being truly concerned with welfare. As a result, some member states have attempted to introduce legislative measures additional to those set out in the directives which have met opposition from those championing free movement of goods. It is important, therefore, to next consider Article 114, in combination with Article 36, which requires various formidable conditions to be fulfilled, prior to any alternative, national standard being permitted¹¹¹.

2.3.5 TFEU Articles 34, 35 and 36

Given that the fundamental philosophy of EU trade is the uninhibited movement of goods across borders¹¹², the implementation of barriers to trade by individual member states is expressly prohibited. Member States will sometimes elect to adopt national legislation which aims to protect a particular principle or issue of social / cultural importance and although it may not initially appear to be the case, such measures may ultimately be viewed by the EU as creating barriers to free trade, leading to legal challenge.

Following the sections of the Treaty which create a customs union¹¹³, Articles 34 and 35 TFEU articulate the prohibition of ‘quantitative restrictions’ and ‘measures having equivalent effect’ with respect to imports and exports whilst Article 36 sets out the permitted derogations which pertain to them¹¹⁴.

¹¹⁰ For an interesting discussion on the role of Article 114 and public health legislation, see A. Abaquesne de Parfouru, ‘Choking smokers, don’t you think the joker laughs at you’: European Union competence and regulation of tobacco products packaging under the new Tobacco Products Directive’ (2018) 25 Maastricht Journal of European and Comparative Law 410

¹¹¹ Article 114 permits member state action via Article 36 derogations or in the protection of the environment / working environment

¹¹² Free movement of goods is enshrined in Articles 28 and 29 TFE

¹¹³ TFEU (n 4) Chapter One, The Customs Union, Articles 30-32 and Chapter Two, Customs Cooperation, Article 33

¹¹⁴ Catherine Barnard, *The Substantive Law of the EU: The Four Freedoms*, (Oxford University Press 2013) 71

Quantitative restrictions are defined as *'measures which amount to a total or partial restraint of, according to circumstances, imports, exports or goods in transit'*¹¹⁵ and can result from statutory provision or administrative protocols¹¹⁶. Quantitative restrictions are generally easily detected and therefore occur relatively rarely¹¹⁷. Measures having equivalent effect have a broader scope and can be any type of regulation which is deemed to hinder trade.

The Court of Justice of the European Union's interpretation is as follows: *'All trading rules enacted by Member States which are capable of hindering, directly or indirectly, actually or potentially, intra-Community trade are to be considered as measures having an effect equivalent to quantitative restrictions'*¹¹⁸

Article 36 TFEU provides the conditions under which derogations from Articles 34 and 35 can be permitted and confirms that barriers to trade may be justifiable with respect to certain national concerns:

*'The provisions of Articles 34 and 35 shall not preclude prohibitions or restrictions on imports, exports or goods in transit, justified on grounds of public morality, public policy or public security; the protection of health and life of animals, humans or plants.....Such prohibitions or restrictions shall not, however, constitute a means of arbitrary discrimination or a disguised restriction on trade between Member States'*¹¹⁹.

Although the protection of health and life of humans, animals and plants is the most commonly cited justification utilised by Member States to advocate obstacles to the free movement of goods (goods including animals)¹²⁰, additional basic rules apply; principally that any adopted measures must be proportionate, in other words no more than is necessary to fulfil the health and life protection requirement. In addition, any measures must be supported by relevant research and evidence¹²¹.

¹¹⁵ Case 2/73 *Geddo v Ente Nazionale Risi* [1973] ECR 865

¹¹⁶ European Commission, 'Free Movement of Goods, Guide to the Application of Treaty Provisions governing the free movement of goods' (2010) 11

¹¹⁷ Damien Chalmers, Gareth Davies and Giorgio Monti, *European Law*, (2nd edn, Cambridge University Press 2010) 746

¹¹⁸ Case 8/74 *Procureur du Roi v. Dassonville* [1974] ECR 837

¹¹⁹ TFEU (n 4) Article 36

¹²⁰ European Commission, 'Free Movement of Goods' (n 114) 27

¹²¹ Case C-270/02 *Commission v Italy* [2004] ECR 1559; Case C-319/05 *Commission v Germany* [2007] ECR I-9811.

2.3.5.1 Health and life versus welfare

It is important to note that the protection justification refers to ‘the health and life of animals’, not animal welfare. Whilst the ‘health and life protection’ measure has been considered in case law (see below), it is currently unclear whether protection of animal welfare will be judged by the European Court to fall into the category of ‘health and life’. Whilst it can be argued that millions of farm animals are maintained in relatively good health, with their lives sustained, many are nonetheless subjected to living conditions with multiple areas of welfare compromise which are detrimental to their quality of life (an animal can be ‘healthy’ but deprived of good welfare, for example, experiencing surgical mutilation without anaesthesia or analgesia). In light of this, it might be suggested that the concept ‘health and life’ could relate to animal welfare. In addition, there are numerous examples of welfare compromises which can be damaging to animal health and therefore animal welfare may yet be successfully cited as justification for national measures. However, to date, the CJEU has not permitted Member States to rely upon Article 36 as justification for barriers to trade on the grounds of animal welfare.

There is a small but significant body of case law relating to Article 36 and animal welfare; two key cases in this field (which pertain to member states exports) and one case (pertaining to imports) are summarised, below, with some additional discussion on the key concepts contained therein.

2.3.5.2 ‘Compassion in World Farming’ ECR I-1251 (exports)

The Compassion in World Farming (hereafter *CIWF*) case¹²² of 1998 concerned the exportation of calves from the UK and the animal welfare concerns surrounding their subsequent European rearing conditions.

CIWF, finding the European veal-crate production system detrimental to animal welfare, sought to secure a ban on the export of British calves to Member States employing such systems (which were prohibited in the UK¹²³). Minimum provisions for

¹²² C-1/96 *R v. Minister of Agriculture, Fisheries and Food, ex parte Compassion in World Farming (CIWF)* [1998] ECR I-1251

¹²³ House of Commons Library Research Paper 00/11, ‘The Export of Farm Animals Bill, Bill 20 of 1999-2000 (2 February 2000) 9 – the United Kingdom banned veal crates in 1990, under The Welfare of Calves Regulations 1987, SI 2021

calf protection were enshrined in Directive 91/629/EEC¹²⁴ but the United Kingdom had introduced higher animal welfare standards, in line with the Directive (which allowed Member States to apply stricter welfare provisions on their own territory¹²⁵) and in light of the European Convention on the Protection of Animals Kept for Farming Purposes and the Recommendation Concerning Cattle¹²⁶. The UK had banned restrictive veal crates for rearing calves and public opposition to the system was widespread, with vocal campaigns to stop exportation of British calves for rearing to slaughter in these crates. This case highlighted, therefore, a situation whereby Member States could be entirely compliant with the EU directive but not with animal welfare standards advocated by the Convention and Recommendation¹²⁷.

Requesting that the UK government ban the export of calves to countries with lower welfare standards, CIWF argued that the European veal-crate system was inhumane and immoral, citing public opinion and veterinary science¹²⁸. The case was ultimately referred to the CJEU, following the assertion of the UK minister that it was not within his power to adopt a ban and he was not minded to introduce any such measure.

The principle question for the court to consider was whether an export ban would constitute a quantitative restriction and, if so, could Article 36¹²⁹ be relied upon to ban calf export, on the grounds of public morality, public policy or the health and life of animals (or, indeed, all three)?

The proposed ban was deemed to be a quantitative restriction; the Court stressed that, wherever possible, the internal market in beef and veal should not be adversely

¹²⁴ Council Directive 91/629/EEC laying down minimum standards for the protection of calves [1991] OJ 340/28 now superseded by Council Directive 2008/119/EEC of 18 December 2008 laying down minimum standards for the protection of calves [2009] OJ L 10/7

¹²⁵ (ibid) Article 11 (2) 'Member States may, in compliance with the general rules of the Treaty, maintain or apply within their territories stricter provisions for the protection of calves than those laid down in the directive'

¹²⁶ European Convention on the Protection of Animals Kept for Farming Purposes (ETS 87, 1976) approved by EC decision 78/923/EEC of 19 June 1978 (OJ 1978 L 323 p.12) and Standing Committee's 1998 Recommendation Concerning Cattle, 21 October 1988

¹²⁷ In fact, the Directive cites the Convention but fails to implement its standards. Article 6 (3) of the Recommendation states 'Where tethers or ties are used, they shall not cause injury or distress, especially when the cattle are lying down, getting up, drinking and feeding. The animals referred to in the appendices should be able to see and touch other cattle. Whenever possible they should also be able to show social investigation and behaviour associated with the maintenance of social structure'. Traditional veal crates which were the subject of this case did not permit fulfilment of these criteria

¹²⁸ *CIWF* (n 122) para 29 (g)

¹²⁹ ex Article 30 EC

affected by Member State regulations¹³⁰ and advised that national measures which curtail free trade contradicted market organisation. With respect to the Convention and Recommendation, these were deemed as non-binding and advisory¹³¹. The Court also commented that although Member States could adopt stricter welfare rules¹³² any derogation could only be applied on home territory; in addition, any derogation had to comply with all provisions set down in the Treaties.

The Court also stated that the directive set down 'exhaustively common minimum standards'¹³³ and the application of stricter national rules¹³⁴ did not prevent exhaustive harmonisation of the field of law¹³⁵; thus, recourse to Article 36 was unavailable¹³⁶. In fact, the Court stated that the proposed export ban would '*strike at the harmonisation achieved by the Directive*'¹³⁷. In effect, the Court said that the directive had implemented a uniform minimum standard of welfare across the Union which was already accepted by Member States (who had approved the measures via the democratic process). Various commentators have described this approach as 'pre-emption'¹³⁸, a complex concept which lies out-with the scope of this thesis but refers to the boundary between national and EU law-making, under which exceptions under Article 36 are not permissible because the EU legislation is viewed (by the EU) as having pre-empted them¹³⁹. This ruling is problematic, because the Directive only ever set minimum standards; in fact, it permitted Member States to implement higher welfare standards if they wished. However, *CIWF* confirms the Court's ease with finding full harmonisation of a directive (thus restricting recourse to Article 36). The

¹³⁰ *CIWF* (n 122)

¹³¹ *ibid*, paras 32 and 34 – the Court held that the provisions in the Convention and Recommendation were indicative only

¹³² Citing Case C-141-3/81 *Holdijk and Others* [1982] ECR 1299, 14 – here, unilateral rules would only be acceptable if they were applicable to national market *and* export market calves; in addition, this case was heard prior to the creation of the community directive and therefore before any animal protection regulation was in place

¹³³ *CIWF* (n 122) para 56

¹³⁴ Under Article 11(2) of the Directive

¹³⁵ *CIWF* (n 122) para 63

¹³⁶ *ibid* 47

¹³⁷ *CIWF* (n 122) para 62

¹³⁸ For a detailed exploration of the concept of pre-emption in the European Union, see Amadeo Arena, 'The Doctrine of Union Pre-emption in the EU Internal Market: Between Sein and Sollen' (2011) 17 *Columbia Journal of European Law* 477. For an interesting discussion of shared competences and pre-emption see Robert Schütze, 'Supremacy without Pre-Emption? The very slowly emergent doctrine of Community pre-emption' (2006) 43 *Common Market Law Review* 1023. See also Dougan (n 109)

¹³⁹ G. van Calster, 'Export Restrictions – a watershed for Article 30' (2000) 25 *European Law Review* (4) 335, 342

Court elected to prioritise and protect the smooth running of the internal market¹⁴⁰ and demonstrated an unwillingness to sanction unilateral action on the part of Member States.

The *C/WF* judgment did not facilitate exploration of animal health and life in relation to welfare as a justification for barriers to trade; the Court did, however, acknowledge the strength of public opinion and the element of public morality with respect to animal welfare. Nonetheless, the Court firmly rejected public opinion as justification for unilateral challenge to a Community measure¹⁴¹.

2.3.5.3 'Hedley Lomas' ECR I-2553 (exports)

The second judgment to consider with reference to Article 36 and animal welfare preceded *C/WF* but the Court's view was consistent in both. '*Hedley Lomas*'¹⁴² concerned the granting of licences for exportation of sheep for slaughter, from the United Kingdom to Spain. The Spanish Society for the Protection of Animals presented evidence of violations of the directive's pre-slaughter stunning requirements¹⁴³ in Spanish slaughterhouses¹⁴⁴ to the Minister of Agriculture for England and Wales; in light of the evidence, the minister refused to issue export licenses to Hedley Lomas Ltd.

The CJEU was asked if an export ban – an Article 35 quantitative restriction on exports – was justifiable based upon Article 36 derogations; the British government argued that, since the directive neither set measures for monitoring compliance nor set penalties for violations, the directive had not exhaustively harmonised this legal field, therefore allowing Article 36 to be invoked.

As in *C/WF*, the Court focused on defining the export ban as a quantitative restriction and confirmed that Article 36 was not applicable under circumstances when 'community directives provide for harmonisation of the measures necessary to achieve the specific objective which would be furthered by reliance upon this provision'¹⁴⁵. This

¹⁴⁰ *C/WF* (n 122) para 53

¹⁴¹ *ibid*, para 67

¹⁴² Case C-5/94 *R v Ministry of Agriculture, Fisheries and Food, ex p Hedley Lomas (Ireland) Ltd* [1996] ECR I-2553

¹⁴³ Under the slaughter directive at that time, Council Directive 74/577/EEC on stunning of animals before slaughter [1974] OJ L 316/10

¹⁴⁴ *ibid*, 7

¹⁴⁵ C-5/94 *Hedley Lomas* (n 142) para 18

indicated that the application of Article 36 can only take place where harmonisation is absent. The Court found that the harmonising legislation and the United Kingdom ban on exports shared a common aim – animal protection¹⁴⁶. However public morality and public opinion were not cited in this case and were not addressed in the Court's judgment.

Hedley Lomas was consistent with the Court's *CIWF* view that the existing directives had fully harmonised the relevant field of law, thus dismissing any recourse to Article 36. The Court's ruling also suggested a general resistance to Member States taking extra-territorial action to protect animal welfare and a prioritisation of maintaining trade.

2.3.5.4 Red Grouse ECR I-2143 (imports)

The *Gourmetterie Van Den Burg* case¹⁴⁷, commonly referred to as 'Red Grouse', saw the prosecution of a Dutch game trader for selling red grouse¹⁴⁸ in violation of Dutch law¹⁴⁹. Inspectors found and confiscated a red grouse carcass from the *Gourmetterie* premises which had been shot in the UK. European Council Directive 79/409¹⁵⁰ prohibited the sale of certain protected species; however, under specific circumstances, the directive allowed killing of certain types of bird. The applicant asserted that the Dutch rules, which prohibited importation of the grouse (legally killed in UK territory), were in breach of Article 34¹⁵¹ and therefore "a measure having an effect equivalent to a quantitative restriction".

The case was referred to the CJEU for their opinion as to whether the import ban could, in contravention of Article 34, be permitted under Article 36¹⁵² as justified in protecting the health and life of animals.

¹⁴⁶ *ibid*, 18: The Court also deemed that the directive's lack of provision for monitoring compliance and penalties for breaches had no effect on the full harmonisation of the law and, further, that the lack of these provisions was largely irrelevant – there is an obligation for Member States to trust each other with respect to application and enforcement of the law, 19

¹⁴⁷ C-169/89 *Gourmetterie Van den Burg* [1990] ECR I-02143

¹⁴⁸ A. Porges, D. Geradin and D. Bethlehem, 'Judgments of the Court of Justice of the European Communities', in Cairo A. R. Robb (ed) *International Environmental Law Reports, Volume 2, Trade and Environment* (Cambridge University Press 2001) 561

¹⁴⁹ Vogelwet, The Netherlands Law on Birds, 1937 (Article 7) preventing grouse being purchased or sold within the Dutch market

¹⁵⁰ Council Directive (EEC) 79/409 on the Conservation of Wild Birds [1979] OJ L 103/01, now superseded by Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds, OJ L 20/7

¹⁵¹ Ex Article 28 TEC

¹⁵² Ex Article 30 TEC

The Court maintained its position, adopted in the *Dansk Denkvit Case*¹⁵³, stating that a Directive which provided for full harmonisation of national law removed Member State recourse to Article 36¹⁵⁴ and advised that the Directive¹⁵⁵ had exhaustively regulated Member States' ability to legislate on the matter. National measures stricter than the directive's provisions could only apply to bird species on home territory¹⁵⁶. Article 36 could not be relied upon; the national import ban was not justifiable in terms of a non-native bird, found in another Member State where it could be legally hunted according to the Directive¹⁵⁷ and therefore the national measure was incompatible with community law¹⁵⁸ and free movement of goods.

Commentators have struggled to understand the reasoning underlying this judgment¹⁵⁹, for several reasons. Firstly, Article 14 of the Directive provides that Member States may introduce stricter protective measures than the baseline measures in the Directive, but no specific instruction is provided in terms of territoriality. In fact, the wording of the Article gives no indication of any restrictions upon its application¹⁶⁰. In addition, the ability to legislate more strictly, to safeguard avian welfare, seemingly contradicts the Court's judgment that the Directive had fully harmonised legislative provisions¹⁶¹.

The opinion of Advocate General Van Gerven¹⁶² offered an interpretation that was at least consistent with the general CJEU approach of protecting free movement of goods. In his view, the case ultimately concerned a member state's attempt to protect the interests of a bird which was found entirely within the territory of another Member State; the Advocate General rejected extra-territorial action on the part of a Member State in this scenario, finding it inconsistent with the Directive's aims. However, it is important to recognise that the Dutch legislators aim here was not to protect the Dutch

¹⁵³ C-29/87 *Dansk Denkvit v Danish Ministry of Agriculture* [1988] ECR 2982

¹⁵⁴ *ibid*, par. 8

¹⁵⁵ Council Directive (EEC) 79/409 (n 150) via Article 14 which states: 'Member States may introduce stricter protective measures than those provided for under this Directive'

¹⁵⁶ C-29/87 (n 153) 12

¹⁵⁷ *ibid*, 16

¹⁵⁸ Dougan (n 109) 872

¹⁵⁹ *ibid*, 872 - see also Christine Janssen, *The Principle of Mutual Recognition in EU Law* (Oxford University Press 2013) 96

¹⁶⁰ W. P. J. Wils, 'The Birds Directive 15 years later: A survey of the case law and a comparison with the habitats directive' (1994) 6 *Journal of Environmental Law* (2) 219, 240

¹⁶¹ Exhaustive regulation is discussed, below

¹⁶² Opinion of Advocate General Van Gerven delivered on 20th March 1990, Case C-169/89 ECR I-02143

state's own economic or trade interests, but rather to further environmental protection. It might be argued that the objective of the Netherlands was a protective role with respect to grouse welfare by ensuring their state played no part in either the killing of a certain avian species or being associated with its sale. Nonetheless, any such aim was not accepted as justification for restrictions and with this judgment, *Red Grouse* set a concerning precedent for animal protection regarding extra-territorial action to protect the health and life of animals within a Member State.

2.3.5.5 Case Law Discussion

The trilogy of cases, above, were all heard by the CJEU over twenty years ago and it is clear that science, public morality and policymaking with respect to animal welfare have developed significantly in scope and knowledge during that period. However, the approach of the Court is important, because it indicates the tension between free movement of goods and Member States' concerns regarding animal welfare. A brief discussion follows, which considers two of the difficult concepts raised in these cases that have, to date, limited the ability of Member States to take unilateral action to protect welfare.

Harmonisation and Exhaustive Regulation

A detailed examination of the concept of harmonisation lies beyond the scope of this thesis; however, in order to understand CJEU rulings on animal welfare cases, it is important to acknowledge the legislative approach adopted by the EU with harmonisation and consider some issues associated with its interpretation and application.

Harmonising directives form the backbone of animal welfare law in the EU and harmonisation is 'the replacement of national laws by a common Union-wide law'¹⁶³. Article 228 of the TFEU provides for the establishment of harmonised goals, but leaves flexibility for Member States as to the achievement of these goals¹⁶⁴. The aim of this legislative framework is to ensure that the internal market functions smoothly¹⁶⁵, by minimising variation in production methods or produce, thus preventing interference

¹⁶³ Damien Chalmers, Gareth Davies and Giorgio Monti, *European Union Law*, (2nd Edn, Cambridge University Press, 2010) 675

¹⁶⁴ Article 228, TFEU

¹⁶⁵ R. Sefton-Green, 'Multiculturalism, Europhilia and Harmonization: Harmony or Disharmony?' (2010) 6 *Utrecht Law Review* (3) 50

with free trade¹⁶⁶. When an area of law is deemed to be totally harmonised, the European Union sets both the baseline standard and also an upper level of permitted protection¹⁶⁷. The term 'exhaustive regulation' has often been confused with harmonisation – it describes the scenario whereby an area of law has been fully defined by EU legislation, thus totally pre-empting any measures by Member States in that field. Exhaustive regulation is analogous to total harmonisation. However, the the CJEU has, on occasion, ruled that Directives have exhaustively regulated their given field, despite the presence of minimum harmonisation only.

Recent European law-making has favoured a model whereby some national, cultural diversity can be maintained: the system of minimum harmonisation which features in animal welfare Directives. This provides for the setting of a legislative baseline by the EU, i.e. the minimum standard which is acceptable within the Union. Under this approach, Member States are required to ensure their products and production methods are compliant with the baseline standards, but can, if they wish, implement stricter national standards¹⁶⁸. This allows member states to create legislation in the 'gap' between the minimum standard and the maximum allowed within the confines of treaty law. A Member State's freedom to legislate for improved animal welfare standards is not only beneficial to the national herd or flock - it is also possible that the decision by certain Member States to implement stricter animal welfare standards may ultimately encourage and lead to European cultural change and further EU-wide improvements in welfare.

It is important to note that, since higher welfare standards generally cost more to implement, their implementation can prove financially detrimental to farmers more concerned about animal welfare¹⁶⁹. Minimum standards ensure the baseline production cost for a given animal product and regrettably, in light of the financial difficulties faced by many producers, are often as far as producers will go in terms of animal welfare. In addition, the higher costs associated with higher welfare production

¹⁶⁶ Dougan (n 109) 854

¹⁶⁷ Paul Craig and Grainne De Búrca, *EU Law: Text, Cases and Materials* (4th Edn, Oxford University Press 2008).

¹⁶⁸ Dougan (n 109), 855

¹⁶⁹ H.L.I. Bornett, J.H. Guy and P.J. Cain, 'Impact of animal welfare on costs and viability of pig production in the UK' (2003) 16 *Journal of Agricultural and Environmental Ethics* (2) 163, 182

systems often damage the competitive ability of the farmers¹⁷⁰. In addition, by creating ‘tiers’ of welfare, research may be rendered meaningless, if data and findings are not universally applied to the benefit of all animals in a particular species group.

Discussion

With reference to harmonisation, the three cases discussed, above, demonstrate the Court’s view that each relevant Directive had provided complete harmonisation of the particular legal field. This proves extremely problematic for Member States that wish to enforce extra-territorial measures designed to protect the welfare of animals, since recourse to Article 36 is automatically precluded in the face of complete harmonisation¹⁷¹.

In *Red Grouse*¹⁷² it was the Court’s view that the relevant Directive¹⁷³ had exhaustively regulated Member States’ ability to protect wild birds. The Court specifically referenced Article 14 of the Directive which allows higher welfare standards to be adopted. The Court held that the Directive had fully harmonised all relevant legislation. Bearing in mind that Article 14 allows the creation and enforcement of welfare standards which exceed minimum EU community standards, it can be argued that since national competence to legislate remains, exhaustive regulation cannot have occurred. In addition, no upper limit of welfare protection has been provided by the EU; thus, community law fails to address this limit and complete harmonisation cannot be found. Of significant interest in this case, the Opinion of Advocate General Van Gerven¹⁷⁴ revealed a finding of incomplete harmonisation – the Advocate General commented that ‘it is only when...directives...make provision for the full harmonisation of all the measured needed to ensure the protection of human and animal life and health and institute Community procedures to monitor compliance therewith, that recourse to Article 36 ceases to be justified’¹⁷⁵.

¹⁷⁰ C. Hubbard, M. Bourlakis and G. Garrod, ‘Pig in the Middle – Farmers and the delivery of farm animal welfare standards’ (2007) 109 *British Food Journal* (11) 919. See also J. McInerney, ‘In what sense does animal welfare have an economic value?’ (2016) 6 *Veterinary Ireland Journal* (4) 218

¹⁷¹ Case C-5/94 *Hedley Lomas* (n 142) para 68

¹⁷² Case C-169/89 *Gourmetterie van den Burg* (n 147)

¹⁷³ Directive 74/409/EEC

¹⁷⁴ Case C-169/89 (n 147) Opinion of AG Van Gerven [3] Note that the Advocate General cited Case 227/82 *Officier Van Justitie v. Leendert Van Bennekom* [1983] ECR I-3883. A detailed discussion of the issues in *Van Bennekom* lies out-with the scope of this thesis but it is somewhat regrettable that *Van Bennekom* was not cited in the three animal welfare cases being discussed

¹⁷⁵ *ibid* para 35

In *Hedley Lomas*¹⁷⁶, the Court found that complete harmonisation of law was present, despite a lack of provisions on compliance or penalties for breach in the relevant Directive¹⁷⁷. There was no recourse to Article 36, since the Member State measure (ban on exports) shared an identical aim with the community Directive, protection of animal welfare. The Directive was deemed to have harmonised all necessary measures to protect animals. Unlike *Red Grouse*, the relevant Directive did not provide the opportunity for national adoption of higher welfare standards (since slaughter welfare provisions are largely uniform and standardised) and the Court did not address the concept of complete harmonisation. However, it could be argued that, since Member States retain the ability to regulate for religious slaughter¹⁷⁸, again, the EU has not provided an upper limit for protection, and therefore complete harmonisation cannot be found. In addition, there is no harmonisation of compliance or breach provisions since none are contained in the legislation. Further, since these provisions are absent from the Directive, it seems difficult to argue that the field of law has been exhaustively regulated by the Community. Notably, Advocate General Léger was of the opinion that Article 36 was applicable in this case, contrary to the Court's findings¹⁷⁹. In identifying an absence of complete harmonisation of animal protection, the Advocate General commented that a complete framework of legislation had not been created, since no Community measures were in place to monitor compliance with the law¹⁸⁰. In addition, he stated that '*if harmonisation is only partial or if the Directive confers on Member States national powers to apply it or introduce measures of control, Articles 36 and 100 of the Treaty can apply.....*'¹⁸¹. It is again regrettable that the Court did not consider this interpretation and offer the applicants scope to explore their proposed animal protection measures under Article 36.

Harmonisation was considered in *CIWF* with reference to the Calves' Directive¹⁸² and also with respect to transitional periods for the adoption of the Directive's regulations.

¹⁷⁶ Case C-5/94 *Hedley Lomas* (n 142)

¹⁷⁷ Slaughter directive (EC) 74/577/EEC (n 143)

¹⁷⁸ *Ibid* (4)

¹⁷⁹ Case C-5/94 *Hedley Lomas* (n 142) Opinion of AG Léger para 15

¹⁸⁰ *ibid* para 20

¹⁸¹ Case C-5/94 *Hedley Lomas* (n 142) Opinion of AG Léger, para 15

¹⁸² Directive 91/629/EEC (n 124)

In setting out 'exhaustively common minimum standards'¹⁸³ the Directive was found to have fully harmonised the field. In addition, the Court held that the temporary derogations (allowing time for implementation of the Directive's aims) had been laid down exhaustively¹⁸⁴. With reference to harmonisation; if full harmonisation of the legal field is present, a standard for calf husbandry should be in force, with minimum and upper levels of protection defined by Community law. However, this model is not present.

More than the two preceding cases, *CIWF* highlights the linguistic and conceptual difficulties which have arisen in the discussion of harmonisation and exhaustive regulation. In effect, the Court has argued that a Directive which sets out minimum standards has exhaustively regulated the relevant field of law¹⁸⁵. As previously discussed, the model of total harmonisation is not only inappropriate for animal welfare legislation (since it would require uniform standards and specified minimum and maximum standards of protection) but more importantly, it is not found in Community animal welfare law. The majority of Directives set out minimum standards only, precisely to allow member states some flexibility to legislate at their desired levels. With respect to exhaustive regulation, the Community must provide regulation of the legal field to 'the exclusion of national regulators' – this cannot apply to the Directives discussed, since Member States have the autonomy to select their own upper level of animal welfare protection¹⁸⁶.

Somewhat surprisingly, Advocate General Léger concurred with the Court's findings in *CIWF*¹⁸⁷, and found on this occasion that complete harmonisation was present. He commented that the purpose of the Directive was to harmonise Member States' legislation in the field, 'even if it results in a level which is considered too weak'¹⁸⁸. His opinion does not, however, fully address the issue of variation in national upper levels of protection.

¹⁸³ *CIWF* (n 122) para 56

¹⁸⁴ *ibid* para 57

¹⁸⁵ For additional discussion of this paradoxical finding, see G. Van Calster (n 139) 344

¹⁸⁶ Robert Schütze, 'From Dual to Cooperative Federalism: the Changing Structure of European Law' (Oxford University Press, Oxford, 2009) 196

¹⁸⁷ *CIWF* (n 122) Opinion of Advocate General Léger

¹⁸⁸ *ibid* para 56: the Advocate General commented that the claim the animal protection level was too low was not evidence of incomplete harmonisation

With respect to transitional periods, however, the Advocate General was of the opinion that, until the transposition date, since certain Member States would be rearing calves in conditions contrary to the Directive, Member States should be able to adopt national protection measures under Article 36¹⁸⁹. Here, the Advocate General is arguing that complete harmonisation cannot be present until the date the Directive comes into force, since until that point, various standards of calf husbandry will be present. Article 36 could, therefore apply. However, even after the Directive is in force, whilst a European-wide minimum standard of welfare exists, Community law will not provide a defined upper level of protection.

Notwithstanding the intricacies and complexity of this area of EU law, it is clear that the tendency of the Court of Justice is to favour a finding of complete harmonisation and therefore prevent recourse to Article 36. Export bans are clearly deemed unjustifiable barriers to trade and in light of the case law discussed, above, it is likely that future attempts to ban exports would be found unlawful and seen as protectionism.

2.4 EU Farm Animal Welfare Legislation

At present, the majority of EU legislation relating to farm animal welfare exists in the form of Directives (although some Regulations are also in place). These Directives bind the Member States to specific objectives to be achieved but allow each national government to elect their own means by which to accomplish them¹⁹⁰. Each legislative instrument confirms the legal authority for the measures being introduced and sets out the relevant area of European competence. There is a smaller body of farm animal welfare legislation in the form of Regulations: these are binding and directly applicable in the Member States; at the moment they enter into force, they automatically form part of national law¹⁹¹.

¹⁸⁹ *CIWF* para 67. The concept that a Directive is unable to remove recourse to Article 36 during a transposition period was demonstrated in Case 35/76 *Simmenthal SpA v Ministero delle Finanze italiano* [1976] ECR 1871 and also Case 29/87 *Dansk Denkavit v Danish Ministry of Agriculture* [1988] ECR 2982

¹⁹⁰ TFEU (n 4) Article 288

¹⁹¹ See for example EU Regulation 1305/2013 (n 84) Article 90 which states '*This Regulation shall enter into force on the day of its publication in the Official Journal of the European Union. It shall apply from 1 January 2014. This Regulation shall be binding in its entirety and directly applicable in all Member States*'

The Incorporation of Animal Welfare Science in EU Law

In order to acknowledge and act upon the ongoing developments in animal welfare science and advances in husbandry, European Union farm animal legislation is subject to analysis, debate and, potentially, reform when new concerns or issues come to light.

The European Parliament's Intergroup on the Welfare and Conservation of Animals lies at the centre of the parliament's animal welfare discussion and debate¹⁹². The group focuses on current animal welfare concerns which are deemed to be the most serious and pressing, and provides a platform for welfare specialists, stakeholders, Commission and parliamentary members to confer and exchange opinions on a monthly basis. The group's work has initiated action on key welfare problems¹⁹³ and continues to bring the concerns of NGOs, consumers and welfare scientists to the forefront of European Parliamentary debate. Members of the group have enabled welfare initiatives (agreed by the Intergroup) to progress to ordinary procedures of the European Parliament.

Specialist scientific input is central to the various discussions which take place between EU institutions and animal welfare campaigners / NGOs; prior to the creation of the European Food Standards Agency (EFSA), the independent Scientific Committee on Animal Health and Welfare (SCAHAW) advised the EU on matters of welfare, its members being leading welfare and animal health scientists. Today, the EFSA works as an independent authority, with a specialist committee assessing the latest scientific research findings as well as carrying out food chain risk assessments. The EFSA's panel on Animal Health and Welfare (AHAW)¹⁹⁴ presents the Commission, European Parliament and Member States with scientific opinion, primarily on farm animal health and welfare; at present it has no mandate to advise on cultural or ethical elements of animal welfare but does offer advice on methods of reducing animal pain and suffering in the areas of husbandry, nutrition, transportation

¹⁹² Intergroup on the welfare and conservation of animals, <<http://www.animalwelfareintergroup.eu>> accessed 18 November 2021. This group is unrelated to Eurogroup for Animals, which is a pan-European animal welfare organisation - Eurogroup for Animals <<https://www.eurogroupforanimals.org/>> accessed 13 March 2021

¹⁹³ For example, the group was proactive in the European Union ban on marketing / trading in cat and dog fur as well as the ban on import / trading in seal products.

¹⁹⁴ EFSA Panel on Animal Health and Welfare, <<https://www.efsa.europa.eu/en/science/scientific-committee-and-panels/ahaw>> accessed 18 November 2021

and humane slaughter¹⁹⁵. Twenty two specialists make up the panel for the period 2018-21, of whom a majority are veterinary surgeons and others are animal welfare specialists. Across the EFSA, more than five hundred opinions have been passed since its creation in 2002 and over the last five years, animal welfare working groups have examined issues such as welfare indicators in dairy cattle, broiler chicken welfare assessment, poultry perches, meat inspection, poultry water bath stunning and sheep welfare.

Farm Animal Legislation within the EU legislative structure

When such legislation is created, the legal authority for the measures being introduced is identified in the opening recital – highlighting the relevant union objective, for example, the internal market or agriculture¹⁹⁶. Since welfare measures are included, but only as an adjunct to a primary economic objective (such as maintaining the functioning of the internal market) they do not, at present, form the primary motivation in policymaking. For example in the Calves Directive 2008/119/EC, the Recital confirms the keeping of calves as an agricultural practice, discusses smooth operation of the market and states that minimum standards are required to ensure ‘rational development of production’¹⁹⁷. Since there is no animal welfare title present in the Treaty, resort is commonly made to Article 37, under the Agriculture Title. Article 13 requires that full regard be paid to animal welfare in the creation of EU policy but this provision has not yet been tested with respect to welfare legislation. This is important because, as demonstrated by the public concerns surrounding Brexit and numerous EU barometer surveys, many consumers believe that the EU places animal welfare at the centre of farm animal production regulation but on closer examination, the welfare standards are of secondary importance, with smooth running of the Internal Market or CAP as the principal goal.

Despite the prioritisation of trade and the classification of animals as goods, the EU nonetheless dedicates significant resources to animal welfare – during the period 2000-2008, approximately 70 million euros per annum was committed to animal

¹⁹⁵ EFSA Newsroom, Catherine Geslain-Lanéelle, ‘EFSA’s Role in the European Food Safety System: Achievements and Challenges’ 22 May 2008

<<https://www.efsa.europa.eu/en/press/news/budapest080522>> accessed 18 November 2021

¹⁹⁶ As an example, Council Directive 2008/119/EC laying down minimum standards for calves is categorised as ‘agricultural’

¹⁹⁷ *ibid*, Recitals [4]-[6]

welfare measures; animal welfare payments to farmers under the European Agriculture Fund for Rural Development represented 71% of this budget, with the remaining 29% being utilised for policy making activities, such as research, training enforcement and education¹⁹⁸. The Food and Veterinary Office of the EU (FVO) functions as an executive agency of the Commission, whose role is to monitor the recognition and implementation of animal welfare legislation¹⁹⁹. For the 2014-2020 period, approximately €1.5 billion of EU rural development funds were allocated to “animal welfare payments” with a view to encouraging improved welfare standards that go beyond EU and national minimum requirements²⁰⁰. Given the CJEU rulings discussed, above, it must be assumed that any enhanced welfare standards will only be applicable on home territory and have no negative impact on free movement of goods.

In October 2017, the European Court of Auditors announced their intention to carry out the first audit focusing solely on animal welfare, to assess if the European Commission (along with member states) has effectively contributed to the farm animal welfare objectives set out by the EU²⁰¹. The focus of their investigation was (i) member state compliance in terms of minimum standards legislation and (ii) co-ordination of Common Agricultural Policy with animal welfare measures. The following year, their report was published²⁰² which concluded that a lack of compliance with minimum welfare standards persisted in some areas of various Member States and that CAP financial resources could be utilised to enable higher welfare standards in more effective ways²⁰³. Minimum welfare standards are the remit of EU directives therefore the chapter will now outline the remit of these directives and consider the extent to which they can ensure positive animal welfare.

Animal Welfare Regulations and Directives

¹⁹⁸ European Commission ‘Communication from the Commission to the European Parliament, The Council and the European Economic and Social Committee on the European Union Strategy for the Protection and Welfare of Animals, 2012-2105, COM 2012/06 FINAL, 3

¹⁹⁹ European Commission, Food and Veterinary Office Annual Report, 2008, 3

²⁰⁰ European Court of Auditors, ‘Special Report 31/2018: Animal Welfare in the EU: closing the gap between ambitious goals and practical implementation’, 13

²⁰¹ European Court of Auditors, ‘EU Auditors to examine Animal Welfare Measures’, 4 October 2017, <<https://www.eca.europa.eu/en/Pages/NewsItem.aspx?nid=8909>> accessed 21 September 2021

²⁰² European Court of Auditors (n 202)

²⁰³ *ibid*, 5

Despite the marked increase in awareness of farm animal welfare issues - in veterinary and behaviour sciences as well as in the minds of producers and consumers – the scope of current European legislation remains relatively limited, in particular given the numerous animal species which enjoy no specific protection under current EU law. At the time of writing, tens of millions of sheep, bovines (excluding veal calves), ducks and salmon are just some of the farmed animals whose welfare is not addressed with species-specific EU legislation. In addition, considering the millions of animals reared for food every year in the European Union, the legislation governing the keeping, transportation and slaughter of animals constitutes just five Directives and two Regulations²⁰⁴; nonetheless, the European Union has introduced some of the most significant animal welfare legislation in the world.

Detailed, below, is a brief overview of the current European Union legislative instruments relevant to farm animal welfare, husbandry, behaviour and veterinary care. There is currently a basic framework of provisions for welfare on-farm, during transportation and at the time of slaughter.

Whilst an in-depth analysis of each regulation is beyond the scope of this chapter, the aim is to provide discussion of each of the current directives with specific reference to an example for each of:

- One welfare provision prescribed by the legislative instrument
- One commonly utilised, contemporary farm animal production method or practice which has been scientifically demonstrated as incompatible with the instrument's animal welfare provision

By considering each instrument in turn, the chapter will demonstrate that despite the provisions contained therein, animal welfare remains compromised in many, currently legal, production systems.

2.4.1 Council Directive 98/58/EC of 20 July 1998 concerning the protection of animals kept for farming purposes

Directive 98/58/EC can be described as an 'umbrella' regulation which sets out basic general principles governing the protection of farmed animals, regardless of the

²⁰⁴ D. Simonin D. and A. Gavinelli., 'The European Union legislation on animal welfare: state of play, enforcement and future activities' in S. Hild S. and L. Schweitzer (eds), *Animal Welfare: From Science to Law* (La Fondation Droit Animal, Éthique e Sciences 2019) 60

species. The directive states that 'these rules apply to farmed animals destined for the production of foodstuffs, wool, skin or fur, or for other agricultural purposes, including fish, reptiles and amphibians'²⁰⁵ and these rules have their origin in the European Convention for the Protection of Animals kept for Farming Purposes²⁰⁶ and the Farm Animal Welfare Council's 'Five Freedoms'²⁰⁷. In keeping with the prioritisation of the internal market and trade, discussed previously, the Directive highlights the organisation and smooth running of the market but also contains the notable instruction that, with respect to the European Convention, the Community must give effect to its principles which 'include the provision of housing, food, water and care appropriate to the physiological and ethological needs of the animals, in accordance with established experience and scientific knowledge'²⁰⁸. Science is, therefore, entrusted to determine the welfare requirements of production animals; research advances into welfare should then facilitate the introduction of improved husbandry methods. In addition, the Directive requires Member States to 'make provision to ensure that the owners or keepers take all reasonable steps to ensure the welfare of animals under their care and to ensure that those animals are not caused any unnecessary pain, suffering or injury'²⁰⁹. Article five of the Directive allows for submission of recommendations for the Commission's consideration in the face of new scientific developments and requires the Commission to submit a report to the European Council every five years, setting out relevant scientific developments and proposed action in light of these developments. The main body of the directive sets out various basic husbandry principles including rules on housing, feeding, watering, movement and inspection of production animals.

²⁰⁵ Preamble to Council Directive 98/58/EC concerning the protection of animals kept for farming purposes OJ L 221 /23

²⁰⁶ European Convention for the protection of animals kept for farming purposes, 10th March 1976, OJ L 323, 17.11.1978

²⁰⁷ It is, however, important to note that Article 1(2) sets out various animals to which the Directive does not apply: experimental / laboratory, wild or invertebrate animals as well as animals involved in shows, competitions and cultural events. Given that many animals involved in shows are farm animals, this approach seems paradoxical. In addition, cultural events in some Member States are associated with serious animal welfare compromises (e.g. bull fighting or goose pulling) and therefore this provision basically permits violation of the very principles it seeks to uphold.

²⁰⁸ Council Directive 98/58/EC (n 207) Preamble

²⁰⁹ *ibid*, Article 3

Welfare Provision

‘Animals must be fed a wholesome diet which is appropriate to their age and species and which is fed to them in sufficient quantity to maintain them in good health and satisfy their nutritional needs. No animal shall be provided with food or liquid in a manner, nor shall such food or liquid contain any substance, which may cause unnecessary suffering or injury’²¹⁰.

Relevant Production System

The culinary delicacy known as foie gras (meaning ‘fatty liver’) is produced from the livers of force-fed geese and ducks. The European Union is responsible for 95% of the world’s foie gras production and the trade generates an annual intra-EU trade income of 100 million euros²¹¹. In 2020 the EU produced 19, 620 tonnes of foie gras, with France producing approximately 75% of this total²¹².

Foie gras production involves the force-feeding of ducks and geese which leads to development of a fatty liver (steatosis). Over a period of 2-3 weeks, a tube is passed into the bird’s oesophagus (gullet) two or three times daily to allow rapid administration of an abnormally large bolus of maize / fat²¹³. This process, known as ‘gavage’ in France, results in the development of a massively enlarged liver, as great as ten times the normal size, with a fat content in excess of 50%²¹⁴.

Young birds are housed in barns during the rearing stage, with some opportunity to access outdoor space, however they do not normally have access to open water which is a requirement for natural behaviour. During the period of force-feeding, birds are kept either in small groups, in cages, or (more commonly) singly, in a plastic or wire cage: in these single cages, birds cannot turn around or open their wings; their heads simply protrude through a small gap in the cage roof, and this facilitates the gavage process.

²¹⁰ Council Directive 98/58/EC (n 207) Annex, 14

²¹¹ Euro Foie Gras, Production < <https://www.eurofoiegras.com/en/the-production/>> accessed 20 October 2021

²¹² *ibid*

²¹³ Report of the Scientific Committee on Animal Health and Animal Welfare (SCAHAW), ‘Welfare Aspects of the Production of Foie Gras in Ducks and Geese’, adopted 16th December 1998

²¹⁴ ‘Foie Gras Factsheet’, Compassion in World Farming <<https://www.ciwf.org.uk/media/3818850/foie-gras-factsheet.pdf>> accessed 20 October 2021

A tube (15-25 cm) is placed into the bird's oesophagus²¹⁵ - this carries a risk of trauma and /or discomfort due to sudden and extreme distension of the soft tissues as well as the potential for pain²¹⁶. Oesophageal scarring, due to repeated trauma from thick metal tubes being passed during the force-feeding process, has been noted in studies and rough operator handling during force-feeding can exacerbate trauma to the oesophageal mucosal surface²¹⁷.

Ducks and geese differ anatomically from other birds in that they do not possess a crop (a muscular, stomach-like pouch for storage of food) and therefore the greatly increased volume of food, in conjunction with the insertion of the feeding tube, leads to abnormal stretching of the oesophagus, as well gastrointestinal inflammation²¹⁸.

Ducks and geese have a refined pain recognition system and a variety of pain receptors. They have evolved a gag reflex to prevent entry of fluids into the trachea. By its nature, force-feeding overcomes this reflex, and may cause distress or pain²¹⁹.

From a behavioural perspective, the manner of feeding does not allow normal prehension of food substrates – under free access feeding, birds would have the ability to assess food substrates using their beaks and voluntarily reject it or regulate the quantity ingested²²⁰.

Two or three times a day, birds undergo administration of around 450g of food per bolus – a significantly greater volume than would normally be ingested on a voluntary basis²²¹. Ducks used in foie gras production have a propensity for fat accumulation

²¹⁵ W. Skippon, 'The animal health and welfare consequences of foie gras production' (2013) 54 Canadian Veterinary Journal (4) 403

²¹⁶ J-M. Faure, D. Guémené and G. Guy, 'Is there avoidance of the force feeding procedure in ducks and geese?' (2001) 50 *Annales de Zootechnie* 2 157

²¹⁷ The Humane Society of the United States, 'Scientists and Experts on Force-Feeding for Foie Gras Production and Duck and Goose Welfare' (2012) Statement: Laura Siperstein-Cook, Avian Veterinarian (8) <<https://www.humanesociety.org/sites/default/files/docs/hsus-expert-synopsis-force-feeding-duck-and-geese-welfare.pdf>> accessed 22 October 2021

²¹⁸ SCAHAW (n 213)

²¹⁹ *ibid*, 35.

²²⁰ Y. Beck, 'Force-feeding of palmipeds and foie gras production: the global review of a choice made by society' (A. Stroud trans) Licence Interfacultaire en Environnement, Faculty of Sciences, Free University of Brussels (1994) 39. See, also, D. Guémené, G. Guy et al. 'Force-feeding procedure and physiological indicators of stress in male mule ducks' (2001) 42 *British Poultry Science* 650, which demonstrated that ducks whose force feeding was interrupted fasted for a period of three days (or longer) suggesting they had exceeded the point of satiety.

²²¹ The average daily consumption of feed for ducks is 15-200g per day C.D. Lacayanga, 'Effects of Different Levels of Madre de agua, Lead tree and Horseradish Fresh Leaf as Partial Replacement of Feeds on Egg Production Performance of Mallard Duck' (2015) 24 *International Journal of Sciences: Basic and Applied Research (IJSBAR)* (3) 74

within the liver²²² and force-feeding large volumes of high carbohydrate corn-based diet affects liver function due to fatty infiltration of the organ²²³; the force-fed diet stimulates pathology within the liver, the result of which is serious compromise of animal welfare and physical pain. In addition, birds are prone to secondary infections of the liver, musculoskeletal degeneration with bone fractures due to dietary deficiencies and lack of mobility and respiratory problems due to pressure on air-sacs from a grossly enlarged liver. It has also been observed that the legs of foie gras birds are often positioned more laterally (away from the midline of the body) and further apart than normal birds, due to expansion of the liver, leading to abnormal gait, impaired walking ability and problems rising to standing²²⁴.

It is interesting to note that these induced physiological abnormalities and health problems were highlighted by the EU's Scientific Committee on Animal Health and Animal Welfare in 1998, the same year that Directive 98/58/EC was passed. In light of the acknowledged awareness of animal welfare concerns surrounding foie gras production at that time, along with the research which has been carried out in subsequent years, it is perhaps surprising that more than twenty years later, the production system remains in place, despite clear scientific evidence that it violates the provisions of the Directive. However, foie gras is an extremely popular product and has been described as '*part of the cultural and gastronomic heritage of France*'²²⁵; given the Article 13 requirement for the EU and Member States to respect cultural traditions whilst formulating policy, this may be an issue that has previously been viewed as too sensitive to address.

Two key issues exist with this Directive. Firstly, using the example of foie gras production, it is clear that the views of welfare scientists were not adequately considered when creating the legislation. In addition, subsequent scientific evidence demonstrating that the traditional foie gras production system is detrimental to bird welfare has not led to amendment of the legislation. Although the Directive lacks any specific competence to ban systems which overtly compromise welfare, the current

²²² S. Davail, N. Rideau et al. 'Pancreatic hormonal and metabolic responses in overfed ducks' (2003) 35 *Hormone and Metabolic Research* (7) 439

²²³ Beck (n 220)

²²⁴ SCAHAW (n 213) 34

²²⁵ CIFO, Interprofession du Foie Gras, <<https://foiegras-factsandtruth.com/heritage/culture-and-gastronomy>> accessed 5 May 2022

provisions of the Directive should nonetheless be sufficient to end traditional foie gras production; the provisions clearly set out basic feeding requirements which foie gras production violates. This production system is well known across Europe and regulated nationally therefore its methods cannot be unknown to member state welfare authorities; this would suggest a lack of compliance with the Directive at Member State level and it is difficult to argue that the European Commission is not aware. Secondly, the Directive fails to specifically address surgical mutilations²²⁶ and makes no provision for protection for gamebirds such as pheasants and partridges²²⁷.

2.4.2 Council Directive 1999/74/EC of 19 July 1999 laying down minimum standards for the protection of laying hens

As discussed in Chapter One, by the 1970s, the majority of Europe's laying hens were housed in battery cages; the subsequent increase in scientific and consumer concerns regarding the welfare of hens in this type of production system led to extensive research into alternative housing and husbandry methods during the period from 1970 to 1990²²⁸. In light of this research, in 1986, the EU adopted Directive 86/113/EEC²²⁹ which set out minimum standards for the protection of battery hens' welfare, one of the first EU legislative instruments which made specific provisions in terms of husbandry²³⁰. However, as with any animal welfare system, scientific research was on-going²³¹ and, with greater understanding of hen welfare, came public and NGO pressure to further improve hen husbandry. The EU Scientific Veterinary Committee report of 1996 considered the various systems available for commercial housing of laying hens at that time, commenting that whilst every system carried benefits and

²²⁶ R. Horgan, 'Piglet Castration and EU Animal Welfare Legislation' (2006) 48 *Acta Veterinaria Scandinavica* S2

²²⁷ As discussed previously, Directive 98/58/EC excludes 'animals intended for use in competitions, shows, cultural or sporting events or activities', see Comment, 'Raising the game' (2008) 163 *Veterinary Record* (21) 609

²²⁸ M.C. Appleby, 'The European Union Ban on Conventional Cages for Laying Hens: History and Prospects' (2003) 6 *Journal of Applied Animal Welfare Science* (2) 103, 107

²²⁹ Council Directive 86/113/EEC of 25 March 1986 laying down minimum standards for the protection of laying hens kept in battery cages, OJ L 095/45

²³⁰ Appleby (n 228) 110. All European battery cages had to provide 450cm² space per hen, by January 1988

²³¹ See, for example, M.S. Dawkins and S. Hardie, 'Space Needs of Laying Hens' (1989) 30 *British Poultry Science* (2) 413, and T.G. Knowles and D. M. Broom 'Limb bone strength and movement in laying hens from different housing systems' (1990) 126 *Veterinary Record* 354. See also R-M. Wegner, 'Poultry Welfare - Problems and Research to Solve them' (1990) 46 *World's Poultry Science Journal* 19

faults, *'individual birds need more area for certain activities than the 450 cm²/bird currently required in battery cages'*²³².

In light of the Committee's report and national consultations, a new Directive was proposed by the Commission in 1998 and shortly afterwards, Directive 1999/74/EC²³³ was adopted. The Directive identified three different husbandry systems for laying hens - non-enriched (battery) and enriched cages and alternative systems²³⁴ - and phased out battery cages by 2012. All cages from 2012 (and all new cages from 2003) were required to provide 750cm² for each hen as well as a perch, next box and litter area to enable pecking and scratching.

Welfare Provision (Enriched cages)

'Laying hens must have:

*(c) litter such that pecking and scratching are possible'*²³⁵ - under Article 2 of the directive, litter is defined as *'any friable material enabling the hens to satisfy their ethological needs'*²³⁶.

Production System

The phasing-in of enriched cages introduced the requirement for access to litter, and as the Directive confirms, litter is necessary for fulfilment of certain ethological (behavioural) needs of laying hens²³⁷. Research demonstrated that non-enriched battery cages lacked foraging substrates (which encourage scratching and ground pecking²³⁸), resulting in overgrown claws and beaks²³⁹ with subsequent trauma from claws becoming caught in fixtures on cages²⁴⁰. The phenomenon of sham dust bathing

²³² Commission of the European Communities Directorate-General for Agriculture, Scientific Veterinary Committee. (1996) Report on the welfare of laying hens. Brussels VI/B/II.2, 110

²³³ Council Directive 1999/74/EC (n 92)

²³⁴ European Commission, Food Safety, Laying Hens, <https://ec.europa.eu/food/animals/animal-welfare/animal-welfare-practice/animal-welfare-farm/laying-hens_en> accessed 22 October 2021

²³⁵ Council Directive 1999/74/EC (n 92) Article 6 (c)

²³⁶ *ibid*, Article 2 (c)

²³⁷ D. L. M. Campbell, A. B. A. Ali, D. M. Karcher and J. M. Siegford, 'Laying hens in aviaries with different litter substrates: Behaviour across the flock cycle and feather lipid content' (2017) 96 Poultry Science 3824. See also C.A. Weeks and C. J. Nicol, 'Behavioural needs, priorities and preferences of laying hens' (2006) 62 World's Poultry Science Journal 296

²³⁸ D. C. Lay Jr, R. M. Fulton et al, 'Hen Welfare in Different Housing systems 1' (2011) 90 Poultry Science 278

²³⁹ P. C. Glatz, 'Claw abrasives in layer cages - a review' (2002) 1 International Journal of Poultry Science 1

²⁴⁰ R. Tauson, 'Health and production in improved cage designs' (1998) 77 Poultry Science 1820

had also been observed²⁴¹, where, in the absence of appropriate litter, hens perform repetitive wing movements (mimicking normal lifting of dust into the plumage) without the final stage of the dust-bathing sequence (movements to shake lipid saturated dust from the plumage). As well as the obvious detrimental effect upon plumage cleanliness and quality, lack of substrate is also believed to cause poor welfare.

The presence of small, loose particle litter allows dust bathing (particles can penetrate spaces between feathers and remove accumulated lipid) and also stimulates foraging behaviour, i.e. scratching and pecking. It has been demonstrated that hens are greatly motivated to forage, despite the presence of feedstuffs²⁴². Typical litter substrates include sand, peat and wood shavings²⁴³. Despite the Directive's provision to ensure litter adequate to satisfy hens' ethological needs, current research has highlighted failings in contemporary enriched cages.

Irrespective of the substrate provided, whether sand, straw or shavings, scientific studies have repeatedly demonstrated that with respect to foraging²⁴⁴, the current enriched cage system does not, generally, permit fulfilment of hens' ethological needs²⁴⁵. Firstly, there is some doubt as to whether a scratching area is actually utilised by the cage's occupants, since the relatively small surface area available may limit the ability of all the hens to access the area and perform the behaviour²⁴⁶. Group aggression and bullying due to limited space can also inhibit less dominant birds from accessing a scratching area.

²⁴¹ A. C. Lindberg and C. J. Nicol, 'Dustbathing in modified battery cages: Is sham dustbathing an adequate substitute?' (1997) 55 *Applied Animal Behaviour Science* 113

²⁴² C. E. S. Lindqvist, K. E. Schutz and P. Jensen, 'Red jungle fowl have more contrafreeloading than White Leghorn layers: Effects of food deprivation and consequences for information gain' (2002) 139 *Behaviour* 1195. See also Norma E. Bubier, 'The behavioural priorities of laying hens: The effect of cost/no cost multi-choice tests on time budgets' (1996) 37 *Behavioural Processes* (2-3) 225

²⁴³ Dr V. Sandilands, SRUC Technical Note, 'Laying Hens: Supplement to the Code of Practice', August 2014, p.4

²⁴⁴ Campbell (n 237)

²⁴⁵ J. J. Cooper and M. J. Albentosa, 'Behavioural priorities of laying hens' (2003) 14 *Avian and Poultry Biology Reviews* 127

²⁴⁶ M. C. Appleby, A. W. Walker et al, 'Development of furnished cages for laying hens' (2002) 43 *British Poultry Science* 489. See also: Farm Animal Welfare Council, Opinion on Enriched Cages for Laying Hens, November 2007, 9. There is also evidence to suggest that hens have a requirement for a reasonable amount of 'personal space' which they prioritise above group size and the ability for social recognition, see H. Blokhuis, T. G. C. M. van Niekerk and Werner Bessei, 'The Laywel Project: Welfare Implications of Changes in Production Systems for Laying Hens' (2007) 63 *World's Poultry Science Journal* 1

In addition, with reference to dust bathing, whilst multiple daily litter applications in enriched cages were shown to have some positive impact on the frequency of dust bathing behaviour, hens studied in this system still demonstrated deficits in typical behaviour specific to their species. The size of recommended dust bathing mats currently utilised has also been found to be inadequate for welfare purposes²⁴⁷.

In their opinion on enriched cages²⁴⁸, the Farm Animal Welfare Council cited research from LayWel²⁴⁹, a research project funded by the European Commission and several member states, which examined the effect of various husbandry systems on the welfare of laying hens; LayWel found that enriched cages carry a medium risk of poor welfare for foraging and dustbathing behaviours as well as feather loss, mortality through cannibalism and feather loss.

Whilst the current Directive was intended to address welfare problems seen with the now-obsolete battery cage system, ample scientific evidence exists to confirm that significant welfare deficiencies remain with the modern enriched cages, despite the provisions of the Directive.

2.4.3. Council Directive 2007/43/EC of 28 June 2007 laying down minimum rules for the protection of chickens kept for meat production (broilers)

At present, approximately six billion broiler chickens are slaughtered annually in the EU²⁵⁰. Directive 2007/43/EC²⁵¹ applies to chickens reared for meat production in houses of 500 birds or more but does not regulate hatcheries or establishments housing breeding stock. The Directive aims to reduce overcrowding of stock and sets a basic, maximum stocking density of 33kg/m²⁵² (a stocking density of 30kg/m² equates to approximately 19 birds per square metre)²⁵³. Minimum periods of darkness are required which offer birds time to rest and provisions are made for drinking,

²⁴⁷ H-W. Lee, H. Louton et al, 'Effects of multiple daily litter applications on the dust bathing behaviour of laying hens kept in an enriched cage system' (2016) 178 Applied Animal Behaviour Science 51

²⁴⁸ FAWC (n 246)

²⁴⁹ Laywel, <<http://www.laywel.eu/>> accessed 22 October 2021

²⁵⁰ Eurogroup for Animals, Better Lives for Broiler Chickens <<https://www.eurogroupforanimals.org/what-we-do/areas-of-concern/better-lives-broiler-chickens>> accessed 18 November 2021

²⁵¹ Council Directive 2007/43/EC of 28 June 2007 laying down minimum rules for the protection of chickens kept for meat production, OJ L 182/19

²⁵² *ibid*, Article 3(2) – however, note that there is a derogation to allow a higher stocking density of 39kg/m², if certain additional husbandry requirements set out in Annex II are fulfilled

²⁵³ Compassion in World Farming:

<<https://www.ciwf.org.uk/farm-animals/chickens/meat-chickens/>> accessed 18 November 2021

feeding, ventilation, noise and inspection. Flock handlers are also required to undergo extensive training and twice daily inspection of birds is mandatory.

In March 2000, SCAHAW's report on the welfare of broiler chickens²⁵⁴ raised various significant welfare concerns relating to broiler husbandry including skeletal disorders (degenerative, infectious and developmental), muscle disorders, dermatitis, thermal discomfort, metabolic and behavioural abnormalities and respiratory disease²⁵⁵. In 2005, the EU Commissioner for Health and Consumer Protection, Markos Kyprianou commented that broiler chicken production systems had caused 'significant welfare problems' adding that 'consumers have repeatedly expressed concern about the welfare of chickens'²⁵⁶. At this time, a consultation period was announced, with a view to creating the first legislation to specifically address broiler welfare²⁵⁷.

Notably, Article 6 of the Directive obliges the Commission to submit a report (on the application of the law and its effects upon animal welfare) to the EU Parliament and Council, by 2012²⁵⁸. The first report was, in fact, published in February 2017²⁵⁹ and discussed the structure of the broiler industry, indicators used by producers to assess welfare and training implementation, but gave no reference to the Directive's actual impact on broiler chicken welfare²⁶⁰. This is concerning, given the constantly evolving scientific understanding of chickens' ethological needs which has been accomplished by research over relatively short periods of time. The SCAHAW report from 2000

²⁵⁴ European Commission, 'The Welfare of Chickens Kept for Meat Production (Broilers)' Report of the Scientific Committee on Animal Health and Animal Welfare, adopted 21 March 2000

²⁵⁵ *ibid*, 105-108

²⁵⁶ N.K. Pedersen, 'Detailed discussion of European Animal Welfare Laws 2003 to present: Explaining the Downturn' (2009) The Animal Legal and Historical Centre, Michigan State University College of Law < <https://www.animallaw.info/article/detailed-discussion-european-animal-welfare-laws-2003-present-explaining-downturn> > accessed 20 October 2021

²⁵⁷ Whilst the European Community was party to the European Convention for the Protection of Animals kept for Farming Purposes as well as a recommendation regarding domestic fowl within the convention, this was the first species-specific legislation to regulate broiler production within the EU

²⁵⁸ Council Directive 2007/43/EC (n 253) Article 6(3): '*On the basis of available data and taking into account new scientific evidence, the Commission shall, not later than 30 June 2012, submit to the European Parliament and to the Council a report concerning the application of this Directive and its influence on the welfare of chickens, as well as the development of welfare indicators. The report shall take into account the different production conditions and methods. It shall also take into account the socio economic and administrative implications of this Directive including regional aspects.*'

²⁵⁹ European Commission, 'Study on the application of the broiler directive (DIR 2007/43/EC) and development of welfare indicators', February 2017

²⁶⁰ 'Eurogroup for Animals, 'Commission Report misses opportunity to show welfare impact, if any, of EU Broiler Directive', 27th November 2017 <<http://www.eurogroupforanimals.org/commission-report-misses-opportunity-show-welfare-impact-eu-broiler-directive>> accessed 10 January 2020

demonstrated numerous areas of concern and to date, many remain to be adequately addressed.

Welfare Provision

'Annex 1, Requirements Applicable to Holdings

Litter

3. All chickens shall have permanent access to litter which is dry and friable on the surface'

Relevant Production System

Broiler chickens are housed in large sheds containing tens of thousands of birds and during the lifetime of a broiler flock (approximately six weeks) litter substrate, scattered on the floor of the shed to absorb excreta, is not normally changed or topped-up. The Directive requires producers to empty chicken houses at the end of each production cycle, once the birds have reached slaughter weight, and then remove the litter, clean and disinfect the housing, providing clean litter for the next batch of birds²⁶¹; it also requires litter to be dry and crumble easily.

Stocking density is one feature of intensive broiler chicken production which impacts on litter quality and plays a central role in welfare²⁶². The presence of large numbers of birds (held within a relatively small area) leads to high volumes of waste production, and therefore 'wet' litter; as the moisture content of the litter increases, via saturation, so does microbial activity, leading to elevated temperatures and increased levels of ammonia. This results in a high incidence of dermatitis.

Footpad dermatitis is a contact skin condition which affects the plantar surface (underside) of the feet of broiler chickens and turkeys²⁶³, causing initial discolouration of the skin, followed by thickening, inflammation and necrosis (death) of areas of tissue²⁶⁴. Skin lesions are often colloquially termed as 'ammonia burns' and arise from exposure to various factors including high ammonia content, moisture and bacteria²⁶⁵.

²⁶¹ Directive 2007/43/EC (n 253) Annex I, 10 (Cleaning)

²⁶² W. Bessei, 'Welfare of Broilers: A Review' (2006) 62 *World's Poultry Science Journal* 455

²⁶³ E. M. Shepherd and B. D. Fairchild, 'Footpad Dermatitis in Poultry' (2010) 89 *Poultry Science* 2043

²⁶⁴ J. B. Kjaer, G. Su, B. L. Nielsen and P. Sørensen, 'Foot pad dermatitis and hock burn in broiler chickens and degree of inheritance' (2006) 85 *Poultry Science* 1342

²⁶⁵ C. Berg, 'Pododermatitis and hock burn in broiler chickens', in C. A. Weeks and A. Butterworth (eds) *Measuring and Auditing Broiler Welfare* (CABI 2004) 37

Footpad dermatitis is significant because it has detrimental effects upon broiler welfare – primarily due to the pain caused by the condition²⁶⁶ which leads to abnormal gait and decreased walking ability²⁶⁷. In fact, over the last few years, some European countries have incorporated an assessment of dermatitis into their welfare assessment, and their scoring of bird condition is a driver to encourage husbandry techniques which reduce the incidence of the disease²⁶⁸. Denmark is one such country – prior to the introduction of their dermatitis monitoring scheme, just under 40% of their entire broiler flock was described as having severe footpad lesions during the summer months²⁶⁹ and in a similar Dutch study, 38.4% of birds were noted to have severe lesions²⁷⁰.

Maintaining dry litter in an intensive-production broiler shed is a near impossible task – it has been estimated that a flock of twenty thousand broilers excrete approximately two and a half thousand litres of water daily²⁷¹; whilst modern housing and ventilation could almost cope with this volume, the addition of other factors tends to make dry litter difficult to maintain²⁷². Examples of additional factors include spillage and leakage from drinkers²⁷³, increased water excretion due to disease²⁷⁴, insufficient litter depth²⁷⁵ and stocking density²⁷⁶.

²⁶⁶ C. Weber Wyneken, A. Sinclair et al. 'Footpad Dermatitis and Pain Assessment in Turkey Poult Using Analgesia and Objective Gait Analysis.' (2015) 56 British Poultry Science 522. See also M. F. Martland, 'Ulcerative Dermatitis in Broiler Chickens: The effects of wet litter' (1985) 14 Avian Pathology 353 for a discussion of the effect of dermatitis on growth rate

²⁶⁷ S. C. Kestin, S. Gordon, G. Su and P. Sørensen, 'Relationships in broiler chickens between lameness, liveweight, growth rate and age' (2001) 148 Veterinary Record (7) 195

²⁶⁸ Kjaer (n 264) Sweden and Denmark use such schemes; in Sweden, all flocks are assessed for incidence and severity of footpad dermatitis and the scores then determine the stocking density on-farm – see S. M. Haslam, T. G. Knowles et al, 'Factors affecting the prevalence of foot pad dermatitis, hock burn and breast burn in broiler chicken' (2007) 48 British Poultry Science (3) 264

²⁶⁹ Aviagen: I. de Jong and J. Van Harn, 'Management Tools to Reduce Footpad Dermatitis in Broilers' (2012)

< <http://pt.staging.aviagen.com/tech-center/download/704/AviaTech-FoodpadDermatitisSept2012.pdf>> accessed 18 November 2021

²⁷⁰ I. C. De Jong, J. Van Harn et al, 'Footpad dermatitis in Dutch broiler flocks: prevalence and factors of influence' (2012) 91 Poultry Science 2411

²⁷¹ S. R. Collett, 'Nutrition and Wet Litter problems in Poultry' (2012) 173 Animal Feed Science and Technology 65

²⁷² M. W. Dunlop, A. F. Moss et al, 'The multi-dimensional causal factors of 'wet litter' in chicken-meat production' (2016) 562 Science of the Total Environment 766

²⁷³ S. F. Bilgili, G. I. Montenegro et al, 'Sand as a litter for rearing broiler chickens 1' (1999) 8 Journal of Applied Poultry Research 345

²⁷⁴ Collett (n 271)

²⁷⁵ Shepherd (n 263)

²⁷⁶ S. G. McIlroy, E. A. Goodall and C. H. McMurray, 'A contact dermatitis of broilers' (1987) 16 Avian Pathology 93

Current evidence confirms that the Directive's provision to provide dry litter, scientific research is unattainable and, as a result, animal welfare is detrimentally affected. In 1923, Dann commented that 'wet litter in the poultry house is a rather troublesome problem to most poultrymen'²⁷⁷ and regrettably, almost a century later, the problem persists.

2.4.4 Council Directive 2008/119/EEC of 18 December 2008 laying down minimum standards for the protection of calves

As discussed in Chapter One, European intensive veal production systems developed as a result of the large number of male dairy calves – a so-called 'by-product' of the milk industry²⁷⁸. As consumer concerns regarding the welfare issues associated with close-confinement veal crates intensified during the 1970s and 1980s, the United Kingdom government moved to phase out veal crates, and the use of crates was banned in 1990²⁷⁹, reflected in the *CIWF* Case discussed, previously.

In 2006, following the Scientific Veterinary Committee's report of 1995²⁸⁰ which highlighted various areas of welfare concern relating to calf farming systems, and in light of campaigns by animal welfare charities and NGOs, the European Commission requested a scientific opinion from EFSA²⁸¹ on the welfare and animal health aspects of intensive calf farming systems. Significant risks to calves' wellbeing included inadequate intake of colostrum (first milk), pathogen exposure due to continuous restocking systems and mixing of calves from different sources, lack of maternal care, insufficient floor space, inadequate lighting and bedding, and iron deficiency²⁸². In 1991, Council Directive 91/629/EEC had been introduced²⁸³ which permitted the use of veal crates of a minimum size but required EU Scientific Veterinary Committee

²⁷⁷ A. B. Dann, 'Wet litter in the Poultry House' (1923) 3 *Poultry Science* 15

²⁷⁸ Compassion in World Farming, *Veal Calves*: <<https://www.ciwf.org.uk/farm-animals/cows/veal-calves/>> accessed 5 May 2022

²⁷⁹ G. Maheny and C. Leahy, 'Farm-Animal Welfare, Legislation and Trade' (2007) 70 *Law and Contemporary Problems*, 325, 339. The *Welfare of Calves Regulations 1987*, SI 2021, introduced provisions to ensure calves were fed a suitable diet with fibre as well as being housed in pens which allowed them to turn freely, unlike in the veal crate system

²⁸⁰ European Commission, Scientific Veterinary Committee, Animal Welfare Section, 'Report on the Welfare of Calves' Adopted November 9, 1995

²⁸¹ EFSA Panel on Animal Health and Welfare, 'Scientific Opinion on the risks of poor welfare in intensive calf farming systems – an update of the Scientific Veterinary Committee Report on the Welfare of Calves' (2006) *EFSA Journal* 366, 1

²⁸² *ibid*, 4

²⁸³ Council Directive 91/629/EEC of 19 November 1991 laying down minimum standards for the protection of calves, OJ L 340/28

reporting. Additional research was carried out on the effects of diet, space within groups, confinement and individual rearing as public concern for calves' welfare increased. Whilst Directive 97/2/EC²⁸⁴ had been passed in 1997 (rendering veal crates illegal from 2006 and introducing the requirement for fibrous feed to accompany veal calves' liquid-only diet), additional legislation, currently in place, then set down minimum standards for the protection of calves – Council Directive 2009/118/EC²⁸⁵.

Welfare Provision

*'All calves must be provided with an appropriate diet adapted to their age, weight and behavioural and physiological needs, to promote good health and welfare. To this end.....a minimum daily ration of fibrous food must be provided for each calf over two weeks old, the quantity being raised from 50 g to 250 g per day for calves from eight to 20 weeks old....'*²⁸⁶

Relevant Production System

The introduction of a fibrous food ration to veal calves arose in light of welfare issues associated with the traditional liquid-only, milk-based diet which, in association with confinement, led to the development of pale, anaemic muscle tissue, known to consumers as 'white veal'²⁸⁷. Lack of solid feed prevents normal development of the rumen (first stomach where the initial stages of digestion occur) and a liquid-only diet is also associated with abnormal oral behaviours²⁸⁸. However, despite the introduction of a daily requirement of 50 to 250 grams fibrous food per day, significant welfare problems persist.

²⁸⁴ Council Directive 97/2/EC of 20 January 1997 amending Directive 91/629/EEC laying down minimum standards for the protection of calves [1997] OJ L 25/24

²⁸⁵ Council Directive 2008/119/EC of 18 December 2008 laying down minimum standards for the protection of calves (Codified version) OJ L 10/7

²⁸⁶ *ibid*, Annex 1, 11

²⁸⁷ B. Pardon, B. Catry, R. Boone and H. Theys, 'Characteristics and Challenges of the Modern Belgian Veal Industry' (2014) 83 *Vlaams Diergeneeskundig Tijdschrift* (4) 155, 158

²⁸⁸ M. Brscic, L. F. M. Heutinck et al, 'Prevalence of gastrointestinal disorders recorded at post-mortem inspection in white veal calves and associated risk factors' (2011) 94 *Journal of Dairy Science* 853, 854. See also S. Mattiello, E. Canali, V. Ferrante et al, 'The provision of solid feeds to veal calves: II. Behavior, physiology and abomasal damage' (2002) 80 *Journal of Animal Science* 367

Studies have demonstrated that the welfare of veal calves in current European systems remains compromised by gastrointestinal problems such as abnormalities of the rumen lining and abomasal ulceration²⁸⁹ (the abomasum being the fourth and final stomach of ruminants which acts similarly to the human stomach in terms of function). The introduction of fibre was intended to stimulate rumen development and reduce stereotypical behaviours but unfortunately other problems have been noted. For example, wheat straw, whilst beneficial in reducing hairballs in the rumen and therefore countering the effects of abnormal licking behaviour, actually increases abomasal ulceration²⁹⁰. Cereal grain, another form of roughage, whilst having positive effects on ruminal development, unfortunately has negative effects upon the abomasum²⁹¹. In fact, research has demonstrated that, within the veal production system, a solid feed which facilitates normal behaviour, promotes growth and reduces damage to the gastro-intestinal tract has not yet been identified²⁹²; provision of the currently advised solid feeds (especially fibres like straw) actually increases the incidence of abomasal erosion and ulceration.

In 2012, the EFSA Scientific Committee Report on cattle and calf welfare²⁹³ highlighted issues associated with the feeding regime imposed by the Directive. It has been suggested that the high levels of abomasal damage seen in veal calves are likely due to (i) the initial ingestion of large volumes of milk replacer which overfill the abomasum, causing areas of local ischaemia (reduced blood supply) then tissue death followed by (2) introduction of roughage which then, due to its abrasive action, traumatises the abomasal lining, causing further lesions and trauma²⁹⁴. It has also been shown that feeding large volumes of milk replacer with a limited number of fibrous meals – the directive provides for a minimum of two feeds per day – can lead to several physiological abnormalities including hyperglycaemia (elevated blood sugar levels)

²⁸⁹ C. Bähler, G. Regula et al, 'Effects of the two production programs 'Naturafarm' and 'conventional' on the prevalence of non-perforating abomasal lesions in Swiss veal calves at slaughter' (2010) 88 *Research in Veterinary Science* 352

²⁹⁰ Brscic (n 288)

²⁹¹ P. Prevedello, M. Brscic, E. Schiavon et al, 'Effects of the provision of large amounts of solid feeds to veal calves on growth and slaughter performance and intravital and post-mortem welfare indicators' (2012) 90 *Journal of Animal Science* 3538

²⁹² Mattiello (n 290) The study noted that structured fibres cause significant abomasal damage

²⁹³ EFSA Panel on Animal Health and Welfare, 'Scientific Opinion on the welfare of cattle kept for beef production and the welfare in intensive calf farming systems' (2012) 10 *EFSA Journal* 5:2669

²⁹⁴ *ibid*, 56

and excretion of glucose in the urine²⁹⁵ – both highly undesirable effects on both health and welfare.

This single example regarding the Calf Directive demonstrates clearly what can happen when well-intentioned regulations are introduced when the full behavioural and clinical picture within a production system is not fully known or understood. The direction to introduce fibrous feed for calves was a positive step with respect to behaviour, however, it is clear that numerous welfare problems remain which are, ironically, exacerbated by the provisions of Directive 2008/119/EEC.

2.4.5 Council Directive 2008/120/EC laying down minimum standards for the protection of pigs

It was not until the turn of the twenty first century that the EU focused on the welfare of farmed pigs. Following the release of various EFSA consultation documents²⁹⁶ the EU passed Directive 2008/120/EC²⁹⁷, moving to ban tethering of sows²⁹⁸ and to prohibit the use of sow-stalls (gestation crates) — metal cages which were used to keep pregnant sows severely confined, lying on their sides. Sows must be kept in groups during the period beginning four weeks after service until a week prior to the expected farrowing time²⁹⁹. In light of the consultation findings, the Directive also sets out requirements for unobstructed floor areas for weaner and rearing pigs³⁰⁰, feeding systems³⁰¹, manipulable material (for behavioural stimulation)³⁰² and provisions on surgical mutilations³⁰³.

²⁹⁵ D. Hugi, R. M. Bruckmaier and J. W. Blum, 'Insulin resistance, hyperglycemia, glucosuria, and galactosuria in intensively milk-fed calves: dependency on age and effects of high lactose intake' (1997) 75 *Journal of Animal Science* 469

²⁹⁶ Including EFSA Panel on Animal Health and Welfare, 'Opinion on a request from the Commission related to welfare aspects of the castration of piglets' (2004) 91 *The EFSA Journal* 1; EFSA Panel on Animal Health and Welfare, 'Scientific Opinion on a request from the Commission related to welfare of weaners and rearing pigs: effects of different space allowances and floor' (2005) *EFSA Journal* 268, 1; EFSA Panel on Animal Health and Welfare, 'Scientific Opinion on Animal health and welfare in fattening pigs in relation to housing and husbandry' (2007) *The EFSA Journal* 564:1

²⁹⁷ Council Directive 2008/120/EC (n 90)

²⁹⁸ *ibid* Article 3.3, from 1st January 2006

²⁹⁹ Council Directive 2008/120/EC (n 90) Article 3.4, from 1st January 2013

³⁰⁰ *ibid*, Article 3.1

³⁰¹ Council Directive 2008/120/EC (n 90) Articles 3.6 and 3.7

³⁰² *ibid*, Article 3.5

³⁰³ Council Directive 2008/120/EC (n 90) Annex 1, Chapter 1, General Conditions, 8: relating to tooth clipping, castration and tail docking

Welfare Provision

'All procedures intended as an intervention carried out for other than therapeutic or diagnostic purposes or for the identification of the pigs in accordance with relevant legislation and resulting in damage to or the loss of a sensitive part of the body or the alteration of bone structure shall be prohibited with the following exceptions:

— a uniform reduction of corner teeth of piglets by grinding or clipping not later than the seventh day of life of the piglets leaving an intact smooth surface.....

.....Neither tail-docking nor reduction of corner teeth must be carried out routinely but only where there is evidence that injuries to sows' teats or to other pigs' ears or tails have occurred. Before carrying out these procedures, other measures shall be taken to prevent tail-biting and other vices, taking into account environment and stocking densities. For this reason inadequate environmental conditions or management systems must be changed'³⁰⁴.

Relevant Production System

Despite domestication, the behaviour of farmed pigs has remained almost identical to that of their wild boar ancestors³⁰⁵; in modern, intensive pig production systems, their environment is relatively barren, with housing construction of slatted floors and concrete³⁰⁶. Whilst some materials for behavioural enrichment are provided in an attempt to provide physiological and psychological welfare (for example biting sticks or chains³⁰⁷), pigs remain highly motivated to forage. If this behaviour cannot be fulfilled, it is redirected towards other pigs in the pen, resulting in a variety of undesirable and damaging behaviours, such as increased aggression, tail biting, ear chewing and biting other animals³⁰⁸.

³⁰⁴ *ibid*

³⁰⁵ R.B. D'Eath and S.P. Turner. 'The natural behaviour of the pig' in Marchant-Forde, J.N. (ed) *The Welfare of Pigs* (Springer 2009) 13

³⁰⁶ R. E. Nordquist, F. J. van der Staay et al, 'Mutilating Procedures, Management Practices, and Housing Conditions That May Affect the Welfare of Farm Animals: Implications for Welfare Research', (2017) 7 *Animals* (2) 9

³⁰⁷ K. Scott, L. Taylor, B.P. Gill and S. A. Edwards, 'Influence of different types of environmental enrichment on the behaviour of finishing pigs in two different housing systems 1. Hanging toy versus rootable substrate' (2006) 99 *Applied Animal Behaviour Science* 222

³⁰⁸ J. E. L. Day, A. Burfoot, C. M. Docking et al, 'The effects of prior experience of straw and the level of straw provision on the behaviour of growing pigs' (2002) 76 *Applied Animal Behaviour Science* 189

In order to prevent damage to the group as a whole (given the welfare and economic factors associated with tissue trauma) and reduce injury / infection from piglet fighting (as well as udder injuries in sows)³⁰⁹, pig producers commonly clip pigs' canine teeth³¹⁰, removing the crown of the tooth to the gum-line, using either cutting or grinding instruments³¹¹.

Despite the Directive's instruction that tooth reduction not be carried out routinely, it is, in fact, common management practice³¹²; whilst the Directive does not indicate a maximum age for tooth cutting³¹³, most piglets have their teeth clipped in the first 24 hours of life³¹⁴. Given that any assessment of trauma to the sow or other piglets arising from behavioural problems would appear over several days, possibly, weeks, surgical mutilation so early in life would appear to be in contravention of the Directive, which requires that, prior to carrying out cutting, other environmental and stocking measures should be taken and husbandry methods altered if necessary, to address problems associated with biting. However, even if the tooth cutting is deemed justified (and is not prophylactic) the process carries serious welfare implications.

There is ample scientific evidence to demonstrate the serious, detrimental effects of tooth clipping. Problematic lesions have been demonstrated to occur in association with both clipping and grinding – haemorrhage, tooth fracture and pulp exposure (opening of the sensory, neurovascular part of the tooth). These are all associated with severe pain and inflammation, as well as increasing the risk of infection³¹⁵ and given the human experience of acute toothache (which is likely analogous), it is challenging to identify a husbandry welfare problem that would justify an animal being

³⁰⁹ R.O. Bates et al 'The influence of canine teeth clipping on nursery and pig performance' (2003) 11 *Swine Health Production* (2) 75

³¹⁰ Nordquist (n 306) 9

³¹¹ S. H. Ison, R. E. Clutton, P. di Giminiani and K. M. D. Rutherford, 'A Review of Pain Assessment in Pigs' (2016) 3 *Frontiers in Veterinary Science* 108. Pigs' teeth are usually cut using either pliers or ground down using a rotating grindstone – see M. Gallois, Y Le Cozler and A. Prunier, 'Influence of Tooth Resection in Piglets on Welfare and Performance' (2005) 69 *Preventive Veterinary Medicine* 13

³¹² G.J. Noonan, J.S. Rand, J. Priest, J. Ainscow, J.K. Blackshaw, 'Behavioural observations of piglets undergoing tail docking, teeth clipping and ear notching' (1994) 39 *Applied Animal Behaviour Science* 203

³¹³ The directive sets a maximum age for castration and tail docking (without analgesia or anaesthesia) at seven days but an appropriate age for tooth clipping is not set

³¹⁴ For example, in the UK: see Farm Animal Welfare Council: 'Opinion on pig mutilations and environmental enrichment' March 2011. FAWC was advised by representatives of the UK Pig Industry that tooth clipping is carried out on a large proportion of indoor-housed piglets in the UK, shortly after birth.

³¹⁵ M. Hay, J. Rue, C. Sansac and G. Brunel, 'Long-term detrimental effects of tooth clipping or grinding in piglets: a histological approach' (2004) 13 *Animal Welfare* 27

subjected to this experience. The EFSA Scientific Opinion on pig health and welfare of 2007³¹⁶ concluded that *'it is likely that tooth resection induces severe pain in piglets and that the rationale of this practice should be re-evaluated'*³¹⁷. Studies have shown that piglets' teeth are often severely injured³¹⁸, especially where unskilled operators cause trauma, such as tooth splintering which leads to gum damage, infection and chronic pain³¹⁹.

The current Directive encourages pig producers to utilise different husbandry methods (provision of toys or substrates) to reduce the need for surgical mutilation of teeth and this indicates a positive move towards better welfare. However, the fundamental issue of overcrowding lies at the core of pig behavioural problems and the Directive fails to adequately address this; instead it permits husbandry practices (albeit with the intention of minimising these options) associated with severe welfare compromises which result in a proven pain-inducing practice to continue. The practice of tooth-clipping is addressed in detail in Chapter Five.

2.4.6 Council Regulation (EC) No 1/2005 of 22 December 2004, on the protection of animals during transport and related operations

Intensive farm animal production, the principle of free movement of goods and international trade have led to the transportation of large numbers of live animals over long distances, not only when moving stock to slaughter but also when young animals are moved to breeding or finishing units. Transportation of live animals is an emotive subject which often forms the focus for welfare charities and consumers alike³²⁰. In 2017, Eurogroup for Animals' campaign, 'Stop the Trucks'³²¹ gathered in excess of

³¹⁶ EFSA Panel on Animal Health and Welfare, 'Scientific Opinion on a request from the Commission on Animal health and welfare aspects of different housing and husbandry systems for adult breeding boars, pregnant, farrowing sows and unweaned piglets' (2007) 572 The EFSA Journal 1, 46

³¹⁷ *ibid*, 60

³¹⁸ Gallois (n 311)

³¹⁹ FAWC (n 314) 4: Whilst the incidence of problems in the UK was relatively low, it was estimated in this report that in other countries, tooth splintering occurs in 4-26% of piglets and tooth infection arises in 7-20% of cases

³²⁰ See for example, Germany's Animal's Angels Long Distance Transport Projects <<http://www.animals-angels.com/projects/europe/long-distance-transport-eu/investigations.html>> accessed 2 November 2021 and Dutch NGO Eyes on Animals, report into heat stress during transportation <<https://www.eyesonanimals.com/resources/special-reports/>> accessed 2 December 2021

³²¹ Eurogroup for Animals <https://www.eurogroupforanimals.org/files/eurogroupforanimals/2020-02/02EurogroupForAnimals_Magazine_April2016.pdf> accessed 2 December 2021

one million signatures from EU citizens calling for the Commission and union decision makers to reduce and ultimately end live transportation of animals.

Council Regulation (EC) 1/2005³²² is the legislation which currently controls transportation of animals with the EU.

Welfare Provision

'The watering and feeding intervals, journey times and rest periods....are defined as follows:

*(a) Unweaned calves, [lambs kids and foals] which are still on a milk diet and unweaned piglets must, after nine hours of travel, be given a rest period of at least one hour sufficient in particular for them to be given liquid and if necessary fed. After this rest period, they may be transported for a further nine hours.'*³²³

Relevant Transportation System: Calves

Long distance transportation of neonatal animals, especially calves, is commonplace within the EU, usually occurring whilst the animals are days or weeks old, unweaned and dependent upon regular milk feeds³²⁴. Calves to be fattened for beef are often relocated from their farm of origin to the beef unit within three weeks of birth and transportation carries the risk of significant welfare compromise. One literature review has suggested that calf mortality during transportation can range from 1 to 23%³²⁵ and animals which do survive transportation often remain clinically and metabolically compromised, often going on to develop secondary disease, related to transportation stress³²⁶.

³²² Council Regulation (EC) No 1/2005 of 22 December 2004 on the protection of animals during transport and related operations and amending Directives 64/432/EEC and 93/119/EC and Regulation (EC) No 1255/97 OJ L 3/1

³²³ *ibid*, Annex 1, Technical Rules, Chapter V, 1.4 (a)

³²⁴ T. Knowles and P Warriss, 'Stress Physiology of Animals During Transport' in *Livestock Handling and Transport*, T Grandin (ed) (CABI 2007) 312. See also Animal Welfare Foundation, <https://www.europarl.europa.eu/cmsdata/230103/20201007_AWF%20Factsheet%20LDT%20unweaned%20calves_Iris%20BAUMGARTNER_AWF_EN.pdf> accessed 5 May 2022

³²⁵ T. G. Knowles, 'A review of post transport mortality among younger calves' (1995) 137 *Veterinary Record* 406

³²⁶ See, for example, A. Wernicki, R. Urban-Chmiel, M. Kankofer and P. Mikucki, 'Evaluation of plasma cortisol and TBARS levels in calves after short - term transportation' (2006) 157 *Revue de Médecine Vétérinaire* 30. The study demonstrated that calf cortisol levels (an indicator of stress) remained elevated above the baseline level for 16 days after transportation. See also, J. Hartung, 'Effects of Transport on Health of Farm Animals' (2003) 27 (Suppl) *Veterinary Research Communications* (1) 525

Young calves are affected by novel physiological experiences (environmental change, restraint and handling) and psychological stressors³²⁷(primarily fear whenever new interactions with handlers or environmental changes occur). The effect of various stressors has been confirmed via measurement of increased physiological parameters, for example, plasma cortisol concentration (elevated during periods of stress)³²⁸, increased heart rate and increased body temperature. Neonates are unable to adequately control their own body temperature, therefore exposure to acute fluctuations in ambient temperature (often experienced during transportation) can lead to severe problems: sudden exposure to cold can cause low blood oxygen, airway constriction and abnormally high blood carbon dioxide levels, whilst sudden exposure to heat can lead to panting, heat stress and eventual collapse³²⁹.

Calves have also been demonstrated to experience significant decreases in bodyweight following transportation³³⁰; it has been concluded that transportation 'normally leads to poor welfare in calves and evidence from mortality rate, heart rate, adrenal activity, enzyme changes, immunological effects, carcass quality and behaviour shows that welfare can be very poor'³³¹.

In 2004, the Scientific Panel on Animal Health and Welfare published their opinion on the welfare of animals during transportation³³², highlighting several problematic elements. It was stated that stressors encountered during transport contribute to poor welfare as well as increasing susceptibility to disease and shedding of pathogens³³³. In addition, the report states that 'the transport of very young [rabbits, ratites, deer and]

³²⁷ E.C. Jongman and K. Butler, 'The Effect of Age, Stocking Density and Flooring during Transport on Welfare of Young Dairy Calves in Australia' (2014) 4 *Animals* 184. See also L.N. Costa 'Short-term stress: the case of transport and Slaughter' (2009) 8 *Italian Journal of Animal Science* (1) 241

³²⁸ See, for example, M. Steinhardt and H. H. Thielscher H. H., 'Maturity of suckler calves and dairy calves at the second and third week of postnatal age and forms of reaction of the animals to transport by road' (1999) 49 *Landbauforschung Volkenrode* 70

³²⁹ S. Elmer S. and P. Reinhold, 'Consequences of changing ambient temperatures in calves – Part 1, Immediate reactions of the respiratory system, the circulation system, metabolism and thermal regulation' (2002) 109 *Deutsche tierärztliche Wochenschrift* 182

³³⁰ T. G. Knowles, S. N. Brown, J. E. Edwards, A. Phillips A. J. and P. D. Warriss, 'Effect on young calves of a one-hour feeding stop during a 19-hour journey' (1999) 144 *Veterinary Record* 687. Calves lost on average 1.4kgs bodyweight in summer and 2.0kgs in winter, taking 2 or 3 days to equal the weights of control-group calves which had not been transported

³³¹ H. R. Trunkfield and D. M. Broom 'The welfare of calves during handling and transport' (1990) 28 *Applied Animal Behaviour Science* 135

³³² SCAHAW 'Opinion of the Scientific Panel on Animal Health and Welfare (AHAW) on a request from the Commission related to the welfare of animals during transport' (2004) 44 *EFSA Journal* 1

³³³ *ibid*, 1

calves should be avoided³³⁴. Unfortunately within this report, cattle, sheep and pig transportation is not addressed in detail but it is notable that the Panel felt it appropriate to advise against transportation of young calves. Given the evidence and this opinion from the European Commission's advisors, it appears that the Regulation currently permits transportation practices which are detrimental to calf health and welfare.

In 2011, the European Commission presented their report on the impact of Council Regulation (EC) 1/2005 to the European Parliament and the Council³³⁵, concluding that the Regulation has brought improvements to animal welfare during transportation but acknowledging that there is room for many improvements to be made; citing EFSA scientific opinion³³⁶, the report also recognised that numerous elements of the Regulation are not yet in line with contemporary scientific understanding. The Court of Auditors Special Report of 2018 also highlighted various areas where welfare during transport could be improved³³⁷.

2.4.7 Council Regulation 1099/2009 of 24 September 2009 on the protection of animals at the time of killing (replacing Directive 93/119/EC)

In 1974, the first European legislation specifically protecting animal welfare was passed, Council Directive 74/577/EEC³³⁸ on the stunning of farmed animals at slaughter. Although the time of slaughter represents a very short period during an animal's life, it has been identified as a time when the animal's welfare may be at its most compromised³³⁹ and has been an area of significant concerns for consumers and animal welfare charities³⁴⁰. The 1974 Directive established rules on the stunning of animals prior to slaughter and was subsequently repealed by directive 93/119/EC³⁴¹

³³⁴ SCAHAW (n 332) 9

³³⁵ European Commission, Report from the Commission to the European Parliament and the Council on the Impact of Regulation (EC) No. 1/2005 on the protection of animals during transport' (10.11.2011) COM (2011) 700 final

³³⁶ EFSA Panel on Animal Health and Welfare (AHAW), 'Scientific Opinion concerning the welfare of animals during transport' (2011) 9 (1) EFSA Journal 1966. The report concluded that the 'optimal' journey time for unweaned animals should be studied further.

³³⁷ European Court of Auditors Special Report (n 202)

³³⁸ Council Directive 74/577/EEC (n 143)

³³⁹ Humane Slaughter Association, Welfare at Slaughter, <<https://www.hsa.org.uk/humane-slaughter/welfare-at-slaughter>> accessed 2 December 2021

³⁴⁰ *ibid.* In fact, as far back as the 1920s, the Humane Slaughter Association campaigned for the introduction of captive bolts for stunning, in Islington, London

³⁴¹ Council Directive 93/119/EC (n 12)

which established common minimum regulations to protect animals at the time of slaughter.

Stunning prior to slaughter is carried out to ensure unconsciousness and insensibility to stimuli, thereby preventing unnecessary anxiety, pain, fear or distress; stunning is an EU statutory requirement, although, as explored in Chapter One, there are some exceptions permitted for religious slaughter.

In 2004, the Scientific Panel on Animal Health and Welfare published an Opinion on welfare aspects of slaughter in the main commercial livestock species³⁴². Their report states that ‘due to the serious animal welfare concerns associated with slaughter without stunning, pre-cut stunning should always be performed’³⁴³ and confirms that ‘without stunning, the time between cutting through the major blood vessels and insensibility, as deduced from behavioural and brain response, is up to twenty seconds in sheep, up to twenty five seconds in pigs, up to two minutes in cattle [and] up to two and a half or more minutes in poultry’³⁴⁴.

In 2009, the EU adopted Council Regulation EC/1099/2009³⁴⁵ (applicable from January 2013), which increased the responsibility of operators to monitor their slaughter methods and also provided clearer guidelines on the scope of slaughter methods as well as introducing the requirement for an Animal Welfare Officer in larger slaughterhouses³⁴⁶.

Welfare Provision

‘General requirements for killing and related operations

Animals shall be spared any avoidable pain, distress or suffering during their killing and related operations.’³⁴⁷

³⁴² EFSA Scientific Panel on Animal Health and Welfare, ‘Opinion on a request from the Commission related to welfare aspects of the main systems of stunning and killing the main commercial species of animals’ (2004) 45 EFSA Journal 1

³⁴³ *ibid*, 2

³⁴⁴ EFSA (n 344) 5

³⁴⁵ Council Regulation (EC) 1099/2009 (n 31)

³⁴⁶ *ibid*, 46

³⁴⁷ Council Regulation (EC) 1099/2009 (n 31) Chapter II, General Requirements, Article 3 (1)

Relevant Production System

Section 18 of the preamble to Regulation EC/1099/2009 confirms the retention of possible derogation from stunning, for religious slaughter, which was contained in earlier legislation.

Exceptions to stunned slaughter are seen with both Shechita (Jewish) slaughter and Muslim Halal slaughter – whilst these religious populations are relatively small in Europe, it has been reported that in 2006/7, in France, the country with the highest EU Muslim population at that time, the percentages of animals not stunned prior to slaughter were 54% of sheep, 25% of cattle and 40% of calves; in 2008 the value of the European Kosher meat market was approximately five billion euros³⁴⁸. There are, therefore, millions of animals currently experiencing slaughter without pre-stunning in the EU.

It is generally now accepted that, like their human counterparts, mammals experience pain when they suffer major cutting injuries to soft tissue³⁴⁹. It is also generally accepted that the neck incision during slaughter of non-stunned animals results in pain and distress³⁵⁰ which lasts until the animal becomes unconscious³⁵¹. Since the incision transects major structures – skin, muscle, carotid and jugular vessels and major nerve pathways – the animal's brain will remain receptive to multiple negative sensory stimuli.

Since non-stunned animals remain conscious for a significant period of time³⁵² they require restraint during the cutting and exsanguination period. Various methods of

³⁴⁸ Library of the European Parliament, 'Religious Slaughter of Animals in the EU', Christopher Needham (2012)
<[http://www.europarl.europa.eu/RegData/bibliotheque/briefing/2012/120375/LDM_BRI\(2012\)120375_REV2_EN.pdf](http://www.europarl.europa.eu/RegData/bibliotheque/briefing/2012/120375/LDM_BRI(2012)120375_REV2_EN.pdf)> accessed 7 December 2021

³⁴⁹ N.G. Gregory, '*Physiology and Behaviour of Animal Suffering*' UFAW Animal Welfare Series (Blackwell Publishing 2004) 94

³⁵⁰ See for example, EFSA Panel on Animal Health and Welfare (AHAW) Scientific Opinion on Welfare of Cattle at Slaughter (2020) 18 The EFSA Journal 11: 6275, 94. See also N. G. Gregory, H. R. Fielding, M. von Wenzlawowicz, K. von Holleben, 'Time to collapse following slaughter without stunning in cattle' (2010) 85 Meat Science 66. See also K. Nakyinsige K, Y. B. Che Man et al, 'Stunning and animal welfare from Islamic and scientific perspectives' (2013) 95 Meat Science 352. Note that there is an alternative view – it has been asserted that the use of an extremely sharp bladed knife and rapid clean incision can lead to the avoidance of significant pain, see for example, S. D. Rosen 'Physiological insights into Shechita' (2004) 154 Veterinary Record 759

³⁵¹ C. B. Johnson, D. J. Mellor, P. H. Hemsworth and A. D. Fisher 'A scientific comment on the welfare of domesticated ruminants slaughtered without stunning' (2014) 63 New Zealand Veterinary Journal 58

³⁵² Opinion of the Scientific Panel on Animal Health and Welfare (n 350)

restraint are utilised in the EU – cattle are turned on their side or on their backs, sheep are hoisted or placed on their sides and poultry are hoisted³⁵³. All such systems carry welfare compromises, including distress and pain (resulting from being held in unnatural positions) and stress caused by time delays in positioning and manoeuvring animals³⁵⁴. Poor design of restraint devices and issues associated with manual restraint can also result in compromised positioning of animals, leading to difficulties in transecting the required structures when making a clean cut to the neck.

In common with the other Directives under discussion, it is clear that the current Slaughter Directive derogation permits practices which are detrimental to animal welfare and expose animals to unnecessary distress and pain. However, given the recent CJEU judgments regarding non-stun slaughter, which suggest some limitations with respect to religious derogations, these methods, and the derogation within the Regulation that permits them, will likely face further opposition and calls for reform of the legislation.

2.5 Chapter Conclusion

This chapter has explored the legislative framework for animal welfare protection in the EU. It has discussed the role of Article 13 TFEU and the current significance of the principle of animal welfare in community law, as well as exploring the contradictory nature of animals as sentient beings but also trading commodities. Whilst Article 13 may be symbolic of the progress made in acknowledging animal sentience, the practical significance of its inclusion in the Treaty on the Functioning of the European Union is less clear; however, recent CJEU rulings on welfare during religious slaughter have confirmed that Article 13 can play an active role when animal welfare concerns are under consideration and will be cited as a general principle by the Court, applicable to all Member States.

The discussion of existing Directives and Regulations has demonstrated that although the introduction of minimum standards has brought some practical benefit to animal

³⁵³ A. Velarde, P. Rodriguez, A. Dalmau et al, 'Religious Slaughter: Evaluation of current practices in selected countries' (2014) 96 Meat Science 278

³⁵⁴ European Commission, 'Restraining systems for bovine animals slaughtered without stunning: Welfare and socio-economic implications' SANCO / 2012 / 10357 (Executive Summary and Key Messages) (2015) 2

welfare, the current framework of legislation neither addresses nor prevents many of the troubling welfare problems observed in current production systems, which have been scientifically proven as detrimental to farm animal welfare. Minimum harmonisation has created a welfare 'floor' which must be observed by all Member States but the primary driving force for this legislation is arguably protection of the Internal Market and unhindered trade.

In considering the ability of Member States to act extra-territorially to protect the welfare of their animals, it is clear that the Court of Justice of the European Union will strive to prevent barriers to trade, by adopting a narrow, strict interpretation of harmonisation and recourse to Article 36.

In summary:

1. The weight of Article 13 remains uncertain and at present, it is challenging to ascertain the full scope of its influence; however, the Court of Justice has recently referred to, and relied upon, Article 13, read in conjunction with relevant scientific evidence, to uphold bans on religious slaughter methods found to be detrimental to animal welfare and this is a positive step.
2. The current framework of EU legislation provides minimum standards of welfare in certain areas, but fails to address many significant welfare problems; a large body of scientific research confirms the presence of these problems but current legislation has not been adapted in light of these findings. With respect to the current Directives, well-intentioned policy makers have focused on a small number of key welfare concerns, within established production systems. This is a strategy which has brought some benefit to animals in terms of health and physical comfort but, unfortunately, fails to address the fundamental problem - intensive stocking densities essentially preclude positive welfare. The resulting legislation often consists of an opening body of positive welfare principles, which then permits derogations, i.e. practices damaging to welfare. These derogations are deemed necessary to prevent further harm but in reality they are needed because the production systems themselves cause serious behavioural abnormalities.

3. The Court of Justice has been reluctant to allow Member States to act extra-territorially to protect animal welfare; recourse to Article 36 is unlikely and, therefore, appears to be of minimal benefit to animal welfare. Public morality was not been afforded significant weight in earlier judgments, but as Chapter Three will discuss, the EU has utilised public morality in a more effective manner, with respect to seal products.

With reference to the above three points, this thesis argues that at present, legislative change (point two) is the area most likely to bring stronger animal protection; in the current era of climate change and appeals for a reduction in intensive farming methods, along with increasing calls for better farm animal welfare, an opportunity now presents to introduce stronger legislation which addresses the most serious welfare issues, which are clearly demonstrated via scientific and veterinary research.

The next chapter will, therefore, explore the relationship between science and policy-making, and consider what role science might play in strengthening current European Union legislation, thereby improving farm animal welfare.

‘Science and Law are like two strands of DNA – different, but inextricably linked. They are necessary to each other, and far more productive together than they ever would hope to be separately’¹

‘Every lawyer knows what “good science” is: the science that supports his or her case’²

3

The Relationship between Science and Law: Evidence Based Policy – with, or without, a European Seal of Approval?

3.1 Introduction

Chapter Two illustrated that, although the European Union has created legislative instruments implementing minimum standards of animal welfare in certain areas, there remains a deficit in current EU legislation with respect to ongoing, significant welfare problems. It was suggested that, moving forwards, an effective method of implementing improved farm animal welfare standards might be the creation of additional legislation based on some established, long-standing scientific principles of animal welfare, i.e. greater use of evidence-based policymaking.

This chapter considers the role of science and research within the European Union and the contemporary role of science in the creation of evidence³-based policy. Firstly, the contemporary role of science as an enterprise, within the European Union, is discussed. This is followed by a brief overview of the development of evidence-based policy making and the significance of such policy making in modern Europe. An outline of modern, accepted scientific research principles follows, setting out the methods now accepted as those most reliable to elicit accurate data. The discussion then considers why science is viewed as the most appropriate discipline to underpin key areas of

¹ Lord Neuberger, Special Speech, ‘Science and Law: Contrasts and Co-operation’ (2016) 11 *Frontiers of Law in China* 579

² O. Houck, ‘Tales from a Troubled Marriage: Science and Law in Environmental Policy’ (2003) 302 *Science* 1928

³ Within this thesis, and, this chapter, the term ‘evidence’ is concerned specifically with *scientific* evidence i.e. research data which is the product of experiments carried out under recognised scientific investigative techniques

European policy and considers some of the problems associated with the reliance upon scientific findings when creating policy. Factors such as scientific objectivity, value-led research, the politicisation of science and citizens' views of science are explored. The current SARS-Covid 19 pandemic is highlighted as an example of these elements in practice. Finally, an analysis of the World Trade Organization (WTO) European Union Seal Products Case⁴ is provided, with specific reference to the key issues detailed, above. This case is important, not only as an example of the EU adopting a higher level of animal welfare protection in the international arena, but also because it perfectly illustrates the difficulty faced by policymakers considering protective legislation in the face of incomplete scientific data and strong public opinion on welfare.

3.2 Science and the European Union

As explained in Chapter One, science has become a central element in modern European society and has been identified as 'the greatest collective endeavour'⁵. In every walk of life, science provides answers to key questions, offering a logical and systematic method through which our world can be better understood. Science facilitates improved human, and animal, health and wellbeing and plays a role in medicine and nutrition, communication, education and our understanding of the environment. Science is also firmly established as a key factor in the workings of the European Union and has become, more recently, a driver for innovation and research across many areas of union competence, including agriculture, fisheries, environment, security, consumer protection, energy and industry⁶.

In 2015, the European Commission stated the aim to create a European Science Advance Mechanism (SAM)⁷, which would facilitate optimal communication between

⁴ WT/DS/400/AB/R - European Communities - Measures Prohibiting the Importation and Marketing of Seal Products

⁵ UNESCO, Science for Society, < <https://en.unesco.org/themes/science-society>> accessed 3 January 2022

⁶ European Risk Forum (ERF), 'Scientific Evidence and the Management of Risk' (October 2016) 7 – the European Union's scientific advisory processes have been under development since the 1950s, with the aim of utilising science to allow identification of hazards, risks and appropriate action via scientific evidence

⁷ For an overview of the SAM, see European Commission, Directorate-General for Research and Innovation, 'How the Group of Chief Scientific Advisors Works' (August 2020) <<https://data.europa.eu/doi/10.2777/490362>> accessed 3 January 2022

leading scientific representatives and the highest levels of Commission policy making, on the basis that: *'[s]ound scientific evidence is a key element of the policy-making process, and therefore science advice should be embedded at all levels of the European policymaking process and co-ordinated across the Commission'*⁸.

3.2.1 21st Century European Union Science

Since March 2000, the EU has increasingly endorsed scientific research as a key component in the future development of the Union and its policies⁹ and has also encouraged greater collaboration between science and information technology. The 'Lisbon Strategy', an arrangement between member states, was created at this time to design *'a challenging programme for building knowledge infrastructures'*, establish a *'European Area of Research and Innovation'* and create a *'very high-speed trans-European network for electronic scientific communications...linking research institutions and universities, as well as scientific libraries, scientific centres and, progressively, schools'*¹⁰. Inter-state co-operation was the goal, allowing researchers from all over Europe to collaborate and share ideas¹¹; EU free movement rules have enabled scientists to work out-with their resident country and since 1987, the Erasmus Student Exchange scheme has facilitated movement of over 470,000 teaching staff and 3.3 million students¹², many of whom have been involved in scientific projects and research.

3.2.2 Horizon Europe

As discussed in Chapter One, it was not until the 1980s that animal *welfare* began to emerge as a scientific discipline in Europe – at the same time as this area of research began to develop, the European Community initiated funding for research activities,

⁸ European Commission, 'Strengthening Evidence Based Policy Making Through Scientific Advice, Reviewing existing practice and setting up a European Science Advice Mechanism' (May 2015) 3

⁹ J.E. Celis and J.M. Gago, 'Shaping Science Policy in Europe' (2014) 8 *Molecular Oncology* 447. The Lisbon Treaty moved science to the fore in order to develop a European society and economy that is knowledge-based. Adopting science at a political level has encouraged a more prominent role for scientists in European policy.

¹⁰ European Parliament, Presidency Conclusions, Lisbon European Council, 12-13 (23rd and 24th March 2000)

< https://www.europarl.europa.eu/summits/lis1_en.htm > accessed 3 January 2022

¹¹ J. Goetschy, 'The open method of co-ordination and the Lisbon Strategy: the difficult road from potential to results' (2005) 11 *Transfer: European Review of Labour and Research* 64

¹² A. Abbott, D. Butler et al, 'Boon or Burden: What has the EU ever done for science?' (2016) 534 *Nature* 7607, 307

establishing an early European framework research programme¹³. This research policy gradually became integrated into Treaties, as a shared competence between Union and Member States¹⁴. The EU research and innovation framework programme, Horizon 2020 (operational from 2014-2020) had an operational budget of approximately €70 billion, and functioned with respect to three pillars: Excellent Science, Industrial Leadership, and Societal Challenges¹⁵. The Horizon Europe research programme continues and has now been extended to 2027, with a budget of €95.5 billion for the period 2021-2027¹⁶; of this, a budget of €8.9 billion will be allocated to food, agriculture and environmental projects.

Scientific research topics relating to animal welfare under Horizon 2020 included 'breeding livestock for resilience and efficiency'¹⁷ and 'alternative production systems to address anti-microbial drug usage, animal welfare and the impact on health'¹⁸, with scientific papers continuing to form the majority of output from EU-funded animal welfare projects. However, The European Animal Welfare Indicators Project (AWIN)¹⁹ - which ran from 2011 to 2015 - also led to the creation of The Animal Welfare Science

¹³ European Parliament Briefing, 'Overview of EU funds for research and innovation' (September 2015) 2

<https://www.europarl.europa.eu/RegData/etudes/BRIE/2015/568327/EPRS_BRI%282015%29568327_EN.pdf> accessed 3 January 2022

¹⁴ *ibid*, 1

¹⁵ The Commission stated that Horizon 2020 aimed to '*ensure Europe produces world-class science, removes barriers to innovation and makes it easier for the public and private sectors to work together in delivering innovation*'. Horizon 2020 played a role in the broader European Research Area, the long-term aim of which is to create a single market for research, innovation and knowledge – see European Commission, Horizon 2020 <<https://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020>> accessed 3 January 2022

¹⁶ European Commission, Directorate General for Research and Innovation, Horizon Europe Budget (2021)

<<https://op.europa.eu/en/publication-detail/-/publication/1f107d76-acbe-11eb-9767-01aa75ed71a1>> accessed 3 January 2022

¹⁷ European Commission, Funding and Tender Opportunities, Breeding livestock for resilience and efficacy (Topic ID: SFS-15-2016-2017)

<<https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/sfs-15-2016-2017>> accessed 3 January 2022

¹⁸ European Commission, Funding and Tender Opportunities, Breeding livestock for resilience and efficacy (Topic ID: SFS-46-2017)

<<https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/sfs-46-2017>> accessed 3 January 2022

¹⁹ Founded by framework programme 7 (2007-2013), the AWIN project (2011-2015) carried out research into animal welfare with respect to pain assessment, disease and early experience as well as setting up the animal welfare science hub resource centre, see European Commission, CORDIS, Final Report Summary – 'Welfare Indicators: (Development, integration and dissemination of animal-based welfare indicators, including pain, in commercially important husbandry species, with special emphasis on small ruminants, equidae and turkeys)' (10 November 2015)

<<https://cordis.europa.eu/project/id/266213/reporting>> accessed 3 January 2022

Hub²⁰, which aims to encourage communication and foster collaboration between like-minded researchers. One notable example of AWIN's research was the introduction of welfare assessment protocols for various farm animal species, which allow tiered assessment of welfare status. A first level, group assessment, requires minimal (or no) animal handling but provides basic, reliable welfare indicators whilst a second level assessment, which relies upon a more detailed individual assessment, can be carried out within a reasonable, practical timeframe to ensure fundamental welfare needs are protected. These AWIN protocols facilitate a system of efficient, on-farm, animal welfare assessment which farmers and stock-keepers can even access via their mobile phones²¹.

A further project in progress is EUWeINet²², established in 2012 to assess the viability of a permanent, co-ordinated EU animal welfare network. The project states four main objectives: (i) the creation of a network of animal welfare science and educational experts; (ii) recognition of areas where there have been difficulties in the implementation of animal welfare legislation; (iii) creation and assessment of strategies to overcome these difficulties; and (iv) consideration of the feasibility of and requirements for creation of an animal welfare network²³.

3.2.3 AWARE and the European Commission Joint Research Centre

Between 2011 and 2014, the EU also funded the AWARE project – ‘Animal WelfAre Research in an enlarged Europe’ whose principal goal was to develop ‘*sustainable and actively expanding Europe-wide networks of farm animal welfare scientists, farm animal welfare university lecturers and students, and stakeholder platforms active in farm animal welfare knowledge transfer and implementation*’²⁴. The overall aims of the

²⁰Animal Welfare Hub <<http://www.animalwelfarehub.com>> accessed 3 January 2022. The aim of the hub is to create a global network of animal welfare data where researchers can collaborate and share information

²¹ M. Battini, E. Dalla Costa et al, ‘Mobile Apps based on AWIN protocols to assess animal welfare on farm’ (2017) 1 OIE Bulletin, Special Dossier on Animal Welfare, 14

See also, for example, the AWIN welfare assessment protocol for horses

<<https://air.unimi.it/retrieve/handle/2434/269097/384836/AWINProtocolHorses.pdf>> accessed 3 January 2022 and the AWIN welfare assessment protocol for sheep

<<https://air.unimi.it/handle/2434/269114>> accessed 3 January 2022

²² EUWeINet <<http://www.euwelnet.eu/en-us/home/>> accessed 3 January 2022

²³ For an overview of EUWeINet's objectives see

<http://www.euwelnet.eu/media/1153/euwelnet_deliverable_1_final.pdf> accessed 3 January 2022

²⁴ European Commission, Directorate General for Research and Innovation, Final Report, Project No. 265686, AWARE (25th April 2014) <<https://cordis.europa.eu/project/id/265686/reporting>> accessed 3 January 2022

project were to explore methods by which farm animal welfare research data could be discussed and disseminated in a more structured manner, and to build a strong, wide ranging forum for farm animal production and welfare. AWARE created a mapping system to track Europe-wide areas of research and promoted the creation of research networks for collaboration and data sharing. Exchange visits between Member State scientists and various roadshows / workshops encouraged greater sharing of research data and the project also sought to create future, pan European collaboration in the field of scientific research²⁵.

The European Commission's Joint Research Centre (JRC) aims to provide 'independent scientific evidence for EU policies'²⁶; funded via the EU budget, the JRC anticipates emerging social, environmental and technological issues, facilitates collaborative scientific agreements (whereby scientific knowledge, data and equipment on the issues can be shared²⁷) and provides policy makers with independent scientific evidence to be utilised in the creation of EU policy on the issues identified. In addition, the JRC has created a Science Hub, which provides a platform for access to, and exchange of, data and knowledge from the JRC and its associated European institutes²⁸.

The JRC incorporates various strands, which enable stakeholders to discuss, collaborate upon and debate significant issues with reference to science and policy making. One such community is the #EU4Facts, Evidence for Policy community, which focuses on policymaking being evidence-informed. The mission statement of this community is 'Evidence for Policy in a post-fact world'²⁹; #EU4Facts aims to address the current climate of misinformation and 'fake news' culture which has emerged in recent years, as a result of social and economic inequality, the disenfranchisement of groups of minority voters, powerful media factions and – most relevant to this thesis – disillusionment with, and lack of trust in, science³⁰. The

²⁵ *ibid*

²⁶ European Commission, Joint Research Centre: <https://ec.europa.eu/info/departments/joint-research-centre_en> accessed 10 January 2022

²⁷ The JRC also has an online publications repository which collates and catalogues the centre's publications - <<https://publications.jrc.ec.europa.eu/repository/>> accessed 10 January 2022

²⁸ European Commission, JRC, EU Science Hub: <<https://ec.europa.eu/jrc/en>> accessed 10 January 2022

²⁹ European Commission, European Science Hub, #EU4Facts: <<https://ec.europa.eu/jrc/en/eu4facts>> accessed 10 January 2022

³⁰ For a fascinating overview of the post-truth era, see S. Lewandowsky, 'Beyond Misinformation: Understanding and Coping with the "Post-Truth" Era' (2017) 6 *Journal of Applied Research in Memory*

community acknowledges that the relationship between science and policy is a complex one, and promotes policy created on the basis of facts, which also recognises the values and principles of citizens. These concepts lie at the core of animal welfare policy making and are examined throughout the remainder of the chapter and the thesis.

Although the JRC facilitates important collaboration and dissemination of scientific data, it is disappointing to note that although ten specific scientific areas are incorporated into the JRC, of which agriculture and food security represent one, there are currently no reports or research topics which focus specifically on farm animal welfare³¹. Topics being investigated include agricultural monitoring (to support implementation of the CAP), forestry, agricultural biodiversity and global food security but, in particular, there is no project focusing on farm animal welfare within intensive production systems³². The field of laboratory animal welfare is, however, one area that is being addressed; in 2010, JRC began investigating research methods which provide alternatives to animal testing - a joint project with the European Centre for the Validation of Alternative Methods (ECVAM)³³.

3.3 European policy making

In today's Europe, citizens and consumers can access information about their health, the environment, a multitude of political and social topics and, of course, animal welfare, via a variety of media platforms. As well as having an expectation of democratic public institutions, the population now desires open discussion of key issues that are important to them, in anticipation of new legislation which will protect their various interests. During the creation of such legislation, modern Europeans expect policy makers to justify their decisions and provide the evidence upon which

and Cognition 353. A detailed exploration of the Post-Truth phenomenon is found in Matthew d'Ancona, *Post-Truth: The New War on Truth and How to Fight Back* (Penguin Random House 2017)

³¹ As of January 2022.

³² European Commission, EU Science Hub, Research Areas, Agriculture and Environment: <https://ec.europa.eu/jrc/en/research-topics?f%5B0%5D=im_field_research_areas%3A2206> accessed 10 January 2022

³³ The European Centre for the Validation of Alternative Methods (ECVAM) was founded in 1991 and works on the '3 Rs' principles – to replace, reduce and refine animal procedures: <<https://ec.europa.eu/jrc/en/eurl/ecvam>> accessed 10 January 2022

their legislation is based³⁴. Increasingly, the European Union has relied upon science to address public concerns, to respond to campaigns and to provide the factual basis for legislation. In 2001 the European Commission committed to more responsible policy-making³⁵, in particular to increase citizen confidence in the mechanisms by which policy makers apply expert advice. In 2002 the Commission published the Science and Society Action plan³⁶, which declared ‘responsible science’ to be at the forefront of policy creation³⁷. Further signs of the increasing importance of evidence based policy-making is the creation of the Commission’s Group of Chief Scientific Advisors³⁸, which is tasked with providing independent scientific opinion on specific issues of policy, where the advice is essential in the development of EU policy or law.

The EU has a long tradition of obtaining scientific opinion on agriculture and the welfare of farmed animals to inform policymaking³⁹. The European innovation partnership for agricultural productivity and sustainability (EIP-AGRI)⁴⁰ supports collaborative projects to prepare for future global challenges in the agricultural and forestry sectors⁴¹. The Commission intends to further promote EIP-AGRI’s role under the CAP, to facilitate collaboration and exchange of data to improve agricultural policy and strengthen rural development. However, it is important to remember that in the last few years, CAP research has tended to centre around three key areas – political

³⁴ J. Girling, ‘The Role of Science in 21st Century EU Policy Making’ (2014) 5 European Journal of Risk Regulation 300

³⁵ European Commission, European Governance: a white paper, COM (2001) 0428 final

³⁶ European Commission, Science and Society Action Plan (2002)

³⁷ Ibid, 8. In 2002 the Commission also published their Communication on the collection and use of expertise by the Commission: principles and guidelines, COM(2002) 713, final, which set out how scientific expertise was utilised by the Commission.

³⁸ European Commission, Members of the Group of Chief Scientific Advisors:

https://ec.europa.eu/info/research-and-innovation/strategy/support-policy-making/scientific-support-eu-policies/group-chief-scientific-advisors/members-group-chief-scientific-advisors_en accessed 10 January 2022

³⁹ House of Lords, European Union Committee, 5th Report of Session 2017-9, Brexit: Farm animal welfare, 12

⁴⁰ European Commission, EIP-AGRI: https://ec.europa.eu/info/research-and-innovation/research-area/agriculture-forestry-and-rural-areas/interactive-innovation-and-eip-agri_en#theeipagriafter2020 accessed 20 January 2022

⁴¹ See legislative provisions, Article 55, Regulation EU 2021/2115 of 2 December 2021 establishing rules on support for strategic plans to be drawn up by Member States under the common agricultural policy (CAP Strategic Plans) and financed by the European Agricultural Guarantee Fund (EAGF) and by the European Agricultural Fund for Rural Development (EAFRD) and repealing Regulations (EU) No 1305/2013 and (EU) No 1307/2013 OJ/L 435/1 and Article 127 of Regulation 1305/2013 of 17 December 2013 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) and repealing Council Regulation (EC) No 1698/2005 OJ/L 347/487

economy, agricultural planning and biodiversity⁴². Whilst data from these three dimensions could all be cited to justify policy change or creation within the CAP, they very clearly represent potentially competing interests and therefore the challenge remains as to which scientific element should take priority.

It is understandable that those involved in the process of policy-making would seek to demonstrate that their decision-making is underpinned by rational, unbiased data. The European Union promotes the importance of scientific objectivity in its policy documents. Two illustrative examples may be provided from the 2011 EFSA Adopted Policy on Independence and Scientific Decision-Making Processes⁴³:

- The Procedural Framework for EFSA's panels and working groups ensures 'impartiality and preventing any form of bias of its outputs⁴⁴'
- The EFSA's established methodologies and risk assessment practices provide 'an additional procedural guarantee of the excellence, objectivity and transparency of the scientific processes and standards followed by EFSA⁴⁵'

These are powerful claims but basing legislation on scientific evidence allows policymakers to show that they have utilised objective factual evidence when designing rules and regulations. However, raw data cannot simply be transposed into law; it must be utilised within a given context and harnessed to amend or improve a certain circumstance. Being in possession of valuable data does not, therefore, guarantee successful creation of policy. In addition, science is a human enterprise and the notion that impartiality in research is guaranteed or that bias can be eliminated is overly simplistic.

3.3.1 Evidence-based Policy Making

Given the regularity with which the European Commission states its desire to base policy on sound scientific data and understanding, it is helpful to consider how this approach began. In fact, the term evidence-based policy making is relatively recent. Although a phenomenon which formally emerged as recently as the 1990s, notably in

⁴² G. Fusco, 'Twenty Years of Common Agricultural Policy in Europe: A Bibliometric Analysis' (2021) 13 Sustainability 10650

⁴³ EFSA Policy on Independence and Scientific Decision-Making processes of the European Food Safety Authority (2011)

⁴⁴ *ibid*

⁴⁵ EFSA (n 43) 6

the United Kingdom⁴⁶, evidence-based policy making (EBPM) is now routinely adopted by European legislators, researchers and politicians (while it should also be recognised that the connection between research, information and policy-creation has been explored and analysed by academics since the turn of the 20th Century⁴⁷).

3.3.2 EBPM - Development and European approach

EBPM has been described as a process whereby evidence gleaned from research is used to demonstrate to policy-makers what processes or principles are effective and therefore will produce positive outcomes for citizens. EBPM gained popularity and political credibility under the UK administration of Tony Blair (1997-2007) and promoted the concept of logical, fact-based decision-making over government processes driven by ideology⁴⁸. The notion that evidence should play a role in the creation of society's rules can be traced back as far as Aristotle⁴⁹ – one modern interpretation of his theory is that three forms of evidence - scientific, value-led and pragmatic knowledge – should inform contemporary policy-making⁵⁰. This is a controversial view but is important to consider, and carries particular significance for animal welfare. This is because whilst scientific data has traditionally been understood as objective, values and 'common sense' are generally accepted as being primarily subjective and, therefore, of less value when trying to legislate. If the latter two elements were to be given equal weight with respect to informing animal welfare policy

⁴⁶ It has been suggested that EBPM emerged around 1999, during the era of the Blair government in the United Kingdom – see W. Parson, 'From Muddling Through to Muddling Up - Evidence Based Policy Making and the Modernisation of British Government' (2002) 17 *Public Policy and Administration* (3) 43. At that time, the Labour administration sought to create government policy based upon sound evidence – in the context of policy and social science, the then-Secretary of State for Education and Employment, David Blunkett, championed a system where scientists would advise government what works and advise what policy strategies would be effective in achieving particular goals. For further discussion see Martin Powell, 'The Policy Process' in Jon Glasby (ed.) *Evidence, Policy and Practice: Critical Perspectives in Health and Social Care* (Policy Press 2011) 18

⁴⁷ A. Boaz, L. Grayson et al, 'Does evidence-based policy work? Learning from the UK experience' (2008) 4 *Evidence and Policy* (2) 233, 234

⁴⁸ S. Sutcliffe and J. Court, 'Evidence-Based Policymaking: What is it? How does it work? What relevance for developing countries?' (November 2005) Overseas Development Institute, iii

⁴⁹ *ibid*, page 1

⁵⁰ Although written with reference to social sciences, rather than veterinary or animal sciences, Bent Flyvbjerg's *Making social science matter: why social inquiry fails and how it can succeed again* (Cambridge University Press 2001) nonetheless makes points relevant to all scientific enterprise, namely that data or knowledge gleaned from case studies can only be fully appreciated within a context of values and social norms. As this thesis will explore, scientific data is simply one element in policy making, which is considered with respect to many other political, ethical and societal factors, before legislation is created. In addition, first-line interpretation of the data itself is subject to individual bias. Faced with such complexity, the concept that a batch of scientific data will alone lead to effective policy making may be viewed as naïve.

making, this could facilitate greater advances in legislation that protects welfare, since, (as demonstrated by the recent ECJ slaughter cases discussed in Chapter Two), citizens of Europe tend to hold strong views about the moral approach to animals, their value in society and what animals need for a contented, healthy existence. Merging these three entities to facilitate creation of policy that is acceptable to the majority of a population is extremely challenging. However, the EU/WTO Seal Products Case, discussed later in this chapter, suggests that values and ‘common sense’ perhaps already carry significantly more influence than might be expected from the official European image of science as the primary guide to policy making.

European political culture promotes democracy, transparency and a rational process of policy creation; it has been suggested that a ‘demand and supply’ system has now emerged with the development of EBPM – the need of administrations and legislators for information, and a reciprocal marked increase in research methods and output of knowledge⁵¹. Policymakers endeavour to imagine improved futures for their citizens and as a result, justify investment in scientific research; information and benefits gleaned from the research are then fed back into policy and administrators hope to demonstrate that they are acting for the good of their citizens.

3.4 Modern Scientific Research Principles

It is out-with the scope of this thesis to provide a detailed analysis of current research techniques, but the methods outlined, below, are the research protocols currently developed within the scientific community over decades, which are accepted as the most suitable to yield objective, factual data. This thesis provides no critique of the methods themselves; rather, it considers how the data obtained is subsequently utilised.

Prior to the Second World War, scientific advances which drove interventions in public health or medicine demonstrated such obvious, positive effects that observation alone was adequate to detect and confirm the benefits to the population at large⁵². However,

⁵¹ B.W. Head, ‘Reconsidering evidence-based policy: Key issues and challenges’ (2010) 29 *Policy and Society* (2) 77

⁵² J. Baron, ‘A brief history of evidence-based policy’ (2018) 678 *The ANNALS of the American Academy of Political and Social Science* 40, 41. Examples would be the development of sanitation systems or the introduction of basic meat hygiene principles as discussed in Chapter One.

from the latter stages of the twentieth century, many areas of human – and animal – health and welfare remained open to further improvement and enhancement; these areas of intervention required deeper evaluation via more nuanced scientific theory, since the likely effects would be far less dramatic than, for example, the outcomes associated with the discovery of penicillin⁵³. When considering the efficacy of interventions in these areas, to confirm that they caused the positive effects seen (rather than their being due to other variables⁵⁴), specific research methods were deemed necessary, to gather reliable, valid information and thus be certain that the intervention was successful⁵⁵.

Accordingly, in more recent times, scientists have adopted the construction of so-called ‘hierarchies of evidence’ – a system that identifies and ranks various forms of evidence utilised in policy making⁵⁶. In general terms, ‘knowing’ is deemed to increase in validity, starting from experiential knowing (based upon practical participation, our own experiences), through theoretical knowing (acquired through intuition or informal research methods), to empirical knowing (which utilises qualitative or quantitative research)⁵⁷. This plays a significant role in the discussion surrounding EBPM because (especially in the current post-truth climate where there is decreasing faith in scientists) many academics and citizens question why empirical knowledge is generally prioritised over individual experience and ponder whether hard data guarantees subsequent creation of suitable policy.

In many academic fields, including medicine and veterinary science, a pyramid of evidence is now adopted which sets out research methods according to increasing ‘validity’ from the base of the pyramid to the apex; within this pyramid, the research

⁵³ Penicillin was discovered in 1928 through simple observation of the fungal contamination of a petri-dish containing bacteria whose growth was noted to be inhibited by the fungus. Despite observing the in-vitro inhibition of bacterial growth, Fleming was not able to purify the penicillin for local, topical use. For further discussion, see M. Lobanowska and G. Pilla, ‘Penicillin’s Discovery and Antibiotic Resistance: Lessons for the Future?’ (2017) 90 *Yale Journal of Biology and Medicine* 135

⁵⁴ These are known as confounding variables – external influences which can alter the effect observed upon the factor being investigated.

⁵⁵ Baron (n 44)

⁵⁶ For a detailed discussion of hierarchies of evidence, see S.M. Nutley, A.E. Powell and H.T.O. Davis, ‘What Counts as Good Evidence?’ (2013) *Provocation Paper for the Alliance for Useful Evidence*

⁵⁷ *ibid*, 6. Qualitative research is scientific observation to gather non-numerical data. Quantitative research is a system of empirical investigation of observed phenomena using mathematical or statistical techniques.

methods deemed to provide the most valid evidence are Randomised Controlled Trials, Meta-Analysis and Systematic Review⁵⁸.

3.4.1 Randomised Controlled Trials

In many areas of modern research, Randomised Controlled Trials (RCTs) are now routinely utilized and have been promoted within medical, veterinary and social science research communities as ‘the ideal methodology for causal inference’⁵⁹; they are defined in human medicine as:

‘A study in which a number of similar people are randomly assigned to 2 (or more) groups to test a specific drug, treatment or other intervention. One group (the experimental group) has the intervention being tested, the other (the comparison or control group) has an alternative intervention, a dummy intervention (placebo) or no intervention at all. The groups are followed up to see how effective the experimental intervention was. Outcomes are measured at specific times and any difference in response between the groups is assessed statistically. This method is also used to reduce bias’⁶⁰.

An example of an actual veterinary animal welfare experimental RCT was carried out as follows: in order to provide evidence to support or discount benefits of tooth clipping in piglets, a group of 207 piglets was assigned to one of three sub-groups for teeth clipping at one day of age: Group 1 had their canine teeth clipped with cutter pliers (hand operated), Group 2 had their canine teeth ground by a grinder (battery operated) and Group 3 had their teeth left intact. All piglets were reared in the same conditions on the same commercial unit. At weaning, all piglets were assessed for weight gain and facial scarring and mortality rate was also assessed. Group 2 pigs with ground teeth had the lowest weaning weight whilst Group 3 pigs with unclipped teeth had the greatest weight gain; it was found that there were fewer pre-weaning deaths in Group

⁵⁸ See, for example, M. H. Murad, N. Asi, M. Alsawas and F. Alahdab, ‘New evidence pyramid’ (2016) 21 BMJ Evidence-Based Medicine 125. For a more detailed analysis of the pyramid of evidence concept, in relation to veterinary medicine, see S. Fricke, ‘A Revised Evidence Pyramid for Veterinary Clinical Resources paper’, Evidence-Based Veterinary Medicine Association (EBVMA) Symposium, 13 November 2015
<<https://rex.libraries.wsu.edu/esploro/outputs/conferenceProceeding/A-Revised-Evidence-Pyramid-for-Veterinary/99900502092401842>> accessed 11 January 2022

⁵⁹ A. Deaton and N. Cartwright, ‘Understanding and misunderstanding Randomized controlled trials’ (2018) 210 Social Science and Medicine 2

⁶⁰National Institute for Health and Care Excellence (NICE):
<<https://www.nice.org.uk/glossary?letter=r>> accessed 11 January 2022

1, clipped teeth group. Groups 1 and 2 also had less facial scarring. From the study it was concluded that clipping teeth yields welfare as well as financial benefits, as it reduces mortality and facial scarring⁶¹. Given the widely acknowledged welfare issues associated with tooth clipping, and the fact that the pigs were housed in a standard commercial unit, it is notable this study concluded that the data from the RCT supported tooth clipping because tooth clipping reduced facial scarring and preweaning mortality, even though Group 3 (intact teeth) had the greatest weight gain. This single study demonstrates the difficulty faced by policy makers who seek advice on animal welfare; every set of data obtained is influenced by various external factors or subjective priorities. In this case, it would appear that there was over-reliance on facial scarring and pre-weaning mortality as welfare indicators; indeed, the study did not address the welfare problems caused by tooth clipping at all. The data itself is unbiased but the options for its interpretation are numerous.

The RCT method allows confirmation that a specific intervention has influenced an outcome because the sole difference between the action (which is randomly assigned) and control groups should be the intervention itself⁶². Whilst there are clear benefits to the use of RCTs, they are not without problems, as indicated above. Some of the difficulties associated with interpretation of the data obtained from RCTs is discussed, below, and in chapter four which focuses specifically on animal welfare science.

3.4.2 Farm Animal Welfare research: Randomised Controlled Trials

Animal welfare research and the challenges faced when interpreting data will be discussed in greater detail in Chapter Four. For the purposes of the present discussion, however, it is useful to note that whilst RCTs have been utilised in some veterinary medicine and agricultural studies, they have not generally been widely used in animal *welfare* research⁶³. In addition, as demonstrated in the example of piglet tooth trimming, above, a large proportion of veterinary farm animal research is focused on animal *health* and / or productivity, with welfare often discussed as only one of many considerations, i.e. the research is primarily focused on the prevention of physical disease, better nutrition, profit or different types of husbandry practice.

⁶¹ P. K. Holyoake, D. J. Broek and A.P.L Callinan, 'The effects of reducing the length of canine teeth in sucking pigs by clipping or grinding' (2004) 82 Australian Veterinary Journal (9) 574

⁶² Justin Parkhurst, '*The Politics of Evidence. From evidence-based policy to the good governance of evidence*' (Routledge 2017) 19

⁶³ L.M. Collins and C.E. Part, 'Modelling Farm Animal Welfare' (2013) 3 Animals (2) 416

However, one of the key components of animal welfare is the *mental* well-being of the animals under study⁶⁴. In the piglet example, above, the focus of the study was whether the tooth clipping would reduce mortality and trauma from fighting, or affect liveweight gain, and although welfare was a stated consideration, the study did not acknowledge either the chronic physical pain resulting from tooth clipping (a welfare concern in itself) or the resultant detrimental mental experience (as a result of chronic pain and discomfort) which these piglets were likely to endure; nor, indeed, did it examine the underlying stocking density and environmental factors which lead to fighting and biting behaviours in the first place.

The focus on health is potentially problematic for animal welfare policy makers because even when RCT methodology is followed, a research study might demonstrate that an intervention has caused an outcome but fail to take into account what additional effect(s) the intervention (or indeed the entire production system) has had on the animals' welfare. Philip Scott, European Veterinary Specialist in Bovine Health and Management provides the example of a theoretical, randomised controlled trial into animal health and husbandry systems for beef cattle. Such a study would likely demonstrate that compared with other husbandry methods, indoor housed, cereal-fed animals are the group found to maintain the best physical health and optimal growth rates. However, a life of confinement indoors, on concrete slatted flooring, at maximum stocking density with other cattle is likely to be detrimental to the *welfare* of those animals⁶⁵. These concepts will be discussed in detail in Chapter Four; at present, it is important simply to acknowledge the fact that RCTs, which tend to focus on a single treatment or technique, may be limited with respect to the evidence they can provide about animal welfare when carried out in veterinary or agricultural research.

In its 2018 report on evidence-based decision making⁶⁶, the Farm Animal Welfare Committee (FAWC) of Great Britain stated that in the field of animal science, information obtained from RCTs is highly regarded but noted that RCTs are primarily

⁶⁴ P.R. Scott, 'The Challenges to Improve Farm Animal Welfare in the United Kingdom by Reducing Disease Incidence with Greater Veterinary Involvement on Farm' (2013) 3 *Animals* (3) 629. The Farm Animal Welfare Committee of Great Britain has stated that farm animal welfare encompasses both physical and mental health

⁶⁵ *ibid*, 631

⁶⁶ Farm Animal Welfare Committee (FAWC) 'Evidence and the Welfare of Farmed Animals, Part 2: evidence-based decision making', Farm Animal Welfare Committee, June 2018

associated with medical and vaccine research, not animal welfare research⁶⁷ - the committee commented that in the field of animal welfare science, RCTs are relatively uncommon, due to practical, economic and ethical reasons⁶⁸.

In addition to RCTs, two other scientific investigative protocols exist which are often cited as efficient and rigorous methods of examining evidence: systemic review and meta-analysis.

3.4.3 Systemic Review and Meta-Analysis

These two research methods are also utilised in scientific, veterinary and welfare research. They can provide a greater over view of a research topic by assessing greater volumes of data, thus representing a greater sample population size.

Systematic Review collects all the relevant studies relating to a given topic, then reviews and analyses their findings. By applying systematic methods of evaluation, the review can identify and assess the relevant research obtained in all previous studies, giving a summary of the available research data on a topic. It also provides an excellent overview of existing knowledge and the current state of understanding of that topic⁶⁹. When invited to assess individual welfare problems, the EU's EFSA Panel on Animal Health and Welfare carries out Systematic Review; the Panel's approach is explored in detail in Chapter Four.

Meta-analysis is a process of research which allows a merging of individual studies to create an 'absolute' effect, via statistical methodology⁷⁰. It is not simply the combining of data – it is statistical analysis of a large volume of data from individual studies with the aim of integrating the results⁷¹. A significant benefit of meta-analysis is the discovery of more detailed information than that which might arise from a single experiment⁷² – often, in smaller trials, especially those with clinical application, the

⁶⁷ *ibid*, p.7

⁶⁸ The FAWC cited their initial report into Evidence and Welfare - Farm Animal Welfare Committee 'Evidence and the Welfare of Farmed Animals, Part 1: The Evidence Base', June 2014

⁶⁹ For a practical application of these techniques, see B. Clark, G.B. Stewart et al. 'Citizens, consumers and farm animal welfare: A meta-analysis of willingness-to-pay studies' (2017) 68 Food Policy 112. See also A.C. da Fonseca de Oliveira, K. Vanelli et al, 'Impacts on performance of growing-finishing pigs under heat stress conditions: a meta-analysis' (2019) 43 Veterinary Research Communications 37

⁷⁰ A. B. Haidich, 'Meta-analysis in medical research' (2010) 14 (suppl. 1) Hippokratia 29

⁷¹ A. Shorten and B. Shorten, 'What is meta-analysis?' (2013) 16 Evidence-Based Nursing 3

⁷² For an explanation of the value of meta-analysis and systematic review in veterinary science, see J.M. Sargeant and A. M. O'Connor, 'Scoping reviews, systematic reviews and Meta-Analysis:

sample of the target population can yield a random, anomalous result with respect to the overall population. In addition, when small sample populations are assessed, there is often no statistically significant difference detectable between trial groups; a meta-analysis of numerous studies, however, can yield more information and has been defined as a 'statistical technique involved in extracting and combining data to produce a summary result'⁷³. Meta-analysis is a quantitative epidemiological tool which allows scientists to assess previous studies in order to reach conclusions about the previous research. Meta-analysis findings can offer more precise estimates of the efficacy of a treatment or the effect of a particular action, than any one of the individual studies included in the analysis⁷⁴.

Having identified some of the fundamental principles of gathering scientific evidence, the chapter will now consider whether data gathered from this kind of scientific investigation can, in itself, adequately provide a suitable evidence-base for policy-making.

3.5 Science as an evidence-base for policy

Having considered how scientific data is collected, the next step in the process of policymaking is harnessing the science as a basis for legislation. The principle of policy creation based upon sound, scientific data is an attractive concept – not only for policy-makers themselves but also for citizens, politicians and research communities; it appears to offer a panacea for various societal problems, using incontrovertible, objective evidence to create policy. However, whilst having considerable value and undoubtedly being well-intentioned, the adoption of evidence-based policy has become entwined with an increasingly common assumption amongst citizens, often promoted by the media, that science can provide unequivocal data to solve any problem with which it is presented. Human beings are typically averse to uncertainty⁷⁵ and are therefore keen to believe that science will yield 'truth'; in fact,

Applications in Veterinary Medicine (2020) 7 *Frontiers in Veterinary Science*
<<https://doi.org/10.3389/fvets.2020.00011>> accessed 11 January 2022

⁷³ S. Gopalakrishnan and P. Ganeshkumar, 'Systematic Reviews and Meta-analysis: Understanding the Best Evidence in Primary Healthcare' (2013) 2 *Journal of Family Medicine and Primary Care* 9

⁷⁴ I. J. Lean, A. R. Rabiee, T. F. Duffield, I. R. Dohoo, 'Invited review: Use of meta-analysis in animal health and reproduction: methods and applications' (2009) 92 *Journal of Dairy Science* (8) 3545

⁷⁵ E. C. Anderson, R. N. Carleton, M. Diefenbach and P.K.J. Han, 'The relationship between uncertainty and affect' (2019) 10 *Frontiers in Psychology* 2504

absolute certainty is rare in any scientific discipline⁷⁶ and this is problematic for the current view of EBPM as well as its practical application.

As a society there is currently little acknowledgement that scientific enterprise does not occur in isolation – once data has been collated, it passes into a socio-political environment and is generally exposed to various exchanges and negotiations between parties with opposing social values⁷⁷. It is rarely the case that social policy is decided on the basis of technical or scientific evidence alone⁷⁸ yet this rationalist model of policy making enjoys much support – the concept that facts, not values, should drive policy-making⁷⁹. In reality, discussion, debate and a struggle between opposing values and ideals is central to the process of designing any policy – and the suggestion that policy-making follows the same objective processes as scientific research is too simplistic⁸⁰. In addition, it has been suggested that technology and science present a particular problem because of an almost routine acceptance (by citizens and policymakers alike) that they always provide unbiased, objective data to under-pin policy⁸¹.

Policymaking is multi-faceted and complex, however, there are three particularly important factors relevant to this thesis with respect to scientific data:

- Scientific ‘objectivity’ and the value-laden nature of scientific enterprise
- The politicisation of Science
- Citizens and their views of science

⁷⁶ See, for example, J. P. Kassirer M.D. ‘Our Stubborn Quest for Diagnostic Certainty’ (1989) 320 New England Medical Journal 1489

⁷⁷ Justin Parkhurst (n 62) 5

⁷⁸ *ibid*

⁷⁹ J. Russell, T. Greenhalgh et al, ‘Recognising Rhetoric in health care policy analysis’ (2008) 13 Journal of Health Services Research & Policy 40

⁸⁰ For discussion of a pragmatic approach to policymaking which acknowledges the limitations of scientific evidence and the tendency of policy makers to act based upon belief systems and individual aims, see P. Cairney and K. Oliver, ‘Evidence-based policymaking is not like evidence-based medicine, so how far should you go to bridge the divide between evidence and policy?’ (2017) 15 Health Research Policy and Systems 35

⁸¹ *ibid*

3.5.1 Scientific Objectivity

In modern Europe, the media regularly provides reports on the latest scientific research, often focusing on positive findings from health / medical trials and predicting revolutionary improvements to the quality of people's lives⁸². This has led to misconceptions about science and its capabilities⁸³ – and is partly responsible for the idea that science is omniscient; the public has been lead to believe that research findings offer us definitive truths. The scientific community has also, at times, encouraged the idea of science as invincible, not only in medicine but also in areas such as mechanical universe theory and reductionism⁸⁴. In addition, the courts have promoted an image of science as impartial and unbiased. In 2014 the International Court of Justice confirmed the fundamental objectivity of science⁸⁵ and within the European Union, science and technology are regularly cited as the objective basis upon which legislation is created. The fundamental problem with this simplistic, deep-seated belief is that it neither acknowledges the possibility of flawed scientific practice nor addresses the fact that data has to then be harnessed within policy; this has led some commentators to question the validity of viewing data as a 'value-neutral basis for regulatory decisions'⁸⁶. Two instances where scientific uncertainty has been at the fore and discussed, below; the Pusztai Affair and COVID-19 pandemic.

The concept of scientific objectivity is founded on the assertion that experimental techniques, scientific findings and conclusions drawn are not subject to subjective influences such as personal beliefs or interests, ethical commitments, community pressures or any other external factors⁸⁷; in essence, the fundamental idea that good science will yield fact.

⁸² Helen E. Longino, *Science as Social Knowledge: Values and Objectivity in Scientific Inquiry*, (Princeton University Press, Princeton, 1990) 3

⁸³ K.R. de Camargo Jr, 'Science, Knowledge and Society' (2011) 101 *American Journal of Public Health* 1352

⁸⁴ D. Boulter, 'Public perception of science and associated general issues for the scientist' (1999) 50 *Phytochemistry* 1, 5

⁸⁵ International Court of Justice, *Whaling in the Antarctic (Australia v. Japan: New Zealand Intervening)* <<https://www.icj-cij.org/public/files/case-related/148/148-20140331-JUD-01-00-EN.pdf>> accessed 12 January 2022. In this case, the Court ruled that science was an objective entity which could not be defined by a state or influenced by its particular agenda.

⁸⁶ L. Levidow and C. Marris, 'Science and Governance in Europe: Lessons from the case of agricultural biotechnology' (2001) 28 *Science and Public Policy* 345

⁸⁷ J. Reiss and J. Sprenger, "Scientific Objectivity", *The Stanford Encyclopedia of Philosophy* (Winter 2020 Edition), Edward N. Zalta (ed) <<https://plato.stanford.edu/entries/scientific-objectivity/>> accessed 12 January 2022

As explained, above, European policymakers demonstrate trust in science, viewing it as a paradigm of objectivity, central to sound policy. For example, in 2015 the European Commission published its report entitled ‘Strengthening Evidence Based Policy Making through Scientific Advice’⁸⁸ which recognised the key role of science in EU policy-making, and the Commission’s 7th Environmental Action Programme (to 2020) endorsed the implementation of policy decisions based upon sound scientific evidence⁸⁹. The 2018 Commission publication ‘Ensuring food is safe’⁹⁰ states: ‘*Since its creation in 2004, The EFSA has become a globally recognised institution that stands for the core values of the EU – state of the art science, transparency, and a high level of protection*’⁹¹. However it is interesting to note that in 2019, the Commission published a detailed, independent report from their Group of Chief Scientific Advisors which acknowledges scientists as the intermediaries between the data and policy, seeks to strengthen scientific impartiality and considers how to deal with, and communicate, scientific uncertainty⁹². It is perhaps the case that the current societal problems with lack of trust in experts and scientists will instigate greater analysis and debate on the traditional view of science and its objectivity.

Whilst the scientific methods explained earlier in the chapter act to maximise objectivity and reduce operator error or unconscious bias in research, it is important to understand there is a subtle but significant distinction between scientific method and the nature of scientific enterprise⁹³. It is entirely reasonable to expect unbiased and balanced, analytical method, since this is the basis of responsible scientific research; however, these objective standards are often, mistakenly, viewed as being applicable to the entire field of scientific discovery.

Scientific method derived from a growing awareness that human perception is unreliable and that we are often misled by our senses; therefore to establish facts, an

⁸⁸ European Commission, ‘Strengthening Evidence Based Policy Making through Scientific Advice Reviewing existing practice and setting up a European Science Advice Mechanism’, May 2015

⁸⁹ European Commission, Memo, New Environmental Action Programme to 2020, questions and answers, 29 November 2012

⁹⁰ European Commission, ‘Ensuring Food is Safe: The veterinary and phytosanitary system of the European Union Explained’ (2017)

⁹¹ *ibid*, 16

⁹² European Commission, ‘Scientific Advice to European Policy in a Complex World’, Independent Expert Report, Group of Chief Scientific Advisors, Scientific Opinion No.7 (September 2019)

⁹³ U. Sabbagh, ‘Science has always been inseparable from politics’, *Scientific American*, April 25th 2017 <<https://blogs.scientificamerican.com/guest-blog/science-has-always-been-inseparable-from-politics/>> accessed 12 January 2022

experimental technique is needed. Scientific method consists of a question and posited explanation (hypothesis) grounded in observation, followed by execution of logically designed and well-controlled experiments, concluding with validation, alteration or rejection of the proposed hypothesis⁹⁴. What is especially important to note here, is that at the end of an experiment, a *hypothesis* is proven (or disproven). A hypothesis is not a fact, rather, it is a suggested explanation of an observed fact. This is a subtlety that is too often overlooked when policy makers rush to act on the basis of data.

Scientific enterprise, on the other hand, is a social activity, which is subject to the aims and beliefs of the stakeholders involved; for example, research projects often derive financial support from large, private companies who carry their own, very specific agendas⁹⁵ and researchers themselves may elect to pursue particular lines of enquiry, perhaps seeking to prove a theory which they already strongly support, potentially at the expense of other areas of investigation. It is essential, therefore, to acknowledge the value-laden nature of scientific enterprise and understand that the selection of a particular topic for research by stakeholders indicates that theory or concept has been deemed the 'most appropriate' to explore for a reason. If it is worthy of funding and support to the interested parties, it is likely they have a purpose for it. Under such circumstances, is it challenging for policy makers to feel confident that focus has been directed to the most appropriate area for investigation.

As explained, above, the most common goal of scientific research is to identify a hypothesised solution to an already-defined question; funding is often provided by parties who have a vested interest in utilising the data which the research yields, the most striking example of this phenomenon being the use of research by the tobacco industry over the last few decades⁹⁶. Under such circumstances, it would be naïve to suggest that the scientific discovery process is value-neutral; in fact, by investigating a particular topic and accepting financial support from stakeholders with their own agendas, scientists are drawn into an arena where subjective values allow the

⁹⁴ S. Carroll, 'Defining the Scientific Method' (2009) 6 Nature Methods 237

⁹⁵ Editorial, 'Private Funding for Science' (2016) 13 Nature Methods 537

⁹⁶ See for example S. Lee, 'The Tobacco Industry's Abuse of Scientific Evidence and Activities to Recruit Scientists During Tobacco Litigation' (2016) 49 Journal of Preventative Medicine and Public Health 23 and T. Gruning, A.B. Gilmore and M. Martin, 'Tobacco industry influence on science and scientists in Germany' (2006) 96 American Journal of Public Health 20

prioritisation of chosen theories or areas for research.⁹⁷ Although it is tempting to believe that science drives policy change, in reality, large corporate actors often impact policymaking by exerting influence on the research agenda⁹⁸.

Any scientific research project which seeks to assess the impact of a production system on the welfare of farmed animals will inevitably be of interest to a wide variety of stakeholders, who may have conflicting goals or opinions. A good example of such research, and the stakeholders involved, is the novel poultry stunning method, Low Atmospheric Pressure Stunning (LAPS)⁹⁹. LAPS causes irreversible stunning of animals via a gradual reduction in atmospheric pressure (and therefore oxygen) leading to loss of consciousness in a controlled and minimally stressful way¹⁰⁰. The method also allows birds to be placed in a chamber whilst in their transport crates, removing the need for handling and (as used in the electrical water-bath systems) shackling upside down by the legs prior to stunning. LAPS was considered to present lower risks to welfare when compared with electrical water-bath stunning and was, therefore, added to Council Regulation 1099/2009¹⁰¹ as a suitable slaughter method for broiler chickens¹⁰². The experimental research was carried out at the Universities of Edinburgh, Glasgow, Arkansas and Scotland's Rural College and involved collaboration between veterinary surgeons, animal behaviourists and an animal physiologist. One researcher had spent much of her career working for broiler companies¹⁰³, and the research itself was funded by a poultry-harvesting equipment manufacturer¹⁰⁴. A decision to amend the current regulation was made, following assessment of the research, by the EFSA.

⁹⁷ For a detailed discussion of the concept of value-free science, see Heather Douglas, 'Rejecting the Ideal of Value Free Science' in Harold Kincaid, John Dupré and Alison Wylie (eds) *Value Free Science – Ideals and Illusions* (Oxford University Press 2007)

⁹⁸ J. Paone, 'When big pharma courts academia: academic alliances with pharmaceutical companies create ethical challenges that some institutions learn to manage' (2002) 16 *The Scientist* (2) 48

⁹⁹ J. Martin, Y. Vizzier-Thaxton et al, 'A new method of stunning poultry: evaluation of physiological and behavioural responses to Low Atmospheric Pressure Stunning (LAPS) in broilers' (2017) *British Poultry Abstracts* 13

¹⁰⁰ 'For discussion of the research findings, see EFSA Panel on Animal Health and Welfare, Scientific Opinion on Low Atmospheric Pressure System for stunning broiler chickens (2017) 15 *EFSA Journal* 12:5056

¹⁰¹ Council Regulation (EC) No 1099/2009 of 24 September 2009 on the protection of animals at the time of killing, OJ L 303/1

¹⁰² *ibid*, Annex 1

¹⁰³ Karen Christensen

¹⁰⁴ Technocatch, LLC <<http://www.technocatch.com/home.php>> accessed 12 January 2022

Various motivations for the introduction of LAPS exist – animal welfare, economic factors (a reduction in damage to, or death of, birds prior slaughter through stress or trauma), politics (to demonstrate policy-making which reflects consumers’ animal welfare concerns) and commerciality of product (in terms of its ‘animal friendly’ status). It is fair to say, therefore, that whilst the research into LAPS may provide objective, raw data, the application and use of that data can, and will, be utilised in different ways and to different ends. This simple example highlights the fact that scientific data can influence implementation of sound evidence-based policy, but underlying vested interests for research being carried out (and associated funding of research projects) are notably influential in terms of what research is carried out in the first place. In addition the research may only be possible if funding from interested actors is guaranteed.

3.5.2 Politicisation of Science

Politicisation in the context of this discussion can almost be described as the polar opposite of the belief in objectivity and infallibility of science. As a factor relevant to policy-making (which has come under scrutiny particularly in recent years), it has been defined as occurring ‘*when an actor emphasises the inherent uncertainty of science to cast doubt on the existence of scientific consensus*’¹⁰⁵. Politicisation is an approach which can be seen to exploit the presence of doubt in scientific research (which can never be completely eliminated), thus bringing into question the validity of research findings and casting doubt in the minds of citizens and possibly other stakeholders¹⁰⁶. Any degree of uncertainty (inherent in all scientific research) is highlighted but rather than the motivation being a desire for accuracy or fact, the underlying agenda is to promote an alternative belief¹⁰⁷.

Probably the best-known example in current times of the politicisation of science is the area of climate change. Information is disseminated to citizens through a wide variety of platforms today – via social media, the press, internet, television or other publications - and although the worldwide scientific community has been

¹⁰⁵ T. Bolsen and J.N. Druckman, ‘Counteracting the Politicization of Science’ (2015) 65 *Journal of Communication* 745, 746

¹⁰⁶ For a fascinating account of the relationship between industry, politicians and scientists with respect to tobacco and public health (and also climate change), see N. Oreskes and E. M. Conway, *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming* (Bloomsbury 2010)

¹⁰⁷ Bolsen (n 105) 746

independently assessed as reaching an almost unanimous verdict on the facts of climate change¹⁰⁸, it is easy for individuals or organisations with agendas contrary to environmental protection to orchestrate campaigns which publicly dispute the evidence supportive of climate change resulting from human behaviour¹⁰⁹. Polarisation of views can occur and this has been particularly notable in the United States, where these types of campaign have led to further political division¹¹⁰, inhibiting societal engagement with the issue and distorting public understanding of the general consensus that climate change is a serious problem confirmed by a multitude of scientists and researchers¹¹¹.

The actors perpetrating politicisation are not necessarily political entities in themselves, but whatever their identity, they understand that the modern world is regulated and may seek to influence or even hinder policy making within certain areas of society. The tobacco industry has, unsurprisingly, formulated and utilised various strategies to challenge and undermine scientific evidence supportive of the risks inherent with cigarette smoking¹¹². One study has detailed the manner in which science can be manipulated to advance a particular policy view in three ways: firstly, by funding and publishing research documents supportive of the tobacco industry's position, secondly through criticism or suppression of research which is contrary to the industry's position and thirdly by distribution of the industry's own data to policy makers and the general public (via the press)¹¹³.

In Europe, a further area where politicisation of science has proven problematic is in the field of genetically modified organisms and it is to this field of research that the chapter now turns, to consider in more detail citizens' views of science and its role in policy.

¹⁰⁸ J. Cook, N. Oreskes, P.T. Doran et al, 'Consensus on consensus: a synthesis of consensus estimates on human-caused global warming' (2016) 11 *Environmental Research Letters* 4. See also W.R.L. Anderegg, J.W. Prall, J. Harold and S.H. Schneider, 'Expert credibility in climate change' (2010) 107 *Proceedings of the National Academy of Sciences of the United States of America* (27) 12107

¹⁰⁹ S. van der Linden, A. Leiserowitz, S. Rosenthal and E. Maibach, 'Inoculating the Public against Misinformation about Climate Change' (2017) 1 *Global Challenges* 1600008

¹¹⁰ R. E. Dunlap, A. M. McCright, 'A Widening Gap: Republican and Democratic Views on Climate Change' (2008) 50 *Environment: Science and Policy for Sustainable Development* (5) 26

¹¹¹ Van der Linden, (n 109)

¹¹² Parkhurst (n 62) 67

¹¹³ L. A. Bero, 'Tobacco industry manipulation of research' (2005) 120 *Public Health Reports* (2) 200

3.5.3 Citizens' Views on Science

At first glance, the European public appears to accept the assertion of policy makers that science plays an important role in modern society and its regulation; in the United Kingdom, scientists have been ranked among the most trusted professionals¹¹⁴ and a 2016 survey in the United States found that 67% of respondents believed that science had a mostly positive effect on society¹¹⁵. Interestingly, however, a Eurobarometer survey in 2010 revealed that 58% of respondents believed *'We can no longer trust scientists to tell the truth about controversial scientific and technological issues because they depend more and more on money from industry'*¹¹⁶, and in 2019, an American study found that although citizens had confidence in scientists there were marked differences between opposing political groups as to the objectivity of scientists and the extent to which they are able to act in the public interest¹¹⁷. This suggests that whilst the general public understands the benefits that the discipline of scientific discovery can bring, citizens are currently somewhat sceptical about the objectivity of scientists, with respect to economic or political influences which may motivate their research. This is notable, because policymakers perceive EPBM as positive with respect to electability, and therefore wish to court favourable public opinion; however, it may be that their devotion to policy based upon scientific data, is not, in itself, adequate to win the support of voters. In fact, an alliance between politicians and science can be perceived by some citizens as negative, especially where the policy field is contentious, for example in genetic editing or automation technology¹¹⁸.

3.5.3.1 GMOs and public opinion

Where a policy field is politically or socially controversial and where there is a high media focus, citizens can resist unquestioning acceptance of scientific data, especially

¹¹⁴ IPSOS Mori Poll, Trust in Professions: Long term trends, 30th November 2017: < <https://www.ipsos.com/ipsos-mori/en-uk/trust-professions-long-term-trends> > accessed 15 January 2022. Scientists were ranked 4th in a list of professions, with 83% of respondents trusting them to tell the truth. For an interesting overview of public attitude to science and scientists in the United Kingdom, see 'Science and the Public: A Review of Science Communication and Public Attitudes to Science in Britain', A Joint Report by the Office of Science and Technology and the Wellcome Trust, October 2000

¹¹⁵ Pew Research Centre, C. Funk, 'U.S Public's trust in science and scientists (2016). A majority of respondents also held that scientists should have a major role in science-related policy decisions

¹¹⁶ Special Eurobarometer 340, 'Science and Technology' (2010 Brussels)

¹¹⁷ Pew Research Center, C. Funk, M. Hefferson, B. Kennedy and C. Johnson, 'Trust and Mistrust In Americans' Views of Scientific Experts' (2019)

¹¹⁸ *ibid*

if they believe their health or safety is at risk. One high-profile example of controversial scientific research where citizens express scepticism (despite the presence of sound, objective scientific data), is to be found in the field of agricultural genetic engineering. Genetically Modified organisms (GMOs) are created by the utilisation of recombinant DNA technology¹¹⁹ which combines genes from different organisms, usually with the aim of creating a faster growing or disease resistant strain of a particular crop or animal¹²⁰. The European Union has traditionally held strong opposition to the use of genetic modification (GM) in agriculture – at present, no GM animals are permitted to enter the European Food Chain¹²¹ and with respect to GM crops, although Europe imports large quantities of GM animal feeds from non-EU countries¹²², it has some of the most rigorous regulations in the world with respect to GMOs¹²³. Individual Member States retain the ability to block their farmers from producing GMOs¹²⁴ and any GMO product must undergo assessment by the EFSA for risks to the environment and human health¹²⁵.

Notwithstanding the large body of positive research findings with respect to GMOs, in line with the European Commission's standards, the European population has remained largely resistant to the introduction of GM products, despite a significant

¹¹⁹ For discussion and explanation of the technique involved, see S. Khan, M. W. Ullah et al, 'Role of Recombinant DNA Technology to Improve Life' (2016) *International Journal of Genomics* 2016:2405954. doi:10.1155/2016/2405954

<<https://pubmed.ncbi.nlm.nih.gov/28053975/>> accessed 15 May 2022

¹²⁰ A.S. Bawa and K.R. Anilakumar, 'Genetically modified foods: safety, risks and public concerns—a review' (2013) 50 *Journal of Food Science and Technology* (6) 1035

¹²¹ EFSA, Genetically Modified Animals, European Framework:

<<https://www.efsa.europa.eu/en/topics/topic/genetically-modified-animals>> accessed 12 January 2022

¹²² Europe imports in excess of thirty million tons of soy and corn animal feeds per annum, the vast majority of which is GM. Mark Lynas, 'With G.M.O. policies, Europe turns against science', *Opinion, New York Times* (October 24th 2015) <<https://www.nytimes.com/2015/10/25/opinion/sunday/with-gmo-policies-europe-turns-against-science.html>> accessed 12 January 2022

¹²³ For example, Directive 2001/18/EC of the European Parliament and of the Council of 12 March 2001 on the deliberate release into the environment of genetically modified organisms and repealing Council Directive 90/220/EEC - Commission Declaration [2001] OJ L 106/1. Regulation (EC) No 1829/2003 of the European Parliament and of the Council of 22 September 2003 on genetically modified food and feed (Text with EEA relevance) [2003] OJ L 268/1

¹²⁴ Since 2015, under Directive (EU) 2015/412 of the European Parliament and of the Council of 11 March 2015 amending Directive 2001/18/EC as regards the possibility for the Member States to restrict or prohibit the cultivation of genetically modified organisms (GMOs) in their territory [2015] OJ L 68/1. For discussion on Member State autonomy, see M. Lee, 'GMOs in the Internal Market: New Legislation on National Flexibility' (2016) 79 *Modern Law Review* 317

¹²⁵ For details of the EFSA assessment process for a GM product, see 'EFSA guidance on the submission of applications for authorisation of genetically modified plants under Regulation (EC) No 1829/2003' (2013) 11 *EFSA Journal* 12:3941

body of evidence to support their safety¹²⁶. The 2010 Eurobarometer Survey found that 70% of respondents agreed that GM food is 'fundamentally unnatural' with 61% of respondents disagreeing with encouraging the development of GM food¹²⁷. The scepticism of Europeans is in direct contrast to their American citizen counterparts and it has been suggested that the marked differences in the historical development of agriculture on these two continents has led to disparate societal attitudes towards GMO science¹²⁸. In Europe, the constraints of geography and terrain have maintained traditional farming methods over the centuries (with some reluctance to embrace technology) whereas American pioneers sought to exploit the available space and 'tame' the landscape. The American desire for techno-economic land management has flourished and although Europe, especially in the Post War era, adopted more intensive agricultural methods, there remains a fundamental difference in the approach to land stewardship between the two continents¹²⁹.

In fact, European citizens continue to demonstrate considerable concern, even fear, with respect to the introduction of GM foods. The increased mechanisation of food production, growth of urban areas and loss of connection to farming and farmland have been said to cause suspicion of modern farming methods¹³⁰; when this is combined with a growing distrust of the motivation of scientists, the result is a population with little or no desire to explore GM produce. The GMO debate has been described as an ongoing 'psychodrama' in Europe¹³¹; ample scientific evidence exists to support the safety of many GM products, yet the public remains unconvinced and unyielding in its opposition, perhaps due to the view that GM technology benefits corporations and not consumers. The approach of the European public also, therefore, demonstrates a reluctance to accept EBPM in this scenario (despite the presence of reassuring data)

¹²⁶ S. Bonny, 'Why are most Europeans opposed to GMOs? Factors explaining rejection in France and Europe' (2003) 6 *Electronic Journal of Biotechnology* (1) 50

¹²⁷ European Commission, Special Eurobarometer 341, Biotechnology (2010 Brussels) 18

¹²⁸ For a detailed discussion of the historical attitudes towards cultivation of rural land in Europe versus The United States of America, see O. Ujj, 'European and American Views on Genetically Modified Food' (2016) 49 *The New Atlantis* 77

¹²⁹ *ibid*, 81-83

¹³⁰ Rémi Dumery, 'By banning pesticides and GMOs, the EU is sleepwalking into a food security crisis', *Euronews* (20 December 2018) <<https://www.euronews.com/2018/12/20/by-banning-pesticides-and-gmos-the-eu-is-sleepwalking-into-a-food-security-crisis-view>> accessed 12 January 2022

¹³¹ Dennis Eriksson and Robert Defez, 'EU and GMOs: The case for a knowledge based society', *Euractiv* (21 Sep 2017) <<https://www.euractiv.com/section/agriculture-food/opinion/wed-eu-and-gmos-the-case-for-a-knowledge-based-society/>> accessed 15 January 2022

and mistrust towards the motivations of political and scientific actors. Importantly, the widespread rejection of GM contradicts the idea that citizens will necessarily embrace legislation simply because it is based upon sound science; in addition, the current European position suggests that policy makers are choosing to respect public opinion, rather than impose policy change that is grounded in science but is unpopular. This is of great significance, particularly in the field of animal welfare legislation, since it appears to suggest that if the public does not like the science then policy makers may decide to reject it as a basis for legislation.

3.5.3.2 The Pusztai Affair

Public scepticism towards scientific findings can be attributed, at least in part, to the influence of media reporting on controversial topics. Perhaps the most notorious example of GMO controversy, resulting in a media storm, was the so-called Pusztai Affair, which began in 1998¹³². Árpád Pusztai, a nutritionist and biochemist working at the Rowett Institute in Scotland, publicly revealed preliminary results from his unpublished research into possible effects upon the gastrointestinal tracts of rats by consumption of potatoes which had been genetically modified to increase resistance to pests¹³³. Pusztai appeared on British television¹³⁴ to discuss some of the initial findings from his research. The transgenic potatoes in his research trial had been modified with a gene from the snowdrop plant allowing production of the protein lectin, which can act as an insecticide. Rats were divided into groups and were fed either (i) genetically modified potatoes (raw and cooked); (ii) unmodified potatoes; or (iii) potatoes spiked with lectin. The significant finding from the experiment was a proliferation of the mucosal lining of the jejunum of rats, observed in GM potato-based diet but not observed in rats fed with control or spiked potatoes¹³⁵. The minutiae of the research protocols (which were controversial¹³⁶ and are still a focus for discussion

¹³² J.M Rhodes, 'GM Foods and the Pusztai Affair' (1999) 318 *British Medical Journal* 581

¹³³ L. Martinelli, M. Karbarz and H. Siipi, 'Science, safety, and trust: the case of transgenic food' 54 (2013) *Croatian Medical Journal* (1) 91

¹³⁴ Pusztai appeared in the aptly named 'Eat up Your Genes'; see 'Monsanto complains to TV watchdog over World in Action' *Farmers Weekly* (21 September 1998) <<https://www.fwi.co.uk/news/monsanto-complains-to-tv-watchdog-over-world-in-action>> accessed 12 January 2022

¹³⁵ Martinelli (n 133)

¹³⁶ In 2007, Pusztai published an article defending his research and clarifying much of the initial confusion surrounding it, see A. J. Pusztai, 'GM Potato Controversy - A case with disturbing implications for present day science' *FoodConsumer.Org* (28 March 2007) <<https://gmwatch.org/en/news/archive/2007/3677-new-pusztai-article-on-gm-potato-controversy>> accessed 20 January 2022

years later) are out-with the scope of this discussion; however, the important factor with respect to public perception is the fallout from the reporting of his findings.

During the television interview, Pusztai stated that rats fed transgenic potatoes demonstrated stunted growth and diminished immune function¹³⁷, adding that he would not consume GM food and felt it was "very, very unfair to use our fellow citizens as guinea pigs". This appears to have been the element of the entire scenario which the press focused and to which the public directed attention. Pusztai was suspended from the Rowett Institute, his lab was sealed, his paperwork was seized for audit and he was publicly heavily criticised for commenting on incomplete data¹³⁸; his research was finally published the following year in the *Lancet* journal¹³⁹, the editor of which also came under criticism for being irresponsible in publishing the research¹⁴⁰. However, given that five of the six *Lancet* reviewers tasked with analysing the paper favoured its publication, it was deemed to be appropriate for the public domain¹⁴¹.

The most interesting observation with respect to Pusztai's case, in terms of public perception of GMOs, was the knee-jerk reaction of the British media to his findings and the extent to which the general population subscribed to negativity directed towards GMOs; indeed, such scepticism remains¹⁴². In the hours following his interview, the British newspapers were consumed with stories of genetically modified 'Frankenstein Foods'¹⁴³ and such commentary undoubtedly sowed the seed of doubt about GM produce in the minds of many consumers. Concerns about the safety of GM food had come to light in the 1990s, when the first GM crops appeared on the market – protests have been fuelled by not only Greenpeace but also a number of high profile

¹³⁷ M. Enserink, 'Transgenic Food Debate: The *Lancet* Scolded over Pusztai Paper' (1999) 286 *Science* 5440:656

¹³⁸ Nina V Fedoroff, 'Analysis of Pusztai Study on GM potatoes and their effects on rats', in Fedoroff, N. and Brown, N. (eds) *Mendel in the Kitchen, a Scientist's View of Genetically Modified Food*, (Joseph Henry Press 2004) 384

¹³⁹ S. W. Ewen and A. Pusztai, 'Effect of diets containing genetically modified potatoes expressing *Galanthus nivalis* lectin on rat small intestine' (1999) 345 *The Lancet* (9187) 1353

¹⁴⁰ Fedoroff (n 138)

¹⁴¹ Enserink (n 137)

¹⁴² By 2011, public opinion had softened on GMOs but a survey carried out by Bayer in 2011 confirmed that 27% of British Consumers still felt that GM food was risky – see 'Frankenfine, Genetically Modified Food', *The Economist* (27 November 2014) <<https://www.economist.com/britain/2014/11/27/frankenfine>> accessed 22 January 2022

¹⁴³ Ben Goldacre, 'Scare Story on GM Potatoes translates cysts into cancers', *The Guardian* (London, 3 March 2007) <<https://www.theguardian.com/commentisfree/2007/mar/03/badscience.science>> accessed 22 January 2022

individuals¹⁴⁴ - and, whilst fear of GM crops had steadily increased, the timing of the Pusztai controversy was also critical; it came at the close of the BSE crisis, which had already seriously damaged the public's view of food safety¹⁴⁵.

The Pusztai affair and public response to GMO provide clear evidence that favourable public opinion is never guaranteed with respect to scientific opinion and data. The relationship between science, policy making and the public is more nuanced than the production of data enjoying automatic public trust; one contemporary scenario is the embodiment of all the issues raised in this sub-chapter – the SARS-COVID 19 pandemic.

3.5.3.3 SARS-Covid 19, Science and Public Opinion

As discussed in Chapter One¹⁴⁶, in 2019 the world experienced an outbreak of respiratory disease resulting from a novel coronavirus, COVID-19, which is on-going at the time of writing. The development of public opinion with respect to this virus has been fascinating to commentators because it encapsulates all the problems discussed, above, with respect to faith in scientists, data interpretation and policy making based upon the available data. It is again out-with the scope of this thesis to discuss the topic in detail, but several key observations can be made, some of which might appear paradoxical.

Perhaps unsurprisingly, in the early months of the pandemic, a time of great uncertainty and fear, public faith in science and scientists increased¹⁴⁷. It has been suggested that the near-constant media reporting on COVID-19 brought the general

¹⁴⁴ David H Freeman, 'The Truth About Genetically Modified Food', *Scientific American*, (1 September 2013) <<https://www.scientificamerican.com/article/the-truth-about-genetically-modified-food/>> accessed 22 January 2022. A number of high profile celebrities have voiced opposition to GMOs over the years, including Paul McCartney, Morgan Freeman and Gwyneth Paltrow: see Genetic Literacy Project, Julie Kelly, 'When Celebrity and Science Collide: Hollywood and the Anti-Biotechnology Food Movement' <<https://geneticliteracyproject.org/2017/03/02/celebrity-science-collide-hollywood-anti-biotechnology-food-movement/>> accessed 22 January 2022

¹⁴⁵ BSE was first identified in 1986, as a new disease of cattle. Incidence peaked in 1992 with losses of 36,700 cattle; in 1996 the European Commission introduced a worldwide ban on export of all British beef products. See K. Vincent, 'Mad Cows' and Eurocrats – Community Responses to the BSE crisis (2004) 10 *European Law Journal* 499

¹⁴⁶ Subchapter 1.3.4 of this thesis

¹⁴⁷ K. Tsamakidis, 'COVID-19, religion and the rise of trust in science' (2020) 369 *British Medical Journal* m1336 – after the ruling body of the Greek Church stated that the virus could not be transmitted during Communion the population turned towards the government and the head of the national COVID scientific committee for advice and information. See also D.S. Luna, J.M. Bering and J.B. Halberstadt, 'Public faith in science in the United States through the early months of the COVID-19 pandemic' (2021) 2 *Public Health in Practice* 100103

population closer to the work of scientists than ever before¹⁴⁸; with virology, immunology and public health being discussed on a daily basis, citizens were able to follow and understand some of the challenges faced by researchers. December 2020 saw the fastest ever development, and conditional approval, of a vaccine in medical history¹⁴⁹ and at that time, public response to the vaccine was generally positive; in the United Kingdom, from that period until March 2021, confidence in the vaccine increased every month¹⁵⁰. However, despite the apparent positive view of science and research, there is a vocal minority that expresses vaccine scepticism, indicating lack of trust in scientists and policy makers.

Taking the United Kingdom as an example, in 2021 a survey by the Office for National Statistics indicated that only around 9% of adults demonstrated vaccine hesitancy but within that statistic, 17% of adults aged 16 to 29 years and 44% of Black or Black British Adults reported hesitancy around vaccination¹⁵¹. Interestingly, the most commonly cited reasons for vaccine refusal were concerns regarding the safety of the vaccine, side effects and possible long-term effects on health from the vaccine. Many respondents also wanted to wait and observe the effects of the vaccine on those already vaccinated. These issues suggest underlying mistrust in scientists' advice that the vaccine is safe; research has shown that the strongest predictor for vaccine uptake is belief in its safety¹⁵². It was reported in November 2021 that 33.6% of the Swiss population had not had a first vaccine, with 33.1% of Austrians and 30.4% of Germans adopting the same sceptical approach¹⁵³.

¹⁴⁸ The Wellcome Trust, Wellcome Global Monitor 2020: COVID-19, 3

¹⁴⁹ Y. Li, R. Tenchov et al, 'A Comprehensive Review of the Global Efforts on COVID-19 vaccine development' (2021) 7 ACS Central Science (4) 512

¹⁵⁰ IPSOS MORI, 'Uptake of the COVID-19 Vaccine', March 2021

<https://www.ipsos.com/sites/default/files/ct/news/documents/2021-04/ipsos_mori_attitudes_to_vaccines_hesitancy_charts.pdf> accessed 22 January 2022

¹⁵¹ Office for National Statistics, Coronavirus and vaccine hesitancy, Great Britain: 13 January to 7 February 2021

<<https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/healthandwellbeing/bulletins/coronavirusandvaccinehesitancygreatbritain/13januaryto7february2021>> accessed 18 January 2022

¹⁵² L.C. Karlsson, A. Soveri et al, 'Fearing the disease or the vaccine: The case of COVID-19' (2021) 172 Personality and Individual Differences 110590, 10

¹⁵³ S. Jones and G. Chazan, 'Nein Danke: the resistance to Covid-19 vaccines in German-speaking Europe' *The Financial Times* (11 November 2021) <<https://www.ft.com/content/f04ac67b-92e4-4bab-8c23-817cc0483df5>> accessed 26 January 2022

With respect to trust in science, it has been observed that the COVID-19 pandemic has altered public opinion of scientific institutions and processes¹⁵⁴; although citizens looked to scientists in the early stages of the pandemic for reassurance and hope, as the crisis has evolved, the scientific process, on show for all to see, has demonstrated inconclusive epidemiological modelling, opposing scientific views on measures to mitigate disease spread and on several occasions, changes in clinical approach or disease management. Much pressure has also been brought to bear by media outlets keen to report on debate and controversy. These issues have led citizens to question scientific understanding and, in the presence of political factions or dissatisfaction with government, scepticism and even conspiracy theories¹⁵⁵ around politicians and policy makers have arisen. In turn, individuals who perceive scientific research and advice to be politically motivated are less likely to perceive COVID as a risk and take mitigating measures, thus leaving themselves more vulnerable to viral infection¹⁵⁶.

Citizens' responses to COVID-19 indicate a change of direction for the general public in the sense that, although many people retain faith in science, scientists and policy makers can no longer assume that their citizens will unquestioningly follow scientific advice. For some time, it has been acknowledged within the scientific community that many researchers believe an admission of scientific uncertainty will negatively impact upon the positive view of science held by the general public. In addition, the scientific community has on occasion, unhelpfully, taken the view that citizens who question scientific findings are 'irrational'¹⁵⁷. In fact, for the future of science and policy making, the importance of citizens, and scientists, accepting and openly acknowledging that science rarely provides definitive answers is essential; this issue is discussed in detail in Chapter Five, with respect to the creation of future animal welfare policy.

¹⁵⁴ L. Palamenghi, S. Barello, S. Boccia and G. Graffigna, 'Mistrust in biomedical research and vaccine hesitancy: the forefront challenge in the battle against COVID-19 in Italy' (2020) 35 *European Journal of Epidemiology* 785

¹⁵⁵ Conspiracy theories often flourish at times of crisis because they purport to offer simple explanations in the face of other actors' uncertainty – see J. Faris and R. Pilati, 'COVID-19 as an undesirable political issue: Conspiracy beliefs and intolerance of uncertainty predict adherence to prevention measures' (2021) *Current Psychology*
<<https://link.springer.com/content/pdf/10.1007/s12144-021-01416-0.pdf>> accessed 22 January 2022

¹⁵⁶ D. M. McLaughlin, J. Mewhirter and R. Sanders, 'The belief that politics drive scientific research and its impact on COVID-19 risk assessment' (2021) 16 *PLoS One* (4) e0249937
< <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0249937>> accessed 22 January 2022

¹⁵⁷ L. Frewer, S. Hunt et al, 'The views of scientific experts on how the public conceptualize uncertainty' (2003) 6 *Journal of Risk Research* 75, 82

From the discussion, above, it is clear that whilst science can provide useful data and evidence via controlled trials, there are multiple external factors which influence not only the entire research process (from selection of projects, through funding, to interpretation of data), but also the subsequent interpretation and use of the data obtained (such as political, economic and cultural beliefs). This does not necessarily make science an unsuitable basis upon which policy can be created yet the issues discussed are neither adequately acknowledged by policy makers nor fully appreciated by the general public. One factor which is, however, gaining momentum, is the sway public opinion may hold over policy creation, whether supported by scientific data or not, and the following final sub-chapter discusses this phenomenon.

The scenario in the following case study clearly illustrates the difficulties encountered and consequences arising when science is cited as the basis for policy within an arena where animal welfare activism and politics dominate the dialogue.

3.6 The EU Seal Products Case

The following case concerns the hunting of seals for fur and the European Union's approach to the welfare elements of this industry. Modern commercial seal hunting is focused primarily in North Europe and the Arctic region, with several species valued for their pelts and to a lesser degree, meat; Canada, Greenland, Russia, Norway and Namibia carry out large scale commercial sealing¹⁵⁸. A variety of seal species are hunted, including harp, grey, hooded and ringed seals¹⁵⁹, none of which are endangered species¹⁶⁰. Following animal welfare and environmental protection campaigns during the 1960s and 1970s¹⁶¹, the culling of white-coated harp seal pups

¹⁵⁸ N. Wegge, 'Politics between science, law and sentiments; explaining the European Union's ban on trade in seal products' (2013) 22 *Environmental Politics* 255, 259

¹⁵⁹ Canada primarily harvests harp seals, along with a small number of grey seals – in 2016, 66,800 harp seals and 1612 grey seals were harvested – see Fisheries and Oceans Canada, Statistics on the Seal Harvest <<https://www.dfo-mpo.gc.ca/fisheries-peches/seals-phoques/seal-stats-phoques-eng.html>> accessed 22 January 2022

In 2015, Greenland harvested 88,119 seals, a mixture of ringed and harp seals, with a small number of hooded and bearded seals – see 'Greenland in figures, 2017', Statistics Greenland, <<http://www.stat.gl/publ/en/GF/2017/pdf/Greenland%20in%20figures%202017.pdf>> accessed 22 January 2022

¹⁶⁰ EFSA Panel on Animal Health and Welfare, 'Scientific Opinion on Animal Welfare Aspects of the killing and skinning of seals' (2007) 610 *The EFSA Journal* 1 (12)

¹⁶¹ P. Dauvergne and K. J. Neville, 'Mindbombs of Right and Wrong: cycles of contention in the activist campaign to stop Canada's seal hunt' (2011) 20 *Environmental Politics* 192

was made illegal in many countries; scientific evidence was widely cited in these campaigns, highlighting the significant and concerning drop in seal population size¹⁶². In 1983, the European Community outlawed the importation of skins and certain juvenile seal products derived from hunting¹⁶³.

Despite the 1983 Directive, hostility to sealing persisted within the European community, and escalated from the late 1990s¹⁶⁴; in 2006, a majority of EU Parliament members declared their request for the Commission to draft a regulation which would ban sale, import and export of hooded and harp seal products – this cross-party effort came in response to concerns regarding sustainability and animal welfare, including the use of humane killing methods¹⁶⁵. Within certain member states, resistance to the seal trade was especially strong – for example, in Germany, the Netherlands and Belgium¹⁶⁶ - and some countries chose to instigate their own, national bans on seal products. Individual Member States saw NGOs wage vocal, often emotive, anti-hunting campaigns which showed images of seal hunting / killing and the ice turned red with blood; these campaigns attracted significant public attention and stimulated strong opposition to the trade. In 2007, the Belgian deputy head of mission in Ottawa commented that the issue was a ‘highly emotional dossier on both sides of the

¹⁶² In 1971 the Northwest Atlantic harp seal population was found to have declined to around 1.1 million animals and, due to concerns about continued decline, a quota system was introduced by Canada. By 2015, the population had levelled off at around 7.4 million animals. See M. O. Hammill, G. B. Stenson et al, ‘Conservation of northwest Atlantic harp seals: Past success, future uncertainty?’ (2015) 192 *Biological Conservation* 181

¹⁶³ Council Directive 83/129/EEC of 28 March 1983 concerning the importation into Member States of skins of certain seal pups and products derived therefrom, OJ L 91/30, allowed products derived from traditional hunting by Inuit communities (Article 3). The directive was extended to apply until 1989 by Council Directive 85/444/EEC of 27 September 1985 amending Council Directive 83/129/EEC concerning the importation into Member States of skins of certain seal pups and products derived therefrom OJ L 259/ 70, and then again via Council Directive 89/370/EEC of 8 June 1989 amending Directive 83/129/EEC concerning the importation into Member States of skins of certain seal pups and products derived therefrom, OJ L 163/37

¹⁶⁴ Wegge (n 158)

¹⁶⁵ Declaration of the European Parliament on banning seal products in the European Union, Banning Seal Products in the European Union, 26th September 2006, P6_TA(2006)0369. The declaration cited concerns including findings of a team of veterinary surgeons who estimated that 42% of slaughtered seals examined may have been conscious during skinning and also cited concerns regarding potential populations effects; the last time seals had been killed in similar numbers, the population had been reduced by two thirds

¹⁶⁶ R. U. Krämer-Hoppe and T. Krüger, ‘International Adjudication as a mode of EU External Governance? The WTO Seal Case’ (2017) 55 *Journal of Common Market Studies* (3) 535, 541; in March 2007, The Netherlands and Belgium introduced their own general ban on seal products

ocean'¹⁶⁷, acknowledging that his country's ban on seal products was passed into law as a result of intense pressure from NGOs and animal activists¹⁶⁸.

In response to the declaration, in 2007, the Commission provided a preliminary response by stating that a ban could not be introduced on the basis of the Convention on International Trade in Endangered Species (CITES) since the seal population had, in fact, increased over preceding decades and did not enjoy endangered status; the 1983 directive was deemed adequate to address the concerns raised by the Parliament¹⁶⁹. With respect to the issue of humane killing, the EFSA was asked to provide a scientific opinion on the welfare of seal killing methods as well as considering killing techniques which would minimise distress and pain to the most effective degree¹⁷⁰. This provided science the opportunity to provide policy makers with the relevant information.

3.6.1 EFSA Opinion

Adopted in December 2007, the EFSA opinion analysed in detail the relevant factors involved in the slaughter of seals. The EFSA panel stated that it had been able to consider killing methods in an objective way (by reviewing killing techniques and processes involved¹⁷¹), although most of the other evidence was deemed to be deficient in terms of scientific validity, biased or overly subjective in nature¹⁷²). Despite a general lack of scientific data on such practices, the panel concluded that '*many seals can be, and are, killed rapidly and effectively, without causing avoidable pain, distress, fear and other forms of suffering*'¹⁷³. The panel did, however, also state that there was evidence that, for many seals, killing did not always occur effectively; the frequency of such scenarios was, naturally, difficult to assess since interpretation of the findings was, to a degree, subjective; in addition, the field environment in which

¹⁶⁷ International Economic Law and Policy Blog, 'From Dolphins to Turtles to Seals: The Next Trade and the Environment Dispute' (July 2007) <<https://ielp.worldtradelaw.net/2007/07/>> accessed 22 January 2022

¹⁶⁸ Heather Scoffield, 'Seal appeal pits animal rights v trade' *The Globe and Mail*, (Ottawa 1 August 2007) <<https://www.theglobeandmail.com/report-on-business/seal-appeal-pits-animal-rights-v-trade/article690560/>> accessed 25 January 2022

¹⁶⁹ European Commission, Reply to the Parliament's Declaration on banning seal products in the European Union, 16 January 2007

¹⁷⁰ EFSA (n 160)

¹⁷¹ *ibid*, 3

¹⁷² EFSA (n 160) 94 The Panel commented in its conclusions that '...there are studies (e.g. by NGOs, industry linked groups) that highlight serious deficiencies and concerns in the hunts, but they may contain potentially unproven serious biases'.

¹⁷³ *ibid*, 4

slaughter took place meant that it was very challenging to apply objective scientific parameters such as time to loss of consciousness; in an abattoir or laboratory, these indicators are easily measured, in a hunt environment, this kind of analysis is not possible¹⁷⁴. The EFSA advised that reliable methods for assessing insensibility (and death) be identified and relied upon, to ensure welfare at the time of killing and recommended that a three-phase killing method be followed – shooting or blunt skull trauma, monitoring of vital signs to ensure unconsciousness and effective exsanguination – all of which should be implemented and enforced effectively¹⁷⁵. The Opinion is lengthy but the advice was essentially that seals could be killed effectively and humanely during hunts although there were certain welfare and slaughter principles which had to be ensured in order to prevent suffering or pain.

3.6.2 COWI Report

Whilst the EFSA was assessing seal welfare and killing methods, the consultancy firm COWI (Consultancy Within Engineering, Environmental Science and Economics) had been commissioned¹⁷⁶ to provide an assessment of the management regimes and regulatory schemes of the principle sealing nations¹⁷⁷. Their report concluded that in terms of regulation and management, Norway's sealing system had the most comprehensive legislation and its management system was the most developed. A second group, which included Canada, Greenland and Sweden, was confirmed as having a suitably developed legislative framework governing sealing, but lacking in suitable training and enforcement of protocols. A third group of nations, Russia and the UK, was found to have inadequate seal hunt data from which to draw valuable conclusions¹⁷⁸. The report was based upon objective data and analysis of existing legal frameworks and, interestingly, although it did make a general observation that policymakers should adopt 'good' practices¹⁷⁹, its focus was the need for labelling schemes to identify more humane practices and, notably, to acknowledge and explore the significance of public opinion regarding the hunting of seals. The report findings

¹⁷⁴ EFSA (n 160) 4

¹⁷⁵ *ibid*, 4

¹⁷⁶ By the European Commission

¹⁷⁷ European Commission, COWI, Assessment of the Potential Impact of a ban of products derived from seal species (April 2008). The European Commission sought to examine the regulatory and management aspects of seal hunting in the states where seal hunting took place prior to introducing any welfare measures and commissioned COWI to do this work.

¹⁷⁸ *ibid*, 133

¹⁷⁹ COWI (n 177) 136

indicated that '*many respondents are against seal hunting for principal reasons - which again may be rooted in a certain perception of the human-nature relation*'. It also commented upon the existence of '*a knowledge gap on hunting methods - i.e. public perception vs. scientific knowledge (EFSA findings) and linked thereto the attitudes towards animal welfare vs. local communities*'¹⁸⁰.

3.6.3 The Canadian Perspective

Given the significance of seal hunting to their country's history and economy, it is unsurprising that the Canadian authorities commissioned their own report on the harp seal hunt, from the Independent Veterinarians' Working Group (IVWG); the group was composed of nine veterinary surgeons from Europe and North America, who stated an objective of eliminating or reducing the suffering of hunted seals '*through improved industry and regulatory practice underpinned by research*'¹⁸¹. Their recommendations were similar to the EFSA, in that they advocated a three-stage 'stun, check and bleed' protocol¹⁸² and made various recommendations as to best practice when killing seals. It was the opinion of the group that it was possible to undertake seal hunting in a humane manner as long as professional guidelines were followed and operators were trained and competent¹⁸³. Notably, the group commented upon the role that observer emotion can play during observation of seal hunting, advising that, whilst blunt trauma to the skull may appear brutal it can nonetheless achieve a swift, humane loss of consciousness¹⁸⁴. The report also cautioned against rhetoric that appealed to emotional responses to visual images which might not accurately represent the scenario being viewed and commented that calm analysis of data was preferential to knee-jerk reaction to inflammatory images. The group's comments perfectly summarise the challenge faced by policy makers (and the public) when dealing with the difficult subject of animal slaughter.

¹⁸⁰ *ibid*, Conclusions

¹⁸¹ Independent Veterinarians' Working Group 'Improving Humane Practice in the Canadian Harp Seal Hunt, A Report of the Independent Veterinarians' Working Group on the Canadian Harp Seal Hunt', August 2005

¹⁸² *ibid*, 7

¹⁸³ IVWG (n 181) 20

¹⁸⁴ *ibid*, 5

Scientific Reports: the findings

The findings of the EFSA, COWI and IVWG reports are representative of the disparate data and opinions which law-makers must consider when creating animal welfare policy. In addition, these three reports only superficially acknowledge public opinion, which was, in fact, the stimulus for initial bans on seal products in Europe. The significance of this moment in European animal welfare policymaking cannot be overstated: legislation banning seal products had been initiated within EU member states, not as a result of scientists approaching their governments with welfare concerns but because of action on the part of citizens. The Commission, therefore, had to consider strong public opinion while it also had to contend with insufficient data, and contradictory interpretations of the data that was available. It might be argued that the Commission was considering additional measures without possessing complete understanding of seal welfare at the time of slaughter or truly comprehending the exact nature of killing methods (and possible improvements that might be made to these techniques). Nonetheless, the European population was firmly opposed to continuation of the trade (which proved crucial to the legitimacy of the measure in the subsequent WTO sphere) and the Commission felt compelled to act.

3.6.4 The Seal Products Regulation

Throughout 2007, the seal hunt controversy had returned to prominence in the media and animal welfare / environmental organisations mobilised a massive campaign which saw the Commission receive thousands of emails and letters from concerned EU citizens, demanding a ban on seal hunting¹⁸⁵. In 2008, in light of the EFSA findings that humane killing did not always occur, and with reference to Europe's duty to animal welfare, under Article 13 TFEU, the Commission proposed Regulation (EC) 1007/2009 on trade in seal products¹⁸⁶. Based on Articles 95 and 133 of the Treaty, and with due consideration of case law relevant to Article 95¹⁸⁷, the proposed regulation outlawed seal products from the European marketplace, with three key exceptions; (i) products derived from traditional Inuit or indigenous hunts, (ii) goods solely for personal family

¹⁸⁵ Wegge (n 158) 263

¹⁸⁶ Regulation (EC) No. 1007/2009 of the European Parliament and of the Council of 16 September 2009 on trade in seal products, OJ L 286/36

¹⁸⁷ European Commission, 'Proposal for a Regulation of the European Parliament and of the Council concerning the trade in sea products' Comm (2008) 469 Final, 8

use, on an occasional basis and (iii) by-products of hunting carried out as part of sustainable marine-resource management and regulated under national laws¹⁸⁸.

3.6.5 Justifications for the Ban

Cognisant of potential incompatibilities with World Trade Organization (WTO) rules, such as free trade and trade without discrimination, the Commission chose to preempt challenges and focus upon public morality (as opposed to animal welfare), invoking a General Agreement on Tariffs and Trade (GATT¹⁸⁹) exemption on this basis:

*'As to the import ban, it is in conformity with Article XX(a) of the General Agreement on Trade and Tariffs (GATT), under which the adoption or enforcement by any contracting party of measures necessary to protect public morals is allowed provided that such measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination. The proposed Regulation is non-discriminatory as the various prohibitions it provides for will apply to intra-Community trade as well as to imports and exports'*¹⁹⁰.

This was a novel tactic and the arguments made by the Commission are particularly pertinent with respect to the (alternative) approach taken in the ECJ rulings discussed in Chapter Two; in those cases, extra-territorial, member state action taken to preserve animal welfare was deemed to be a barrier to trade and was prohibited. Preservation of trade within the EU was prioritised. Public morality was swiftly dismissed as a justification for national import and export bans (*"[i]n any event, a Member State cannot rely on the views or the behaviour of a section of national public opinion, as CIWF maintains, in order unilaterally to challenge a harmonising measure adopted by the Community institutions"*)¹⁹¹ and the issue of extra-territorial action taken by member states was found in all three cases to be unwarranted and contrary to the rules of the internal market. In CIWF, for example, Advocate General Léger advised that Article 36 TFEU does not permit a member state *'to restrict its exports on account*

¹⁸⁸ Regulation (EC) No. 1007/2009 (n 186) Art. 3, 1 and 2

¹⁸⁹ General Agreement on Tariffs and Trade 1947 (GATT 1947) 55 U.N.T.S. 194

¹⁹⁰ European Commission Proposal (n 187) 8

¹⁹¹ Case C-1/96 *R v Minister for Agriculture, Fisheries and Food, ex p Compassion in World Farming Ltd* [1998] ECR I-1251 [67] As discussed in Chapter Two, in the CIWF case, public morality was deemed to be a simple reflection of the public's opinion on animal welfare and protection – i.e. not an independent concern and therefore no justification for measures on a national basis which would be barriers to free trade.

*of extra-territorial circumstances which, even though they produce effects within its population, do not affect, on its own territory, the interest protected by this provision*¹⁹².

It is notable that within the EU, numerous member states had already taken steps to ban the import and sale of seal products – Italy, Belgium and Luxembourg had moved towards a ban and Austria, The Netherlands and the UK had also begun the process of instigating a ban¹⁹³. It is reasonable to state, therefore, that the internal market trade in seal products was being distorted by member state legislation, yet no action had been brought against the member states by the Commission for their import bans. This appears to contradict the ruling in the *Red Grouse* case, where a member state's ban on the importation of a non-native bird, in the interests of conservation, was deemed unjustified and found to be a barrier to trade. The import ban was not justifiable to protect the health and life of animals, under Article 36, and in his opinion on the case, Advocate General Van Gerven advised that because the ban related to imported products it could '*not be justified on the basis of any rule of reason*'¹⁹⁴.

The case law renders the Commission's approach to seal products paradoxical¹⁹⁵. In fact, with respect to Finland, Sweden and Scotland (all EU Member States whose seal hunt management and regulation had been assessed by the Commission) there are remarkable similarities between *Red Grouse* and the Seal Products Case (although only the latter featured an extra-territorial dimension, thus engaging the WTO). Both scenarios involved a European legal entity seeking to deny import of an animal product on the basis of the manner in which it had been killed. In *Red Grouse* the Dutch sought to prevent sale of grouse which were not permitted to be shot in the Netherlands but could be legally shot in the UK, whilst with respect to seal products, the Commission wanted to ban import of seal products from seals killed in a manner which the Commission believed to be indefensible, from both their own Member States and from states outside the EU. In other words, in *Red Grouse*, a Member State was precluded

¹⁹² Case C-1/96 *R v Minister for Agriculture, Fisheries and Food, ex p Compassion in World Farming Ltd* [1998] ECR I-1251; Opinion of Advocate General Léger, 15 July 1997 [113]

¹⁹³ N. Sellheim, 'Policies and Influence - Tracing and Locating the EU Seal Products Trade Regulation' (2015) 17 *International Community Law Review* 3, 18

¹⁹⁴ Case C-169/89 *Gourmetterie Van Den Burg ('Red Grouse')* [1990] ECR I-2143; Opinion of AG Van Gerven, para 5

¹⁹⁵ For a fascinating overview of the issue of public morality internally and externally to the EU, see R. O'Gorman, 'Of Eggs, and Seals, and Leghold Traps: Internal and External Public Morality as a Factor in European Union Animal Welfare Legislation' in J.A. McMahon and M.N. Cardwell (eds) *Research Handbook on EU Agricultural Law* (Edward Elgar 2015) 323

by the CJEU from taking action to prevent an import on the basis of a public morality, yet this was the very step that the Commission sought to implement internationally with respect to seal products. In addition, the Commission also sought to impact upon non-EU parties with its legislation, for example, Canada and Russia, thus extending their legislation extra-territorially¹⁹⁶.

3.6.6 Public Morality

It appears that the Commission felt able to rely upon public morals in order to justify a ban on seal products, although they proclaimed internal market distortion as the driving factor. Whilst the geographical territories involved were, of course, primarily outside the European Union, as explained above, certain member states were also involved in small scale sealing – for example, the UK, Sweden and Denmark. The Commission’s decision to introduce a ban on seal products based on public morals was also justified as a necessary exercise in harmonisation of laws. The Commission stated that uniform measures, across member states, in the form of a ban on seal products would *‘eliminate the present fragmentation of the internal market, which results from the existing differences between Member States’ provisions governing the trade, import, production and marketing of seal products, while taking into account animal welfare considerations. Such result could only be obtained by measures taken at Community level since national measures, including total bans, are by definition only enforceable in parts of the internal market*¹⁹⁷. Whilst the argument in favour of harmonisation is reasonable, it fails to address why member states were permitted to take independent action in banning seal product imports from other Member States; indeed, the Commission’s wording implies an acceptance of the fact that member states had chosen to create their own legislation on the matter (this Member State autonomy was reflected in the more recent CJEU non-stun slaughter cases, where individual States introduced measures to protect welfare). Even accepting that this was a measure to regulate the single market and that the Commission acted with the intention of harmonising the EU marketplace rules on seal products, under most circumstances, their legislation would take the form of laying down minimum standards as opposed to introducing outright

¹⁹⁶ For an interesting discussion of the phenomenon of EU extra-territoriality, see J. Scott, ‘The new EU “extraterritoriality”’ (2014) 51 Common Market Law Review (5) 1343

¹⁹⁷ European Commission proposal (n 187) 13

prohibition. The seal ban was particularly surprising given that several member states had active, if small, seal hunting communities; in addition, a ban on a product is almost unheard of within EU legislation. However, it is interesting to note that in 2007, two years before the seal products ban, the precedent for an alternative approach to animal welfare legislation can be identified when the Commission introduced Regulation (EC) No 1523 / 2007, which banned Community import and export of cat and dog fur¹⁹⁸.

Regulation (EC) 1523/2007 is of particular relevance to animal welfare and the seal products ban with respect to the justification and reasoning for its creation. The Regulation's opening paragraph states that '*In the perception of EU citizens, cats and dogs are considered to be pet animals and therefore it is not acceptable to use their fur, or products containing such fur*'¹⁹⁹. The Commission elected to ban the use of these products in light of the consumer perception of dogs and cats as pets; essentially consumer morality²⁰⁰. As discussed in Chapter Two, the welfare needs of any given animal are the same, irrespective of the value that their particular keeper accords them. The Commission's approach here is problematic because there are many people across Europe who keep pet chickens, goats and sheep yet it seems unlikely that the Commission would legislate to ban the use of chicken products because some people consider them to be pets. On the other hand, there will be some who see no difference between consuming meat from a cow and meat from a dog if the husbandry and slaughter processes preserve welfare. It must be concluded that this Regulation is not based on scientific principles, since it would be entirely possible to humanely slaughter any species. Notably, the word 'science' does not appear within the Regulation and the word 'scientific' is only found once, relating to analysis of cat fur²⁰¹. The words 'welfare' and 'sentient' are also absent²⁰². Whilst there are numerous valid reasons for prohibiting import and export of dog and cat fur, the Regulation does not

¹⁹⁸ Regulation (EC) No 1523/2007 of the European Parliament and of the Council of 11 December 2007 banning the placing on the market and the import to, or export from, the Community of cat and dog fur, and products containing such fur, OJ L 343/1

¹⁹⁹ *ibid* (1)

²⁰⁰ Sellheim (n 193) 26

²⁰¹ Regulation 1523/2007 (n 197) 2

²⁰² In contrast, for example, in Regulation (EC) No. 1099/2009 (n 101), 'welfare' is used 60 times and 'scientific' 29 times

follow the Commission's message that European Union animal welfare legislation is based on sound scientific data and research.

In contrast to the Regulation banning dog and cat fur, Regulation 1007/2009 opens with the acknowledgement that seals are sentient²⁰³, cites 'welfare' on eight occasions and alludes to the EFSA scientific opinion on welfare at the time of killing²⁰⁴. However, although scientific evidence plays a role in the Commission's approach, the Regulation cites '*expressions of serious concerns by members of the public and governments sensitive to animal welfare considerations*²⁰⁵ as the driver for individual Member States introducing bans on seal products, and 'citizens' / 'consumers' are mentioned several times in relation to the need for Europe-wide legislation banning seals products. This may have been an early nod to the provisions within GATT Article XX(a)²⁰⁶. However, having acknowledged the view of European citizens that seal hunting causes animal suffering, the Regulation then cites the culture of the Inuit population as a justification for continued sale of their seal pelts. This would indicate that the legislation accommodates two – opposing - cultural views, and attempts to incorporate both opinions. At first glance this might almost appear to be the perfect solution but it does not, unfortunately, bring an end the inappropriate slaughter of seal pups, which was the problem identified for the Commission via the EFSA panel.

Since the initial consultation period focused on gathering scientific evidence to support or deny the viability of a ban on seal products, the focus on citizen morality, public opinion and the internal market was a notable and dramatic change of direction, perhaps initiated in consideration of GATT's general exemptions. In fact, the Commission's prioritisation of public opinion formed the crux of the fierce international debate which subsequently ensued, and exemplifies selective application of science in law-making.

²⁰³ Regulation (EC) No. 1009/2007 (n 184) (1)

²⁰⁴ *ibid* (11)

²⁰⁵ Regulation (EC) 1009/2007 (n 184) (4)

²⁰⁶ GATT (n 189) Art. XX (a)

3.6.7 Reactions to the Proposal

Initial national reactions to the Commission's proposal varied from sceptical to deeply concerned. The Norwegian foreign minister, writing to Catherine Ashton, EU trade Commissioner, described the proposed ban on seal products as a '*dangerous precedent in the matter of sustainable harvesting of renewable resources*²⁰⁷ and concerns were also raised by Canada, Sweden, Denmark, Estonia and Finland²⁰⁸. On the opposing side, the European parliament viewed the proposal as overly lenient, with the majority of MEPs seeking an absolute ban on the trading of seal products²⁰⁹.

Whilst Norway argued against the inconsistency of applying more stringent rules to the hunting of seals than that of other mammals, the matter was passed to the Committee of Internal Market and Consumer Protection (IMCO) in the European Parliament²¹⁰. The appointed rapporteur, Diana Wallis MEP, had a special interest in Arctic issues and had significant knowledge of seal hunting practices. In her draft report, she stated that '*[a] ban does not appear to be an appropriate, nor a proportionate, measure for achieving the twin policy goals of this proposal – of securing high animal welfare standards and limiting impact of any action on Inuit communities.*²¹¹'. Wallis' approach appears reasonable because at that stage, possible amendments and improvements to slaughter methods had not been fully explored, and humane slaughter had been found possible; a total ban on sale of seal products would have detrimental effect on Inuit communities.

Despite a multitude of concerns being raised, the European Parliament voted on 5th May 2009 to ban seal products. Total votes in favour of the ban were 550, votes against were 49 and 41 MEPs abstained²¹². The vote was remarkable, given the extent to which veterinary and scientific opinion had suggested that seal hunting could be humanely practised. The North Atlantic Marine Mammal Commission (NAMMCO)

²⁰⁷ Pete Harrison, 'Norway threatens action if EU bans seal products' *Reuters* (20 April 2009) < <https://www.reuters.com/article/us-eu-norway-seals-idUSTRE53J3LI20090420>> accessed 22 January 2022

²⁰⁸ Wegge (n 158) 265

²⁰⁹ Many did not wish the Inuit hunting derogation to remain in place

²¹⁰ Wegge (n 158) 266

²¹¹ European Parliament, Rapporteur Diane Wallis, 'Draft Report On the proposal for a regulation of the European Parliament and of the Council concerning trade in seal products' 2008/0160 (COD) 7 January 2009

²¹² F. de Ville, 'Explaining the Genesis of a Trade Dispute: The European Union's Seal Trade Ban' (2012) 34 *Journal of European Integration* 37

described the ban as ‘*a huge step backward for sustainable development*’ and commented that decisions affecting marine conservation should be based upon science and take into consideration numerous factors, including inter-species relationships, prey population size and hunting activities²¹³. NAMMCO believed that the European ban directly contradicted all of these elements. In addition, the Estonian, Finnish and Swedish governments (whose countries all had small-scale Baltic seal hunting concerns, and who, whilst ultimately permitted to continue the practice on a strictly non-commercial footing, were deeply concerned about restricting centuries-old hunting traditions), were keen to point out that EC competence did not extend to hunting unless directly linked to species conservation²¹⁴. It is of note that, in line with this comment, the EU’s Slaughter Regulation (EC) 1099/2009 specifically excludes hunting from its provisions, stating ‘*Hunting or recreational fishing activities take place in a context where conditions of killing are very different from the ones used for farmed animals and hunting is subject to specific legislation. It is therefore appropriate to exclude killings taking place during hunting or recreational fishing from the scope of this Regulation*’²¹⁵ and this hunting exclusion was reiterated in the more recent non-stun slaughter case, C-336/19.²¹⁶

The Council enacted and signed Regulation 1007/2009 on 16th September 2009. By October 2009 Canada and Norway had approached the WTO for consultation on the ban. Following several years of protracted debate and discussion, in 2015 amended Regulation (EU) 2015/1775²¹⁷ came into force, in order to reflect WTO rulings on the matter and the current EU approach to seal products is to permit two derogations from the general ban: (i) it permits sale of products of Inuit or other indigenous community hunts, providing that hunts are conducted with due regard to animal welfare²¹⁸ and (ii)

²¹³ Statement issued at the 18th Annual Meeting of NAMMCO, Tromsø, Norway, 10 September 2009, ‘EU import ban on seal products is a huge step backwards for sustainable development’ in NAMMCO Annual Report 2009, North Atlantic Marine Mammal Commission, Tromsø, Norway, 529

²¹⁴ Statement by Sweden, Finland and Estonia, Council of the European Union, 20th July 2009, 11152/09 Add.1

²¹⁵ Regulation (EC) 1099/2009 (n 101) (14)

²¹⁶ Case C-336/19 *Centraal Israëlitisch Consistorie van België and Others v Vlaamse Regering* [2020]

²¹⁷ Regulation (EU) 2015/1775 of the European Parliament and of the Council of 6 October 2015 amending Regulation (EC) No 1007/2009 on trade in seal products and repealing Commission Regulation (EU) No 737/2010 (Text with EEA relevance) OJ L 262/1

²¹⁸ *ibid* (3) and in line with Article 3 (1)

it allows for scenarios where import of products is of an occasional nature, consisting exclusively of goods for travellers / their families personal use²¹⁹.

3.6.8 WTO Judgments - Discussion

The WTO dispute panels considered various elements of the EU seal products ban and objections raised by Canada, Norway and others in great detail; the relevant area for this thesis is the EU's argument that the measure was necessary for the protection of public morals, under Article XX(a). The WTO panel and Appellate body provided important guidance as to public morality within the WTO sphere.

The panel found that the EU measure was designed to 'address the moral concerns of the EU public with regard to the welfare of seals'²²⁰ and confirmed that within the public morals exemption, addressing citizen's concerns about seal welfare was a legitimate objective²²¹. Interestingly, the Appellate body was very respectful of an individual country's definition of public morality²²², rejecting the argument that the EU should have evidenced the risk to public morality or identified the exact content of the morality issue.

The panel notably commented that:

*'While the focus on the dangers or risks to human, animal, or plant life or health in the context of Article XX(b) may lend itself to scientific or other methods of inquiry, such risk-assessment methods do not appear to be of much assistance or relevance in identifying and assessing public morals'*²²³.

Canada had argued that, since the EU did not impose any trade restrictions or bans in order to protect other species treated similarly to seals, their measure could not be upheld, but the WTO Appellate body rejected this claim, stating that countries are free to set different levels of protection even where there are areas of comparable moral concern²²⁴. Canada made a strong, logical argument here - albeit one that applies to

²¹⁹ Regulation (EU) 2015/1775 (n 217) Article 3 (2)

²²⁰ WTO: European Communities – Measures Prohibiting the importation and marketing of seal products, Reports of the Panel, WT/DS400/R, WT/DS401/R (25 November 2013), 7.410. The Appellate body also confirmed that the measure was necessary to protect public morality.

²²¹ *ibid*, 7.419.

²²² P. Serpin, 'The public morals exception after the WTO seal products dispute: has the exception swallowed the rules?' (2016) 217 *Columbia Business Law Review* 217, 240

²²³ WTO: European Communities – Measures Prohibiting the importation and marketing of seal products, Reports of the Appellate Body, WT/DS400/QB/R, WT/DS401/AB/R (22 May 2014), 5.198.

²²⁴ *ibid*, 5.200.

comparable *scientific* concerns as well as moral concerns - that the risks to animal welfare associated with seal hunting are also observed in abattoirs and during terrestrial hunting, but the EU's approach to these problems is not consistent. Even if problems associated with religious, non-stunned slaughter are momentarily put to one side, there are also many acknowledged problems than can occur when animals are stunned²²⁵. Of particular relevance to seal killing is the provision within the EU's own slaughter regulation²²⁶ that permits a percussive blow to the head for killing piglets, lambs, rabbits and hares i.e. the same method used for killing seals. This technique is not extensively discussed within the regulation yet is deemed acceptable for various farmed species. With respect to animal welfare in the context of terrestrial hunting, the EU has no legislation. However, with respect to public morality, issues during farm animal slaughter are known to a large body of the general public, cause great concern and regularly form the subject of NGO campaigns, but the EU does not move to ban all slaughter processes in light of these concerns. The WTO approach thus suggests that legislators have the ability to discriminate between public morals and prioritise some over others; for example, public morality about seals has been judged by the Commission as relatively more pressing or significant than public morality regarding farm animals at slaughter, thus justifying the most extreme intervention (a ban on products). It is challenging to find a logical basis for this approach.

It might be argued that where two moralities collide, the most practical arbitrator would be the available scientific evidence. This has already been discussed with reference to religious slaughter - where one community believes that pre-stun slaughter is essential for welfare whilst the other community believes that non-stunning is essential in light of their cultural / religious beliefs. Under those circumstances, sufficient scientific evidence has been collated to demonstrate that pre-stunning is essential for welfare and the CJEU has been seen to rely upon scientific data to uphold a ban on non-stunned slaughter, albeit acknowledging public morality at the same time. In the case of seals, one community believed that killing baby seals was unconscionable whilst the other believed it was reasonable and an important part of their heritage. Had

²²⁵ See for example S. J. Shields and A.B.M Raj, 'A critical review of electrical water-bath stun systems for poultry slaughter and recent developments in alternative technologies' (2010) 13 Journal of Applied Animal Welfare Science (4) 281 and M. Becerril-Herrera, M. Alonso-Spilsbury, C. Lenus-Flores et al, 'CO2 stunning may compromise swine welfare compared with electrical stunning' (2009) 81 Meat Science (1) 233

²²⁶ Regulation (EC) 1099/2009 (n 101) Annex 1, Chapter 1, Table 1

the EU chosen to prioritise the science, they could have stated that welfare problems were present during some seal slaughter, confirmed that the EFSA opinion was unable to demonstrate that seal welfare was *always* compromised and accepted that options to improve slaughter of seals using different tools or protocols had not been fully explored. They would then have had two options: (i) to suggest further research and in the meantime introduce a temporary ban on seal products to reassure consumers, or, (ii) made sales of seal products contingent upon specified, guaranteed methods of killing²²⁷ acceptable to the EU. Instead, the Commission chose to justify a ban on the basis of public morals, because in their view the science was not definitive; this has fascinating implications for future animal welfare policy.

Ultimately, although the WTO Appellate Body confirmed the EU ban as a justifiable method of protecting public morals, and found the objective of protecting indigenous communities was legitimate, they ruled that the derogation for indigenous communities led to non-justifiable discrimination²²⁸, leading to amendment of the EU Regulation. The retention of Inuit and indigenous slaughter is also paradoxical, given that no scientific evidence was presented to indicate it was any more welfare-friendly than other countries' methods; this is a similar approach to permitting derogations for religious slaughter – despite the presence of acknowledged harms, the practices are permitted to continue in the interests of tradition.

The EU Seal Products Case illustrates the fundamental problems that arise when the available science and consumer morality cannot be reconciled. The derogation in Regulation 2015/1775, for Inuit and indigenous slaughter, epitomises confused policymaking and shares contradictory traits with Regulation (EC) 1099/2009. Both regulations cite scientific evidence (and with respect to seal killing, the evidence could arguably have been afforded greater significance by the EU) but then permit derogations on the basis of cultural tradition which lead to serious animal welfare compromises. However, this endorsement of cultural tradition was not upheld by the CJEU with respect to religious, non-stun slaughter. It appears that the EU will cite public morality as a driver for animal welfare policy externally, but is less willing to accept public morality as a justifiable measure within its own territory. Fundamentally, despite the repeated citing of public morality, legislative instruments are present within

²²⁷ Such as stun, check and bleed discussed, above

²²⁸ WTO Appellate Body Reports (220) 5.338.

the EU welfare framework that permit the continuation of practices morally abhorrent to large numbers of citizens.

3.7 Chapter Conclusion

This chapter has explored the role of science in European Union policy making with respect to the Commission's stated ongoing commitment to base their legislation on sound scientific evidence. This commitment has been discussed, with specific reference to science as a human enterprise, subject to bias and error, and the chapter has highlighted the fact that whilst scientific method can yield objective data, such data is then viewed through the prism of political, economic, social and cultural opinion.

Whilst science can yield important and valuable information, the ultimate use of the information is dependent on a multitude of factors. With this in mind, the assertion that sound scientific data will guarantee good policy making is overly simplistic.

The chapter has also considered the difficulties introduced via politicisation of science and the tendency of the general public to either show blind faith in science or, in the post-truth era, treat scientists and policymakers with distrust. In light of the SARS-COVID-19 pandemic, the public is awakening to the fact that science rarely provides definitive proof or guarantees an outcome.

It has been demonstrated that whilst policymakers are well intentioned in their desire to create legislation based on sound scientific principles, the journey from the point of discovery of scientific evidence to creation of policy is complex and tortuous. This journey is further complicated when the scientific evidence is incomplete but there is public pressure to address perceived problems. These issues were discussed with reference to the EU Seal Products Case, which perfectly demonstrates the difficulties faced by policymakers dealing with multiple stakeholders who all bring different agendas – and their own interpretation of 'the science' - to the table. Balancing incomplete or contested scientific data and public morality is probably the greatest challenge faced when creating animal welfare policy.

Recent CJEU judgments have confirmed a willingness on the part of the European judiciary to consider both science and public morality, with respect to animal slaughter. Whilst public morality was cited and given credence, the science was relied upon as

the primary justification for judgment. There are very few dissenting voices when it comes to stunning as a prerequisite for positive welfare, making the reliance on scientific data reasonable.

In contrast, the Commission's approach to outlawing sales of cat and dog fur indicated a move towards greater acknowledgement of public morality in policy making; in fact, in this area, public opinion appears to have been the principal driver for creating legislation. The Seal Products case sits somewhere between these two examples and it can be argued that this scenario is representative of many other animal welfare problems, i.e. some scientific data is available but media reporting and public concerns have caused a heightened reaction to the problem, putting significant pressure on policy makers to act. In the case of seals, the EFSA lacked sufficient scientific data to comment definitively on seal welfare at slaughter, although they did have evidence that significant welfare compromises took place during killing. Under these circumstances, the Commission could have adopted a precautionary approach with respect to the science (a mechanism discussed in detail in Chapter Five) but instead elected to follow public opinion, citing it as the principal driver for policy, thus relegating the science to second place. This was a controversial decision, because citizens' views were often based on emotion rather than fact, although it proved effective with respect to GATT Article XX (a). In addition, the choice to prioritise public morality might be viewed as undermining the decades of scientific research carried out to evidence and demonstrate welfare problems. The Seal Products Case thus raises important questions for policy makers about the degree of certainty they seek from scientists when deciding to rely on data as the basis for policy.

The next chapter will examine the discipline of animal welfare science, specifically, and consider some of the difficulties researchers experience with respect to proving if, and when, welfare is compromised. It considers how scientists carry out welfare risk assessments with respect to welfare hazards and negative outcomes. The chapter will consider the varying degrees of evidence available upon which to potentially justify creation of stronger animal welfare policy, then analyse the approach of the EFSA Panel on Animal Health and Welfare, advisors to the Commission, to research data. The Chapter will consider how the Panel reviews and summarises data, and how it deals with the issue of scientific uncertainty. The chapter will also explore what

conclusions the Panel can reach when considering specific welfare issues and how their advice ultimately impacts on policymaking.

'In studies of animal behaviour, there is near official consensus about anthropomorphizing: it is to be avoided...the explanation of the cock of a parrot's head as evidence of his puzzlement; the easy assignment by a pet owner of love and desire to her dog. It is taken to be just those characteristics we attribute to a subject that the subject does not have'¹

'People must have renounced, it seems to me, all natural intelligence to dare to advance that animals are but animated machines.... It appears to me, besides, that such people can never have observed with attention the character of animals, not to have distinguished among them the different voices of need, of suffering, of joy, of pain, of love, of anger, and of all their affections. It would be very strange that they should express so well what they could not feel'²

4. Animal Welfare Science

Defining and Assessing Welfare, Research Challenges and the Methodology of the EFSA Panel on Animal Health and Welfare

4.1 Introduction

Chapter Two of this thesis outlined the European Union's current legislative framework for the protection of animal welfare, highlighting numerous intensive-production welfare issues which scientific research has demonstrated are inadequately addressed by the existing regulatory framework, despite minimum standards legislation and the introduction of Article 13 recognising animal sentience. Chapter Two also explored the early reluctance of the CJEU to permit unilateral Member State action to protect the welfare of their animals out-with their national territory, but also acknowledged the more recent CJEU approach to non-stunned slaughter, which

¹ P.J. Asquith, 'The inevitability and utility of anthropomorphism in description of primate behaviour' in R. Harrè and V. Reynolds (eds) *The Meaning of Primate Signals* (Cambridge University Press 1984) 138

² Francois Marie Arouet (Voltaire), *Traité sur la Tolérance*, 1763

allowed an individual Member State to rely upon welfare science to uphold bans on religious slaughter practices. Chapter Three then considered the relationship between science and policymaking, exploring several factors which indicate that, despite the best efforts of researchers, science remains a fallible enterprise, and the data it yields may be subjected to external influences or agendas. As a result it can be very challenging to directly translate data into effective policy. Specific socio-political factors were also identified as affecting the willingness of policy makers to incorporate research findings into legislation. Of particular note was the EU Seal Products case, which can be viewed as an attempt by the EU to legislate intra- and extra-territorially, and which epitomises the key problems faced by policymakers when trying to balance animal welfare concerns with social and political interests. This case also highlighted the role of the European Food Safety Authority (EFSA) in advising the Commission on contemporary scientific data; the EFSA Panel on Animal Health and Welfare (AHAW) advised there was insufficient viable, unbiased evidence available for them to fully analyse seal welfare and, whilst they could objectively assess some of the described killing techniques, further data would be required to allow complete assessment of stun and slaughter methods³. The lack of definitive evidence ultimately led the Commission to cite scientific opinion, but use public morality to justify the ban on seal products. This approach was not entirely consistent with the Commission's widely stated principle of basing policy making on sound science, although the research data played an important role.

The EU Seal Products case encapsulated fundamental difficulties in seeking definitive data upon which to justify policymaking; science is an ever-advancing, dynamic field and in most areas of research a degree of uncertainty will almost always remain, with the occasional anomalous result or unexpected discovery. With this in mind, Chapters Four and Five will focus on animal welfare science and consider if this field of research is capable of providing data that reaches an adequate threshold of certainty upon which policy makers can take action to protect welfare. Public morality and citizen opinion will be put to one side⁴, to allow full assessment of the role of welfare science in EU policy creation.

³ EFSA Panel on Animal Health and Welfare, 'Scientific Opinion on animal welfare aspects of the killing and skinning seals' (2007) 610 *The EFSA Journal* 1, 3

⁴ Public morality and citizen opinion will be discussed, in brief, with reference to future welfare legislation in Chapter Six

In order to establish the extent to which animal welfare science can be (and is) incorporated into policy, Chapter Four offers a brief overview of accepted animal welfare research methods (looking at practical application of the experimental techniques explained in Chapter Three), and discusses some of the key problems encountered when assessing and interpreting the welfare of animal subjects. It is essential to understand the complex, sometimes contradictory, data with which policymakers are presented, in order to then suggest and formulate approaches through which the data can inform legislation. The role of the EFSA Panel on animal health and welfare is explored, since their role in advising the Commission on welfare issues is central in the process of policy making.

This chapter therefore addresses three central areas:

- Animal welfare as a social concern and topic of scientific enterprise: the definition of animal welfare is explored and the complexity of the concept is explained.
- Methods of assessing animal welfare: research techniques and approaches to analysing findings are discussed, along with behaviour assessment, highlighting areas that prove problematic to researchers.
- The EFSA Panel on Animal Health and Welfare: the methodology used when formulating Scientific Opinions is summarised, and AHAW's methods of risk assessment – utilising input and outcome factors when assessing welfare - are discussed. The subchapter then explains AHAW's view on the use of animal-based measures when assessing welfare. Finally the sub-chapter advances three possible conclusions the AHAW Panel may reach when assessing data, and demonstrates the vicious circle which exists with respect to inconclusive data and policymaking.

4.2 Animal Welfare Science – defining and assessing welfare

A search for 'animal welfare' on today's internet will yield millions of resources⁵, with information offered on the subject by governmental bodies, charities, NGOs and the media, as well as scientists, academics and members of the general public. Social

⁵ An internet search carried out for 'animal welfare', provided 2, 510, 000, 000 results <<https://www.google.com/>> accessed 2 February 2022

media provides an effective educational and fundraising platform for animal welfare campaigns⁶ and ‘animal welfare’ is a term utilised by citizens, farmers and campaigners as well as policymakers on a daily basis; however, one of the most commonly overlooked elements of the term animal welfare is its actual definition.

With respect to consumer / non-academic understanding of farm animal welfare, research has demonstrated that individual citizens’ views on welfare are ideologically diverse, with disparate ideas about the meaning of animal welfare. Consumer views of what constitutes ‘good welfare’ range from the provision of ‘natural’ production systems in terms of outdoor environments or factors relating to quality of life, to good health or a positive emotional experience⁷ - ideas which, interestingly, reflect scientific research findings.

Despite the creation of Article 13 TFEU, which confirms the sentient nature of animals, and the creation of various legislative instruments designed to protect animal welfare, the EU fails to provide a definition of animal welfare within its regulatory framework and it is important to consider why this is the case. Chapter One discussed the development of animal welfare as a scientific discipline - it would seem reasonable, therefore, to expect the enterprise itself to provide a definition of ‘animal welfare’. In fact, this has proved extremely problematic, not least because animal welfare research is a unique science; in examining and assessing the experience of an animal with respect to various external influences, it incorporates multiple disciplines including physiology, neurology, psychology, ethology, and veterinary medicine⁸. A multi-disciplinary approach is necessary because our animal subjects are unable to articulate their experiences or problems as humans can and therefore evidence-based assessment is the only available option, involving extensive information-gathering and analysis. In addition, (as briefly discussed in the previous chapter), assessing only one

⁶ One example study demonstrated a 66% increase in donations and 66% overall increase in adoption of animals due to social media campaigns. EDGE research for the American Society for the Prevention of Cruelty to Animals (ASPCA), ‘Effectiveness of Social Media Use on Impact of Animal Shelters and Rescue Organizations’ 12 September 2018
< <https://aspca.app.box.com/s/eu6xvozxrlzytjdhkox9hg0ski6fgklh> > accessed 1 February 2022

⁷ For an interesting exploration of consumer views of welfare, see A.B. Evans and M. Miele, ‘Enacting Public Understandings: The Case of Farm Animal Welfare’ (2019) 99 *Geoforum* 1, 10.1016/j.geoforum.2018.12.013. One of the study’s aims was to consider the possibility of creating a hybrid academic-public knowledge system. See also M. Miele, I. Veissier, A. Evans and R. Botreau, ‘Animal Welfare – establishing a dialogue between science and society’ (2011) 20 *Animal Welfare* 103

⁸ C. Carenzi and M. Verga, ‘Animal welfare: review of the scientific concept and definition’ (2007) 8 *Italian Journal of Animal Science* sup1, 21

element of an animal's experience i.e. its physiological health, will not provide sufficient information about its overall quality of life. Veterinary assessment of a rabbit for meat production, housed in a wire cage, may find the animal to be, clinically, in perfect health with good liveweight gain, yet its barren environment may have considerable negative effects on its mental and emotional state.

The multi-disciplinary approach has, however, presented difficulties when attempting to provide an over-arching definition of welfare, because several key elements have to be considered when assessing an animal's experience – the animal's ability to express natural behaviour, the animal's physical health and the animal's emotional or mental wellbeing⁹. In addition, given that the subjects of welfare research range from food-production animals and laboratory rodents to primates, domesticated pets and marine animals, an additional challenge encountered by scientists has been to construct a definition of 'animal welfare' which can be applied to the lives of all of these creatures.

4.2.1 Defining Animal Welfare

During the 1960s and 1970s, as awareness of animal sentience awakened, the focus of scientific discussion with respect to the lives of animals was primarily centred upon human intervention and husbandry systems, rather than considering the experience of the animals themselves¹⁰. The term 'animal welfare' began to be utilised in the 1970s but no attempt was made to define it in any way until the 1980s. During that time, veterinary scientists and biology researchers posited that all animals are subject to various environmental challenges which impact upon their methods of response. These can be physiological (such as changes in their tissues or immune system) or behavioural¹¹, and they can both adversely affect the animal, with it becoming accepted that an individual's inability to control the interactions they have with their environment can be detrimental to their overall experience¹².

⁹ H. J. Blockhuis, I. Veissier, M. Miele and B. Jones, 'Safeguarding Farm Animal Welfare', in Melissa Vogt (ed) *Sustainability Certification Schemes in the Agricultural and Natural Resource Sectors, Outcomes for Society and the Environment* (Routledge 2019) 140

¹⁰ David Fraser, 'Animal Welfare' in Mary C. Rawlinson and Caleb Ward (eds) *The Routledge Handbook of Food Ethics*, (Routledge 2016) 267-8

¹¹ D. Broom, 'A History of Animal Welfare Science' (2011) 59 *Acta Biotheoretica* 121

¹² J.M. Weiss, 'Effects of coping behaviour in different warning signal conditions on stress pathology in rats' (1971) 77 *Journal of Comparative and Physiological Psychology* 1

Another area of research which supported the need to define animal welfare was the study of animal motivation systems. Between 1950 and 1980 numerous experiments successfully demonstrated the ability of animals to make decisions and, notably, evidenced the motivational reaction of animals who did not have their needs met¹³, with these individuals regularly observed to show frustration. Such research challenged the previously held view that animals were driven by instinct and were, essentially, automata.

One widely-held view which was challenged during this period was the theory that domesticated animals had been so modified by man as to be incomparable with their equivalents living in the wild; various studies¹⁴ demonstrated that in many areas, the behaviour of farm animals was virtually identical to that of their non-domesticated ancestors. This is particularly interesting, since one of the most commonly held views amongst consumers, who generally have no scientific training, is the belief that animals should be able to live in a manner which reflects their 'natural', wild state as closely as possible¹⁵.

A further popular opinion which was disproven at this time was the theory that the cognitive function of domesticated animals is low and unsophisticated. Cattle and sheep have been demonstrated as able to recognise multiple individuals¹⁶ in experiments; this research has been built upon in subsequent years and we now know that animals have far more sophisticated problem solving skills and awareness than was originally believed. Cattle demonstrate strong learning ability, pigs are able to understand and use mirrors, and calves have positive emotional responses to learning new tasks¹⁷.

¹³ See, for example, M. Morgan and D. Eimon, 'Incentive motivation and behavioural inhibition in socially isolated rats' (1975) 15 *Physiology and Behaviour* (4) 405 and B. A. Baldwin, 'Operant Studies on the Behavior of Pigs and Sheep in Relation to the Physical Environment' (1979) 49 *Journal of Animal Science* 1125

¹⁴ G. McBride, I.P. Parer and F. Foenander, 'The social organisation and behaviour of the feral domestic fowl' (1969) 2 *Animal Behaviour Monographs* 125 and P. Jensen, 'Observations on the maternal behaviour of free-ranging domestic pigs' (1986) 16 *Applied Animal Behaviour Science* 131

¹⁵ B. Clark, G. B. Stewart et al 'A Systematic Review of Public Attitudes, Perceptions and Behaviours Towards Production Diseases Associated with Farm Animal Welfare', (2016) 29 *Journal of Agricultural and Environmental Ethics* 455

¹⁶ K. M. Kendrick and B. A. Baldwin, 'Cells in temporal cortex of sheep can respond preferentially to the sight of faces' (1987) 236 *Science* 448

¹⁷ See for example, K. M. Kendrick, A. P. da Costa et al, 'Sheep don't forget a face' (2001) 414 *Nature* 165. See also K. Hagen and D.M. Broom, 'Emotional reactions to learning in cattle' (2004) 85 *Applied Animal Behaviour Science* 203, an experiment which demonstrated that calves show excitement when learning new tasks and D. M. Broom, H. dos Santos Sena Brunel and K. L. Moynihan, 'Pigs

The Brambell committee of 1965¹⁸ had considered some key elements relating to welfare but did not attempt to define it; instead the committee's work was guided by one of its members, William H Thorpe, Professor of Animal Ethology at the University of Cambridge, whose report¹⁹ accentuated the importance of understanding animal biology and advised of the biological needs of animals, including the need to express certain behaviours, which, if frustrated, would cause problems for the animals. Thorpe's opinion led to the creation of the Five Freedoms concept, which is discussed, below.

In 1982, Dr. Barry Hughes, a veterinary surgeon and ethologist, working at the Roslin Institute in Edinburgh, stated that animal welfare indicated that an animal was in harmony with its environment or with nature²⁰. Although this definition was not of practical application (since 'harmony' was poorly defined and not scientifically quantifiable), it was a useful first step. On the basis of Hughes' work, Donald Broom proposed his definition of welfare in 1986, which is the definition currently cited in EU policy documents²¹:

'The welfare of an individual is its state as regards its attempts to cope with its environment.'

Subsequent publications by Broom explored and further clarified this definition²², explaining that welfare is a term which refers to animals, including humans, but not plants²³. (Well-being has the same meaning as welfare but can be perceived as less

learn what a mirror image represents and use it to obtain information' (2009) 78 *Animal Behaviour* 1037 – this experiment confirmed that pigs could learn how a mirror image works and use this information in subsequent tasks

¹⁸ As stated in Chapter One, the Committee members were Prof. F.W. Rogers Brambell (Chairman), D.S. Barbour, Lady Barnett, Prof. T.K. Ewer, Alec Hobson, H. Pitchforth, Walter R. Smith, Dr. W.H. Thorpe and F.J.W. Winship, who offered a range of expertise from agriculture, zoology, veterinary and behavioural sciences

¹⁹ W. H. Thorpe, 'The assessment of pain and distress in animals', Report of the Technical Committee to Enquire into the Welfare of Animals Kept under Intensive Husbandry Conditions, Appendix III, F. W. R. Brambell (chairman) 1965 (London H.M.S.O.)

²⁰ B.O. Hughes, 'The historical and ethical background of animal welfare' in J. Uglow (ed) *How well do our animals fare?* (1982) Proc. 15th Annual Conference of the Reading University Agricultural Club 1981, 1

²¹ See, for example, Emeritus Professor Donald M Broom, European Parliament, 'Animal Welfare in the European Union', Study for the PETI Committee (2017)

²² For example, D.M. Broom, 'The scientific assessment of animal welfare' (1998) 20 *Applied Animal Behaviour Science* (1-2) 5, D.M. Broom, 'Animal welfare: concepts and measurement' (1991) 69 *Journal of Animal Science* 4167 and D.M. Broom, 'Assessing welfare and suffering' (1991) 25 *Behavioural Processes* 117

²³ D. M. Broom 'A usable definition of Animal Welfare' in A. Clarke (ed) *The Thinking Horse* (Guelph: Equine Research Centre 1995) 66

scientific hence the adoption of welfare as the popular legal and scientific term). Welfare is a scientifically measurable entity and covers a spectrum from very good to poor, where poor would be defined as problems with coping or an absolute failure to cope (coping meaning being in possession of bodily and mental stability)²⁴. Broom has also stated that pain, pleasure and fear are biological mechanisms of coping that have evolved and these are also important factors in an animal's welfare²⁵.

The World Organization for Animal Health (OIE) further described animal welfare in 2011, although their contribution was not a definition but rather, a statement clarifying general considerations for welfare²⁶, which remains part of their Terrestrial Animal Health Code:

'Animal welfare means the physical and mental state of an animal in relation to the conditions in which it lives and dies.

An animal experiences good welfare if the animal is healthy, comfortable, well nourished, safe, is not suffering from unpleasant states such as pain, fear and distress, and is able to express behaviours that are important for its physical and mental state.

Good animal welfare requires disease prevention and appropriate veterinary care, shelter, management and nutrition, a stimulating and safe environment, humane handling and humane slaughter or killing. While animal welfare refers to the state of the animal, the treatment that an animal receives is covered by other terms such as animal care, animal husbandry, and humane treatment'

The combination of Broom's definition and the OIE statement highlights the numerous elements which are required to ensure good welfare; the 'physical and mental state of the animal' incorporating a multitude of factors; it is clear, therefore, that assessment of animal welfare is challenging.

²⁴ D. M. Broom and K. G. Johnson, *Assessing Animal Welfare* (Springer International 2003) 87

²⁵ D.M. Broom, 'Welfare, stress and the evolution of feelings' in A. P. Møller, M. Milinski, and P. J. B. Slater (eds) *Advances in the study of behavior*, Vol. 27 (Academic Press 1998) 371

²⁶ OIE (World Organization for Animal Health) Terrestrial Animal Health Code (2021) 7.1

4.3 Methods of Assessing Welfare

Given the diverse range of physical and mental parameters which contribute to the welfare of an animal, it is unsurprising that different approaches to assessing welfare exist. In order to ensure that animals are spared pain, suffering or fear, various techniques have been suggested for assessment of welfare, which might then provide data suitable for citation in the creation of stronger welfare policy. Although it is out-with the scope of this thesis to analyse these approaches in any great detail, an overview of the principal methods is sufficient to demonstrate that welfare assessment is a very challenging task for scientists, and yields complex data for policymakers to interpret and apply. In order to establish what animals need for their welfare, the first step is ascertaining the parameters that allow measurement of their wellbeing.

Professor David Fraser²⁷ has explained that different researchers have focused on different concerns with respect to animal welfare and these concerns form the criteria upon which their welfare assessment is based²⁸. For some, the emphasis should be placed upon health, with freedom from physical harm or disease – this was traditionally the focus of veterinary surgeons²⁹. Other individuals focus on so-called ‘affective’ states³⁰, such as pleasure, pain or distress. In addition, some focus upon the living of a ‘natural life’. Fraser has commented that focusing on any one element to the exclusion of the others will inevitably lead to compromises in the animal’s welfare.

Fraser identified three conceptual frameworks for assessing welfare: biological functioning, affective state and natural living³¹. It is interesting to note that these three frameworks all utilise, to a greater or lesser extent, the scientific specialisms originally identified by the Brambell Committee in 1965 as necessary to assess welfare.

²⁷ Professor Fraser of the University of British Columbia has spent more than four decades working in the field of animal welfare and is an internationally recognised authority on the subject. He is one of the original members of the Animal Welfare Working Group of the OIE.

²⁸ D. Fraser, ‘Understanding Animal Welfare’ (2008) 50 *Acta Veterinaria Scandinavica* S1

²⁹ D. Fraser, ‘Assessing animal welfare: different philosophies, different scientific approaches’ (2009) 28 *Zoo Biology* (6) 507

³⁰ The term ‘affective state’ refers to feelings or emotions; they are mood states (not acute, as in a startle response - affective states last longer) which result from an accumulation of experiences as opposed to a single stimulus. See, for example, D. Fraser and I. J. H. Duncan, ‘Pleasures’, ‘pains’ and animal welfare: toward a natural history of affect’ (1998) 7 *Animal welfare* 383

³¹ D. Fraser, ‘Assessing animal welfare at the farm and group level: the interplay of science and values’ (2003) 12 *Animal Welfare* 433

4.3.1 Biological Functioning

This animal welfare model focuses on the biological functioning of an animal as it attempts to cope with its environment – animals will encounter multiple environmental stimuli which can cause stress or fear³²; stimuli can be conflicting and certain responses may be prioritised. Biological functioning generally refers to elements of physical health, for example, stress and immune responses and growth or repair systems within the body, but it can also include behavioural responses³³. The physical condition of animals is probably the element of their welfare which is potentially the most straightforward to assess, since there are often specific parameters which can be measured – liveweight gain, skin and coat condition, vital signs such as heart rate and respiratory rate as well as various biochemical stress markers³⁴. In the early days of welfare science, veterinary – and often medical – scientists tended to promote the idea that health essentially *is* welfare, the implication being that if an animal (or person) experiences good physical health then their welfare is good. In addition, until relatively recently, scientists and veterinary surgeons were not prepared to refer to or consider animals' feelings³⁵.

With respect to legal intervention and monitoring, biological functioning provides the most readily interpretable data upon which to base standards and protocols for animal welfare. Physical and physiological problems can generally be visually identified or confirmed via veterinary investigation or testing, and biological functioning has, therefore, been utilised widely within the EU – not only to facilitate creation of minimum standards of welfare, but also when formulating sanitary and phytosanitary (SPS) measures relating to animal disease, public health and food safety³⁶.

³² Carenzi (n 8)

³³ J.L. Barnett and P.H. Hemsworth, 'Welfare monitoring schemes: using research to safeguard welfare of animals on the farm' (2009) 12 *Journal of Applied Animal Welfare Science* 114

³⁴ Various hormones and biochemical markers can indicate stress – this is an extremely complex topic, however, for an overview of some basic principles, see E. Möstl, 'Hormones as Indicators of Stress' (2002) 23 *Domestic Animal Endocrinology* 67

³⁵ J. Panksepp, 'Affective consciousness: core emotional feelings in animals and humans' (2005) 14 *Consciousness and Cognition* 30

³⁶ Animal health, food safety and public health are important aspects in trade negotiation and agreement, as per the WTO SPS Agreement. See European Parliament, Agriculture and Rural Development, 'Comparative analysis of EU standards in food safety environment, animal welfare and other non-trade concerns with some selected countries' (2012) Within the EU, the Food and Veterinary Office of the EU regularly performs checks on animals and animal produce, utilising biological assessment parameters, to assess the equivalence of third country control systems with those in the EU, as well as carrying out checks within the EU boundary. Assessment of biological

In summary, the biological model says that an animal's fitness and biological functioning will reflect its ability to cope with environmental challenges – the most extreme coping functions being associated with the poorest welfare conditions. In other words, the impact of stress on an animal's biological functioning allows us to understand its welfare status³⁷. This approach can yield some useful information, but the limitation with this model, as discussed earlier, is that an animal can be in excellent health yet encounter negative mental experiences with respect to its environment. In addition, biological functioning with respect to physiological markers (discussed, below) can prove very challenging.

4.3.2 Affective State

This welfare assessment framework is based on the idea that an animal's welfare is derived from its ability to have affective experiences³⁸. In other words, poor welfare will be present when environmental effects are predominantly negative or detrimental. Due to the fact that assessment of affective states was unobtainable through early scientific research, the concept of animals having feelings or emotions was generally dismissed; however, more recent research has confirmed that multiple similarities exist between human and animal brain chemistry, neurological pathways and behaviour³⁹. For example, we now understand that both human and animal emotional experiences are dependent upon comparable sub-cortical⁴⁰ brain systems and various mammalian species have been shown attraction to rewards, and even drugs, in similar ways to humans⁴¹. Notably, the welfare role of mental processes was given acknowledgement by Brambell in 1965, stating '*welfare is a wide term that embraces both the physical and mental well-being of the animal. Any attempt to evaluate welfare, therefore, must take into account the scientific evidence available concerning*

parameters during transportation, at slaughter and on farm can facilitate welfare assessment and, therefore, compliance with welfare regulations

³⁷ Barnett (n 33)

³⁸ Affective states are defined as persistent mood states (e.g. depression or anxiety) – they do not arise from a single acute stimulus (like a startle response on visualising a predator) but result from accumulated experiences. See I. J. H. Duncan and D. Fraser, 'Understanding animal welfare' in M.C Appleby and B.O. Hughes (eds) *Animal Welfare* (CAB International 1997) 20-23

³⁹ Barnett (n 33)

⁴⁰ The area of the brain below the cerebral cortex which in humans is associated with social, affective and cognitive functions – see J. Ko, 'Neuroanatomical Substrates of Rodent Social Behavior: The Medial Prefrontal Cortex and Its Projection Patterns' (2017) 11 *Frontiers in Neural Circuits* A. 41

⁴¹ Panksepp (n 35)

the feelings of animals that can be derived from their structure and functions and also from their behaviour.⁴²

To some extent, the affective approach arose as a critical response to the biological model. Animals may be physically healthy whilst exhibiting stereotypes or abnormal behaviours which arise from negative affective states⁴³. Some affective states like anxiety or depression will induce subtle differences in an animal's behaviour that can hint at sub-clinical disease (where no immediately obvious physical symptoms are visible). It is difficult to argue that physical and emotional aspects of wellbeing would not both play a role in overall welfare. The concept of animal health and feeling being central to welfare has been promoted far more widely in recent times – and given the inclusion of sentience in Article 13 TFEU, it cannot now be argued that animals lack the ability to experience positive and negative feelings.

Whilst some welfare scientists, such as Ian Duncan⁴⁴ argue that welfare is *entirely* concerned with feelings⁴⁵, the more commonly adopted approach is that of Marian Stamp Dawkins, i.e. that an individual's feelings are central to their welfare but various other elements such as health also play an important role⁴⁶. In terms of research methodology, although observations of behaviour and certain physiological parameters have been used to evaluate *negative* affective experiences in animals⁴⁷, scientists are currently searching for methods by which *positive* affective experiences may be assessed. Over the coming years, this is likely to be based upon neuroscience, in particular with reference to behaviours which are rewarding to animals⁴⁸. As with the affective state model, however, limitations are present – feelings are fundamentally

⁴² Professor F.W. Rogers Brambell (Chairman), 'Report of the Technical Committee to Enquire into the Welfare of Animals kept under Intensive Livestock Husbandry Systems', December 1965 (London, HMSO)

⁴³ Commonly seen in stabled horses, stereotypes such as weaving, crib biting (wood chewing) and box walking are often noted in individuals found to be in perfect health; the behaviour is seen as an indicator of reduced welfare. See for example, A. Sarrafchi and H. J. Blokhuis, 'Equine stereotypic behaviours: Causation, occurrence and prevention' (2013) 8 *Journal of Veterinary Behaviour* (5) 386

⁴⁴ Professor Emeritus, University of Guelph, Campbell Centre for the Study of Animal Welfare

⁴⁵ I. J. H. Duncan, 'Welfare is to do with what animals feel' (1993) 6 *Journal of Agricultural and Environmental Ethics* suppl. 2, 8. See also I. J. H. Duncan and J. C. Petherick, 'The implications of cognitive processes for animal welfare' (1991) 69 *Journal of Animal Science* 5017

⁴⁶ M. S. Dawkins 'From an animal's point of view: motivation, fitness and animal welfare' (1990) 13 *Behavioral and Brain Sciences* 1

⁴⁷ For example, A. Boissy A, G. Manteuffel, M. B. Jensen et al. 'Assessment of positive emotions in animals to improve their welfare' (2007) 92 *Physiology and Behaviour* 375

⁴⁸ *ibid*

subjective and therefore inaccessible to scientific investigation⁴⁹; this renders them vulnerable to anthropomorphism and variable interpretation.

4.3.3 Natural Living and Natural Behaviour

The idea that animals should be able to perform ‘natural behaviours’ and enjoy a ‘natural life’ is a view held by some scientists as well as citizens⁵⁰. This opinion is less well described in scientific literature, partly because the definition of ‘natural’ is unclear and challenging to quantify scientifically. With respect to a wild animal that has been captured and placed in captivity, natural behaviour can appear a straightforward concept but in domesticated animals the picture is far less clear.

If this model is to be utilised effectively, it must permit identification of those ‘natural behaviours’ that are desirable with respect to welfare, and it must be able to justify the reasoning as to their inclusion in welfare schemes or monitoring⁵¹. Neuroscientific research has provided sound evidence that animals feel rewarded when undertaking particular behaviours⁵², including foraging, play, maternal behaviours and exploration of their environment⁵³ and it is central to welfare that an animal’s surroundings can facilitate these behaviours. Those behaviours might be described as natural. On the other hand, another example of common maternal behaviour - aggression towards offspring, sometimes infanticide - may be natural, but also highly undesirable for welfare⁵⁴.

It is common for consumers to view certain behaviours as ‘natural’; these tend to be species-specific, for example, grazing by cattle, dust bathing by poultry and foraging by pigs are all often cited as examples of natural behaviour⁵⁵. However, simply being a species-specific behaviour is inadequate to indicate the presence of good welfare, because many stereotypies are also species-specific, yet actually indicate that the

⁴⁹ (Carenzi n 8)

⁵⁰ J. Yeates, ‘Naturalness and Animal Welfare’ (2018) 8 *Animals* (4) 53

⁵¹ J. L. Barnett, P. H. Hemsworth, G. M. Cronin et al, ‘A review of the welfare issues for sows and piglets in relation to housing’ (2001) 52 *Australian Journal of Agricultural Research* 1

⁵² *ibid.* See also, for example, D. J. Mellor, ‘Enhancing animal welfare by creating opportunities for positive affective engagement’ (2015) 63 *New Zealand Veterinary Journal* 3

⁵³ D. J. Mellor ‘Positive animal welfare states and encouraging environment-focused and animal-to-animal interactive behaviours’ (2015) 63 *New Zealand Veterinary Journal* 9

⁵⁴ C. Chen, C.L. Gilbert et al, ‘Maternal infanticide in sows: Incidence and behavioural comparisons between savaging and non-savaging sows at parturition’ (2008) 109 *Applied Animal Behavioural Science* 238

⁵⁵ M. B. M. Bracke and H. Hopster, ‘Assessing the importance of natural behaviour for animal welfare’ (2006) 19 *Journal of Agricultural and Environmental Ethics* 77

animal's welfare is poor – for example, feather pecking in birds or tail biting in pigs⁵⁶. 'Natural' has also been defined as behaviour seen in nature, i.e. not the behaviour witnessed in artificial production or breeding systems. Whilst it is undoubtedly true that artificial environments can prove detrimental⁵⁷, they can also provide many benefits to an animal's welfare, including constant food supply, regulation of temperature and air humidity, and protection from diseases⁵⁸. Natural behaviour has also been described as behaviour that animals are positively motivated to perform⁵⁹ - in other words, performing the behaviour is pleasurable, and this is the definition of an 'ethological need'⁶⁰. Even this definition is challenging, since animals likely obtain pleasure from certain behaviours within artificial environments which would not strictly be considered 'natural'. For example, various studies have demonstrated that the provision of plastic toys to weaned pigs have positive effects on behaviour and welfare⁶¹ – neither the toys themselves nor the action of playing with them could be viewed as 'natural' in common parlance.

Bracke and Hopster have offered a helpful definition of natural behaviour as follows: *"Natural behaviour is behaviour that animals tend to perform under natural conditions, because it is pleasurable and promotes biological functioning"*⁶².

At present, whilst the natural living theory of behaviour is incapable of providing a thorough, rigorous framework for assessing welfare, it does allow understanding of the welfare benefits associated with providing opportunities for animals to fulfil behavioural needs which provide them with pleasure.

⁵⁶ *ibid*

⁵⁷ For example, with respect to stocking densities that can increase inter-animal aggression or cages that lead to stereotypies

⁵⁸ Bracke (n 55). The view that intensive production systems are 'all negative' or that extensive systems / free range are 'all positive' is overly simplistic; see D. Temple and X. Manteca, 'Animal Welfare in Extensive Production Systems is Still an Area of Concern' (2020) 4 *Frontiers in Sustainable Food Systems* 545902

⁵⁹ F. Ohl and F. J. van der Staay, 'Animal Welfare: at the Interface between science and society' (2012) 192 *The Veterinary Journal* (1) 13

⁶⁰ Needs are discussed in further detail, below

⁶¹ H-S. Hwang, Jae-Kang Lee et al, 'Effect of toys on behaviour and body weight of weaned pigs after mixing' (2021) *Czech Journal of Animal Science* (8) 323. See also M. Marcet-Rius, P. Pageat et al, 'The provision of toys to pigs can improve the human-animal relationship' (2020) *Porcine Health Management* 29

⁶² Bracke (n 55) 80

In summary, each of the three conceptual assessment frameworks, above, brings helpful information when considering an animal's welfare status. Blokhuis⁶³ has suggested that, since the concept of animal welfare is clearly multifactorial, all the key elements are important, and therefore the approach should be holistic; for example, if an animal exhibits behaviour that is deemed normal, yet it is incubating disease and therefore in poor health, the behavioural aspect does not negate the health problems in terms of welfare. It is evident that none of the frameworks can, singlehandedly, provide adequate information to ensure welfare and therefore a multi-faceted approach is needed. Central to this thesis is the fact that welfare assessment is a challenging, complex process; welfare data is open to a variety of interpretations and different actors may place different emphasis on each of the methods discussed, above. These factors render the available information difficult for policy makers to decipher⁶⁴.

It is important to appreciate that these three principal frameworks, whilst occasionally used in isolation, are not set in stone. Since their development, there has been considerable overlapping and merging of the concepts, in an attempt to create a thorough, universally applicable method of animal welfare assessment which allows consideration of physical and mental wellbeing, as well as the ability to express natural behaviours. This process has been bolstered by some additional welfare concepts which form the next section for discussion.

4.3.4 Adaptation versus Coping, and Stress

Formulating a method to assess welfare based on upon physical and mental wellbeing, as well as a natural behavioural requirement, has led scientists to consider another important factor – the manner in which an animal adjusts *to* its environment. This is especially pertinent to welfare legislation, because intensive production management practices push animals to their metabolic, physical and emotional limitations. If welfare scientists and policy makers wish to ensure positive welfare, it is essential to identify adaptation thresholds of discomfort / stress within an environment, beyond which animals should not be subjected, in order to create a living environment

⁶³ J.H Blokhuis, 'International cooperation in animal welfare: the Welfare Quality project® '(2008) 50 Acta Veterinaria Scandinavica Suppl. 1, S10

⁶⁴ F. Vanhonacker and W. Verbeke, 'Public and Consumer Policies for Higher Welfare Food Products: Challenges and Opportunities' (2013) 27 Journal of Agricultural and Environmental Ethics 153

that is not detrimental to their wellbeing. Broom has commented that, in addition to analysing physical and mental state, adaption - how well an animal is able to change in order to exist within a particular environment - is another factor that can be considered in welfare assessment⁶⁵.

For an individual animal, its ability to adapt refers to its capacity to utilise its physiological and behavioural regulatory systems to cope with its environment⁶⁶. Mortality in intensive production systems is kept at a low level in order to ensure profitability, therefore it might be argued that the animals in these systems have adapted to their environment and that, given not only their survival but often good health, their welfare has not been seriously compromised. In fact, an animal might adapt to a particular environment, but do so with great difficulty, perhaps experiencing physical pain, or severe mental distress or depression⁶⁷. A calf removed from its mother and fed milk from a bucket will undoubtedly adapt to this method of feeding, yet it may experience mental frustration at being unable to suckle⁶⁸ or distress at separation from its mother. With this in mind, adaptation cannot be viewed as a guarantee of good welfare – and can be seen as a less effective measure of welfare than ‘coping’⁶⁹. Coping is defined as where an animal’s mental and physical systems have acted to neutralise environmental impact. In other words, animals ‘cope’ by utilising various physical or mental strategies to deal with aversive situations⁷⁰ and this terminology provides more accurate reflection of animal experience. Various parameters can be assessed in order to ascertain whether an animal is coping with its environment (or not) including injury, disease, mortality and development⁷¹; behaviour is a strong indicator. An animal experiencing difficulty in coping may demonstrate

⁶⁵ Broom (n 11)

⁶⁶ D. M. Broom, ‘Adaptation’ (2005) 119 *Berliner und Münchener Tierärztliche Wochenschrift* 1

⁶⁷ *ibid.* Separation of mother cow and calf is often cited as an event which triggers distress and depression – see B.A. Ventura, M.A.G. von Keyserlingk, C.A.Schuppli and D.M.Weary, ‘Views on contentious practices in dairy farming: The case of early cow-calf separation’ (2013) 96 *Journal of Dairy Science* 6105

⁶⁸ D. Fraser, D.M. Weary, E. A. Pajor and B.N. Milligan, ‘A scientific conception of animal welfare that reflects ethical concerns’ (1997) 6 *Animal welfare* 187

⁶⁹ As utilised in Broom’s definition of welfare – ‘the state of an animal as it attempts to cope with its environment’

⁷⁰ B. Wechsler, ‘Coping and coping strategies: a behavioural view’ (1995) 43 *Applied Animal Behaviour Science* 123

⁷¹ *ibid*

increased intensity or frequency of coping behaviours, such as territoriality or reproductive behaviours⁷².

Stress is another factor often cited in welfare research and literature. In human medicine, stress has become a significant concern with respect to its mental and physical impact and it has been a subject central to animal welfare for some time. Broom has described stress as “*an environmental effect on an individual which overtaxes control systems and results in adverse consequences, eventually reduced fitness*”⁷³ and has stated that stress can never be seen as positive, although there can be scenarios where welfare is briefly poor without long-lasting negative effects and therefore without stress⁷⁴. It is certainly true to say that the presence of stress alone will not necessarily indicate poor welfare, nor will the absence of a stress response indicate good welfare.

4.3.5 Needs

The next step in the overall welfare-assessment equation is needs; these can only be confirmed following observation of the various parameters listed, above. To an extent, it may be possible to predict an animal’s needs. That said, until observation of an animal’s reactions to various husbandry scenarios and environmental provisions contained therein are fully assessed, it can be very difficult to precisely pinpoint a specific need.

Broom has defined needs as follows: *‘[a] need is a requirement, which is part of the basic biology of an animal, to obtain a particular resource or respond to a particular environmental or bodily stimulus’*⁷⁵. Needs allow the animal to function effectively and they originate in the brain; animals have needs for resources like warmth, water or food, but they also have needs to perform specific actions⁷⁶, for example, the creation of a nest by a hen prior to laying the egg. The first time needs were formally proposed

⁷² J.M. Koolhaas, S.M. Korte et al, Coping styles in animals: current status in behavior and stress-physiology’ (1999) 23 Neuroscience and Biobehavioural Reviews (7) 925

⁷³ D. M. Broom and A. F. Fraser, *Domestic and Animal Welfare and Behaviour* (4th Edn. CAB International 2007) 15

⁷⁴ *ibid*

⁷⁵ D.M. Broom and K.G. Johnson, Stress and Animal Welfare, Key issues in the Biology of Humans and other animals (Springer 2019) 31

⁷⁶ F. Toates and P. Jensen, ‘Ethological and psychological models of motivation’, in J. A. Meyer and S. W. Wilson (eds) *Farm Animals to Animats* (MIT Press 1991) 194

as the basis for regulation of animal welfare came in 1965 with the Brambell Report's⁷⁷ 'Five Freedoms' guidelines and although they have been superseded by more sophisticated scientific assessment, their contribution is clear: an outline of the needs of any given species has remained the foundation of reports on animal welfare by EU scientific panels and The Council of Europe for decades.

The Five Freedoms

As explained in Chapter One⁷⁸, The Brambell Committee created the Five Freedoms framework as a method of ensuring animal welfare, in light of the conclusions that their consultations had reached regarding the five basic needs of farm animals raised in confinement⁷⁹: the freedom to stand up; the freedom to lie down; freedom to turn around; the freedom to groom themselves; and the freedom to stretch their limbs. In the 1980s, John Webster⁸⁰ of the UK Farm Animal Advisory committee suggested that although these fundamental freedoms were essential for intensively reared production animals, they did not adequately address many significant welfare issues⁸¹; as a result, Webster proposed a more detailed set of freedoms and in 1993 the Farm Animal Welfare Council (FAWC) published their expanded Five Freedoms which remain the same today⁸²:

- **Freedom from thirst, hunger and malnutrition:** By ready access to a diet to maintain full health and vigour
- **Freedom from thermal and physical discomfort:** By providing a suitable environment including shelter and a comfortable resting area
- **Freedom from pain, injury and disease:** By prevention or rapid diagnosis and treatment
- **Freedom from fear and distress:** By providing sufficient space, proper facilities and the company of the animal's own kind

⁷⁷ Brambell (n 18)

⁷⁸ Chapter One, 1.4.3

⁷⁹ J. Webster, 'Animal Welfare: Freedoms, Dominions and A Life Worth Living' (2016) 6 *Animals* (6) 35

⁸⁰ Professor Emeritus at the University of Bristol. A veterinary surgeon, he founded a unit for the study of animal behaviour and welfare in 1977, which now has 50 researchers. He was a founding FAWC member.

⁸¹ Webster (n 79)

⁸² S.P. McCulloch, 'A critique of FAWC's Five Freedoms as a Framework for the analysis of animal welfare' (2013) 26 *Journal of Agricultural and Environmental Ethics* 959

- **Freedom to express normal behaviour:** By ensuring conditions which avoid mental suffering

The five freedoms are recognised on a worldwide basis and are still regularly cited by charities, food producers, veterinary surgeons and policymakers⁸³; they have also been influential in the creation of legislation⁸⁴ such as the UK Animal Welfare Act 2006⁸⁵ and form the basis of the animal welfare protocols for many farm assurance schemes⁸⁶. The 1998 EU Directive on the Protection of Animals kept for Farming Purposes⁸⁷ was created, to a large extent, to reflect the five freedoms and they also feature prominently in the criteria / sub criteria of the European Welfare Quality Scheme⁸⁸ - a significant welfare assessment project⁸⁹.

The fundamental principles of the five freedoms have stood the test of time. That having been said, nowadays they are generally deemed too general to ensure positive animal welfare and whilst useful in defining what animals should not experience, they have their limitations with respect to informing policy on specific welfare requirements in complex husbandry scenarios. For example, it is arguably self-evident that animals should not be thirsty, but there are numerous management options for provision of

⁸³ See for example, The OIE animal welfare strategic initiative— OIE, Global Conference on Animal Welfare: an OIE Initiative, A.C.D. Bayvel, 'The OIE animal welfare strategic initiative — Progress, priorities and prognosis' (2004) 13. See also J. Vapnek and M. Chapman, 'Legislative and Regulatory Options for Animal Welfare', Food and Agricultural Organisation of the United Nations (FAO) Legislative Study 104 (2010) which explains that the Five Freedoms have become accepted as fundamental animal welfare principles

⁸⁴ D.J. Mellor, 'Updating Animal Welfare Thinking: Moving beyond the "Five Freedoms" towards "A Life Worth Living"' (2016) 6 *Animals* (3) 21

⁸⁵ The Animal Welfare Act 2006, United Kingdom

⁸⁶ H. Buller, H. Blokhuis, P. Jensen and L. Keeling, 'Towards farm animal welfare and sustainability' (2018) 8 *Animals* (6) 8. See also P. Jones and D. Comfort, 'Animal Welfare and Major Food retailers' (2022) 8 *Athens Journal of Business and Economics* 9

⁸⁷ Council Directive 98/58/EC of 20 July 1998 concerning the protection of animals kept for farming purposes [1998] OJ L 221/23

⁸⁸ I. Veissier, K.K. Jensen, R. Botreau, and P. Sandøe, 'Highlighting ethical decisions underlying the scoring of animal welfare in the Welfare Quality Scheme' (2011) 20 *Animal Welfare* 89. See also R. Botreau, I. Veissier, A. Butterworth et al, 'Definition of criteria for overall assessment of animal welfare' (2007) 16 *Animal Welfare* 225

⁸⁹ Welfare Quality was the largest ever collaborative animal welfare project within the EU. Financed under the European sixth framework Programme for Research and Technological development, the project began in 2004 and involved the work of more than 40 European institutions, with 13 European Country partners as well as four partners in Latin America. One of the main goals of the project was to formulate science-based methodology for assessing animal welfare with a standardised method to integrate this information to assign cattle, pig, or poultry farms to one of four categories of welfare (from excellent to poor). For a discussion of the project, see H.J. Blockhuis, I. Veissier, M. Miele and B. Jones, 'The Welfare Quality® project and beyond: Safeguarding farm animal well-being' (2010) 60 *Acta Agriculturae Scandinavica, Section A – Animal Science* 129

fluids, and various welfare issues can be observed when supplying water to herds or flocks, such as inability to access the water source due to overcrowding, injury or aggression from individuals within the group⁹⁰.

One problem with the basic concept of the freedoms is that, although unintended, they could be interpreted as representing an unattainable state⁹¹ – animals will never be fully free from thirst or hunger and, in fact, these physiological experiences can be beneficial under certain circumstances. For example, if an animal is suffering from an acute disease process, thirst may allow it to address any dehydration caused by gastro-intestinal problems. An animal that is never hungry might prove to be obese and therefore its physical welfare would be compromised. Equally, it is impossible to guarantee that animals will never experience disease or physical discomfort, since normal interaction with other animals in their group renders such problems relatively likely – and the social interaction itself is essential for positive welfare. Mellor argues it is disingenuous to suggest that this kind of utopian existence can really be created for our animals, and it is unfair to both producers and consumers to encourage the idea that the freedoms can be fully achieved⁹².

Commentators have also questioned the practicality of the fifth freedom, to express normal behaviour⁹³. Although an admirable sentiment, it would be impractical to suggest that animals housed in intensive production systems could, or indeed, should be able to express the full range of their natural behaviours; territorial aggression and reproductive freedom are normal behaviours, but they are clearly undesirable in terms of welfare. Nonetheless, despite the weaknesses which have been highlighted, the five freedoms were the first attempt to create a welfare framework to protect welfare in production animals and they remain one of the greatest achievements in farm animal welfare; they also represent the beginning of an era where welfare scientists

⁹⁰ For a detailed discussion of issues faced with dairy cows and calves in accessing water, see M.B. Jensen and M. Vestergard, 'Invited review: Freedom from thirst—Do dairy cows and calves have sufficient access to drinking water?' (2021) 104 *Journal of Dairy Science* (11) 11368. Many welfare problems are seen in intensive housing systems, where animals or birds are unable to access water – this may be due to a multitude of factors including lack of space, lack of ability or fitness to reach water stations (especially in broiler flocks close to slaughter), competition or territoriality from other members of their group.

⁹¹ Mellor (n 84)

⁹² *ibid*

⁹³ Webster (n 79)

began to focus on methods by which the experience of animals could be more fully assessed and it is the practical application of these methods to which the sub-chapter now turns.

4.3.6 Animal Welfare Assessment in Practice

In addition to the various schools of thought on the definition of animal welfare and the challenging terminology used when analysing the components that make up welfare, a further obstacle is finding methods by which welfare can be assessed in the field. It is extremely difficult to assess the welfare of a large group (and impossible to assess every one of sixty thousand chickens in a broiler shed); with larger species of farm animals, handling or close assessment can involve significant risk to assessor safety.

Researchers strive to develop specific, objective, observable indicators which will provide information on an animal's welfare and quality of life, but this has proved challenging, since the indicators not only need to be scientifically reliable but they also need to be suitable for practical application in the field⁹⁴. The UK Farm Animal Welfare Council has stated that welfare standards should ensure that animals have 'a life worth living'⁹⁵ yet although this aim sounds straightforward, actually evidencing the experience of animals is very difficult. Not only do animals vary greatly as individuals with respect to their personal adaptation styles and physiology⁹⁶, but their observers also vary greatly in their approach to welfare and their assessments will inevitably contain subjective elements. Nonetheless, there are some commonly utilised assessment factors, discussed below, which facilitate more objective welfare assessment.

4.3.6.1 Input versus Outcome Factors

In their quest to learn more about animal experience, and better inform society on welfare, researchers have sought measurable parameters upon which policy makers

⁹⁴ F. Wemelsfelder and S. Mullan. 'Applying ethological and health indicators to practical animal welfare assessment' (2014) 33 Scientific and Technical Review, Office International des Epizooties 111

⁹⁵ Farm Animal Welfare Council (FAWC) Farm Animal Welfare in Britain: Past, Present and Future (October 2009)

⁹⁶ J.M. Koolhaas and C.J. Van Reenen, 'Animal Behaviour and Well-Being Symposium: Interaction between coping style / personality, stress and welfare: Relevance for Domestic Farm Animals' (2016) 94 Journal of Animal Science (6) 2284

could ‘hang’ legislation and facilitate more positive animal wellbeing. For example, if it can be demonstrated that a particular management practice causes pain and distress, policymakers can legislate to prohibit the practice or introduce more suitable, welfare-friendly measures. At present, the most commonly assessed elements in farmed animals’ housing systems are classified as ‘input’ and ‘outcome’ factors.

4.3.6.2 Input Factors

Input factors are central to this thesis and form the focus of Chapter Five. Traditionally, welfare researchers have preferred working with input factors, as they are generally easier to identify and analyse⁹⁷. Input factors include husbandry measures, which pertain to the housing unit itself, such as stocking density, housing, bedding materials and ventilation, but they also include management measures, performed by farmers or vets, such as surgical mutilations, breeding protocols or the use of medications. In fact, the majority of European animal welfare legislation concentrates on input factors, because the regulations define minimum welfare standards - establishing which management and husbandry techniques are acceptable and which should be prohibited⁹⁸. Council Directive 2007/43/EC⁹⁹ set down various husbandry and management standards for chicken farms; for the first time in European animal welfare legislation, the Directive also identified ‘welfare indicators’, to be monitored and introduced post-slaughter assessment to screen for welfare failings at the farms of origin: ‘...the official veterinarian shall evaluate the results of the post-mortem inspection to identify other possible indications of poor welfare conditions such as abnormal levels of contact dermatitis, parasitism and systemic illness in the holding or the unit of the house of the holding of origin’¹⁰⁰.

⁹⁷ J.A. Mench, ‘Assessing animal welfare at the farm and group level: A United States perspective’ (2003) 12 *Animal Welfare* 493

⁹⁸ J. Rushen and A.M.B. de Passille, ‘The scientific basis of animal welfare indicators’, in Frans J. M. Smulders and Bo Algers (eds) *Welfare of Production Animals: Assessment and Management of Risks* (Wageningen Academic Publishers 2009) 391.

⁹⁹ Council Directive 2007/43/EC of 28 June 2007 laying down minimum rules for the protection of chickens kept for meat production [2007] OJ L 182/19

¹⁰⁰ *ibid*, Annexe III (2) post mortem inspection. It is important to note, however, that according to the European Commission’s own report of 2016, on the use of slaughterhouse data to monitor broiler welfare, only approximately twenty five percent of the EU broiler industry is effectively monitored with respect to welfare under this scheme; see European Commission, Overview Report, Use of Slaughterhouse Welfare to Monitor Welfare of Broilers on Farm (2016)

The perceived advantage of focusing on input factors is that they are relatively easy to identify, therefore their impact on welfare should be demonstrable. However, in order to create policy to protect welfare, there should be a body of scientific evidence that clearly demonstrates a particular management practice is damaging to animals and this is where difficulties can arise. Firstly, management factors do not generally operate in isolation – there is significant overlap between the numerous husbandry and management practices that influence an animal’s experience at any given time and these can interact, thus affecting, altering or compounding an animal’s reaction(s). Secondly, particularly with respect to husbandry measures like feeding or housing, there are very few practices which carry only benefits and no harm; the reality is that all intensive production systems carry risks to welfare. It can be extremely challenging, therefore, to decide which husbandry system is the least damaging to welfare, especially given that within any one system, numerous input factors will be operating concurrently.

An example of the difficulties encountered with input factors can be seen with respect to the welfare of laying hens. One detailed study has demonstrated that when comparing non-cage systems with enriched cage systems, hens kept in the non-cage systems had stronger bone density, exhibited less fear and made greater use of the resources available in their environment. On the other hand, the hens in enriched cages had better air quality in their housing and lower mortality¹⁰¹. It is not, therefore, straightforward to decide which system is preferable for welfare by looking only at the input factor which appears, superficially, to be cage or non-cage system. Within the system there are numerous other input factors, all of which impact on welfare. The central issue at the root of any assessment is that husbandry systems and their input factors are often too complex to be judged as hazardous or not; they all have advantages and disadvantages¹⁰². In fact, one UK study of dairy cattle welfare questioned the efficacy of an RSPCA welfare standards scheme¹⁰³ which is heavily

¹⁰¹ B. Rodenburg, F. Tuytens, K. de Reu et al, ‘Welfare assessment of laying hens in furnished cages and non-cage systems: An on-farm comparison’ (2008) 17 *Animal Welfare* (4) 363

¹⁰² Rushen (n 98)

¹⁰³ Previously known as Freedom Food, the RSPCA Assured Scheme is a voluntary welfare scheme which producers and farmers can sign up to, and achieve accreditation if they are assessed and found to comply with the RSPCA’s welfare standards

reliant on input-factors. The study demonstrated that several management factors, upon which the scheme focused, did not fully protect the welfare of the cattle¹⁰⁴.

In contrast, however, it has been much easier for researchers to assess welfare with respect to individual input factors, because where there is a single factor, that either clearly preserves welfare, such as pre-stunning at slaughter, or, a single factor that causes severe pain or trauma, such as tail docking, tooth clipping, beak trimming and castration without anaesthesia or analgesia¹⁰⁵, a clear link can be made between the input factor and its impact upon the animal, demonstrated by outcome factors (discussed below). Chapter five of this these will argue that a continued focus on single input factors would provide a clearer basis for future legislation prohibiting the most serious welfare compromises without the need for further research.

Although it can be clearly demonstrated that surgical mutilations performed without adequate analgesia or anaesthesia can cause acute and chronic pain - and therefore seriously compromise welfare - it is far easier to clearly identify welfare compromises with respect to these single input factors¹⁰⁶ than with husbandry management systems as a whole. Traditionally, however, EU minimum standards legislation has attempted to regulate an entire field of husbandry, laying down regulations that cover multiple input factors. Unfortunately, because it is so challenging to definitively identify which individual input factor in a production system leads to welfare compromise, the resulting scientific data has proven equivocal, causing policy makers to shy away from taking radical steps to improve stocking density and housing or to implement environmental improvements.

4.3.6.3 Outcome Factors

Given the complexity of assessing welfare with respect to overlapping input factors, many researchers have been keen to focus instead on the response of animals to

¹⁰⁴ D.C.J. Main, H.R. Whay et al, 'Effect of the RSPCA Freedom Food Scheme on the welfare of Dairy Cattle' (2003) 153 Veterinary Record 227. The study showed that whilst the scheme did provide welfare benefits such as reduction in the incidence of mastitis, there was also reduced welfare in other areas. The Freedom Food cattle had higher levels of milk fever which was likely due to their being over-conditioned and they also had a higher incidence of locomotory and limb problems

¹⁰⁵ There is a vast body of research work which has examined pain associated with routine surgical mutilations in farm animals and this data is explored in detail in Chapter Five

¹⁰⁶ Rushen (n 98)

these inputs - these animal-based indicators are known as outcome factors¹⁰⁷. Outcome factors are explained, below, and they are discussed later in the chapter in the context of EFSA scientific assessment of welfare; in EFSA AHAW assessments they are generally referred to as animal-based measures (ABMs).

With respect to outcome factors, welfare assessment generally involves consideration of the *negative* outcomes for the animal which relate to the husbandry or management practice being examined. Although benefits are sometimes considered, it is generally the adverse effects that are focused upon, since prevention of harm is the priority. Through observing and examining animals in various husbandry systems, it is possible to directly assess their welfare and in measuring certain parameters, the goal is to obtain an overall welfare assessment of the animals, which can provide a welfare score¹⁰⁸.

Over the last few decades, science has developed a spectrum of measurable parameters which can be reflective of an animal's welfare, but there are various difficulties associated with assessing outcome-factors. Firstly, it is can be difficult to design methodology which allows rapid and reliable assessment of the animals in commercial contexts¹⁰⁹. In addition, with respect to measuring physiological parameters, assessment can be very time consuming and essentially impractical when dealing with large groups; herd assessment is more practical than individual examination, yet it does not address individual animal responses to stimuli which can vary significantly¹¹⁰. There are also issues associated with the period of time for observation – whilst some issues, mastitis in dairy cattle for example, will become clear very quickly (due to the constant screening of the milk tank for increases in white cell count) other issues like lameness may not be observed so quickly¹¹¹. Much will also depend upon the opportunity for observation, the regularity of observation and the individual animal's response to a particular problem, as well as its individual ability to

¹⁰⁷ S.E. Richmond, F. Wemelsfelder et al, 'Evaluation of Animal-Based Indicators to Be Used in a Welfare Assessment Protocol for Sheep' (2017) 4 *Frontiers in Veterinary Science* A. 210

¹⁰⁸ Botreau (n 88)

¹⁰⁹ Wemelsfelder (n 94)

¹¹⁰ G.J. Mason and M. Mendl, 'Why is there no simple way of measuring animal welfare?' (1993) 2 *Animal Welfare* 301, 304. For a fascinating discussion about individuality and personality in animal subjects, see S.H. Richter and S. Hinze, 'From the individual to the population – and back again? Emphasising the role of the individual in animal welfare science' (2019) 212 *Applied Animal Behaviour Science* 1

¹¹¹ Wemelsfelder (n 94)

adapt to any given husbandry practice or system. Dairy cattle being milked twice daily can be visually assessed in the milking parlour, whereas hill sheep in the Scottish Highlands may be so widely distributed that they are not seen for days or weeks at a time. The goal of scientists is to identify a select number of key indicators which will give an overall picture of animal welfare¹¹², but at present, outcome factors are best utilised in conjunction with input factors for welfare assessment¹¹³. The field of animal-specific outcome factors is vast and impossible to fully address in this thesis; however, for the purposes of finding data to inform policymaking, two important outcome factors follow: physiological indicators of animal welfare and animal behaviour.

Physiological Indicators of Animal Welfare – Stress and its Effects

Stress is ‘the biological response elicited when an individual perceives a threat to its homeostasis’¹¹⁴ and can cause various physiological changes which result from what is commonly known as the ‘fight or flight response’: increased heart and respiratory rate, endorphin release, increased blood pressure and constriction of blood vessels with diversion of blood to muscle for escape¹¹⁵.

More specifically, stress stimulates the sympathetic nervous system¹¹⁶ and hypothalamic-pituitary-adrenal (HPA) axis¹¹⁷. Measurements of HPA axis alterations, most commonly blood serum cortisol¹¹⁸, have been used for some time in animal welfare research and for many years these measurements were viewed as sound indicators with respect to welfare¹¹⁹. Although certain management practices which cause pain when performed without analgesia, such as castration, have been

¹¹² D.C.J Main, S. Mullan et al, ‘Welfare outcome assessments in laying hen farm assurance schemes’ (2012) 21 *Animal Welfare* 389

¹¹³ M. C. Leach, P.D. Thornton and D.C.J. Main, ‘Identification of appropriate measures for the assessment of laboratory mouse welfare’ (2008) 17 *Animal Welfare* (2)161

¹¹⁴ Homeostasis is the self-regulatory process that ensures stable internal, physical conditions in a living organism. G.P. Moberg. ‘Biological Response to Stress: Implications for Animal Welfare’ in G.P. Moberg and J.A. Mench (eds) *The Biology of Animal Stress* (CABI Publishing 2000)

¹¹⁵ N. N. Etim, E. E. A. Offiong et al, ‘Stress and Animal Welfare: An Uneasy Relationship’ (2013) 1 *European Journal of Advanced Research in Biological and Life Sciences* 110

¹¹⁶ One branch of the autonomic nervous system whose roles include the ‘fight or flight’ response through hormone release

¹¹⁷ In brief, the hypothalamus of the brain releases CRF (corticotropin releasing factor), this binds to receptors on the pituitary gland leading to ACTH (adrenocorticotrophic hormone) release and this in turn binds to receptors on the adrenal glands stimulating release of cortisol, which is the parameter commonly measured in welfare studies

¹¹⁸ Rushen (n 98)

¹¹⁹ P. Mormède, S. Andanson, B. Aupérin et al, ‘Exploration of the hypothalamic-pituitary-adrenal function as a tool to evaluate animal welfare’ (2007) 92 *Physiological Behaviour* 317

identified largely due to HPA axis alterations¹²⁰, there are difficulties in using these measurements with other, more subtle, chronic types of stressor. Another interesting factor to note is that in some physiological situations, the process of parturition (birth) is triggered by activation of the HPA axis¹²¹, meaning the system has positive benefits as well as being associated with stress.

In early animal research it was assumed that an increased cortisol level always indicated that an event caused stress and it was also believed that increased cortisol was a universal response to any stressor¹²². These ideas are now disproven; we understand that no two stressors are the same and that individual animals will respond physiologically in very different ways. Interestingly, in an early study, it was observed that, contrary to researchers' expectations, calf tail docking did not increase plasma cortisol levels¹²³ and it was suggested that this meant docking was no more distressing than handling (subsequent research has disproven this theory¹²⁴). An additional problem with the physiological secretion of cortisol is its release by the adrenal gland in pulses¹²⁵; internal body rhythms and other endocrine processes can affect its release, and concentrations can alter significantly within a matter of minutes; thus, these factors greatly limit the value of measuring cortisol with respect to chronic stressors, such as group interactions or stocking density¹²⁶. A further complication is

¹²⁰ See, for example, J.E. Kent, V. Molony and I.S. Robertson, 'Changes in plasma cortisol concentration in lambs of three ages after three methods of castration and tail docking' (1993) 55 *Research in Veterinary Science* (2) 246. See also A. Peers, D.J. Mellor, E.M. Wintour and M Dodic. 'Blood pressure, heart rate, hormonal and other acute responses to rubber-ring castration and tail docking of lambs' (2002) 50 *New Zealand Veterinary Journal* (2) 56 and A.S. Dinniss, D.J. Mellor et al, 'Acute cortisol responses of lambs to castration using a rubber ring and/or a castration clamp with or without local anaesthetic' (1997) 45 *New Zealand Veterinary Journal* (3) 114

¹²¹ R. Palme and E. Möstl 'Measurement of cortisol metabolites in faeces of sheep as a parameter of cortisol concentration in blood' (1997) 62 *International Journal of Mammalian Biology* (S2) 192

¹²² Rushen (n 98)

¹²³ One study measured cortisol responses in calves being tail docked; it found that in the majority of the calves, the cortisol levels measured suggested that those docked with either a rubber ring or docking iron experienced no more distress than those that were control handled and had simulated docking. N.J. Petrie, D.J. Mellor, K.J. Stafford, R.A. Bruce and R.N. Ward 'Cortisol responses of calves to two methods of tail docking used with or without local anaesthetic' (1996) 44 *New Zealand Veterinary Journal* 4

¹²⁴ See, for example, R.J. Troncoso, D.E. Herzberg et al, 'Mechanical/thermal sensitivity and superficial temperature in the stump of long-term tail-docked dairy cows' (2018) *PeerJ* 6:e5213; DOI 10.7717/peerj.5213 and E.M. Tom, I.J.H. Duncan et al, 'Effects of tail docking using a rubber ring with or without anesthetic on behavior and production of lactating cows' (2002) 85 *Journal of Dairy Science* (9) 2257

¹²⁵ For an example of an experiment which focused on pulsatile cortisol secretion, see L. Hänninen, P. Løvendahl et al, 'The effect of floor type or relocation on calves' pulsatile growth hormone and cortisol secretion' (2006) 56 *Acta Agriculturae Scandinavica A: Animal Science*, 99

¹²⁶ Rushen (n 98)

the fact that in many species, handling of animals and blood sampling can in themselves elicit a stress response and therefore it is difficult to know whether the management practice being examined, or the handling of the animal, has caused a particular level of cortisol. In order to address this, other matrices have been utilised to measure cortisol levels including eggs, feathers, urine and faeces, as well as saliva and milk¹²⁷ although research has demonstrated limitations with respect to all of them¹²⁸.

Animal Behaviour

Animal behaviour is a complex area of research, but historically, observation of farm animal behaviour has allowed significant progress in identifying and addressing certain welfare problems experienced by production animals – an animal's behaviour can often tell us if it is physically healthy (for example, a dairy cow spending long periods of time lying down, with reluctance to rise, may be experiencing foot disease or lameness) but it can also demonstrate if their needs are being met, specifically with respect to their choices and preferences¹²⁹. However, as with all the elements of behaviour discussed, previously, animal preferences can prove difficult to interpret.

Although testing an animal's preference for a particular environmental factor such as bedding type or housing style seems a simple and obvious method by which to detect what the animal wants, their behaviour can be challenging to decipher¹³⁰. For example, it is important to remember that while an animal may choose one environmental option over another, this simply tells us that one option is preferred, not that it is ideal for the animal's welfare. For example, studies have demonstrated that cattle prefer softer bedding, such as straw, to sand, but softer substrate leads to longer periods of recumbency which can in turn cause higher incidence of hock lesions, foot disease and general uncleanliness¹³¹ all of which are detrimental to welfare. In addition, it has

¹²⁷ R. Palme, 'Monitoring stress hormone metabolites as a useful, non-invasive tool for welfare assessment in farm animals' (2012) 21 *Animal Welfare* (3) 331, 332

¹²⁸ M.J. Sheriff, B. Dantzer, B. Delehanty et al, 'Measuring stress in wildlife: techniques for quantifying glucocorticoids' (2011) 166 *Oecologia* (4) 869

¹²⁹ M.S. Dawkins, 'Using behaviour to assess animal welfare' (2004) 13 *Animal Welfare Suppl.* 1, 3

¹³⁰ This is a very broad field of study – for a detailed discussion, see R.D. Kirkden and E.A. Pajor, 'Using preference, motivation and aversion tests to ask scientific questions about animals' feelings' (2006) 100 *Applied Animal Behaviour Science* 29

¹³¹ M. Norring, E. Maninen et al, 'Effects of Sand and Straw Bedding on the Lying Behavior, Cleanliness, and Hoof and Hock Injuries of Dairy Cows' (2008) 91 *Journal of Dairy Science* (2) 570

been demonstrated that animals introduced to a novel option i.e. something they have no previous experience of, may initially choose the option they know, yet if given time to try the new option, they may then alter their preference¹³². Operant tasks are commonly used now, where animals under assessment perform a task to obtain a reward – once accessing the reward is learned, different conditions under which the animal is willing to ‘work’ to receive the award can be examined, telling us much about their decision making and choices¹³³.

Most difficult to interpret is the ability of animals to consider longer term effects of an environmental factor. Indeed it is unclear whether they are able to consider chronic consequences. It was generally believed that animals would favour an immediate reward over the same (or an even larger reward) in the future¹³⁴, but some research has shown that chickens will decline a small reward offered in order to have a larger reward at a later time¹³⁵. With respect to all of these elements, however, it has yet to be fully explored whether an animal being in the conditions that it prefers are actually better for its welfare.

Summary

The above discussion has demonstrated the complexities associated with assessing welfare and gathering tangible evidence from which conclusions can be drawn. Within the EU legislative process, once studies have been completed and data obtained, it is the role of the EFSA Panel on Animal Health and Welfare to examine and analyse the data, in order to advise EU policy makers. The chapter therefore now considers the approach of the Panel when assessing welfare data and explores their Scientific Opinions, on which the Commission relies to justify its policy making.

¹³² Rushen (n 98)

¹³³ For discussion, see E. Patterson-Kane, M.R.P. Elmore and E.A. Pajor, ‘Operant animal welfare: Productive approaches and persistent difficulties’ (2008) 17 *Animal Welfare* (2) 139

¹³⁴ I.J.H. Duncan, ‘The interpretation of preference tests in animal behaviour’ (1978) 4 *Applied Animal Ethology* 197, 198

¹³⁵ S.M. Abeyesinghe, C.J. Nicol, S.J. Hartnell and C.M. Wathes, ‘Can domestic fowl, *Gallus gallus domesticus*, show self-control?’ (2005) 70 *Animal Behaviour* (1) 1

4.4 The EFSA Panel on Animal Health and Welfare

In order for EU legislation to adequately reflect on-going advances in welfare science and developments in production methods, the Commission requires a mechanism by which the latest data and ideas can be analysed, debated and, where applicable, incorporated into policy. The European Parliament also plays a role in welfare policy and its Intergroup on the Welfare and Conservation of Animals¹³⁶ lies at the centre of the Parliament's animal welfare discussion and debate. The group focuses on urgent, contemporary animal welfare concerns and provides a platform for welfare specialists, stakeholders, Commission and parliamentary members to confer and exchange opinions on a monthly basis. The group's work has initiated action on key welfare problems and continues to bring the concerns of NGOs, consumers and welfare scientists to the forefront of European Parliamentary debate. Members of the group have enabled welfare initiatives (agreed by the Intergroup) to progress to ordinary procedures of the Parliament. Intergroups play a central role in the functioning of the European Parliament, facilitating co-operation and discussion of specific topics between parties with opposing socio-political views¹³⁷.

Specialist scientific input is central to the various discussions which take place between the EU institutions and animal welfare campaigners / NGOs. Prior to the creation of the European Food Standards Agency (EFSA) and the Panel on Animal Health and Welfare (AHAW), the independent Scientific Committee on Animal Health and Welfare (SCAHAW)¹³⁸ advised the EU on matters of welfare, its members being leading welfare and animal health scientists. As explained in Chapter Two, the EFSA now works as an independent authority, with a specialist committee assessing the latest scientific research findings as well as carrying out food chain risk assessments.

This subchapter describes the scope of EFSA authority, format of AHAW scientific opinions, considers the Panel's preferred methods of assessing welfare and proposes

¹³⁶ Intergroup on the Welfare and Conservation of Animals, <<https://www.animalwelfareintergroup.eu/>> accessed 16 March 2022

¹³⁷ For a detailed discussion of Intergroup methodology, see P. Nedergaard and M.D. Jensen, 'The anatomy of Intergroups – network governance in the political engine room of the European Parliament' (2014) 35 Policy Studies (2) 192

¹³⁸ For the archive of SCAHAW Opinions, see <https://ec.europa.eu/food/horizontal-topics/expert-groups/scientific-committees/scientific-committee-animal-health-and-animal_en> accessed 28 February 2022

three possible conclusions the Panel may reach when advising policy makers on available scientific data in any given area of welfare.

4.4.1 Regulation (EC) 178/2002

Regulation 178/2002¹³⁹ lays down general principles pertaining to food law / food safety and establishes the EFSA. Two provisions found within the Regulation's preamble are notable¹⁴⁰, and especially pertinent to the policymaking issues discussed within this thesis, because they confirm that whilst science is the most appropriate foundation upon which to base risk assessment and management, other factors will play a part:

(18) In order for there to be confidence in the scientific basis for food law, risk assessments should be undertaken in an independent, objective and transparent manner, on the basis of the available scientific information and data.

(19) It is recognised that scientific risk assessment alone cannot, in some cases, provide all the information on which a risk management decision should be based, and that other factors relevant to the matter under consideration should legitimately be taken into account including societal, economic, traditional, ethical and environmental factors and the feasibility of controls.

The inclusion of this wording in the Regulation which lays down the remit of EFSA scientific panels indicates an awareness on the part of the Commission that the scientific data presented to panels such as AHAW may not, on occasion, provide an adequate evidence-base upon which to justify creation of welfare policy. However, it is interesting to note that the alternative routes to risk assessment suggested in Recital 19 of the Regulation are all, fundamentally, subjective – societal, ethical and cultural factors. In the context of seeking evidence to assess risks to welfare, it is difficult to conceive of a scenario where public opinion or cultural tradition would provide suitable information to support or deny the presence of a risk. Indeed, Article 6(2) of the Regulation states that '*Risk assessment shall be based on the available scientific evidence and undertaken in an independent, objective and transparent manner*'¹⁴¹.

¹³⁹ Regulation (EC) No. 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety OJ L 31/1

¹⁴⁰ *ibid* (18) and (19)

¹⁴¹ Regulation (EC) No. 178/2002 (n 139) Art. 6 (2)

Nonetheless, whilst the Regulation permits a risk assessor to consider these alternative factors, the realm of EFSA panels is restricted to science¹⁴² and scientific data is clearly confirmed throughout the Regulation as the primary focus. Article 28 provides guidance on the structure and function of scientific committees, whilst Article 29 details the mechanism by which a scientific opinion may be requested¹⁴³. In addition, the EFSA has stated that '[e]thical, socioeconomic, cultural and religious aspects are outside the remit of the AHAW Panel'¹⁴⁴.

The EFSA Panel on Animal Health and Welfare (AHAW) presents the Commission, European Parliament and Member States with scientific opinion, primarily on farm animal health and welfare; at present it has no mandate to advise on cultural or ethical elements of animal welfare, but does offer advice on methods of reducing animal pain and suffering in the areas of husbandry, nutrition, transportation and humane slaughter. Twenty one specialists make up the panel for the period 2018-2021, which includes several veterinary surgeons and animal welfare specialists. Across the EFSA, more than five hundred opinions have been passed since its creation in 2002 and AHAW working groups over the last five years have examined issues such as welfare indicators in dairy cattle, broiler chicken welfare-assessment, poultry perches, meat inspection, poultry water bath stunning and sheep welfare. In addition to review of the scientific basis for existing legislation¹⁴⁵, the AHAW panel also advises the Commission on future policy, scientifically assesses recent events in animal health / welfare and contributes to the overall EU animal welfare strategy¹⁴⁶.

4.4.2 Scientific Opinions of the AHAW panel

EFSA AHAW assistance may be requested by the Commission but advice can also be offered to European Parliament and Member States; in addition, EFSA panels may choose to 'self-commission' to offer scientific assessment within the context of the

¹⁴² Regulation (EC) 178/2002 (n 139) Chapter III

¹⁴³ *ibid* Art. 28 and Art. 29

¹⁴⁴ Regulation (EC) No. 178/2002 (n 139) 2

¹⁴⁵ See for example EFSA Panel on Animal Health and Welfare (AHAW), 'Welfare of Sheep and Goats at Slaughter' (2021) 19 EFSA Journal 11:6882 and EFSA Panel on Animal Health and Welfare (AHAW) 'Scientific opinion concerning the killing of rabbits for purposes other than slaughter' (2020) 18 EFSA Journal 1:5943

¹⁴⁶ EFSA, F. Berthe, P Vannier, P. Have et al, 'The role of EFSA in assessing and promoting animal health and welfare' (2012) 10 EFSA Journal (10) s.1002

WTO SPS (sanitary and phytosanitary) agreement¹⁴⁷, which requires risk assessment to justify measures taken by members to protect human health, animal health or phytosanitary elements.

A mandate to issue scientific opinion is initially provided which leads to creation of a working group, whose members are experts in that particular field. A risk assessor is also assigned to consider methodology and protocols. A report is then created which collates all relevant data available on the issue at hand; once this has been analysed and considered, a Scientific Opinion will be adopted, offering recommendations and conclusions, which is published along with all relevant data¹⁴⁸.

In 2014, the EFSA Scientific Committee published guidance on the format and content of EFSA Opinions and Statements, to ensure continuity and clarity across the output of all panels¹⁴⁹. Every Opinion opens with identification of the subject, an abstract and summary, before setting out the background and stating the requestor of advice. The main body of an Opinion focuses on data and methodology which is assessed via clearly documented steps. Any variability or uncertainty in data must be acknowledged and quantified as far as possible. Importantly, assessment should be underpinned by scientific information and any conclusions drawn by a Panel should only arise from accepted methods of reasoning or from data¹⁵⁰.

4.4.3 AHAW Panel approach to Welfare Assessment

Scientific Opinions are extremely complex and detailed, animal welfare opinions especially so, since they often incorporate animal disease and food safety as well as welfare¹⁵¹; this sub-chapter focuses on a single area of AHAW animal welfare which is most relevant to this chapter, i.e. methods by which animal welfare assessment can be best achieved.

As discussed in the sub-chapters, above, animal welfare is notoriously challenging to assess because scientists are often asked to consider scenarios where multiple input

¹⁴⁷ WTO, The WTO Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) [1995] Article 5

¹⁴⁸ O. Ribó, D. Candiani and J. Serratosa, 'Role of the European Food Safety Authority (EFSA) in providing scientific advice on the welfare of food producing animals' (2009) 8 Italian Journal of Animal Science Suppl. (1) 9, 10

¹⁴⁹ EFSA Scientific Committee, Scientific Opinion, 'Guidance on the structure and content of EFSA's scientific opinions and statements' (2014) 12 EFSA Journal (9) 3808

¹⁵⁰ *ibid*, 9

¹⁵¹ Ribó (n 148) 12

factors are at play within a given environment, and animal outcome factors are variable and difficult to interpret. In 2012, the AHAW Panel published their Guidance on Risk Assessment in Animal Welfare¹⁵², and in 2015 the EFSA provided a comprehensive technical report¹⁵³, setting out the history of their approach to animal welfare assessment; this document also explains the current Commission and AHAW approach to input and outcome factors and using these publications, the key elements relevant to this thesis are explained, below.

Since 2004, AHAW Panel Opinions have assessed risk, defined as '*[a] function of the probability of negative welfare consequences and the magnitude of those consequences, following exposure to a particular factor or exposure scenario, in a given population*'¹⁵⁴. In simple terms, the degree of likelihood or possibility of negative outcome(s) after exposure to an input factor. The Panel also identifies hazards, defined as '*a factor with the possibility to cause poor welfare*'¹⁵⁵. Wherever possible, risk assessment has taken within the context of various housing and management systems¹⁵⁶. Although they have not been the primary focus of research, positive factors which bring animal welfare benefits have, on occasion, been considered and these positive factors may be more formally investigated in future Opinions.

EFSA has always utilised input and outcome factors; within the EFSA welfare assessment framework, input factors are classified in two ways¹⁵⁷:

1. Resource-based measures, i.e. the resources available and the physical environment in which an animal lives (bedding, food provision, housing style and stocking density); and
2. Management-based measures i.e. the husbandry practices that are carried out on the farm (surgical mutilations, use of medications, frequency of milking, reproductive interventions)

In summary, during EFSA risk assessment process, the aim is to identify input factors which cause (or are suspected to cause) negative outcomes and these elements are

¹⁵² EFSA Panel on Animal Health and Welfare, 'Scientific Opinion, Guidance on Risk Assessment for Animal Welfare' (2012) 10 The EFSA Journal 1:2513

¹⁵³ EFSA Panel on Animal Health and Welfare, Scientific Opinion, 'Statement on the use of animal-based measures to assess the welfare of animals' (2012) 10 EFSA Journal (6) 2767

¹⁵⁴ EFSA (n 152) 29

¹⁵⁵ *ibid*, 28

¹⁵⁶ EFSA (n 150) 6

¹⁵⁷ *ibid*, 8, for a diagrammatic overview of these concepts

labelled as 'hazards'. The chance or likelihood of these negative outcomes is the risk assessment. Each animal will respond to hazards and outcome factors are the consequences. These indicators of welfare are defined by EFSA as animal-based measures (ABMs) and incorporate¹⁵⁸:

1. The response of the animal and
2. The effects upon the animal

EFSA has acknowledged that whilst the above protocol may appear straightforward, it is, in fact, challenging due to the multi-factorial nature of animal husbandry. At any given time, animals in production systems will find themselves exposed to several input factors, either successively or simultaneously¹⁵⁹. In addition, even where a single input factor, such as an infectious agent is identified, although there may be a single consequence (disease), this may in fact trigger several subsequent outcome factors (the clinical symptoms of the disease, altered behaviour, altered interaction with the herd / flock and impact on mental wellbeing). The degree of complexity of any assessment will depend on the number of identifiable input and outcome factors present. EFSA has acknowledged that, under some circumstances, an animal's response to an input factor may be so marked, it can definitively demonstrate failure to cope and subsequent welfare compromise¹⁶⁰. However, in scenarios where outcome factors are milder or less easily identified, welfare assessment is very challenging.

It could be argued there will almost always be more than one outcome factor (given the complexity of animals' physical and psychological body systems), but many input factors are more easily identifiable and can be separated and assessed in a more straightforward way. In fact, there are various scenarios where a single input factor can be identified and linked directly with serious, consequent negative welfare outcomes and these scenarios are analysed in detail in Chapter Five.

¹⁵⁸ EFSA (n 150) 9

¹⁵⁹ EFSA (n 152) 8

¹⁶⁰ EFSA (n 150) 10

4.4.4 Contemporary focus on animal-based measures (ABMs)

Whilst early EFSA welfare assessments focused on input factors (management and resource measures)¹⁶¹, the requirement for a more holistic, integrated approach to welfare, incorporating more focus on outcome (animal based measures or ABMs) factors has been acknowledged.

The EU Welfare Quality Project built on earlier research into outcome factors; its aim was to create a standard methodology for welfare assessment based on monitoring ABMs. The project differed from early EFSA opinions because its focus was not identification of input factors that led to negative (or positive welfare) but, rather, identified various ABMs which can be monitored and utilised during a single inspection to allow assessment of current welfare levels at that moment in time. The Welfare Quality® project measured the magnitude of outcomes, which then enabled assessment of dairy cow welfare irrespective of management practices or housing systems¹⁶². Interestingly, the later EFSA Scientific Opinion on dairy cow welfare¹⁶³ retained focus on establishing the (input) hazards that caused negative welfare outcomes, then made recommendations on possible action to reduce or eliminate them. The EFSA is now moving towards greater emphasis on ABMs as demonstrated by various outcome-based publications, such as the 2020 AHAW Panel Opinion on the welfare of rabbits¹⁶⁴.

Whilst the Five Freedoms identified needs and necessary provisions for welfare, the function of ABM assessment is to establish whether or not an animal's needs are being met. The Welfare Quality Project designed four welfare principles for this purpose, based on ABMs, which are subdivided into twelve criteria¹⁶⁵:

- Good feeding (absence of prolonged hunger, absence of prolonged thirst)

¹⁶¹ M. Brscic, B. Contiero, L. Magrin et al, 'The Use of the General Animal-Based Measures Codified Terms in the Scientific Literature on Farm Animal Welfare' (2021) 8 *Frontiers in Veterinary Science* 634498, 2. For an interesting summary of the value of outcome factors being assessed on-farm, see S. Edwards, 'Experimental welfare assessment and on-farm application' (2007) 16 *Animal Welfare* 111

¹⁶² *ibid*, 2

¹⁶³ EFSA Panel on Animal Health and Welfare, Scientific Opinion, 'Scientific Opinion on the use of animal-based measures to assess welfare of dairy cows' (2012) 10 *EFSA Journal* 1:2554

¹⁶⁴ EFSA Panel on Animal Health and Welfare, Scientific Opinion, Health and welfare of rabbits farmed in different production systems' (2020) 18 *The EFSA Journal* 1:5944

¹⁶⁵ Welfare Quality, L. Keeling (ed) 'An overview of the Development of the Welfare Quality® Project Assessment Systems', Welfare Quality Reports No.12 (2009)

- Good Housing (comfort around resting, thermal comfort, ease of movement)
- Good Health (Absence of injuries, absence of disease, absence of pain induced by management procedures)
- Appropriate behaviour (expression of social behaviours, expression of other behaviours, good human-animal relationship, positive emotional state)

Potential Limitations of ABMs

When considering the value and application of ABMs, EFSA Opinions have highlighted some weaknesses. EFSA has commented that greater knowledge and understanding of the relationship between input and outcome factors is necessary, to ensure that the welfare consequences of particular practices can be fully assessed¹⁶⁶. As with human health and wellbeing, there are numerous challenges associated with attempting to identify a particular causative factor in the context of an individual's physical or mental experience and EFSA acknowledges the multidimensional nature of welfare¹⁶⁷.

There are undoubtedly many areas where ABMs are incredibly useful in assessing welfare and preventing harm. One example of a predictive animal-based welfare indicator is measuring the somatic cell count in milk, which facilitates detection of sub-clinical (or clinical) mastitis. This early warning system can prevent development of more serious disease and thus prevent welfare compromise¹⁶⁸. However, animal-based measures which fall into the category of behaviour are far more complex to assess and, at present, our knowledge of animal behaviour and psychology is simply not sufficient to always allow scientists to draw satisfactory conclusions about welfare.

Another key issue is that behavioural ABMs are usually observed at a single moment in time; this means that a true understanding of animal (or group) welfare status may not have been achieved. With this in mind, EFSA has commented that a representative time sample is preferable¹⁶⁹ but this may not be practical or possible on-farm. It is also important to remember that not all observable outcomes are acute – many will be the result of chronic exposure to hazards over time, and the ABMs can sometimes take a while to become apparent.

¹⁶⁶ EFSA (n 150) 1

¹⁶⁷ *ibid*, 2

¹⁶⁸ EFSA (n 150) 11

¹⁶⁹ *ibid*, 15

EFSA has also acknowledged that when utilising ABMs there can be a lack of specificity; for example, if the ABM is body condition score or injury score, then there may be a large number of possible hazards responsible for the visible, negative welfare outcome¹⁷⁰. Fundamentally, there is great difficulty in navigating the complex web of direct and indirect links in the welfare picture.

It is not entirely clear why input factors have fallen from favour within the Commission and the EFSA; whilst the benefits of a framework to assess and interpret animal-based outcomes are undeniable, input factors which carry serious welfare compromises are relatively easy to identify, yet have not yet been fully addressed by European animal welfare legislation. It may be that within the EU, there is a perception that early welfare legislation led to prohibition of the most serious hazards (such as lack of suitable, humane slaughter protocols or battery cages), and therefore in the belief that the most pressing welfare concerns have been addressed, the focus has now be placed on linking currently permissible husbandry factors to identifiable animal based measures.

Outcome factors have undoubtedly become the key area for the Commission. In their working paper on the European Union Strategy for the Protection and Welfare of Animals 2012-2015, utilisation of ABMs is cited as one of four elements required in the formation of a potentially simplified EU animal welfare network¹⁷¹; in addition, a recent study has suggested that financial support for producers, within the Common Agricultural policy network, could be harnessed to improve welfare, whereby ABM assessment would demonstrate positive animal-based outcomes and therefore a better quality of life¹⁷², leading to remuneration for farmers. This would indicate a move away from rewarding producers who implement specific husbandry or management factors and provide a greater focus on the experience of the animals in their care.

¹⁷⁰ EFSA Panel on Animal Health and Welfare, Scientific Opinion, 'Scientific Opinion on the use of animal-based measures to assess welfare in pigs' (2012) 10 EFSA Journal 1:2512, 2. Similar comments were made regarding lameness in broiler chickens – see EFSA Panel on Animal Health and Welfare, Scientific Opinion, 'Scientific Opinion on the use of animal-based measures to assess welfare of broilers' (2012) 10 EFSA Journal 7:2774, 2

¹⁷¹ European Commission, Staff Working Paper Impact Assessment (SEC (2012) 55 19.01.12) accompanying the Communication on the Second EU Animal Welfare Action Strategy COM (2012) 59

¹⁷² A. Bergschmidt, S. March, K. Wagner and J. Brinkmann, 'A Results-Oriented Approach for the Animal Welfare Measure of the European Union's Rural Development Programme' (2021) 11 Animals 1570. It has also been suggested that ABMs are positive for on-farm welfare because they encourage greater observation of the animal as a whole, with continuous reinforcement that the animal is a sentient being – rather than simply focusing on compliance with a husbandry condition (input factor) or observing a single behaviour (outcome factor): see S. Lucassen, 'Animal Based Measures: A step towards rights for farm animals' (2019) 3 Society Register (3) 159

However, despite the positive steps being taken, earlier chapters have demonstrated that, in fact, many serious welfare concerns remain and these can be identified via the EFSA [hazard (input factor) >>> animal >>> negative animal-based outcome] pathway.

4.4.5 AHAW Panel Opinions: Conclusions Drawn

The final element of EFSA AHAW approach to welfare is consideration of the Panel conclusions which are drawn following review of the available research data in creation of the Panel's Opinion. This is an important step because the conclusions drawn can induce policy makers to legislate or, alternatively, decline to intervene in areas of animal husbandry and welfare. A review of the key SCAHAW and AHAW welfare opinions indicates that there are three basic conclusions that the Panel will reach and these are outlined, below, with reference to specific EFSA Opinions.

4.4.5.1 AHAW Conclusion One

Identification of risks causing welfare compromise sufficient to justify prohibition of a husbandry practice

The first animal welfare legislation passed by the (then) EEC was Council Directive 74/577/EEC¹⁷³ whose stated aim was to minimise or prevent suffering at the time of slaughter¹⁷⁴. The Directive was very short but set out provisions for ensuring stunning of animals prior to exsanguination¹⁷⁵. At that time, citizens across Europe were beginning to express concerns about farm animal welfare but it is interesting to note that there was no EFSA AHAW panel, or equivalent, to inform legislators at that time; in addition, there was little detailed scientific data available on the experiences of animals during slaughter, although some organisations had obtained data which could be presented to national and European legislators¹⁷⁶. Since then, veterinary and meat hygiene research has yielded a vast amount of data on the subject of welfare at slaughter, much of which has been relied upon to update EU slaughter regulations

¹⁷³ Council Directive 74/577/EEC of 18 November 1974 on stunning of animals before slaughter [1974] OJ L 361/10

¹⁷⁴ *ibid*, preamble

¹⁷⁵ Council Directive 74/577/EEC (n 173) Article 1 (1) and (2) set out pre-stunning requirements. The preamble contained a derogation for religious rites with respect to pre-stunning.

¹⁷⁶ See, for example, History of the Humane Slaughter Association <<https://www.hsa.org.uk/downloads/related-items/history-factsheet.pdf>> accessed 2 March 2022

and create more detailed provisions. The EFSA AHAW Opinion on Welfare of Cattle at Slaughter¹⁷⁷ was published in 2020 and provides an example of the first of three possible Panel conclusions regarding welfare i.e. it identifies a husbandry practice that is contrary to welfare – slaughter without pre-stunning - and advises against its use.

Over approximately one hundred pages, the Opinion considered the three principal components of slaughter – pre-stunning, stunning and bleeding – and the Panel identified forty welfare hazards that could occur, thirty nine of which originated from operator failings¹⁷⁸. Tables of information are provided which detail each hazard individually, its effect on welfare, the subsequent, identifiable animal-based measures and corrective or preventative action¹⁷⁹.

Most relevant to this thesis are the conclusions drawn from the available research data; the Panel makes several important statements with respect to pre-stun slaughter or the lack thereof:

Conclusions:

- *‘Consciousness is a prerequisite for cattle to experience pain, fear and distress. Therefore, animals that are ineffectively stunned, recover consciousness or those slaughtered without stunning, will be exposed to the hazards and experience the related welfare consequences. Pain and fear can be assessed indirectly by assessing the state of consciousness using specific ABMs at all stages’¹⁸⁰*
- *‘Slaughter without stunning leads to severe pain, fear and distress due to restraint for the neck cutting and the cutting of soft tissues in the neck that will last until the onset of unconsciousness, which can be further delayed due to formation of aneurysm and carotid occlusion’¹⁸¹*

Recommendations:

- *‘Since during slaughter without stunning all animals have to endure the welfare consequences resulting from remaining conscious during bleeding and*

¹⁷⁷ EFSA Panel on Animal Health and Welfare (AHAW) Scientific Opinion: Welfare of Cattle at Slaughter (2020) 18 EFSA Journal (11):6275

¹⁷⁸ *ibid*, 1

¹⁷⁹ EFSA (n 176) See, for example, outcome table on ‘unloading of cattle from the truck’, 33

¹⁸⁰ *ibid*, 4.3 (1) 94

¹⁸¹ *ibid*

*therefore experience severe pain, fear and distress, slaughter without stunning should not be practiced*¹⁸²

The advice from EFSA is unequivocal; several outcome tables outline the numerous welfare consequences during slaughter without pre-stunning and the Panel conclusions provide policy makers with unambiguous, objective data demonstrating the need for animals to be pre-stunned. The ongoing issues with slaughter derogations are discussed in Chapter Five, but it is evident that where the AHAW Panel can draw clear, categorical conclusions, as noted within this Opinion, an optimal level of evidence is available to policymakers, who can rely on the information when creating or amending legislation. However, not all AHAW opinions are as incontrovertible and the next example is representative of many animal welfare Opinions.

4.4.5.2 AHAW Conclusion Two

Identification of risks causing welfare compromise but significant uncertainty regarding causative factors

In 2019, the EFSA AHAW panel adopted its Opinion on Rabbit Welfare¹⁸³; rabbits are farmed in large numbers for meat and fur across the European Union and since the last scientific Opinion on their welfare had been published in 2005¹⁸⁴, the European Parliament AGRI Committee requested a summary of contemporary data on rabbit husbandry systems and welfare.

The Opinion, again of approximately one hundred pages, assessed three sub-groups of rabbits (does, kits and growing rabbits) and considered six housing systems¹⁸⁵. The Opinion focused on various commonly reported health-related and behaviour-related welfare consequences (outcome factors) with respect to each sub-group of rabbit and housing type. The Panel acknowledged that, rabbits might not demonstrate stress or pain due to their evolutionary adaptations as a prey species¹⁸⁶ (meaning that animal-based measures are more difficult to assess), but nonetheless identified and

¹⁸² EFSA (n 176) 5.4 (5), 96

¹⁸³ EFSA Panel on Animal Health and Welfare, Scientific Opinion, Health and welfare of rabbits farmed in different production systems' (2020) 18 The EFSA Journal 1:5944

¹⁸⁴ EFSA Panel on Animal Health and Welfare, Scientific Opinion 'The Impact of the current housing and husbandry systems on the health and welfare of farmed domestic rabbits' (2005) 267 The EFSA Journal 1

¹⁸⁵ EFSA (n 183) 1. Housing systems considered were: 'conventional cages, structurally enriched cages, elevated pens, floor pens, outdoor/partially outdoor systems and organic systems'

¹⁸⁶ *ibid* 33

considered numerous outcome factors including prolonged hunger / thirst, pododermatitis, locomotory disorders, skin lesions / wounds, respiratory gastroenteric reproductive and skin disorders, thermal stress and behavioural abnormalities¹⁸⁷.

This Opinion epitomises the complexity of animal welfare assessment; it incorporates a large volume of information on different housing systems, animal based measures (health and behavioural) and reflects the difficulty in identifying which particular housing system or practice is responsible for an individual welfare problem. In reality, as discussed earlier in the chapter, the overlap of input and outcome factors renders definitive conclusions refractory to identification and therefore the AHAW panel conclusions reflect this uncertainty – a few demonstrative examples are as follows:

Conclusions:

- *‘Generally, objective data are lacking on the welfare consequences occurring in different production systems and expert opinion about the occurrence and relative severity of different welfare consequences is highly variable’¹⁸⁸.*
- *‘Schemes to evaluate welfare outcomes - e.g. through the use of ABMs–exist for rabbits but have not been widely used or validated’¹⁸⁹*
- *‘In general, there is a lack of information on many of the behavioural needs of rabbits The present size of conventional cages, enriched cages, elevated pens and organic systems (the latter only in case no access to outdoor area is provided) restricts movement according to EKE* experts. However, knowledge on the space requirement which is necessary to acceptably meet the behavioural and physiological needs for all rabbit categories is still lacking. Therefore, it is not possible to recommend a minimum space requirement which gives acceptable welfare’¹⁹⁰.*

**(expert knowledge elicitation)*

¹⁸⁷ EFSA (n 177) 31-21

¹⁸⁸ EFSA (n 177) 4 (2), 79

¹⁸⁹ *ibid*, (3), 79

¹⁹⁰ EFSA (n 177) 4 (17) 81

Recommendations

In addition to more specific advice on elements of husbandry systems where clear issues were identified, the Panel made the following general recommendations on the welfare of farmed rabbits¹⁹¹:

- *‘A systematic and large-scale data collection exercise should be carried out to provide objective information on rabbit welfare in different housing and management systems in the EU’*
- *‘To facilitate objective comparisons of rabbit welfare, adoption of a validated welfare assessment protocol suitable for on-farm use should be standardised across the EU’*
- *‘Because of the diversity of rabbit farming systems, defining general resource-based standards is difficult. In the future, these should be complemented by use of ABMs’*
- *‘Basic research should be carried out to better understand the behavioural needs of rabbits, and the provisions for these, which are necessary in farm conditions to ensure good welfare’*

It can be argued that the AHAW Panel Opinion on rabbit welfare epitomises the quandary in which scientific advisors and policymakers find themselves when seeking to assess welfare in intensive production systems. Whilst there is ample evidence that animals housed in such systems face numerous, acute and chronic welfare compromises, the task of breaking down every relevant input and outcome factor is Herculean and AHAW Panel Opinions from the last two decades are generally reflective of the difficulty in proving a definitive link between evidence of welfare compromise and the causative factor(s)¹⁹². In fact, as explained above, many welfare compromises will result from more than one risk / input factor and will be expressed via multiple outcome measures.

¹⁹¹ *ibid* 81-83

¹⁹² There are numerous EFSA Scientific Opinions which cite the need for greater understanding of key concepts and further research, see for example, EFSA Panel on Animal Health and Welfare (AHAW), Scientific Opinion on the use of perches for laying hens (2015) 13 *The EFSA Journal* 5:4131, EFSA Panel on Animal Health and Welfare (AHAW), Scientific Opinion Concerning the Welfare of Animals during Transport (2011) 9 *The EFSA Journal* (1):1966 and EFSA Panel on Animal Health and Welfare (AHAW), Scientific Opinion concerning a Multifactorial Approach on the use of animal and non-animal based measures to assess the welfare of pigs’ (2014) 12 *The EFSA Journal* 5:3702

4.4.5.3 AHAW Conclusion Three

Lack of current knowledge on risks causing welfare compromise

The final possible conclusion-type arising from AHAW Panel assessment of welfare research data arises where current scientific knowledge is insufficient to draw any definitive conclusions and this scenario is reflected in the current EU approach to fish sentience.

In 2009, the Panel published a Scientific Opinion on Sentience in Fish¹⁹³, following a request from the Commission to provide opinion on welfare aspects of fish farming. The focus of the Opinion was neurobiology and consideration of the capacity of fish to experience fear, distress or pain, as well as evidence of sentience¹⁹⁴.

The Panel accepted that the concept of welfare is applicable to all animals (mammals, birds and fish) but acknowledged that fish welfare is a poorly developed area of science; to date, protocols to evaluate fish welfare have not been developed¹⁹⁵. The Opinion offered some basic conclusions:

Conclusions:

- *‘There is scientific evidence to support the assumption that some fish species have brain structures potentially capable of experiencing pain and fear.’¹⁹⁶*
- *‘The balance of evidence indicates that some fish species have the capacity to experience pain.’¹⁹⁷*
- *‘From studies of sensory systems, brain structure and functionality, pain, fear and distress there is some evidence for the neural components of sentience in some species of fish.’*
- *Our knowledge and understanding of manifestations of sentience in fish, however, are limited.’¹⁹⁸*

¹⁹³ EFSA Panel on Animal Health and Welfare, Scientific Opinion, General approach to fish welfare and to the concept of sentience in fish (2009) 954 The EFSA Journal 1

¹⁹⁴ *ibid*, 3

¹⁹⁵ EFSA (n 188) 3

¹⁹⁶ EFSA (n 188) 12

¹⁹⁷ *ibid*, 15

¹⁹⁸ EFSA (n 188) 19

Recommendations:

Unsurprisingly, given the lack of available, definitive data, the AHAW Panel felt unable to make any recommendations with respect to specific husbandry practices and instead advised the following steps:

- *‘A range of welfare indicators should be considered when welfare is being evaluated. Indicators of fish welfare should be species-specific, validated, reliable, feasible and auditable’¹⁹⁹.*
- *‘Research and developments in the area of cognition and brain imaging techniques should be carried out in fish to further our knowledge and understanding of pain perception’²⁰⁰.*

It is important to note that this Opinion dates from 2009 and at the time of writing is the most recent Opinion on fish welfare. Fish sentience and welfare is a rapidly developing scientific field²⁰¹ and it appears that opportunities are being missed to address fish welfare via legislation.

4.5 Chapter Conclusion

This chapter has explained the complexity of animal welfare as a scientific discipline and provided an overview of current research methods. The approach of the EFSA Panel on Animal Health and Welfare (AHAW) has been discussed, with specific reference to the conclusions drawn when the Panel assesses contemporary data and advises policymakers on alteration or prohibition of husbandry practices.

Given the difficulties with defining animal welfare, and the complex relationship between input (husbandry / management) factors and outcome (animal-based) factors, it is apparent that policymakers can no longer adopt the simplistic approach that science will ‘provide all the answers’; this is reflected in more than two decades’ worth of EFSA opinions as well as in the scientific literature. In terms of husbandry

¹⁹⁹ *ibid*, 9

²⁰⁰ EFSA (n 188) 14

²⁰¹ For an overview of recent developments in the field of fish welfare see J. Law and M.E. Lien, ‘The practices of fishy sentience’ in K. Asdal, T. Druglitrø and S. Hinchcliffe (eds) *Humans, Animals and Biopolitics The More-Than-Human Condition* (Routledge 2017) 30. For an interesting discussion of the approach to acknowledgement of sentience see B. de Mori, ‘Is ‘history’ repeating itself? The case of fish and arthropods’ sentience and welfare’ (2019) XXI *Ethics and Politics* (2) 491

and housing practices, data can be inconclusive and is, at times, contradictory; researchers and AHAW now acknowledge that there is significant overlap between input factors, and that their effects on animals are varied and, at times, extremely challenging to interpret.

To date, the AHAW Panel has consistently reached one of three Conclusions in their Opinions:

- (i) that there is sufficient evidence that a management practice can be linked to welfare compromise and therefore amendment or prohibition is advised
- (ii) that there is evidence of welfare compromise but the link between input factors and outcome factors has not been established, meaning more research is required before action to protect welfare can be advised
- (iii) that at present there is a lack of knowledge and understanding in a particular area of welfare, meaning advice cannot yet be provided

Historically, Conclusion Two has been the most common finding in AHAW (and SCAHAW) Opinions. Given the difficulties associated with this Conclusion, this thesis asserts that a vicious circle of sorts has now developed within the EU animal welfare policymaking system – a circle that is demonstrated by the Opinion on rabbit welfare. The problem originates from researchers' inability to obtain clear-cut, definitive data for presentation to the EU, via AHAW. Over the last two decades, researchers have worked tirelessly to identify links between welfare hazards and welfare outcomes for the animal; some clear links have been established, however, many remain tenuous or unproven. This is not due to fault on the part of scientists, but simply reflects the nature of science itself – the areas currently being researched are now so complex that the likelihood of obtaining definitive, straightforward 'facts' on every element of an animal's experience in an intensive production system is extremely low. Overlap and interaction of input and outcome factors leads to inconclusive findings with respect to welfare impacts. The resulting scenario is one where AHAW is presented with ambiguous or overly complex data, meaning the Panel is unable to advise definitively on whether a particular husbandry system should be altered or prohibited; the Panel then advises further research, despite the presence of acknowledged welfare compromises, meaning that farm animals remain in the same production systems until additional research is presented. When additional data is obtained, given the complex

nature of welfare assessment, it will also be unlikely to attain the threshold for the AHAW Panel to advise amendment or prohibition of the husbandry system - and therefore the cycle of welfare problems continues²⁰².

The next chapter will, therefore, consider alternative approaches to the three scenarios detailed above, by examining what action might be taken by policymakers to prohibit practices that are demonstrably detrimental to animal welfare, with respect to the welfare-science data that is currently available.

²⁰² These elements are discussed further in Chapter Five but one classic example of this vicious circle is the issue of tooth clipping in piglets. Vast quantities of research have identified various environmental input factors that cause pigs to bite each other (no single husbandry element could ever be identified as responsible for the behaviour) and so additional research repeatedly been cited as necessary. In the meantime, piglets continue to have their teeth clipped routinely to prevent injury to other pigs, whilst the husbandry systems remain essentially unchanged and more research is carried out.

‘Scientific answers are not definitive; they are, almost by definition, the best ones we have at any given time. Consider.’¹

‘Is there any knowledge in the world which is so certain that no reasonable man could doubt it?’²

5

Alternative Approaches to Animal Welfare Policy Making: Beyond Reasonable Doubt, Pragmatism and Precaution

5.1 Introduction

Chapters Three and Four of this thesis explained that scientific research can provide valuable data to assist policy-makers when considering amendment or creation of legislation; policy-makers seek to cite scientific ‘evidence’ as the basis for legislation, to provide justification for measures taken. Animal welfare science is a complex and developing field where much is yet to be learned about the behaviour, emotional lives and needs of animals. Nonetheless, it has so far been established that animals are sentient and have positive and negative, physical and emotional experiences. Article 13 TFEU requires that, as sentient beings, full regard should be paid to animals’ welfare requirements and therefore sentience must now be viewed as an integral element in policy pertaining to animal welfare. Animals and their quality of life have been established as an important consideration in European society³ and therefore legislators have chosen to enshrine in law various duties with respect to their welfare.

The European Commission and the EFSA Animal Health and Welfare (hereafter AHAW) Panel have acknowledged that the (currently) available animal welfare science

¹ Carlo Rovelli, Theoretical Physicist

² Bertrand Russell, *The Problems of Philosophy* (Williams and Norgate 1912) 9

³ Concerns about animal welfare can be noted in many areas of European society, in media sources, educational settings, politics etc. and these concerns are confirmed in various Eurobarometer surveys, for example, European Commission, Special Eurobarometer 442: Attitudes of Europeans Towards Animal Welfare’ (2016 Brussels)

data is not always capable of establishing definitive links between a particular management practice or husbandry system and negative welfare outcome. Within intensive farm-animal production systems, the relationship between input and outcome factors is so complex that allocation of a particular welfare outcome to one single management factor is extremely challenging. Whilst some individual input factors can be directly linked to negative welfare outcomes, the likelihood of research providing 'definitive' evidence with respect to every individual cause of negative welfare is very low, likely impossible.

Chapter Four explained that, to date, the AHAW Panel has examined available research data on various welfare scenarios and reached one of three conclusions:

- Conclusion One: there is sufficient evidence that a management practice can be linked to welfare compromise and therefore amendment or prohibition of that practice is advised
- Conclusion Two: there is evidence of welfare compromise but the link between management factors and animal outcomes has not been fully established, meaning more research is required before introduction of measures to protect welfare can be advised. This is the most commonly reached AHAW conclusion.
- Conclusion Three: at present there is a lack of knowledge and understanding in a particular area of welfare, meaning advice cannot yet be provided and measures are not introduced with respect to welfare

Under circumstances where scientific data has proved inconclusive with respect to exact causation of husbandry-related negative welfare compromises, the AHAW Panel has advised further research (Conclusion Two). However, on occasion, faced with this lack of conclusive data, the Commission has appealed to public morality for justification of animal welfare legislative measures, as seen with respect to the European Seal Products Case. The EFSA has also acknowledged that public morality may play a role in animal welfare policy-making, although this is a difficult concept to justify in terms of objectivity. Public morality as justification for welfare legislation is addressed in the conclusion of this thesis.

Although some welfare measures are progressing in the EU, a partial impasse has been reached, where the Commission and AHAW cite the lack of definitive research findings as a barrier to policy-making (despite widespread acknowledgement of numerous welfare problems and the on-going difficulties faced by scientists in obtaining conclusive data); this chapter proposes a possible way-forward with respect to the three AHAW panel conclusions, and discusses key elements as follows:

The first sub-chapter argues in favour of accepting the limitations of welfare science and the necessary establishment of a threshold of evidence for data to support policy-making. The concept of reasonable doubt, in law and in science, will be summarised and advanced as a suitable model for adoption in animal welfare policy-making.

The subsequent sub-chapters then advance two science-based, policy-making pathways that are currently available to European animal welfare policy-makers:

Pathway One:

To date, the Commission has created animal welfare legislation most effectively in the context of a single, clearly identifiable input factor (husbandry or management measure) linked to one or more detrimental outcome factors which cause welfare compromise; this method is reflected in the Slaughter Directive⁴. It is argued, therefore, that this approach could be similarly applied to currently permitted management practices that cause pain, a readily identified negative welfare consequence. It is proposed that where clear evidence exists, beyond reasonable doubt, of a management practice that causes pain and suffering, prohibitive legislation can be introduced, in line with AHAW Conclusion One. Two common management practices are considered in light of this model: tooth-clipping in piglets and beak trimming in chickens.

Pathway Two:

In accepting the limitations of science in the context of husbandry systems as a whole (for example, broiler chicken production or caged layer hens) and acknowledging the findings in AHAW Conclusions Two and Three, it is proposed that where evidence exists, beyond reasonable doubt, of serious welfare compromises arising from a

⁴ Council Regulation (EC) No 1099/2009 of 24 September 2009 on the protection of animals at the time of killing (Text with EEA relevance) (2009) OJ L 303/1, hereafter the Slaughter Directive

husbandry regime that incorporates multiple input factors, and where absolute understanding of outcome factors is likely unattainable, legislation can be introduced on the basis of the precautionary principle. This subchapter explores the application of the precautionary principle (PP) in Environmental and Public Health law, analysing the use of the principle in the EU's prohibition of beef hormones in meat production and in the EU's approach to neonicotinoids in plant protection. The sub-chapter also explores the approach of the Commission and CJEU to the scope of the PP and proposes various justifications for a precautionary approach to animal welfare policymaking: with respect to AHAW Conclusions Two and Three, a potential ban of enriched cages for laying hens is utilised as an example of application for this model.

5.2 Pragmatism: Accepting the Limitations of Science

Chapters One and Four explained that decades of scientific research have yielded vast amounts of useful data with respect to animal health and welfare⁵; this information will continue to guide veterinary, agricultural and welfare sectors, and further understanding of animal welfare will undoubtedly develop in the coming decades. In the meantime, however, intensive production systems are extremely detrimental to animal welfare and there is little indication that the current Commission-AHAW approach will adequately address the problems faced by animals within these systems. The past two decades have witnessed the AHAW Panel consistently advise that additional research is required with respect to the principal farm-animal production systems currently utilised in the European Union⁶, in order for them to be able to recommend further animal protection measures. Given the difficulties faced by scientists working with complex animal subjects, it seems unlikely that definitive data can be sourced meaning the current welfare issues are unlikely to be outlawed in the near future. It can be argued therefore, that whilst science has a major role to play in informing policy, it is important to acknowledge and accept its limitations and embrace

⁵ D. Fraser, 'Translating Animal Welfare into Science', in Joy Mench (ed) *Advances in Agricultural Animal Welfare: Science and Practice* (Elsevier 2018) 129

⁶ As seen, for example, in EFSA Panel on Animal Health and Welfare, 'Scientific Opinion on the use of perches for laying hens' (2015) 13 *The EFSA Journal* 6:4131, EFSA Panel on Animal Health and Welfare, 'Scientific Opinion, Health and welfare of rabbits farmed in different production systems' (2020) 18 *The EFSA Journal* 1:5944 and EFSA Panel on Animal Health and Welfare, 'Scientific Opinion on the use of animal-based measures to assess welfare of broilers' (2012) 10 *The EFSA Journal* 7: 2774

realistic expectations as to what it can provide. If this step is not taken, a permanent impasse is inevitable. Animal welfare is a concept, which appeals to the European population and policy-makers, arguably as a sound bite⁷, but the reality is that animal welfare science is not a single entity but a field that encompasses multiple, overlapping scientific disciplines including physiology, immunology, neurology and ethology⁸; absolutes, in terms of animal-based data, are extremely rare.

In order to facilitate science-based protection of animal welfare via policy therefore, it is essential to establish a threshold for usable scientific evidence, i.e. a standard of proof, which policy-makers will accept as sufficient upon which to create new policy or amend existing regulations. Rather than seeking definitive ‘answers’ or irrefutable ‘proof’, this thesis argues that it is appropriate - and practical - to employ the concept of ‘beyond reasonable doubt’, and the rationale for this proposal is now explained.

5.2.1 Beyond Reasonable Doubt in Law

Although most commonly associated with the legal system, the concept of burden of proof is, in reality, a central element in any process of adjudication or assessment, irrespective of the subject of examination. Disciplines such as law and science utilise evidence to resolve uncertainties⁹ because few areas of human discovery deal in absolute certitude and, therefore, a threshold of evidence is required to support a hypothesis or, in the case of the legal system, justify a conviction. When considering available evidence, the criminal law concept of ‘beyond reasonable doubt’ can provide

⁷ News stories about individual animals and their welfare often receive huge public attention but this level of interest does not necessarily translate into a desire to truly understand welfare concepts – this is reflected in two situations where government officials sought to euthanase individual farm animals and the population protested, despite the fact that millions of other animals had already been killed under similar circumstances; Geronimo the Llama, euthanased due to suspected TB – Jane Dalton, ‘Geronimo the alpaca: Initial post-mortem “shows euthanised animal did not have tuberculosis”’ *The Independent* (London, 8 September 2021) <<https://www.independent.co.uk/news/uk/home-news/geronimo-post-mortem-results-alpaca-b1916386.html>> accessed 18 May 2022 - and Phoenix the calf who was found under the carcasses of euthanased cattle, including his mother, during the UK foot and mouth pandemic, Anthony Browne, ‘Calf? I nearly died’, *The Guardian* (London, 29 April 2001) <<https://www.theguardian.com/news/2001/apr/29/politics.footandmouth>> accessed 18 May 2022

⁸ A.J. Webster, ‘What use is science to animal welfare?’ (1998) 85 *Naturwissenschaften* (6) 262

⁹ A.R. Gardner-Medwin, ‘Reasonable Doubt: Uncertainty in Education, Science and Law’ (2011) 171 *Proceedings of the British Academy* 465

a practical route to decision-making, when navigating complex data, information or statistics¹⁰.

In English criminal law, the burden of proof – beyond reasonable doubt - addresses the mechanism by which the facts in issue are to be adduced and determined; the burden of proof has been defined as follows:

‘It need not reach certainty, but it must carry a high degree of probability. Proof beyond reasonable doubt does not mean proof beyond the shadow of a doubt. The law would fail to protect the community if it admitted fanciful possibilities to deflect the course of justice. If the evidence is so strong against a man as to leave only a remote possibility in his favour which can be dismissed with the sentence “of course it is possible, but not in the least probable,” the case is proved beyond reasonable doubt, but nothing short of that will suffice’¹¹.

Within the American criminal legal system, ‘beyond reasonable doubt’ has been further clarified: ‘doubts’ being defined as only substantial, practical doubts¹², not fanciful or sceptical¹³. One American judge advised a jury that reasonable doubt *“is not mere possible doubt; because everything relating to human affairs [...] is open to some possible or imaginary doubt”¹⁴*. This comment mirrors perfectly the field of animal welfare science – ultimately any hypothesis can be subject to doubt but the important factor is that in order to *prevent* action being taken in the context of data under review, there must be relevant, demonstrable evidence of doubt about the information to hand.

5.2.2 Beyond Reasonable Doubt : Animal Welfare Science Data

Within the context of EU animal welfare legislation, it is interesting to note that at no point has the Commission or, indeed, the AHAW Panel, explicitly stated the threshold for integration of welfare science data into legislation. Although numerous reports

¹⁰ N. Oreskes, ‘The Scientific Consensus on Climate Change: How do we Know We’re not Wrong?’ in E.A. Lloyd and E. Winsberg (eds) *Climate Modelling Philosophical and Conceptual Issues* (Springer 2018) 54

¹¹ *Miller v. Minister of Pensions* [1947] 2 All ER 372 (Denning, LJ). For a detailed discussion of the concept, see J.B. Weinstein and I. Dewsbury, ‘Comment on the Meaning of ‘proof beyond a reasonable doubt’ (2006) 5 Law, Probability and Risk (2) 167

¹² K.N. Kotsoglou, ‘Proof beyond a context-relevant doubt. A structural analysis of the standard of proof in criminal adjudication’ (2020) 28 *Artificial Intelligence and Law* (1) 111, 129

¹³ *State v. Dauphinee*, 121 Pa. Super. 565, at 590 (1936)

¹⁴ *Commonwealth v. Webster*, 59 Mass. 295 (Mass. 1850) Shaw J.

pertaining to animal welfare acknowledge inconclusive or incomplete data¹⁵, there is no Commission literature that confirms the level of certainty required from animal welfare science data to instigate policy-change¹⁶. Given the nature of scientific enterprise it would be impractical to seek certainty of a particular percentage or statistic; however, a requirement for a threshold of evidence is present in every aspect of the law¹⁷ and therefore it seems counterintuitive not to have such a threshold in the field of animal welfare which is consistently cited as incorporating evidence-based legislation.

It is interesting to note that in 2017, the Commission elected to publish a report on decision-making under uncertainty¹⁸, in the context of the precautionary principle. The principle will be discussed in detail in the second half of this Chapter however, for the purposes of the present discussion, the key elements in this Report were the following statements:

'It is unrealistic to expect regulatory science to provide totally conclusive information to governments on public health or environmental issues — as some element of uncertainty is an unavoidable part of scientific inquiry.....'

Science and technology studies have shown that uncertainty can stem from more than a simple lack of data or inadequate models of risk assessment. Uncertainty might also exist in the form of indeterminacy (where we don't know all the factors influencing the causal chains), ambiguity (where there are contradictory certainties), and ignorance (where we don't know what we don't know)¹⁹.

¹⁵ As discussed in Chapter Four, the majority of AHAW Opinions cite inconclusive or incomplete data on a variety of animal-welfare subjects. The European Union Strategy for The Protection and Welfare of Animals 2012-15 cites science-based animal indicators as a mechanism for better policy but gives no indication of a threshold for evidence - European Commission 'Communication from the Commission to the European Parliament, The Council and the European Economic and Social Committee on the European Union Strategy for the Protection and Welfare of Animals, 2012-2105, COM 2012/06 FINAL

¹⁶ The Commission's Food Safety and Animal Welfare website cites the Five Freedoms and legislation passed to date but gives no clarity as to the mechanism by which data is deemed suitable to underpin policy

¹⁷ The burden of proof is present in criminal and civil law, but thresholds of evidence are also necessary when creating evidence-based policy, and evidence is utilised in public health, environmental and social policy-making as well as in animal welfare

¹⁸ European Commission, Science for Environment Policy, 'Future Brief: The precautionary principle: decision-making under uncertainty' Issue 18 (September 2017)

¹⁹ *ibid*, 5

What is notable about this report, is the fact that agricultural or animal welfare issues in policy-making were neither acknowledged nor discussed. The statements, above, are clearly as applicable in these fields as they are in public health or environmental policy, yet they were not included.

In the same year, EFSA adopted specific guidance on analysis of uncertainty in scientific assessments, which also acknowledged the nature of scientific enterprise and offered some clarity on the manner in which EFSA panels present inconclusive data to policy-makers:

*'Uncertainty analysis is an integral part of scientific assessment. In this Guidance, those producing a scientific assessment are referred to as 'assessors' and those who will use the finished assessment are referred to as 'decision-makers'(the latter includes but is not limited to risk managers). Assessors are responsible for analysis of uncertainty; decision-makers are responsible for resolving the impact of uncertainty on decision-making.'*²⁰

In fact, although there is no overt declaration of a burden of proof for policy-making in animal welfare, it might be argued that the Commission and AHAW must have previously adopted some form of [available-evidence versus doubt] assessment with respect to animal welfare. In creating the Slaughter Directive²¹ stunning requirement, the Commission presumably acted on the basis of available evidence, overwhelmingly supportive of pre-stunning, whilst taking into account the small body of opinion (primarily from scholars or regions where religious slaughter carries significance) which casts doubt on the argument that stunning is necessary for welfare.

5.2.3 Slaughter Directive (EC) No. 1099/2009

The subject of animal welfare at slaughter has been a focus of veterinary, meat hygiene and animal welfare research for decades. However, although the AHAW Panel Opinions on welfare at slaughter contain seemingly unequivocal statements regarding the negative welfare consequences of slaughter without pre-stunning²², it

²⁰ EFSA Scientific Committee, Guidance on Uncertainty Analysis in Scientific Assessments (2018) 16 EFSA Journal 1:5123, 5

²¹ (EC) No 1099/2009 (n 4)

²² For example, in the 2020 EFSA assessment of cattle welfare at slaughter, the Panel stated: 'Therefore, animals that are not or ineffectively stunned or recover consciousness will be exposed to the hazards and related welfare consequences' – EFSA Panel on Animal Health and Welfare (AHAW) Scientific Opinion on Welfare of Cattle at Slaughter (2020) 18 The EFSA Journal 11: 6275, 94. See

is important to acknowledge that within the global context of this controversial subject, there is, in fact, a body of scientists currently presenting data to support the argument that pre-stunning is *not* necessary for positive welfare. Whilst this thesis fully accepts the AHAW Panel's reasoning and the findings of numerous European studies that identify and confirm welfare compromises during non-stun slaughter, it must nonetheless be recognised that an alternative opinion, with allegedly supportive data, exists. For example, one veterinary journal has stated that '*Shechita and halal, due to their intrinsic nature and due to their routine controls on every step and for every individual animal, cannot be regarded as negligent or intentionally painful, distressing or inducing suffering to animals*'²³ and some researchers have argued that Halal slaughter has the potential to reduce suffering and pain²⁴.

Despite the on-going debate surrounding welfare issues noted during non-stun slaughter, it is clear that the Commission has chosen to accept the majority view amongst European welfare scientists²⁵ - that stunning is necessary to ensure positive welfare at the time of killing - and has introduced legislative measures to ensure pre-slaughter stunning in the commercial setting²⁶. It must be assumed, therefore, that this decision was based on the belief that the available evidence of welfare compromise was overwhelmingly compelling. This cannot be known for certain as the issue has not been directly addressed to date but it confirms that the Commission is willing to act in light of reasoned, convincing evidence.

also EFSA Panel on Animal Health and Welfare (AHAW) Scientific Opinion on Welfare of Sheep and Goats at Slaughter (2021) 19 The EFSA Journal 11:6882, 9 – 'During bleeding following stunning, sheep and goats will experience welfare consequences in case of persistence of consciousness or if they recover consciousness before death'

²³ P.S. Pozzi, W. Geraisy, S. Barakeh and M. Azaran, 'Principles of Jewish and Islamic Slaughter with Respect to OIE (World Organization for Animal Health) Recommendations' (2015) 70 Israel Journal of Veterinary Medicine (3) 3

²⁴ See for example, Z.A. Aghwan, A.U. Bello et al, 'Efficient halal bleeding, animal handling, and welfare: A holistic approach for meat quality' (2016) 121 Meat Science 420, and J. Loeb, 'Is shechita really any worse than waterbath?' (2019) 184 The Veterinary Record (20) 604

²⁵ Although research into welfare at slaughter can yield anomalous or contradictory findings, it can be seen that almost all the available data indicates negative welfare outcomes for animals slaughtered without stunning. A recent survey of UK veterinary students indicated that 95.2% of respondents wanted to see all animals stunned prior to slaughter, including during religious slaughter: A. Fuseini, A. Grist and T. Knowles, 'Veterinary Students' Perception and Understanding of Issues Surrounding the Slaughter of Animals According to the Rules of Halal: A Survey of Students from Four English Universities' (2019) 9 Animals 293

²⁶ (EC) No 1099/2009 (n 4) The Directive states that 'There is sufficient scientific evidence to demonstrate that vertebrate animals are sentient beings' (19) and 'Many killing methods are painful for animals. Stunning is therefore necessary to induce a lack of consciousness and sensibility before, or at the same time as, the animals are killed' (20)

5.2.4 Applying ‘beyond reasonable doubt’ to welfare data

It must be acknowledged that even when objective, sound data is obtained, it can be incomplete, yet it can also subsequently be subjected to varying interpretations (and challenges) and therefore absolute consensus in welfare research is seldom available although general consensus is often reached. This scenario is regularly observed in public health – the classic example being the quest to demonstrate the link between cigarette smoking and lung cancer. Whilst it has now been established that smoking accounts for approximately 90% of male lung cancers and 70-80% of female lung cancers²⁷, and that passive smoking carries significant health risks to children and adults²⁸, it is nonetheless the case that links between smoking and an individual patient’s development of disease are not fully understood: rates of lung cancer in non-smokers are currently noted to be increasing²⁹ and there are still many questions to answer regarding interactions between genetics and lifestyle factors³⁰. Nonetheless, in light of the overwhelming evidence of risks associated with smoking and the demonstration of the key role played by smoking in various cancers, European Member States have acted to protect health by instigating bans on smoking in public places and the Council of the European Union has also passed its recommendation on smoke-free environments³¹.

This thesis proposes, therefore, that in order to justify legislation on the basis of research findings in animal welfare, it is appropriate to acknowledge the ever-present element of uncertainty in science but to intervene where there is evidence of welfare compromise ‘so convincing that a reasonable person would not hesitate to act³²’. In other words, where there is evidence of welfare compromise, beyond reasonable doubt, the available data is sufficient to justify legislative measures to prevent harm.

²⁷ T. Walser, X. Cui et al, ‘Smoking and Lung Cancer’ (2008) 5 Proceedings of the American Thoracic Society (8) 811

²⁸ Y-Q Sun, Y. Chen et al ‘Passive smoking in relation to lung cancer incidence and histologic types in Norwegian adults: the HUNT study’ (2017) 50 European Respiratory Journal (4) 1700824

²⁹ S. Dubin, ‘Lung cancer in non-smokers’ (2020) 117 Missouri Medicine (4) 375

³⁰ See for example, B.D. Carter, C.C. Abnet et al ‘Smoking and Mortality — Beyond Established Causes’ (2015) 372 New England Medical Journal 631 and A-S Kim, H-J Ko et al, ‘Exposure to Second-hand Smoke and Risk of Cancer in Never Smokers: A Meta-Analysis of Epidemiologic Studies’ (2018) 15 International Journal of Environmental Research and Public Health 9: 1981

³¹ Council Recommendation of 30 November 2009 on smoke-free environments (2009) OJ C 296/4

³² C.B. Mueller, L. Kirkpatrick and L.L Richter, *Evidence Under the Rules : Texts, Cases and Problems* (Aspen Publications 1997) 145

In order to substantiate the assertion that the evidence is beyond reasonable doubt, this thesis proposes that where the EFSA AHAW Panel³³ and other relevant professional bodies³⁴ concur with, and offer supportive opinion on data, this represents a reasonable body of professionals on whose advice policymakers can rely³⁵.

The use of 'beyond reasonable doubt' as the threshold of proof for data to justify legislative change in animal welfare is now discussed with respect to two Pathways for policy-making.

5.3 Proposed Pathway One: Where a single input factor can be linked, beyond reasonable doubt, to negative animal welfare outcomes: policy-making in light of AHAW Conclusion One

AHAW Conclusion One finds that there is sufficient evidence that a management practice can be linked to welfare compromise and therefore amendment or prohibition of that practice is advised.

The majority of current EU farm animal legislation was created following assessment and critique of management and husbandry systems, in order to ensure uniformity of practices across member states and also to introduce minimum standards of welfare³⁶. As discussed in previous chapters of this thesis, although the Commission has taken steps to outlaw certain management practices detrimental to animal welfare, many other practices remain which cause serious harm. This sub-chapter will argue that with respect to a number of management practices that cause pain, there is ample scientific evidence of welfare compromise to justify their prohibition. Pain can never be completely avoided in animal production systems, since some medical or surgical

³³ EFSA AHAW Panel <<https://www.efsa.europa.eu/en/science/scientific-committee-and-panels/ahaw>> accessed 1 March 2022

³⁴ This might include national or international organisations such as the World Organisation for Animal Health (OIE) <<https://www.oie.int/en/what-we-do/standards/standards-setting-process/code-commission-reports/>> accessed 1 March 2022, or the Federation of Veterinarians of Europe (FVE), Working Groups, <<https://fve.org/about-fve/>> accessed 2 March 2022

³⁵ A 'reasonable body' could constitute a number of specialist opinions from veterinary, ethology and agricultural experts

³⁶ F. Lundmark, C. Berg et al, 'Intentions and Values in Animal Welfare Legislation and Standards' (2014) 27 Journal of Agricultural and Environmental Ethics 991

interventions will necessarily involve temporary tissue inflammation or discomfort, but practices that are not strictly necessary to improve overall quality of life cannot be justified. The sub-chapter proposes that the rationale behind provisions in the EU Slaughter Directive provides a suitable, four point 'template' Pathway for future policy-making.

5.3.1 Policy-Making: the Slaughter Directive Template

Although the Commission and AHAW have focused on animal-based measures in recent times, they have also acknowledged that input (management) factors are often easier to identify and therefore can provide a sound basis for welfare legislation³⁷. This is clearly reflected in the Slaughter Directive, where a single input (management) factor – slaughter without pre-stunning, or non-stun slaughter – is addressed³⁸; it can be argued that similar steps could be taken in other areas of farm animal husbandry, to prohibit damaging management practices that are proven to cause pain.

5.3.2 Four Steps to Policy-Making

When analysing the decision to create the slaughter directive, four key steps can be identified and these individual factors are now explained.

(1) A single input factor / management practice: non-stun slaughter

The first element required when considering prohibition of management practices detrimental to welfare is identification of the relevant input factor – in this case, slaughter without pre-stunning. This input factor is an individual, clearly identifiable step – an animal either undergoes captive bolt or electrical stun prior to the cutting of its arteries or receives no pre-stunning before exsanguination³⁹. Non-stun slaughter is

³⁷ Discussed in detail in EFSA Panel on Animal Health and Welfare (AHAW), Scientific Opinion, 'Statement on the use of animal-based measures to assess the welfare of animals' (2012) 10 EFSA Journal (6) 2767

³⁸ (EC) No 1099/2009 (n 4) Stunning methods, techniques and justifications for pre-stunning are mentioned 138 times in the Directive, which states the aim of avoiding pain and minimising the distress and suffering of animals at the time of killing (2)

³⁹ For a recent study comparing slaughter of sheep with pre-stunning and without, see M. Kiran, B.M. Naveena, M. Smrutirekha et al, 'Traditional halal slaughter without stunning versus slaughter with electrical stunning of sheep (*Ovis aries*)' (2019) 148 Meat Science 127

a self-contained management choice and the resulting outcomes have been repeatedly observed under research conditions as well as in slaughterhouses⁴⁰.

(2) Hazards identified and animal-based measures (ABMs) indicating welfare compromise

During exsanguination, animals being slaughtered without pre-stunning will encounter various hazards and experience the welfare consequences associated with remaining aware until they become irreversibly unconscious. There are multiple welfare issues for animals slaughtered without pre-stunning⁴¹, including, but not limited to:

Hazards

- ✓ Incomplete sectioning of major arteries⁴²
- ✓ Requirement for repeated cutting of skin and soft tissue / vessels⁴³ which causes pain and trauma to tissues
- ✓ Wound stimulation (via movement or apposition of skin edges)⁴⁴ – if wound edges are able to contact each other, this causes pain
- ✓ Aspiration of blood into the trachea⁴⁵
- ✓ Failure to recognise occlusion of the carotid arteries (where the arteries constrict to prevent blood loss), resulting in false aneurysms, slower exsanguination and prolonged time to unconsciousness⁴⁶.

⁴⁰ See, for example, C.B. Johnson, T.J. Gibson, K.J. Stafford and D.J. Mellor, 'Pain Perception at slaughter' (2012) 21 *Animal Welfare* (S2) 113 – an experiment carried out in a university research setting, using the minimum anaesthesia model which allows animals to be assessed for response to noxious stimuli whilst unconscious, thereby limiting their pain experience. In this study, calves were minimally anaesthetised and the effects on ventral neck incision of the major blood vessels was assessed via electroencephalogram (EEG), the findings demonstrating that the period between cutting and complete loss of consciousness is associated with pain.

⁴¹ EFSA AHAW Welfare of Cattle at Slaughter (n 22) 72-82; this subsection on bleeding without stunning details the welfare consequences cattle can experience

⁴² *ibid*, 70

⁴³ A. Velarde, P. Rodriguez, A. Dalmau et al, 'Religious slaughter: Evaluation of current practices in selected countries' (2014) 96 *Meat Science* 278

⁴⁴ DIALREL, K. Von Holleben, M. von Wenzlawowicz et al, 'Report on good and adverse practices - Animal welfare concerns in relation to slaughter practices from the viewpoint of veterinary sciences' (2010) 39

< <https://www.dialrel.net/dialrel/images/veterinary-concerns.pdf> > accessed 10 March 2022

⁴⁵ *ibid*, 25

⁴⁶ For discussion of problems associated with false aneurysms, see T.J. Gibson, N. Dadios and N.G. Gregory, 'Effect of neck cut position on time to collapse in Halal slaughtered cattle without stunning' (2015) 110 *Meat Science* 310

Observable ABMs⁴⁷

- ✓ Escape attempts, struggling – fear and distress
- ✓ Vocalisation – pain, fear and distress
- ✓ Facial expression – pain, fear and distress

It is important to appreciate that these are *observable* ABMs i.e. they can be detected visually, with ease, by operators as well as researchers. There will be other ABMs such as heart rate, cortisol levels and electrical brain activity that will reflect negative experiences but the aim of this proposed Pathway is formulation of a practical, on-site approach to welfare. Given the large numbers of animals involved, noise levels and safety measures for operators, it is very challenging to carry out physical assessment of heart or respiratory rate on-site.

(3) Evidence beyond reasonable doubt that the single input factor causes proven, negative animal-based outcomes

As explained, above, with respect to any scientific theory, an alternative interpretation of data is always possible and the scenario of negative welfare associated with non-stun slaughter is no different. However, this thesis argues that there is a large amount of data supportive of the welfare compromises associated with this slaughter technique, and this is accepted by a body of scientific experts who accept that negative welfare outcomes are established and proven.

The AHAW Panel Opinions on welfare of cattle, sheep and pigs at slaughter⁴⁸ all set out the findings from numerous research projects and conclude that pre-stun is essential for welfare at slaughter⁴⁹. The Humane Slaughter Association has conducted

⁴⁷ Under laboratory conditions, various physiological parameters indicating awareness and stress during non-stun slaughter have been studied – see for example A.B. Sabow, Y.M. Goh et al, ‘Electroencephalographic and blood parameters changes in anaesthetised goats subjected to slaughter without stunning and slaughter following different electrical stunning methods’ (2018) 59 Animal Production Science 849. However, there is ample evidence available on-site, at abattoirs, in terms of observable physical signs, that animals are conscious, aware and distressed during non-stun slaughter.

⁴⁸ EFSA AHAW (n 22) Cattle and Sheep, see also EFSA Panel on Animal Health and Welfare (AHAW) Scientific Opinion on Welfare of Pigs at slaughter (2020) 18 The EFSA Journal 6: 6148. Although pigs are not subject to non-stun slaughter, the Opinion explains why effective stunning is necessary for welfare

⁴⁹ *ibid*, Welfare of Cattle at Slaughter (n 22) 4.4 (2), 94 – the Panel concluded that ‘*Slaughter without stunning leads to severe pain, fear and distress due to restraint for the neck cutting and the cutting of soft tissues in the neck that will last until the onset of unconsciousness, which can be further delayed due to formation of aneurysm and carotid occlusion*’

numerous research projects and collated data from many studies, concluding that *'all animals should be effectively stunned prior to being bled, because this precludes the possibility of suffering'*⁵⁰. Citing various research papers, the Federation of Veterinarians of Europe (FVE) has stated that *'FVE is of the opinion that from an animal welfare point of view, and out of respect for an animal as a sentient being, the practice of slaughtering animals without prior stunning is unacceptable under any circumstance'*⁵¹ and the British Veterinary Association has stated that *'all animals should be effectively stunned before slaughter to render them unconscious and therefore insensible to pain, distress, fear and suffering'*⁵².

(4) Justification for Policy

Given the available evidence, the Commission chose to prohibit slaughter without pre-stunning, albeit with derogations which are discussed elsewhere in the thesis. It can be argued, therefore, that the Commission followed the steps, outlined above, to protect animal welfare despite there being some areas of research in this field that remain contested. This thesis asserts that the Commission acted on the available evidence, and accepted that animal welfare was compromised, beyond reasonable doubt, by non-stun slaughter, due to the pain and distress experienced during that process.

The argument in favour of prohibiting non-stun slaughter is bolstered by the fact that slaughter practices are performed on sentient creatures; a sentient animal has been defined as follows: *'..... capable of being aware of its surroundings, of sensations in its own body, including pain, hunger, heat or cold and of emotions related to its sensations. It is aware of what is happening to it and its relations with other animals, including humans'*⁵³. Since pain, fear and distress have all been identified at the time of exsanguination without prior stunning, and, given the instruction found within Article 13 TFEU to pay due regard to welfare precisely because animals can have these

⁵⁰ Humane Slaughter Association, 'Religious Slaughter' (2016) 3
< <https://www.hsa.org.uk/downloads/related-items/religious-slaughter.pdf> > accessed 2 March 2022

⁵¹ FVE, Position Paper, Slaughter of Animals without Prior Stunning' (2002) FVE/02/104 Final

⁵² British Veterinary Association, BVA position on the welfare of animals at slaughter, 4 (recommendation 23)

<<https://www.bva.co.uk/media/3664/full-position-bva-position-on-the-welfare-of-animals-at-slaughter.pdf>> accessed 12 March 2022

⁵³ Compassion in World Farming, J. Turner, 'Recognising the Sentience of Farm Animals, A Report by Compassion in World Farming Trust' (2006) 4

experiences – i.e. they are sentient - it can be argued that in prohibiting non-stun slaughter, the Commission’s approach is reasonable and appropriate in light of the overwhelming scientific evidence of welfare compromise associated with this management practice.

5.3.3 Pain

The focus of this sub-chapter is on a serious animal welfare consequence: pain. Wherever animal welfare is discussed, whether in the context of the Five Freedoms, in scientific literature or as part of a welfare campaign, pain and suffering are generally highlighted as the most serious welfare issues which animals must be spared. Since Article 13 enshrines sentience in European Law, and given that sentience indicates animals are capable of feeling pain, it is argued that management practices causing pain can – and should - be prohibited where possible and this will be demonstrated in the two examples discussed, below.

Pain has been described as ‘an element of sentience that merits particular consideration’⁵⁴. This is primarily because decades of research have confirmed the negative responses of animals to noxious stimuli and the accompanying behavioural alterations that they employ to remove themselves from these stimuli; animals also learn to avoid future painful experiences. Pain is defined as ‘*an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage*’⁵⁵ which exactly describes what occurs at non-stun slaughter or during surgical mutilation. One of the key welfare needs for animals, identified in the 1960s within the Five Freedoms framework was freedom from pain; in fact, the ability to feel pain is probably the most scientifically-identifiable indicator of welfare. As explained, above, pain can never be entirely removed from the life of any animal, but causes of unnecessary pain should be removed wherever possible.

In order to demonstrate that painful procedures can be addressed by policy based on currently available data, this subchapter will now consider two common management

⁵⁴ Scottish Government, Scottish Animal Welfare Commission, ‘Principles for ascribing sentience to animals and case study of the evidence for sentience in cephalopods’ (2021) 10

⁵⁵ S.N. Raja, D.B. Carr et al, ‘The revised International Association for the Study of Pain definition of pain: Concepts, challenges, and compromises’ (2020) 161 Pain 1976

practices which could be prohibited on the basis of the four steps of proposed Pathway One:

- (1) Identification of a single input factor (management practice)
- (2) Identification of hazards to welfare with identifiable or observed ABMs which lead to pain
- (3) Evidence that data supportive of welfare compromise is beyond reasonable doubt, with supportive specialist or expert opinion
- (4) Justification for the policy in light of Article 13

5.3.4 Tooth Clipping in Pigs

Chapter One outlined various common management practices, utilised in intensive farm animal production, that are associated with negative welfare outcomes. Minimum standards legislation often incorporates instruction on husbandry practices and some Directives address surgical mutilations. The European Pig Directive 2008/120/EC, adopted in 2008⁵⁶, states the following⁵⁷:

'Tail-docking, tooth-clipping and tooth-grinding are likely to cause immediate pain and some prolonged pain to pigs. Castration is likely to cause prolonged pain which is worse if there is tearing of the tissues. Those practices are therefore detrimental to the welfare of pigs, especially when carried out by incompetent and inexperienced persons. As consequence, rules should be laid down to ensure better practices.'

Although the discussion, below, applies proposed Pathway One to tooth clipping in pigs, this approach could equally be applied to tail docking⁵⁸ and castration without anaesthesia⁵⁹.

⁵⁶ Council Directive 2008/120/EC of 18 December 2008 laying down minimum standards for the protection of pigs (Codified version) [2008] OJ L 47/5

⁵⁷ *ibid* (11)

⁵⁸ For discussion of the current situation with respect to piglet tail docking in the EU, see N. de Briyne, C. Berg, T. Blaha et al, 'Phasing out pig tail docking in the EU - present state, challenges and possibilities' (2018) 4 *Porcine Health Management* 27

⁵⁹ Piglet castration has been the focus of welfare campaigners in Europe for the last few years and in 2010 the EU agreed its 'European Declaration on alternatives to surgical castration of pigs' <https://ec.europa.eu/food/system/files/2016-10/aw_prac_farm_pigs_cast-alt_declaration_en.pdf> accessed 10 March 2022. The aim of the declaration was to ensure surgical castration would be carried out either under anaesthesia or with prolonged analgesia from 2012, and a long-term goal was stated to outlaw surgical castration of pigs by 2018. A ban on the practice has not, to date, been enacted. Approximately 31.5% of all pigs slaughtered have been castrated and some progress has

Tooth clipping has been studied with respect to welfare impacts since the 1970s⁶⁰. Although the Pig Directive prohibits routine surgical mutilations (those carried out uniformly across an entire group, as a standard protocol)⁶¹, it shares a common feature with the Slaughter Directive, i.e. it permits derogations. In this case, derogations from the prohibition of routine surgical mutilations are permitted under circumstances where animals may harm their litter mates or others in their group. With respect to tooth clipping, the Directive allows '*a uniform reduction of corner teeth of piglets by grinding or clipping not later than the seventh day of life of the piglets leaving an intact smooth surface; boars' tusks may be reduced in length where necessary to prevent injuries to other animals or for safety reasons*'⁶². However, given the serious, detrimental effects associated with this practice, it can be argued that prohibition across all management systems is indicated. Tooth clipping is permitted via derogations, but this thesis proposes that these derogations should be removed to prevent unnecessary harm; this step would need to be taken in conjunction with alterations to intensive production systems, primarily, reductions in stocking densities. This is because current stocking rates do not permit adequate space per pig, leading to high levels of frustration, aggression and fighting.

(1) Identification of a single input factor (management practice)

Tooth clipping is a single, verifiable input factor – it is the management practice of reducing the crown portion of piglets' teeth to prevent damage to littermates and also to sows' udders⁶³. Piglets are born with eight teeth (deciduous canine teeth and corner incisors, commonly referred to by producers as 'needle teeth'⁶⁴). Clipping is carried

been made in Germany where general (gaseous) anaesthesia is a legal requirement during castration; this technique is also utilised in the Netherlands. See Professional Pig Community 333, 'The Pig Castration Situation in the European Union' 31 January 2022 <https://www.pig333.com/articles/the-pig-castration-situation-in-the-europeanunion_18100/> accessed 20 March 2022

⁶⁰ For example, see D. Fraser, 'The 'teat order' of suckling pigs: II. Fighting during suckling and the effects of clipping the eye teeth' (1975) 84 *The Journal of Agricultural Science* (3) 393

⁶¹ Council Directive 2008/120/EC (n 56) Annex I, Chapter I, (8) states: 'All procedures intended as an intervention carried out for other than therapeutic or diagnostic purposes or for the identification of the pigs in accordance with relevant legislation and resulting in damage to or the loss of a sensitive part of the body or the alteration of bone structure shall be prohibited'

⁶² *ibid*

⁶³ M. Hay, J. Rue, C. Sansac, G. Brunel and A. Prunier, 'Long-term detrimental effects of tooth clipping or grinding in piglets: a histological approach' (2004) 13 *Animal Welfare* 27

⁶⁴ American Veterinary Medical Association, Literature Review, 'Welfare Implications of teeth clipping, tail docking and permanent identification of piglets' (15 July 2014) <<https://www.avma.org/resources-tools/literature-reviews/welfare-implications-teeth-clipping-tail-docking-and-permanent-identification-piglets>> accessed 20 March 2022

out using either steel cutters or a grinding stone, the aim being to reduce sharp edges; cutters often reduce the crown of the tooth to a point level with the gumline, sometimes one third of the crown is removed⁶⁵.

(2) Hazards identified and ABMs indicating welfare compromise

The practice of tooth clipping has been identified by the AHAW Panel as a hazard to welfare in itself, which is not currently addressed via Welfare Quality®, other than in terms of frequency of occurrence⁶⁶. It is interesting to note that although a vast body of scientific literature details research findings indicative of welfare compromise associated with the practice, the relevant clinical signs and behavioural indicators have not been examined or discussed in detail by AHAW in recent years⁶⁷.

Hazards

The act of cutting across (or grinding) the upper section of a tooth is associated with major tooth lesions which arise as a result of damage to the natural anatomical structure of the tooth and which are compounded by the nature of the oral cavity in animals⁶⁸. Some of the hazards noted in scientific studies were identified via histological (microscopic) examination of teeth and their associated structures, others can be identified visually:

- ✓ Complete or partial fracture of remaining tooth (dentine⁶⁹)
- ✓ Opening of the pulp cavity (therefore open to the oral cavity and vulnerable to contact with anything present in the mouth)

⁶⁵ B. Zhou, X.J. Yang et al, 'Effects of tail docking and teeth clipping on the physiological responses, wounds, behavior, growth, and backfat depth of pigs' (2013) 91 Journal of Animal Welfare Science (10) 4908

⁶⁶EFSA Panel on Animal Health and Welfare, 'Scientific Opinion on the use of animal-based measures to assess welfare in pigs' (2012) 10 The EFSA Journal 1:2512. In other words, the only direct provision relating to piglet tooth-clipping in the current welfare projects and schemes is the requirement that tooth clipping is not automatically carried out but done when indicated by injury to other animals in the group. In reality, tooth clipping is carried out as routine, widely across the EU

⁶⁷ In fact, in the 2014 Opinion on animal-based measures to assess pig welfare, tooth clipping is not mentioned - EFSA Panel on Animal Health and Welfare, Scientific Opinion concerning a Multifactorial Approach on the use of animal and non-animal based measures to assess the welfare of pigs' (2014) 12 The EFSA Journal 5:3702

⁶⁸ Animals do not simply use their mouths and teeth to eat, the oral cavity plays a role in exploration of the environment and social interactions. The mouth itself becomes colonised with bacteria shortly after birth, therefore if a structure within the mouth is damaged, infection can arise.

⁶⁹ Dentine is the hard layer which lies under the enamel of the tooth and protects the pulp cavity which is the innervated, vascularised (sensitive) area of the tooth

- ✓ Haemorrhage, inflammatory-cell infiltration and abscessation
- ✓ Gingivitis (infection and inflammation of the gum and surrounding tissues)

Observable ABMs

Some outcomes for piglets with clipped or ground teeth are challenging to fully assess because expression of pain in animals is not fully understood. However a number of animal based measures are easily identified during and immediately after the procedure as directly associated with tooth clipping.

- ✓ Vocalisation – grunting, howling – pain, fear and distress
- ✓ Teeth champing – pain, distress
- ✓ Teat-seeking and udder-mouthing – displacement behaviours - stress⁷⁰
- ✓ Increased time alone and decreased playing time for two days after tooth clipping – likely attributable to pain and distress⁷¹. (Lying alone increases the risk of hypothermia and is also, therefore, a welfare issue in itself).

It is important to also consider the chronic effects of tooth clipping, i.e. animal-based measures which can be missed due to (i) impracticality of inspecting the mouths of hundreds of piglets or grower pigs in intensive systems and (ii) the fact that animals often continue to eat despite significant oral pain⁷². The anatomical structure of mammalian teeth share multiple similarities and, since research has confirmed that equivalent lesions in humans are associated with severe pain⁷³, it is reasonable to conclude that the experience of tooth clipping for piglets brings serious welfare compromise. Lesions in human deciduous teeth (such as decay or abscess formation) have been associated with pain, especially where heat or cold are present⁷⁴. It has

⁷⁰ G.J. Noonan, J.S. Rand, J. Priest, J. Ainscow, J.K. Blackshaw, 'Behavioural observations of piglets undergoing tail docking, teeth clipping and ear notching' (1994) 39 Applied Animal Behaviour Science 203, 209

⁷¹ L. Fou, B. Zhou et al, 'Effects of tail docking and/or teeth clipping on behavior, lesions, and physiological indicators of sows and their piglets' (2019) 90 Journal of Animal Science 1320, 1325

⁷² B.A. Niemiec, J. Gawor, A. Nemeč et al. 'World Small Animal Veterinary Association Global Dental Guidelines' (2020) 66 <https://wsava.org/wp-content/uploads/2020/01/Dental-Guidelines-for-endorsement_0.pdf> accessed 20 March 2022

⁷³ D. Ngassapa, 'Correlation of clinical pain symptoms with histopathological changes of the dental pulp: a review' (1996) 73 East African Medical Journal 779

⁷⁴ K.M. Milsom, M. Tickle and A.S. Blinkhorn 'Dental pain and dental treatment of young children attending the general dental service' (2002) 192 British Dentistry Journal 280

been estimated that the pain piglets experience from cut or ground teeth likely lasts until the point when they shed their deciduous teeth i.e. around the fiftieth day of life⁷⁵.

(3) Evidence that data supportive of welfare compromise is beyond reasonable doubt, including specialist opinion

Although the pain response of individual animals may vary, the histological evidence – tooth cell and dental structures examined via microscope - is irrefutable and confirms tissue damage and inflammatory responses that cause pain in the animal. This evidence is conclusive and arguably more reliable than trying to assess the individual, behavioural pain response or behaviour alterations of animals within a group, although it would be difficult to argue that the extreme vocalisation and struggling seen during teeth clipping is not associated with pain⁷⁶. As with every animal welfare factor under research, there have been contradictory findings with respect to the effect of tooth clipping on live-weight gain⁷⁷, frequency of infections following tooth clipping⁷⁸ (due to haematogenous – bloodborne- spread of bacteria) and injuries within the group⁷⁹, but the fundamental, physiological evidence that tooth clipping causes pain – both acute and chronic – cannot be denied.

In their 2007 Scientific Opinion on health and welfare in fattening pigs⁸⁰, the AHAW panel only addressed tooth clipping in one section, with respect to the needs of pigs; nonetheless, the advice is clear with respect to pain:

⁷⁵ Hay (n 63) 5

⁷⁶ Some studies have highlighted the fact that piglets squeal and scream simply on being picked up or restrained but this does not mean that the vocalising during tooth clipping does not indicate distress; it is simply another negative experience that is causing vocalisation and attempts at escape; see S.M. Schmid and J. Steinhoff-Wagner, 'Impact of Routine Management Procedures on the Welfare of Suckling Piglets' (2022) 9 *Veterinary Sciences* (1) 32

⁷⁷ *ibid*

⁷⁸ Arthritis has been noted in some groups following tooth clipping but not all – compare, for example, I. Strom 'Arthritis in piglets' (1996) 79 *Dansk Veterinaertidsskrift* 575 and J.M.E. Brown, S.A. Edwards et al, 'Welfare and production implications of teeth clipping and iron injection of piglets in outdoor systems in Scotland' (1996) 27 *Preventive Veterinary Medicine* 95

⁷⁹ Some studies will state that leaving piglets teeth unclipped cannot be recommended in farrowing crate scenarios – for example E. Lewis, A. Boyle et al, 'The effect of two piglet teeth resection procedures on the welfare of sows in farrowing crates. Part 2' (2005) 90 *Applied Animal Behaviour Science* (3-4) 251- whereas others have stated that tooth resection has little overall impact on sow injuries, see M. Gallois, Y Le Cozler and A. Prunier, 'Influence of Tooth Resection in Piglets on Welfare and Performance' (2005) 69 *Preventive Veterinary Medicine* 13

⁸⁰ EFSA Panel on Animal Health and Welfare, Scientific Opinion on Animal health and welfare in fattening pigs in relation to housing and husbandry (2007) *The EFSA Journal* 564:1

*'Pigs need to avoid any environmental impact or pathological condition that causes pain. In pig husbandry, castration, tail-docking, tooth-clipping, nose-ringing, excessive aggression, tail-biting, vulva-biting, are some examples of sources of pain that is acute and perhaps also chronic. Lameness resulting from claw or joint disorders can be associated with serious chronic pain, as can lesions resulting from bad floor quality'*⁸¹. This is a straightforward acknowledgement that the practice of tooth clipping causes pain which is significant because it is a stand-alone statement which is not countered by possible problems associated with piglets being left with intact deciduous teeth. In practice, damage to sows' udders and trauma to litter mates from fighting is the common justification for continuance of routine tooth clipping but whilst damage to sows' udders might remain an issue if piglets teeth remained intact, it does not generally lead to significant lasting damage. If prohibition of tooth clipping was done in conjunction with lower stocking rates per unit, fighting (and consequent injuries) would be significantly reduced. As this thesis has repeatedly found, there are no simple solutions with respect to multi-factorial management systems, but removing sources of severe, acute and chronic pain must be a priority.

The United Kingdom Department for Environment, Food and Rural Affairs (DEFRA) states in its Code of Practice for the Welfare of Pigs that 'tooth reduction can cause short-term pain and may cause long-term pain if teeth are fractured due to poor technique. Local infection and joint infection can result'⁸². The American Veterinary Medical Association has also stated that 'clipping has been shown to increase behaviours suggestive of discomfort such as "chomping....Piglets whose teeth have been clipped may experience more gum and tongue injuries and potentially painful inflammation or abscesses of the teeth'⁸³. It can be argued, therefore, that evidence of pain resulting from tooth clipping is beyond reasonable doubt.

(4) Justification for the policy in light of Article 13

Since the 2007 Treaty of Lisbon, animals have been identified as sentient by the European Union. In 2013, a systematic review of scientific literature – over 2500 peer-reviewed papers on the concept of sentience in animals⁸⁴ – found that there was

⁸¹ *ibid*, 92

⁸² DEFRA Code of Practice for the Welfare of Pigs (2020) 37

⁸³ AVMA (n 64) Detriments

⁸⁴ H. Proctor, G. Carder and A. Cornish, 'Searching for animal sentience: A systematic review of the scientific literature' (2013) 3 *Animals* (3) 882

'overwhelming evidence' that animals are sentient. Therefore given the sentient nature of pigs, acknowledged in European law, and evidence beyond reasonable doubt that the surgical mutilation of tooth-clipping causes pain, this thesis argues that prohibition of this practice is necessary and warranted, in order to ensure EU pig welfare legislation is consistent with the provisions contained within Article 13.

5.3.5 Beak Trimming

Within intensive chicken production systems (laying hens and broiler chicken units), birds are housed in large numbers in close proximity to one another, at high stocking densities, whether in enriched cages for layers or sheds for broilers⁸⁵. Given that the average number of chickens in a European commercial holding is between forty three thousand and one hundred thousand birds⁸⁶ and that European enriched cages for layers each hold between forty and eighty hens⁸⁷, individual space for movement is limited and therefore behaviours such as feather pecking, fighting and hen-cannibalism can arise⁸⁸. As a result of these high stocking densities, producers have introduced various mechanisms to reduce the incidence, and minimise the effects of, fighting within flocks, and beak trimming is one such measure.

Two key pieces of contemporary EU legislation address surgical mutilations in chickens and (in line with provisions for slaughter and tooth clipping) prohibit routine beak trimming but permit derogations. The Directive on the protection of chickens kept for meat production (hereafter the Broiler Directive)⁸⁹ states that *'all surgical interventions carried out for reasons other than therapeutic or diagnostic purposes which result in damage to or the loss of a sensitive part of the body or the alteration of bone structure shall be prohibited. However, beak trimming may be authorised by Member States when other measures to prevent feather pecking and cannibalism are*

⁸⁵ For discussion of some of the modern systems for laying hens see V. Gerzilov, V. Datkova et al, 'Effect of Poultry Housing Systems on Egg Production' (2012) 18 Bulgarian Journal of Agricultural Science (6) 953 and for broiler production see A. El-Deek and K. El-Sabrou, 'Behaviour and meat quality of chicken under different housing systems' (2018) 75 World's Poultry Science Journal (1) 105

⁸⁶ European Parliamentary Research Service, M. Augère-Granier, 'The EU poultry meat and egg sector: main features, challenges and prospects' (2019) 5

⁸⁷ National Farmers Union, 'Enriched colony cages – the facts'

<<https://www.nfuonline.com/archive?treeid=65408>> accessed 20 March 2022

⁸⁸ H.N. Phillips and B.J. Heins, 'Effects of Outdoor Stocking Density on Growth, Feather Damage and Behavior of Slow-Growing Free-Range Broilers' (2021) 11 Animals (3) 668

⁸⁹ Council Directive 2007/43/EC of 28 June 2007 laying down minimum rules for the protection of chickens kept for meat production (Text with EEA relevance) (2007) OJ L 182/19

*exhausted*⁹⁰. The Directive on the protection of laying hens⁹¹ (hereafter the Laying Hens Directive) also prohibits mutilations, providing instruction that ‘*In order to prevent feather pecking and cannibalism, however, the Member States may authorise beak trimming*’⁹².

As shall be seen, beak trimming is associated with numerous negative welfare consequences and therefore Pathway One can also be applied to this practice, facilitating prohibition.

(1) Identification of a single input factor (management practice)

Beak trimming (partial beak amputation) is a single, identifiable input factor (management practice) and is the act of removing the sharp upper and lower tips of a bird’s beak, with the aim of reducing damage to skin and feathers of other birds if pecking or fighting ensues, as well as preventing mortality and cannibalism⁹³. At present, two principal methods of beak trimming are utilised with the EU – beak trimming is generally still carried out routinely, despite the provisions contained in the relevant Directives⁹⁴. The first method is hot blade trimming, which involves removal of the beak tips with cautery of the stumps. The second method, infra-red beak treatment, affects the outer beak tissue (via heat from an infra-red lamp) and following this treatment, over time, the beak tips soften⁹⁵, reducing their effectiveness in causing damage during fighting.

Within the EU, the process of beak trimming traditionally involved removal of a third to half of the upper mandible and in some units approximately the same proportion of the lower beak was also removed, using the hot blade method⁹⁶. Many chicken

⁹⁰ *ibid*, Annex 1 [12]

⁹¹ Council Directive 1999/74/EC of 19 July 1999 laying down minimum standards for the protection of laying hens (1999) OJ L 203/53

⁹² *ibid*, Annex (8)

⁹³ C. Nicol, ‘Beak Trimming: Science and Policy’ in J.A. Mench (ed) *Advances in Poultry Welfare* (Elsevier 2018) 176

⁹⁴ See DEFRA, the United Kingdom Beak Trimming Action Group Review (2015)

<<https://www.gov.uk/government/publications/beak-trimming-action-group-review>> accessed 22 March 2022

⁹⁵ P.C. Glatz and G. Underwood, ‘Current methods and techniques of beak trimming laying hens, welfare issues and alternative approaches’ (2020) 61 *Animal Production Science* (10) 968

⁹⁶ EFSA Panel on Animal Health and Welfare, ‘Opinion on a request from the Commission related to the welfare aspects of various systems of keeping laying hens’ (2005) 197 *The EFSA Journal* 1, 97

producers routinely utilise hot-blade beak trimming in day old chicks or pullets (young birds aged from 1 to 8 weeks of age), despite routine mutilation being prohibited.

There is considerable variation between Member States and other European countries with respect to the technique involved. For example, in the UK no more than one third of the beak can be removed. By contrast, Sweden, Norway and Finland banned beak trimming many years ago while the procedure is currently being reassessed by other countries due to the welfare concerns associated with the practice⁹⁷.

(2) Identification of hazards to welfare with observed ABMs indicating welfare compromise

In their Opinion on chicken welfare regarding management and housing of grand-parent and parent breeding stocks of chickens, the AHAW Panel adopted a similar approach to that taken with tooth clipping in piglets, i.e. the practice of tooth clipping was identified as a hazard in its own right⁹⁸. Notably, the Panel also included an expert opinion score for the intensity of the hazard to welfare, and beak trimming was deemed to score 4/5, with 5 representing the maximum intensity of hazard⁹⁹. As seen with tooth clipping, some of the hazards associated with beak trimming are identified by histological examination of tissues whilst others will be grossly detectable via visual examination.

Hazards

Morphological abnormalities¹⁰⁰ (beak structure pathologies) including but not limited to:

- ✓ Misalignment of upper and lower beak, with or without crossing of structures
- ✓ Jagged or sharp, deformed beak ends
- ✓ Permanently open beak

⁹⁷ *ibid*, 98

⁹⁸ EFSA Panel on Animal Health and Welfare, 'Scientific Opinion on welfare aspects of the management and housing of the grand-parent and parent stocks' (2010) 8 *The EFSA Journal* 7:1667, 42

⁹⁹ *ibid*, 42, Table 1

¹⁰⁰ One study of 25 flocks found morphological abnormalities at occurrence rates varying from 0.48% to 46.6% of the flocks – Y. Yamauchi, S. Yoshida et al, 'Morphologically abnormal beaks observed in chickens that were beak-trimmed at young ages' (2017) 79 *Journal of Veterinary Medical Science* 9

- ✓ Uneven growth on the upper or lower beak¹⁰¹

In pullets, i.e. birds not beak trimmed at one to ten days of age, formation of neuromas is seen. When a more developed beak is trimmed, the remaining beak tip underneath the epidermal layer forms scar tissue and over a period of days, damaged nerves regrow but in disorganised manner, a process often seen in nerve cells after an injury¹⁰². Nerve fibres continue to grow but they cannot reach normal tissue to innervate so instead grow back into themselves to form a bundle or complex neuroma. Studies have identified abnormal activity within this type of neuroma complex¹⁰³, and this kind of spontaneous and irregular discharge of nerve impulses is implicated in stump pain, post-amputation¹⁰⁴.

ABMs

- ✓ During trimming and for a protracted period after trimming, increased heart rate – fear, distress and pain¹⁰⁵
- ✓ Struggling and vocalising during the beak trimming process – fear, stress, pain¹⁰⁶
- ✓ Reduced food intake for several days post-trimming, reduced movement, increased sleeping and abnormal pecking behaviour – suggestive of pain; also indicates issues related to abnormal prehension of food¹⁰⁷ caused by alteration to the normal anatomy of the beak

¹⁰¹ *ibid.* For a discussion of morphological effects on beak growth and appearance, following infra-red and hot blade techniques, see R. M. Marchant-Forde and H.W. Cheng, 'Different effects of infrared and one-half hot blade beak trimming on beak topography and growth' (2010) 89 *Poultry Science* 12, 2559

¹⁰² M.J. Gentle, 'Pain issues in Poultry' (2011) 135 *Applied Animal Behaviour Science* 252, 253

¹⁰³ J. Breward and M.J. Gentle, 'Neuroma formation and abnormal afferent nerve discharges after partial beak amputation (beak trimming) in poultry (1985) 41 *Experientia* 1132

¹⁰⁴ Z. Seltzer, Y. Paeon, A. Elson and R. Ginzburg, 'Neuropathic pain behaviour in rats depends on the afferent input from nerve-end neuroma including histamine-sensitive C-fibres' (1991) 128 *Neuroscience Letters* 203

¹⁰⁵ P.C. Glatz, 'Effects of beak trimming and restraint on heart rate, food intake, body weight and egg production in hens' (1987) 28 *British Poultry Science* 4

¹⁰⁶ Australian Poultry Co-operative Research Centre, P. Glatz and G. Hinch, 'Minimise cannibalism using innovative beak trimming methods' (2008) 4. There is minimal literature or data from observations of poultry during beak trimming – to date, most studies have focused on the period after beak trimming

¹⁰⁷ Glatz (n 105)

(3) Evidence that data supportive of welfare compromise is beyond reasonable doubt, including specialist opinion

Although it is now generally accepted that infra-red trimming is slightly less damaging to welfare than hot-blade trimming¹⁰⁸, research carried out in recent years has demonstrated that both procedures involve significant pain to birds; infra-red beak trimming is associated with acute pain and a short period of post-trimming pain, whilst hot blade trimming is associated with acute and protracted chronic pain¹⁰⁹. Some studies in chickens have suggested a lack of observable pain response in the period immediately after beak trimming, but in human patients, a similar pain-free interval has been noted after full thickness burns¹¹⁰ and therefore, whilst the exact duration and timing of pain may vary, it is undeniable that the procedure can be directly linked to pain and distress. Neuroma formation is observed where older birds have their beaks trimmed whereas this problem has not been observed in beak-trimmed chicks under ten days of age; the abnormal, reactive nature of this type of nerve tissue mean birds will experience chronic pain in the beak area¹¹¹.

In addition to causing pain, beak trimming has also been found to detrimentally affect birds' natural preening mechanisms¹¹² and to impair the function of beak mechano- and magnetoreceptors, negatively affecting eating and pecking behaviours¹¹³. The EFSA has confirmed that birds with soft tissue lesions or integument (surface tissue) damage will experience '*negative affective states such as pain, discomfort and/or distress*'¹¹⁴ and states that these negative welfare consequences 'may result from mutilation practices (e.g. beak trimming...)'¹¹⁵.

The AHAW Panel summarises beak trimming as follows: '*the procedure may involve acute distress from handling, and pain and distress from performing the beak trimming*

¹⁰⁸ EFSA AHAW Opinion (n 95) 26

¹⁰⁹ Gentle (n 99) 254

¹¹⁰ *ibid*, see Robertson, K.E., Cross, P.I., Terry, J.C., 1985. The crucial first days' (1985) 85 American Journal of Nursing 30

¹¹¹ EFSA AHAW Opinion (n 95) 26

¹¹² D.W. Van Liere, 'Responsiveness to a novel preening stimulus long after partial beak amputation (beak trimming) in laying hens' (1995) 34 Behavioural Processes 169

¹¹³ R. Friere, M.A. Eastwood and M. Joyce, 'Minor beak trimming in chickens leads to loss of mechanoreception and magnetoreception' (2011) 89 Journal of Animal Science (4) 1201

¹¹⁴ EFSA, Event Report, 'The use of animal-based measures at slaughter for assessing the welfare of broiler chicken on farm: scientific NCPs Network exercise' (2021) EN-7075, Annex B, 20

¹¹⁵ *ibid*

*procedure. In addition, it deprives the bird from important sensory feedback from its beak. It can have harmful neuro-anatomical consequences: although tissue damage is repaired the sensory receptors are not replaced, and neuromas may be formed and may become a source of chronic pain. However, there is some evidence that if the procedure is performed in young birds (less than 10 days of age) neuromas are not formed*¹¹⁶. This statement summarises the key welfare consequences associated with beak trimming and confirms the presence of acute and chronic pain.

The British Veterinary Association and British Veterinary Poultry Association have stated that *'the beak is a sensory organ, so the act of beak trimming may cause pain, suffering and distress. It should therefore only be considered as a last resort, once all other intervention strategies have been attempted and following veterinary advice*¹¹⁷. They have also stated that *'retailers, governments, industry and key stakeholders must work together in moving towards a poultry industry that no longer finds a need to routinely treat beaks as a management solution*¹¹⁸. The American Veterinary Medical Association has commented that *'Although younger birds that are beak trimmed experience less neuroma formation and have relatively normal oral behaviours, all methods of beak-trimming induce pain and physiologic stress in birds. Pain and physiological stress resulting from beak-trimming should be minimized to provide for the overall welfare of the animal*¹¹⁹.

Given the specialist opinions on the available scientific data, above, it is asserted that evidence exists beyond reasonable doubt that pain (acute and chronic) is associated with beak trimming.

(4) Justification for the policy in light of Article 13

As explained with reference to tooth clipping in pigs, the European Union has accepted the sentience of animals and their ability to experience pain, fear and distress. With this in mind, the overwhelming evidence and consistent expert opinion confirming that

¹¹⁶ EFSA AHAW Opinion (n 98) 26

¹¹⁷ British Veterinary Association, Policy Statement, 'BVA and BVPA policy position on feather pecking in laying hens' July 2019 < <https://www.bva.co.uk/media/3696/bva-and-bvpa-policy-position-on-feather-pecking-in-laying-hens.pdf>> accessed 22 March 2022

¹¹⁸ *ibid*, recommendation 3

¹¹⁹ American Veterinary Medical Association, Literature Review, Welfare Implications of Beak Trimming <<https://www.avma.org/resources-tools/literature-reviews/welfare-implications-beak-trimming>> accessed 22 March 2022

beak trimming is a painful procedure would support a policy decision to ban this painful practice. In 21st century Europe, performing surgical mutilations such as beak trimming without analgesia or anaesthesia cannot be justified and therefore this thesis argues that there is ample justification to warrant this management practice.

5.3.6 Conclusions: Pathway One

The Slaughter Directive demonstrated that the Commission is able to take action to protect farm animals where evidence exists beyond reasonable doubt that their welfare is compromised by an identifiable input (management) factor demonstrably linked to negative animal-based measures that cause pain and distress. Although the threshold of proof required for scientific evidence to influence policy change has never been stated, this thesis argues that evidence beyond reasonable doubt is an appropriate threshold to enable policy-makers to form conclusions and take steps to protect welfare on the basis of the available data.

Proposed Pathway One sets out four steps for logical assessment of individual management practices associated with pain, which policy makers could follow when considering welfare legislation: identification of an input (management) factor; hazards and negative animal-based measures associated with that factor which cause pain (acute or chronic); confirmation that the available evidence is beyond reasonable doubt, supported by expert veterinary or scientific opinion; and consideration of the practice in light of Article 13 and animal sentience.

In acting to prohibit practices such as non-stun slaughter and surgical mutilations which cause pain, fear and distress, the Commission's decision to include derogations allowing these hazards to continue under certain circumstances is contradictory and confusing. It can be argued that this lack of consistency is now more challenging to justify, given the presence of Article 13, which places sentience at the core of EU policy pertaining to animals. Derogations are discussed in the concluding chapter of this thesis.

Where farming practices have been demonstrated by scientific research across decades to cause acute and chronic pain, it is unconscionable to be in possession of this data and to allow these practices to continue. Enshrining sentience in law is of little practical value if painful non-stun slaughter and surgical mutilations without anaesthesia or analgesia are permitted to continue.

Although this sub-chapter focused on slaughter, tooth clipping and beak trimming, Pathway One and the steps contained therein could also be applied to numerous other painful practices including tail docking in pigs, claw trimming in chickens and gavage feeding in foie gras production.

Whilst it is important to acknowledge that, to date, we have limited understanding of the psychological or emotional experiences of animal subjects, it should be recognised that in human medicine there are also many areas of psychology and behaviour that remain poorly understood. However, variations in human responses or incomplete data do not preclude action in medicine being taken to prevent harm to people where physical pain may be a hazard. Our limited understanding of the psychological aspect of pain in animals should not be permitted to negate the large amount of knowledge we have about physical pain – as one notable research organisation has cautioned, we should not treat absence of evidence as evidence of absence¹²⁰. Pain, as a process, is vastly complex, yet over the last few decades scientists have made great advances in understanding the physiological, cellular and chemical nature of pain. Animal models are used in research to replicate human visceral, neuropathic and inflammatory pain¹²¹ and therefore there can be no doubt that their physical experience of pain is very similar if not identical to that of humans. We may never be able to fully identify and document the effects that surgical mutilations have on animals but this thesis argues that we already have access to an immense body of evidence that demonstrates, beyond reasonable doubt, the link between surgical mutilations and pain; this evidence can – and should - be utilised more effectively to support stronger animal welfare policy-making.

If routine surgical mutilations are to be prohibited, the underlying justifications for their current use must be addressed. Producers argue that tooth clipping and beak trimming are necessary to minimise trauma to others in the group. As explained earlier, in most cases, the pain associated with a wound from fighting or a cut on a sow's udder should not cause anything close to the levels of pain associated with fractured teeth; a similar comparison can be made with respect to pain from plucked feathers or wounds versus

¹²⁰ National Research Council (US) Committee on Recognition and Alleviation of Pain in Laboratory Animals, *Recognition and Alleviation of Pain in Laboratory Animals* (National Academies Press 2009) 23

¹²¹ N.E. Burma, H. Leduc-Pessah, C.Y. Fan and T. Trang, 'Animal Models of Chronic Pain: Advances and Challenges for Clinical Translation' (2017) 95 *Journal of Neuroscience Research* 1242

neuroma formation in beaks. Therefore, selection of the ‘lesser of two evils’ would be reasonable justification to outlaw routine mutilations. Secondly, whilst animals and birds will always engage in territorial behaviours, resulting in some levels of pain or discomfort, research has demonstrated time and again that negative behaviours are associated within intensive systems due to high stocking density; this means a lack of space, inability to perform natural behaviours and enforced, constant interaction with others in the group. The thesis thus proposes a second pathway, to address intensive husbandry systems demonstrated to be detrimental to welfare and justify a policy shift away from intensive farming.

5.4 Proposed Pathway Two: where evidence exists, beyond reasonable doubt, of serious welfare compromises arising from a husbandry regime that incorporates multiple input factors, and where absolute understanding of outcome factors is likely unattainable, legislation could be introduced on the basis of the precautionary principle.

AHAW Conclusion Two: there is evidence of welfare compromise but a direct link between individual management factors and animal outcomes has not been fully established, meaning more research is required before introduction of measures to protect welfare can be advised. This is the most commonly reached AHAW conclusion.

AHAW Conclusion Three: at present there is a lack of knowledge and understanding in a particular area of welfare science meaning advice cannot yet be provided by the Panel and measures are not, therefore, introduced with respect to protection of welfare

Pathway One has demonstrated that it would be possible to utilise animal welfare research data as the basis for policy change where evidence exists, beyond reasonable doubt, that a single management factor is a direct cause of acute or chronic pain, suffering and welfare compromise. As explained in Chapter Four, however, many husbandry systems expose animals to simultaneous input factors – for example, management choices with respect to a particular model of animal housing will incorporate surface area, stocking density, ventilation, temperature, humidity, light and provision of food/ water. When animals in any intensive housing system are observed,

they often display various animal-based measures that indicate serious negative welfare outcomes, but these cannot generally be definitively linked to a single management practice. Laying hens in enriched cage systems will usually show signs of feather plucking, inter-group aggression, abnormal pecking behaviour and cannibalism¹²², but it is not possible to definitively identify a single management factor that is responsible for the negative welfare outcomes. If researchers were able to clearly establish the exact consequence of each management choice and its precise effects on animals to policy-makers, then welfare law would be a simple process; unfortunately this is not the nature of science or animal behaviour. As Pathway One demonstrated, under some circumstances, establishing a causative link between a single input factor and the outcome factor of pain is straightforward; regrettably this option is not often available to researchers and therefore a pragmatic alternative approach is necessary.

Given the limitations detailed, above, it is argued that AHAW Conclusions Two and Three simply reflect the nature of scientific enterprise i.e. that scientific research has limitations and definitive evidence can seldom be provided to policymakers. Animal welfare science is not unique in this sense – uncertainty is present in every scientific field, yet the European Union has managed to overcome the impasse between observed harm and uncertain causation, creating policy based on scientific research for decades. It is appropriate, therefore, to consider how EU legislation was created to prevent harm to human beings or the environment in the absence of scientific certainty, given that, in common with animal welfare, human health and the environment are deemed to be worthy of protection under the fundamental principles of the TFEU¹²³.

This sub-chapter explores the precautionary principle, the mechanism underpinning EU protection of public health and the environment, facilitating steps to prevent harm in the absence of definitive scientific proof. The history of the principle and its incorporation by the EU in their policymaking is discussed first, along with an example

¹²² EFSA AHAW Panel Opinion on Welfare Aspects of Laying Hens (n 91) 65. See also B. Tainika and A. Şekeroğlu, 'Effect of Production Systems for Laying Hens on Hen Welfare' (2020) 8 Turkish Journal of Agriculture – Food Science and Technology (1) 239

¹²³ Consolidated version of the Treaty on the Functioning of the European Union [2008] OJ C115/47 (TFEU): TFEU Articles 9 and 11 requires human health and environmental protection be integrated in the Union's policies and activities

of its early use, in the prohibition of growth hormones in beef production. The EU's ban on Neonicotinoid insecticide use is then considered, which examines the role of the EFSA, the PPR (Plant Protection and Residues) Panel, their approach to the relevant science and the Commission's application of the precautionary principle to support legislating on the basis of EFSA findings. CJEU case law relevant to the scope principle is demonstrated as supportive of the potential application of the principle in animal welfare situations. A second pathway is suggested to harness the principle for welfare policymaking, on the basis of AHAW conclusions Two and Three; this Pathway Two is applied in the context of a proposed ban on enriched cages for laying hens.

5.4.1 The Precautionary Principle: Definition and History

Despite being regularly cited by policymakers, and employed in various international treaties, the precautionary principle has been defined in different ways with no single definition available; however, it can be summarised as follows:

*'When an activity raises threats of serious or irreversible harm to human health or the environment, precautionary measures that prevent the possibility of harm (for example, moratorium, prohibition) shall be taken even if the causal link between the activity and the possible harm has not been proven or the causal link is weak and the harm is unlikely to occur.'*¹²⁴

The concept of taking precautionary steps to prevent harm is hardly novel; in everyday society, citizens benefit from 'erring on the side of caution' or 'looking before they leap'¹²⁵. However, in the field of policymaking, the precautionary principle has developed not only to prevent harm but also as a mechanism to drive legislative and social change¹²⁶. The principle is probably most widely known for its role in environmental legislation - often applied where risk of environmental damage has been found to be scientifically tenable yet where the degree of risk has not yet been

¹²⁴ S. Holm and J. Harris, 'Precautionary principle stifles discovery' (1999) 400 Nature 398

¹²⁵ Julian Morris, 'Defining the Precautionary Principle' in Julian Morris (ed) *Rethinking Risk and The Precautionary Principle* (Butterworth-Heinemann 2002) 1

¹²⁶ C.J. Pereira Di Salvo and L. Raymond, 'Defining the precautionary principle: an empirical analysis of elite discourse' (2010) 19 Environmental Politics (1) 86

conclusively demonstrated¹²⁷. The classic example in this scenario is the theory of climate change¹²⁸. That said, although the principle is widely acknowledged for its role in environmental policy, it has been utilised in the context of public health protection albeit without being expressly mentioned in Article 168 TFEU as it is in Article 191 TFEU. In European and at International level, a precautionary approach has been seen with respect to various scenarios including the use of hormones in beef¹²⁹, which is discussed in detail, below. It is important to note that, according to the widely accepted definition, above, measures to prevent harm should be taken *even when* evidence for a link between an activity and harm is weak or unproven; however, there has been considerable disagreement with respect to the potential level of risk¹³⁰ which will lead to engagement of the principle and this is discussed later in the sub-chapter.

Historically, the precautionary principle (hereafter 'PP') can be traced back to the 1970s, as one of the founding principles of environmental policy in West Germany. Known as 'Vorsorgeprinzip', the principle (which means foresight planning) declared that danger and risk were different. It advised that governments should take appropriate steps to prevent danger, and in the case of risks, analyse the relevant risk factors and, if deemed reasonable, instruct preventative steps¹³¹. Various versions of the principle were initially utilised in the justification of environmental protection policies, such as measures to prevent global warming, acid rain and North Sea

¹²⁷ M.C. Calver, J. Grayson, M. Lilith and C.R. Dickman, 'Applying the precautionary principle to the issue of impacts by pet cats on urban wildlife' (2011) 144 *Biological Conservation* (6) 1895-1901, 1901

¹²⁸ For decades scientists have presented evidence supportive of climate change or 'global warming' and despite opposition from many different actors, citing economic, social or financial concerns, legislators have erred on the side of caution and chosen to take precautionary action. See G. Heal and B. Kriström, 'Uncertainty and Climate Change' (2002) 22 *Environmental and Resource Economics* 3 and for a fascinating discussion of the difficulties associated with demonstrating the causative link between emissions and climate change outcomes, see L.A. Omuko, 'Applying the Precautionary Principle to Address the "Proof Problem" in Climate Change Litigation' (2016) 21 *Tilburg Law Review* (1) 52

¹²⁹ See sub-chapter 5.4.3 for a discussion of the European ban on hormones in beef production and the subsequent WTO dispute.

¹³⁰ See, for example Case T-13/99 *Pfizer Animal Health SA v Council of the European Union* [2002] ECR II-03305; in this case which concerned a ban on antibiotics in animal feed to protect human health, Pfizer, the drug manufacturer claimed that risk assessment and management had not been appropriately carried out and therefore that the precautionary principle had been misapplied.

¹³¹ Morris (n 125) 1. For a short history of the Precautionary Principle see J.K. Aronson, 'When I use a word . . . The Precautionary Principle: a brief history' (2021) 375 *British Medical Journal* 3095

pollution¹³². The endeavours to enforce protection of the North Sea were, in fact, the vehicle for the introduction of the PP into the international sphere¹³³.

Now incorporated into various international treaties and advocated by numerous official bodies¹³⁴, the most significant time in the development of the PP was in 1992, when the Rio Declaration on Environment and Development adopted the concept in the form of Principle 15:

*'In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.'*¹³⁵

In recent years, European citizens, NGOs and charities have increasingly made appeals for the PP to be applied in various areas of legislation¹³⁶, primarily to protect human health; this has been attributed to the development of a risk-averse culture in which activists have played a significant role in promoting the idealistic (unachievable) goal of a zero-risk society¹³⁷. The desire to eliminate all risk has permeated every area of society – from medicine and childcare to transport and food safety – and risk

¹³² A. Jordan and T. O'Riordan, 'The precautionary principle in contemporary environmental policy and politics'. In: C. Raffensperger and J.A. Tickner (eds) *Protecting public health and the environment: implementing the precautionary principle*. (Island Press 1999) 15. For detailed discussion of the precautionary approach to marine environmental issues, see M. MacGarvin, 'Precaution, Science and the Sin of Hubris' in T. O'Riordan and J. Cameron (eds) *Interpreting the Precautionary Principle* (Earthscan 1994) 69

¹³³ C. Petrini and P. Vecchia, 'International Statements and definitions of the precautionary principle', (2002) 21 IEEE Technology and Society Magazine (4) 4, 5. In the Ministerial Declaration of the Second International Conference on the Protection of the North Sea (London, 1987), Section VII, it was stated that in order to protect the North Sea, 'a precautionary approach is necessary which may require action.....even before a causal link has been established by absolutely clear scientific evidence'

¹³⁴ Erik Persson, 'What are the core ideas behind the Precautionary Principle?' (2016) 557-8 *Science of the Total Environment* 134, 135

¹³⁵ Rio Declaration on Environment and Development 1992, United Nations, Principle 15, p.3 <<https://www.jus.uio.no/lm/environmental.development.rio.declaration.1992/portrait.a4.pdf>> accessed 30 March 2022

¹³⁶ European Risk Forum (ERF) Study, 'The Precautionary Principle, Application and Way Forward', Brussels, October 2011, 4. Notably the study mentions animal health or nutrition several times but there is no discussion of animal welfare as an area where the PP could be applied. For a discussion of the PP with respect to sentience in octopods and decapods, see J. Birch, 'Animal sentience and the precautionary principle' (2017) 16 *Animal Sentience* 1

¹³⁷ For examples of this phenomenon, see J. Carlet, J. Fabry, R. Amalberti and L. Degos, 'The "Zero Risk" Concept for Hospital-Acquired Infections: A Risky Business!' (2009) 49 *Clinical Infectious Diseases* (5) 747 and M. Matsuo and H. Yoshikura, "'Zero" in terms of food policy and risk perception' (2014) 45 *Food Policy* 132

governance is a topic of great interest to consumers¹³⁸. However, although the EU has introduced various legislative measures to protect human health and the environment the Commission has stated that society's default position is risk management and control, since situations of zero risk are rare¹³⁹. It has been noted that the European Courts have moved towards the requirement that risk assessment yields evidence of evident or 'concrete' harm in order for legislative intervention via the PP to be justified¹⁴⁰; in addition, the severity of consequences arising from a hazard plays a significant role where the proportionality of a precautionary intervention is sought¹⁴¹. The challenges faced by policymakers when invoking the PP to protect public health, in the face of trade and economic opposition is reflected in the EC Asbestos Case. This case was a WTO environmental dispute which ultimately saw a rejection of Canada's challenge to a French ban in imports containing asbestos and asbestos-like products, with the WTO Panel and Appellate body upholding protection of human health and safety to the level that they deem suitable. Although it is important to note that in the Asbestos Case, the hazard was extreme in terms of risk (meaning that mitigation measures were not realistically available, and therefore this was potentially a scenario more aligned with proposed Pathway One) the situation nonetheless demonstrates the opposition faced by policymakers wishing to invoke the PP.

¹³⁸ European Commission, Special Eurobarometer 238, Risk Issues (2006 Brussels). The survey examined risk perceptions across 25 EU Member States and whilst environmental pollution and car accidents were the most common concern for the citizens who took part, other risks were shown to be significant, including food safety, use of pesticides and chemicals which might affect their health. Notably, across the EU, 60% of respondents stated that they had concerns about the welfare of farmed animals: in Denmark and Sweden this was consumers' top concern.

¹³⁹ Commission of the European Communities, 'Communication from the Commission on the precautionary principle', Brussels 2.2.2000, COM (2000) 1 final

¹⁴⁰ E. Stokes, 'The EC courts' contribution to refining the parameters of precaution' (2008) 11 *Journal of Risk Research* 4. Stokes has commented that the European Judiciary seeks to connect precaution with risk assessment, to facilitate justification of measures taken in the protection of public health or the environment.

¹⁴¹ European Communities – Measures Affecting Asbestos and Asbestos-Containing Products (12 March 2001) WT/DS135/AB/R. For discussion of the dispute and implications for precautionary action, see M-C. Cordonier Segger and M.W. Gehring, 'The WTO and Precaution: Sustainable Development Implications of the WTO Asbestos Dispute' (2003) 15 *Journal of Environmental Law* (3) 289

5.4.2 The Precautionary Principle in the EU – an overview

The EU currently employs the PP in environmental protection and public health scenarios where legislative decisions are required amidst conditions of scientific uncertainty. It is beyond the scope of this thesis to examine in detail the multitude of theories surrounding the definition of ‘risk’, how to assess risk and the identification of hazards – these concepts are the subject of regular debate and discussion; rather, the aim of this chapter is to offer an overview and summary of the approach currently adopted by the EU.

In 1999 a European Council Resolution was passed¹⁴², requesting that the Commission set out detailed guidelines on the application of the PP in EU policy making; published the following year, the Commission’s communication¹⁴³ on the PP set out a general framework for its use, on the basis of input from the Directorates-General of Enterprise, Health and Consumers and the Environment.

The Commission has stated that taking appropriate steps to minimise harm from suspected hazards - in the face of incomplete evidence and, often, controversy - is necessary because the risks to human health or the environment are often potentially very serious and therefore swift decision-making, to mitigate potential damage as far as possible, is essential¹⁴⁴. As a fundamental principle of EU environmental law, the PP is described in Article 191 (2) of the TFEU as follows:

‘Union policy on the environment shall aim at a high level of protection taking into account the diversity of situations in the various regions of the Union. It shall be based on the precautionary principle and on the principles that preventive action should be taken, that environmental damage should as a priority be rectified at source and that the polluter should pay’¹⁴⁵.

¹⁴² Council Resolution of 13th April 1999 on the Precautionary Principle, OJ C 206/1

¹⁴³ European Commission, ‘Communication from the Commission on the Precautionary Principle’ COM (2000) 1 final, Brussels

¹⁴⁴ *ibid* 3

¹⁴⁵ TFEU (n 120) Article 191 (2). These principles are now incorporated into the UK Environment Act 2021 (Eliz. 2 c30)

Following Brexit, the UK government launched a consultation on environmental policy, stating their intention to introduce five key environmental principles with the fifth being the PP, explained as follows: ‘.....where there are threats of serious or irreversible environmental damage, a lack of scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation’¹⁴⁶.

The Commission has confirmed that the PP encapsulates the concept of legislative intervention as being reasonable, even where evidence supportive of a risk is unclear or perhaps speculative in nature, and where costs of regulation may be significant; in other words, they advise a ‘better safe than sorry’ approach¹⁴⁷ and wish to operate at a level of ‘high’ protection. Given the arguably non-committal approach adopted by the EU with respect to animal welfare legislation, the difference in approach here is notable. Whilst the AHAW Panel is in possession of large volumes of data demonstrating serious welfare compromises resulting from intensive production systems, the Commission’s consistent approach has been to seek further information and ‘fill in the gaps’. Despite the knowledge that animals are compromised within these systems (a threshold which greatly exceeds speculation or supposition), the Commission’s approach is to wait for more evidence.

Although the assessment of relative risk and the associated hazards will, to an extent, be a subjective evaluation (influenced to a greater or lesser degree by the aims and priorities of the different stakeholders), animal welfare science is nonetheless able to provide compelling, objective evidence of harm arising from currently permitted intensive production systems. In addition, although risk, in itself, features two variables – the likelihood of a negative outcome and the degree of its significance, or magnitude¹⁴⁸ - it cannot reasonably be argued that environmental scientists are more competent or more experienced in assessing risk to their subjects than welfare

¹⁴⁶ UK Government, Consultation Launched on environmental principles < <https://www.gov.uk/government/news/consultation-launched-on-environmental-principles>> accessed 10 April 2022. For an overview of the advice and approach taken see J. Scott, ‘Legal Aspects of the Precautionary Principle: A British Academy Brexit Briefing’ November 2018 <<https://www.thebritishacademy.ac.uk/documents/309/Legal-Aspects-of-the-Precautionary-Principle.pdf>> accessed 10 April 2022

¹⁴⁷ European Commission (n 143) 4

¹⁴⁸ A. Stirling and D. Gee, ‘Science, Precaution, and Practice’ (2002) 117 Public Health Reports (6) 521

scientists. There seems, therefore, little reason to exclude animal welfare policymaking from the scope of the PP.

Even allowing for the possibility that certain stakeholders may believe animal welfare is less valid or of less importance than human health or environmental protection, Article 13 TFEU has confirmed animal sentience and the EU is now required to pay full regard to the welfare of animals when creating legislation. Animal welfare research has provided a large body of evidence of harm that is as valid as the findings of these other scientific disciplines¹⁴⁹. It is also interesting to note that whilst Article 13 contains a derogation for religious and cultural traditions, the environmental and health principles do not; this means that subjective, cultural views or traditions do not have the same level of influence as they enjoy with respect to animal welfare. Of course, even where such traditions exist, they do not in any way negate the scientific data supportive of harms. In addition, there are individuals within European society who, for religious reasons, refute the existence of climate change, such as the so-called 'climate-creationists'¹⁵⁰, yet in the environmental sphere the Commission is content to adopt a precautionary approach to environmental protection, with no regard for the views of such religious groups. The variable application of derogations represents a further inconsistency in the Commission's approach to the TFEU principles.

With respect to environmental regulation, the Commission has also advised that when the PP is utilised, there is a presupposition that harmful or dangerous effects have been noted but scientific assessment has been unable to sufficiently quantify the risk¹⁵¹. In other words, harm has been identified and, despite the extent of risk not being fully established, preventative legislation is passed. Within the WTO context, the

¹⁴⁹ Animal Welfare Research combines various different disciplines including biology, neuroscience and ecology which are established areas of scientific discovery – M.S. Dawkins 'A user's guide to animal welfare science' (2006) 21 *Trends in Ecology and Evolution* (2) 77. Whilst it can be argued that elements of animal behaviour science are open to subjective interpretation and bias, this can be seen with respect to environmental observations and data interpretation too – T. Rytwinski, S.J. Cooke et al, 'Acting in the face of evidentiary ambiguity, bias, and absence arising from systematic reviews in applied environmental science' (2021) 775 *Science of the Total Environment* 145122

¹⁵⁰ K.L. Marshall, 'Revisiting the Scopes Trial: Young-Earth Creationism, Creation Science, and the Evangelical Denial of Climate Change' (2021) 12 *Religions* 133. See also E.H. Ecklund, C.P. Scheitle et al, 'Examining Links Between Religion, Evolution Views, and Climate Change Skepticism' (2017) 49 *Environment and Behaviour* (9) 985. In Germany, for example, it was estimated that in 2009 approximately 20% of the population holds creationist beliefs: A. Curry, 'Creationist Beliefs Persist in Europe' (2009) 323 *Science* 5918:1159

¹⁵¹ European Commission (n 143) 2

Appellate body has advised that ‘...if a Member chooses to base SPS measures on a risk assessment... it must have made the preliminary determination that the relevant scientific evidence is sufficient to perform a risk assessment’¹⁵². Given that welfare research is generally based on identifying risks and associated hazards, and since numerous hazards to farm animals have been identified in this way, it is difficult to argue that this is not reflected in the welfare policymaking scenario. For example, it is unlikely we will ever be able to establish the precise extent of distress and discomfort a sow feels when confined in a farrowing crate, but multiple harmful effects have been repeatedly observed¹⁵³.

The Commission states that, most importantly, there must be ‘reasonable grounds for concern’ regarding identified risks or hazards; in other words, a risk must be feasible (more than speculation) in order for the PP to be invoked¹⁵⁴. Over the last decade, it has become clear that in European and International law, it is not the intention of the PP to permit action with respect to all possible chances of any hazard; rather, in order to legislate using the principle, there should be (i) an identifiable probability of harm (based on reasonable grounds for concern) and (ii) irreversible or serious risk of anticipated damage¹⁵⁵. Such scenarios undoubtedly exist with respect to risks associated with farm animal intensive production systems.

An additional problem faced by policymakers with respect to risk, is that in the vast majority of scenarios, there will always be a risk-benefit balance to calculate. Virtually no activity is risk-free. Therefore, this is a relationship that requires consideration on a case-by-case basis, because policymakers need to allow for the social and cultural

¹⁵² WTO Analytical Index SPS Agreement (n 35) Article 5 (Jurisprudence) 25

<https://www.wto.org/english/res_e/publications_e/ai17_e/sps_art5_jur.pdf> accessed 10 April 2022

¹⁵³ Farrowing crates are permitted for short periods of use under the current EU Pig Directive (n 52) Annexes I and II. Various animal based measures indicating welfare compromise have been noted in sows, including lameness, skin lesions and abnormal behaviour – see M. Bonde, T. Rousing et al, ‘Associations between lying-down behaviour problems and body condition, limb disorders and skin lesions of lactating sows housed in farrowing crates in commercial sow herds’ (2004) 87 *Livestock Production Science* (2-3) 179. Lack of social contact and inability to express normal movement and behaviour also have effects on sows’ mental state – see J.L. Barnett, P.L. Hemsworth et al, ‘A review of the welfare issues for sows and piglets in relation to housing’ (2001) 52 *Australian Journal of Agricultural Research* (1) 1

¹⁵⁴ European Risk Forum Study (n 136) 4. The Commission brief explains that the PP should not be used inappropriately as a concealed protectionist measure.

¹⁵⁵ A. Trouwborst, ‘Prevention, Precaution, Login and Law: The relationship between the precautionary principle and the preventative principle in International Law and Associated Questions’ (2009) 2 *Erasmus Law Review* (2) 105, 110

expectations of interested stakeholders. For example, in many European cultures there is a desire for artisan food produce, and many dairy products are made with raw, (unpasteurised) milk, which carries potential health risks for consumers. Food safety policymakers must, therefore, balance the desires of the consumer with their overall responsibility for citizen health and safety¹⁵⁶. In general terms, consumers will accept a small degree of risk as long as there is a perceivable or significant benefit – risk with no benefit will not be tolerated¹⁵⁷. Nevertheless, it is important to remember that in human health or food safety scenarios, every citizen has the autonomy to decide whether they wish to take a risk and potentially incur a harm, or not. In the case of animal welfare, the risks involve hazards to the animal but the benefits of an intensive production system are generally enjoyed by the consumer; although animals receive some benefits including shelter, nutrition and veterinary care.

The EU's use of the PP has been described as a 'triumph for the protection of environmental values'¹⁵⁸. In 2002 the Court of First Instance (CFI) described the PP as a 'general principle of community law' to be applied in the areas of 'public health, safety and the environment, by giving precedence to the requirements related to the protection of those interests over economic interests'¹⁵⁹. This is another remarkable statement which is in direct contrast to the CJEU Rulings on animal welfare discussed in Chapter Two; in those cases, the single market and free movement of goods (economic and trade concerns) were prioritised over animal welfare and public morality concerns highlighted by Member States.

The Commission has confirmed that it has utilised the PP in various areas of legislation, including biodiversity management, protection of health and environmental regulation¹⁶⁰. In fact, farm animal production was one of the first legislative scenarios in relation to which the principle was utilised, although public health rather than animal

¹⁵⁶ In the Canary Islands for example, local cheese plays a principal role in the areas cultural heritage - they are the Spanish region with the greatest production and consumption of unpasteurised goat milk cheese. As a result, food hygiene management and safety proves challenging – see C. Carrascosa, R. Millán et al, 'Identification of the risk factors associated with cheese production to implement the hazard analysis and critical control points (HACCP) system on cheese farms' (2016) 99 *Journal of Dairy Science* (4) 2606

¹⁵⁷ European Risk Forum Study (n 136) 7

¹⁵⁸ I. Cheyne, 'Taming the Precautionary Principle in EC Law: Lessons from Waste and GMO Regulation' (2007) 4 *Journal for European Environmental and Planning Law* (6) 468, 469

¹⁵⁹ Joined Cases T-74/00, T-76/00, T-83/00 to T-85/00, T-132/00, T-137/00 and T-141/00, *Artogodan GmbH and others v Commission of the European Communities* [2002] ECR II-04945 para.184

¹⁶⁰ European Commission (n 143) 4

welfare was the motivating factor for policy change. The following discussion of the EU beef hormones ban demonstrates the application of a precautionary approach in an area of public concern, where scientific certainty was not established.

5.4.3 An early use of the Precautionary Principle: the European Union ban on growth hormones in meat production

One of the earliest applications of the PP in the European Union was, interestingly, in the field of food safety, specifically with respect to the use of hormones in beef cattle. Although the focus in this case was human health (and the potential for hormones administered to farm animals to cause damage to meat eaters) the scenario inevitably concerned animal health since these hormones were being administered to cattle. The administration of hormones enables faster growth of an animal and reduces the volume of food intake required to achieve target weight, as well as improve meat quality¹⁶¹. From the 1950s, in the United States and the United Kingdom, two hormones (diethylstilboestrol (DES) and hexoestrol) were administered to beef cattle, either via implants placed under the animal's skin or provided as a dietary additive. On average, these substances enabled increases of 10-15% in daily liveweight gains and feed conversion efficiency as well as improving the ratio of lean: fat meat¹⁶².

Described as 'the first significant EU consumer or environmental regulation more risk averse or stringent than its American counterparts'¹⁶³, the European Commission's 1985 complete ban¹⁶⁴ on the use of growth hormones in production animals arose largely due to public concerns surrounding the possible adverse effects of these hormones on human health. In fact, although citizens and welfare organisations had voiced concerns about intensive agricultural production since the 1960s, this was

¹⁶¹ Use of hormones has been trialled since the 1950s in the USA, for an early study of their application see W.E. Dinusson, F.N. Andrews and W.M. Beeson, 'The effects of stilbestrol, testosterone, thyroid alteration and spaying on the growth and fattening of beef heifers' (1950) 9 *Journal of Animal Science* (3) 321. See also T.D. Burgess and G.E. Lamming, 'The effect of diethylstilboestrol, hexoestrol and testosterone on the growth rate and carcass quality of fattening beef steers' (1960) 2 *Animal Science* (1) 93 and for a more recent study, see D.D. Itana and A. Duguma, 'The Role and Impacts of Growth Hormones in Maximizing Animal Production- A review' (2021) 9 *Turkish Journal of Agriculture – Food Science and Technology* (6) 975

¹⁶² F.A.O., Weiert Velle, 'The Use of Hormones in Animal Production', F.A.O. Animal Health and Production Paper 31 (1982)

¹⁶³ D. Vogel, 'The hare and the tortoise revisited: The new politics of consumer and environmental regulation in Europe' (2003) 33 *British Journal of Political Science* (4) 557, 562

¹⁶⁴ Council Directive 85/649/EEC of 31 December 1985 prohibiting the use in livestock farming of certain substances having a hormonal action OJ L 382/228

arguably the first time that public morality can be viewed as having a direct effect on European Agriculture. Italy was at the centre of debate; during the late 1970s and early 1980s, the Italian press reported on alleged black market sales of hormones for use in agriculture and highlighted concerns that adolescents who had consumed French veal, which contained traces of the hormone diethylstilboestrol (DES), had developed various medical disorders including abnormal genital development and irregular hormonal activity¹⁶⁵. The Italian state had banned the use of DES ten years earlier (1961)¹⁶⁶ and took immediate steps to limit imports of veal from other member states¹⁶⁷. As a result, consumer groups across Europe then began a campaign to end the use of all hormones in food production animals. In light of this public pressure, the European Council proposed the creation of legislation to prohibit the use of hormone products except for therapeutic reasons¹⁶⁸ and in July 1981 placed an immediate ban on certain growth hormones¹⁶⁹. Directive 81/602 stated '*[w]hereas, due to the residues that they leave in meat, certain substances with a thyrostatic, oestrogenic, androgenic or gestagenic action **may**¹⁷⁰ be dangerous for consumers.....*'¹⁷¹. In line with the PP, legislative action was taken without scientific certainty. Further studies were also proposed within the directive to investigate an additional five hormones, not subject to the ban at that stage¹⁷². The Commission was asked to provide a report (by July 1984) on the nature of these hormones, setting out the relevant scientific knowledge and understanding; Professor G. E. Lamming chaired the Scientific Group on Anabolic Agents in Animal Production, tasked with discovering whether the use of the five

¹⁶⁵ S. Princen, 'EC Compliance with WTO Law: The Interplay of Law and Politics' (2004) 15 *European Journal of International Law* (3) 555, 566

¹⁶⁶ Denmark had banned the use of such hormones in 1963 and Germany since 1977 but the Netherlands, France and the United Kingdom allowed most hormones to be administered to beef cattle for growth production. See A. Passantino, '*Steroid Hormones in Food Producing Animals: Regulatory Situation in Europe*' in Carlos C. Perez-Marin (ed) *A Bird's-eye View of Veterinary Medicine* (InTech 2012) 38

¹⁶⁷ Morris (n 125) 2

¹⁶⁸ Commission of the European Communities, Proposal for a Council Regulation (EEC) Concerning the Uses of Substances with a Hormonal Action and those having a Thyrostatic Action in Domestic Animals, COM (80) 614, 31 October 1980, Brussels

¹⁶⁹ Council Directive 81/602 of 31 July 1981 concerning the prohibition of certain substances having a hormonal action and of any substances having a thyrostatic action OJ L 222/32

¹⁷⁰ Bold emphasis added – the key element here being that at the time of legislating, the Commission was not in possession of definitive proof that the hormones were damaging to human health, hence the use of the PP

¹⁷¹ *ibid*, preamble

¹⁷² Oestradiol 17 β , Progesterone, Testosterone, Trenbolone and Zeranol

hormones still in use for fattening livestock presented an adverse effect on health¹⁷³. Despite the working group concluding that oestradiol, testosterone and progesterone would not cause harm to human health if used appropriately as growth hormones in production animals, and that trenbolone and zeranol would need further research and investigation with respect to their safety¹⁷⁴, the Commission took the decision to implement a total ban on all hormones for growth promotion from January 1988. This was a notable – and controversial - decision, not least because three of the European Union’s own scientific committees - Food, Veterinary and Animal Nutrition supported the findings of the Lamming Group, i.e. that the hormones did not identify a risk of harm to human health. In addition, the OIE scientific symposium on animal production and anabolic usage came to the conclusion that *‘hormones generally pose no cancer risk where exposure is to levels below those required for detectable hormonal activity.....test data for trenbolone and zeranol suggest that these agents.....are neither mutagenic nor clastogenic’*¹⁷⁵.

WTO Dispute

Unsurprisingly, given the increasing demand for meat production worldwide and the large amount of cross-territorial trade, the EU directive was subject to significant opposition and led to a litigation battle lasting almost twenty years. The United States first contested the hormone ban via the General Agreement on Tariffs and Trade (GATT) dispute settlement process in 1986 by way of the Tokyo Round’s Technical Barriers to Trade Agreement whilst threatening retaliatory tariffs against certain imported EU goods¹⁷⁶. The EU responded by preventing creation of a panel for settlement of the issue and the US instituted retaliatory tariffs, which failed to alter the position of the EU¹⁷⁷. In 1996, the US approached the World Trade Organization to

¹⁷³ European Commission, Report of the Scientific Veterinary Committee, the Scientific Committee for Animal Nutrition and the Scientific Committee for Food on the basis of the report of the scientific group on anabolic agents in animal production, EUR 8913 (1984)

¹⁷⁴ G.E. Lamming, G. Ballarini, E.E. Baulieu et al, ‘Scientific Report on Anabolic Agents in Animal Production’ (1987) 121 *The Veterinary Record* (17) 389

¹⁷⁵ ‘Anabolics in Animal Production, Public health aspects, analytical methods and regulation’, Symposium at OIE, Paris 15-17 February 1983 (OIE, 1983) Mutagenic refers to alteration of the DNA in a cell and clastogenic to disruption or breakages of sections of genes

¹⁷⁶ Congressional Research Service, Renée Johnson, ‘The U.S.-E.U. Beef Hormone Dispute’, Congressional Research Service, Report for Congress, R40449, 14 January 2015, 5

¹⁷⁷ O. Costa, ‘A force for and because of multilateralism: when is the EU a multilateralist actor in world society?’ (2013) 20 *Journal of European Public Policy* (8) 1213, 1221

request dispute settlement¹⁷⁸. and claimed that the EU was in contravention of its obligations under WTO SPS Agreement¹⁷⁹; in 1997, the WTO panel found that the EU ban was in violation of certain SPS requirements¹⁸⁰. In 1998, following an appeal, the WTO upheld its findings but offered the EU the chance to conduct its own risk assessment into possible hazards associated with meat from animals subjected to hormone treatment. Over the following five years, the EU carried out research into the relevant hormones¹⁸¹ and in 2003 stated that its research had found estradiol-17 β was carcinogenic; with respect to the additional five hormones under investigation, the body of knowledge available at that point made it impossible to quantitatively assess the full risks to consumers. Following this announcement, in 2003, Directive 2003/74/EC was enacted, which bans oestradiol and provisionally bans the other listed hormones, on the basis that more scientific data is necessary to fully understand the risks to human health. This confirms the adoption of the PP – legislating on the basis that there is some evidence of potential harm but without complete data or definitive evidence. By instituting the measures as a provisional ban, it was the view of the EU that this is compliant with its obligations under WTO SPS¹⁸². Following further dispute over trade sanctions imposed by the US and Canada, the WTO Appellate body ruled in 2008 that it was permissible for the EU to maintain the ban on hormone-treated beef imports, but that the US and Canada could also retain certain trade sanctions on the EU. Notably, the panel also found that the EU ban was not incompatible with WTO legal rules, a decision which appears to have granted considerable freedom to the EU in creating its food-safety regulatory framework. After some further disagreement, in 2009 a memorandum of understanding (MOU) was co-signed by the EU and US, on

¹⁷⁸ WTO, “European Communities—Measures Concerning Meat and Meat Products (Hormones),” Dispute DS26. Canada also instituted an action against the EU – DS48

¹⁷⁹ World Trade Organization (WTO) SPS (n 35)

¹⁸⁰ Specifically, that the ban did not conform to the need for such measures to: be based upon international standards (Article 3), be based upon risk assessment and appropriate techniques for such risk assessment (Article 5.1) and avoid arbitrary distinctions or unjustifiable distinctions which lead to discrimination or a trade restriction (Article 5.5)

¹⁸¹ European Commission, Opinion of the Scientific Committee on Veterinary Measures relating to Public Health, Assessment of potential risks to human health from hormone residues in bovine meat and meat products, 30 April 1999. See also European Commission, Review of Specific Documents Relating to the SCVPH Opinion of 30 April 99 on the Potential Risks to Human Health from Hormone Residues in Bovine Meat and Meat Products’ 3 May 2000 and European Commission, Opinion of the Scientific Committee on Veterinary Measures relating to Public Health, Review of previous SCVPH opinions of 30 April 1999 and 3 May 2000 on the potential risks to human health from hormone residues in bovine meat and meat products, 10 April 2002

¹⁸² WTO SPS (n 35) Article 5.7: “Members shall seek to obtain the additional information necessary for a more objective assessment of the risk, and review the sanitary and phytosanitary measures accordingly within a reasonable period of time”

the importation of beef from cattle not administered hormones for growth-promotion as well as increased import duties to be applied by the US to certain EU products¹⁸³.

Discussion: The Precautionary Approach to The Beef Hormone Ban

The decision to legislate in this situation brings into question the relative importance of the role played by science in EU policymaking and the significance afforded to the Opinions of the Commission's own expert panels. It suggests that in the face of public pressure, a precautionary approach may be adopted even where there is scant evidence of risk. If the EU is not guided by the Opinions they have commissioned from their scientific experts, it might be argued that their claim to evidence-based policymaking lacks credibility – their approach in the beef hormones case undoubtedly undermines the claim that EU policy is based on science¹⁸⁴, since the relevant research found no evidence of risk to human health. This approach is mirrored in the EU ban on genetically modified produce. Despite a lack of evidence to suggest that GMOs are damaging to human health¹⁸⁵, European citizens harbour a fear and mistrust of GM produce and as a result, the EU has traditionally proved resistant to GMO crops; at present, nineteen of the twenty seven EU Member States have a partial or full ban on the cultivation of GMOs¹⁸⁶. Within the animal welfare sphere, the same approach has also been observed with respect to the EU Seal Products Case. As discussed in Chapter Three, scientific opinion on risks associated with seal culling found that the data was incomplete and the AHAW Panel felt unable to assess much

¹⁸³ WTO, European Communities – Measures concerning meat and meat products (hormones), Joint Communication from the European Communities and the United States, WT/ DS26/28. 30 September 2009.

¹⁸⁴ For example, the European Commission's Projects for Policy (P4P) Initiative states that 'The European Commission is committed to evidence-based policy making and exploiting valuable research and innovation results to their full potential' <https://ec.europa.eu/info/research-and-innovation/strategy/support-policy-making/scientific-support-eu-policies/p4p_en> accessed 10 April 2022. The Commission also states that 'Through the years, the European Union has developed a solid and science-based legislative model on animal welfare', European Commission, International Activities, <https://ec.europa.eu/food/animals/animal-welfare/international-activities_en> accessed 10 April 2022

¹⁸⁵ A recent study on the current state of play with respect to GMOS and public safety has stated that 'since the start of wide exercise of modern biotechnology in the early 1980s for genetic improvement of food crops...there have never been any direct safety hazard reported from any GE or GMOs': T. Fikre Teferra, 'Should we still worry about the safety of GMO foods? Why and why not? A review' (2021) 9 Food Science and Nutrition (9) 5324.

¹⁸⁶ European Commission, Environment, European Green Capital, 'Several European Countries act to rule out GMOs' <<https://ec.europa.eu/environment/europeangreencapital/countriesruleoutgmos/>> accessed 11 April 2022. For a discussion of Member States' ability to select their territorial levels of protection with respect to GMOs, see M. Lee, 'GMOs in the Internal Market: New Legislation on National Flexibility' (2016) 79 The Modern Law Review (2) 317

of the available evidence, due to its biased or incomplete nature¹⁸⁷ – despite these gaps in knowledge the EU elected to act in the face of public pressure and adopt a precautionary approach, banning import of seal products on the basis that seals *might* be suffering during slaughter following percussive stunning with picks or clubs.

The purpose of this sub-chapter is to demonstrate that adopting a precautionary approach would be entirely reasonable when creating animal welfare policy; however, it must be highlighted that there is a counter-intuitive aspect to the Commission's decision to adopt a precautionary approach in circumstances (as in GMOs) where research fails to provide *any* evidence of harm – particularly given that, at the same time, it fails to take steps to protect animal welfare under circumstances where the scientific evidence is far stronger. For example, when assessing cattle welfare at slaughter the AHAW Panel has stated that every animal should be stunned prior to exsanguination¹⁸⁸, yet the EU has elected to allow non-stun slaughter to continue in the context of religious rites, via a derogation. Even if it were argued that there is some contradictory research data on the experience of animals slaughtered without stunning (as discussed earlier in this Chapter), there is far more evidence to support negative welfare outcomes during non-stun slaughter than in the case of seal slaughter. Despite this, the Commission has neither fully acted upon the available science nor taken a precautionary approach to non-stun slaughter in farm animals and this is challenging to comprehend.

The EU ban on the use of hormones in beef production and the reactions of the various relevant actors (legislators, scientists, farmers and consumers) provide an insight into the problems and controversies faced by legislators who elect to invoke the PP. As discussed previously in this chapter, the difficulties associated with lack of certainty in science come to the fore. In common with animal welfare scenarios, the beef hormone

¹⁸⁷ Scientific Opinion of the Panel on Animal Health and Welfare, Animal Welfare Aspects of the killing and skinning of seals (2007) 610 The EFSA Journal 1, 94: the Panel commented in its conclusions that '*There are only a very limited number of studies published in peer-reviewed journals that can be used to evaluate, with a high degree of certainty, the efficacy of the various killing methods employed in different seal hunts around the world on a quantitative basis. This is why the Risk Assessment had to take a qualitative approach. Nevertheless, there are studies (e.g. by NGOs, industry linked groups) that highlight serious deficiencies and concerns in the hunts, but they may contain potentially unproven serious biases*'

¹⁸⁸ EFSA Panel on Animal Health and Welfare, Scientific Opinion on the Welfare of Cattle at Slaughter (2020) 18 The EFSA Journal 11:6275, 96

ban (which focused on public health and safety) presented a dilemma where consumers perceived a hazard and associated harm, researchers could not provide scientific certainty (or even a strong likelihood) on a causal link between the hormones and damage to human health and policymakers were drawn into an arena where multiple stakeholders expressed varied and conflicting interests. However, the significant outcome of this scenario was the EU's decision to utilise the PP to pass legislation in the absence of scientific certainty and, more strikingly, to retain a ban on hormone use, despite the later scientific opinion of their own experts who failed to find evidence confirming harm to human health. It is useful to now focus on the principle in current policymaking in order to better understand the EU's approach when considering, and acting upon, the advice of its scientific experts, since this area is clearly complex and, as the beef hormone ban has demonstrated, potentially controversial.

5.4.4 The Precautionary principle in contemporary EU Policymaking

Animal welfare research can yield incomplete or inconclusive data from study of intensive production systems, so it is useful to consider the EU's approach to uncertainty in environmental and public health policy. By considering the conditions under which it already deems invocation of the PP appropriate, an analogous approach could arguably be suitable for introduction into animal welfare policymaking. Environmental policymakers have experienced particular difficulties when trying to create protective legislation, as research is usually unable to offer indisputable conclusions regarding certain environmental theories¹⁸⁹. For example, anthropogenic climate change - global warming - is a multifactorial, dynamic situation, which requires future planning based on current as well as retrospective evidence and trends. Scientists in this field utilise previous climate trends and patterns to form theories of projected climate change and the expected outcomes for the environment; however, this methodology cannot normally provide conclusive answers and speculation is inherent in the research¹⁹⁰. Nonetheless, climate protection legislation has been

¹⁸⁹ A. Stirling, 'Precaution in the Governance of Technology' (2016) Science Policy Research Unit (SPRU), Working Paper Series, SWPS 2016-14 (July) 4

¹⁹⁰ For discussion of the PP and climate change, see W.D. Montgomery and A.E. Smith, 'Global Climate Change and the Precautionary Principle' (2000) 6 Human and Ecological Risk Assessment (3) 399. For a more detailed exploration of scientific uncertainty with respect to climate change and

passed by the EU¹⁹¹ even though the causative links between various actions and subsequent climate impacts have not been fully established.

The EU opinion on scientific uncertainty

The Commission has confirmed that scientific uncertainty is a challenging concept to explain. According to their 2017 briefing on the PP¹⁹², being uncertain cannot simply be defined as lacking available data or being unable to fully assess a particular research model. Importantly, the Commission's brief has explained some of the circumstances under which research findings can be deemed 'uncertain', i.e. (i) where there is ambiguity (when more than one 'certainty' appears to exist from a study), (ii) indeterminacy (when multiple factors influence a casual chain of events – this is especially pertinent in animal welfare, where husbandry systems under examination are seen to involve numerous different elements, all of which impact upon the animal subjects under observation) and, finally, (iii) plain ignorance, where scientists are not even aware that there are factors involved, yet to be identified.

Scientific uncertainty – when can the PP be applied?

In its brief on the PP, the Commission cites René von Schomberg, who has published a detailed account of application of the Principle in scenarios of uncertainty¹⁹³ as a two-step process which centres around the following key elements¹⁹⁴:

1. *'The principle is to be applied in cases of potential adverse impacts on the environment or human health with serious consequences (thus implying that these consequences are unacceptable if realised)*

the application of the PP, see J. Aldred, 'Climate change uncertainty, irreversibility and the precautionary principle' (2012) 36 Cambridge Journal of Economics (5) 1051

¹⁹¹ As an example, the European Green Deal is a package of legislation and measures introduced to protect the climate and battle climate change – European Commission, Communication from the Commission to the European Parliament, the European Council, The Council, the European Economic and Social Committee and the Committee of the Regions, The European Green Deal, COM (2019) 640 final, Brussels 11.12.2019

¹⁹² European Commission (n 18) 3

¹⁹³ R. Von Schomberg, 'The precautionary principle: Its use within hard and soft law' (2012) 3 European Journal of Risk Regulation (2) 147

¹⁹⁴ *ibid*, 147-8. Von Schomberg has commented that 'serious' is open to a multitude of interpretations, however, in the context of precaution, where a level of protection has been set, or is expected, the consequences of any potential infringement of that level can be viewed as 'negative' or 'serious'

2. *Governmental action should be taken even though “complete” scientific evidence is not available, there is on-going scientific controversy, and/or there are disagreements about the lack of scientific knowledge. These circumstances are referred to as instances of scientific uncertainty. Scientific uncertainties arise because of controversies over the possibility of adverse effects to the environment or human health, their scope or their degree of seriousness.’*

Whilst the Commission has confirmed that, at present, there is no single, straightforward protocol in place for the application of the PP, Von Schomberg makes two important statements regarding precaution: firstly, that application of the PP is a ‘*normative risk management exercise which builds upon scientific risk assessments*’¹⁹⁵ and secondly that, ‘*within the EU context, these provisional measures do not have a prefixed expiry date: one can only lift precautionary measures if scientific knowledge has progressed to a point that one would be able to translate former uncertainties in terms of risk and adverse effects to terms of defined, consensual levels of harm and damage*’¹⁹⁶; therefore, adopting a precautionary approach permits protection from risk whilst the science develops and additional data can be sourced to clarify the situation. Social science utilises the term ‘normative’ in the context of cultural norms or shared values and in legal academia, ‘normative’ describes the manner in which something should be done, according to a value position, prescribing standards. Since ensuring positive animal welfare has been demonstrated to be an issue of primary importance to citizens, and, since Article 13 provides us with a legal basis for acknowledgement of sentience and a duty to pay full regard to animal welfare, it seems reasonable to assert that animal welfare is as valid an area as environmental protection or public health for normative risk management exercise, built upon scientific risk assessments¹⁹⁷.

Scenarios Where the PP is Not Applicable

The Commission has also confirmed that where a risk of harm is quantifiable and a suitable level of protection has been identified, the PP will not apply, as the information

¹⁹⁵ Von Schomberg (n 193) 156

¹⁹⁶ *ibid*

¹⁹⁷ In fact, as the thesis has demonstrated, risk assessment is the method of choice for the AHAW Panel when identifying negative welfare outcomes

available will allow application of normal risk management practices¹⁹⁸. Similarly, the PP should not be applied to hazards which are vague or purely speculative; nor should it be applied to risk which is imagined i.e. where there is a lack of tangible evidence; rather, the PP should apply on the basis of scientific investigation which may not have provided definitive proof but has indicated that there *may* be relevant risks and hazards¹⁹⁹. This approach was confirmed by the Court of First Instance *Pfizer Case* which considered a ban on an antibiotic, virginiamycin, used as a growth promoter, due to fear of transfer of anti-microbial resistance from animals to humans. In this case²⁰⁰, the pharmaceutical company, Pfizer, contested Council Regulation (EC) No 2821/98²⁰¹, which specifically prohibited the use of the antibiotic Virginiamycin; Pfizer had criticised the Community institutions for failing to obtain proof of the reality or extent of risk to human health associated with the growth promoter before acting. The Court, however, found that an appropriate scientific assessment had been carried out and that there was sufficient scientific evidence to conclude that it was likely that virginiamycin posed a risk to human health²⁰². The court stated that *'[t]he precautionary principle can therefore apply only in situations in which there is a risk, notably to human health, which, although it is not founded on mere hypotheses that have not been scientifically confirmed, has not yet been fully demonstrated'*²⁰³.

Whilst it may be possible to adopt a precautionary approach where science has identified possible harms but has not yet established the specific cause and effect relationship²⁰⁴, it is particularly difficult to definitively identify cause-effect relationships in areas of research where the situation under investigation is subject to multiple influencing factors. This is a problem seen in environmental protection and human health yet is also a challenge faced in animal welfare research; the classic example of

¹⁹⁸ European Commission (n 18) 5

¹⁹⁹ *ibid*

²⁰⁰ Case T-13/99 *Pfizer Animal Health SA v Council of the European Union* [2002] ECR II-03305

²⁰¹ Council Regulation (EC) No 2821/98 of 17 December 1998 amending, as regards withdrawal of the authorisation of certain antibiotics, Directive 70/524/EEC concerning additives in feeding stuffs OJ L 351/4

²⁰² Case T-13/99 *Pfizer* (n 200) [165]

²⁰³ *ibid*, 146

²⁰⁴ For an interesting overview of cause-effect in the context of environmental epidemiology, see Douglas L Weed, 'Environmental epidemiology Basics and proof of cause-effect' (2002) *Toxicology* 181-182, 399

this situation is the attempt to identify the relative effects of various postulated causes of global warming²⁰⁵ and the same challenges exist when trying to definitively quantify the individual causative impact of multiple input factors within a production system on an animal's welfare.

Most commonly, application of the PP can be justified when a plausible risk from a specified activity has been identified but there is a lack of adequate scientific evidence or agreement from experts with respect to the nature or degree of negative effects to be seen²⁰⁶. This has been confirmed in numerous cases in the CJEU²⁰⁷. For example, in light of the British BSE beef crisis in the 1990s, the Commission introduced a temporary ban on British beef imports, citing the protection of public health. When considering the precautionary stance taken by the EU in legislating on the matter, the Court held that *'where there is uncertainty as to the existence or extent of risks to human health, the institutions may take protective measures without having to wait until the reality and seriousness of those risks become fully apparent.'*²⁰⁸.

Procedural Steps when invoking the PP

In order to further clarify its procedural approach, the Commission has stipulated that three principles should be applied when policymakers are considering invoking the PP²⁰⁹:

- employment of the principle should be done on the basis of the most detailed scientific evaluation available

²⁰⁵ Von Schomberg (n 193) Demonstrating cause-effect relationships in scientific research can be extremely challenging; for example, in the context of farm animal welfare research, when investigating a physical pathology like feather plucking (effect) in caged hens, there are various environmental as well as individual animal factors that may (cause) the development of the behaviour. However, the advantage of applying the PP in such a scenario, would mean that although the reason for feather plucking might never be definitively identified, if there was sufficient scientific evidence to implicate overcrowding in the cage as the most likely cause for the plucking, legislation could be passed to reduce stocking density or alter housing design.

²⁰⁶ European Commission (n 18) 5

²⁰⁷ It has been established that by 2008, a total of 140 cases from the ECJ and General Court (previously the Court of First Instance) had referred to the PP. This included 52 opinions and 88 orders / judgements. See The Health Council of the Netherlands, 'Prudent Precaution', Advice to The Minister of Housing, Spatial Planning and the Environment, No. 2008/18E, The Hague, 26 September 2008

²⁰⁸ Case C-180/96 *United Kingdom of Great Britain and Northern Ireland v Commission of the European Communities* ECR I-2269, par. 99

²⁰⁹ European Commission (n 140) and (n 17)

- evaluation of risk and the possible consequences of inaction should be carried before taking steps to legislate (or not)
- all stakeholders must be able to examine the various options available and the process should ensure transparency at all times

In addition, the Commission provides detailed instruction on the precautionary approach within its Communication from 2000²¹⁰. advising that any legislative measures taken must demonstrate proportionality with respect to the level of protection selected ²¹¹ i.e. they should not be trying to achieve zero-risk. There should be no discriminatory action – comparable scenarios must be approached in the same way and be consistent with any previous legislative action. A full analysis should be made of the costs and benefits associated with action or inaction²¹². Finally, all decisions must be open to review, in the face of new research data and measures should assign the burden of proof, i.e. specify responsibility for contributing further scientific data to allow a more extensive assessment of risk²¹³.

Given that the Commission's Communication is not legally binding the next section of the Chapter examines a recent precautionary initiative and considers its compatibility with the norms advanced by the EU.

5.4.5 The EU Neonicotinoid Ban

In order to understand how the EU acknowledges an area of concern, examines contemporary research, creates legislation via the use of the precautionary principle and then justifies its policymaking, it is helpful to consider a recent, controversial, example from the field of plant health and production: the EU ban on Neonicotinoids.

²¹⁰ *ibid*

²¹¹ European Commission (n 140) at 6.3

²¹² Meaning that the decision to utilise the PP should not be made on the basis of hazard assessment alone

²¹³ These points confirm that the use of the PP is dependent upon further scientific data and research – demonstrating a desire to ultimately obtain full evidence-based assessment of risk (or greater than achievable at the present moment) – see K. Garnett and D.J. Parsons, 'Multi-Case Review of the Application of the Precautionary Principle in European Union Law and Case Law' (2017) 37 Risk Analysis (3) 502

The Commission's decision to outlaw the use of these pesticides is particularly relevant to this thesis because their regulatory approach was based upon the review and analysis of available scientific evidence by the EFSA as well as the PPR panel (Plant Protection Products and their Residues) – similar to the method by which the EFSA AHAW panel has collated and assessed scientific evidence for the Commission. Further, as is the case with areas of welfare research pertaining to husbandry systems, the data available with respect to neonicotinoid pesticides was incomplete. It is useful, therefore, to examine how the EFSA came to its conclusions from the available science and why the EU chose to legislate, using the PP.

Background

In 2006, scientists identified a phenomenon now known as colony collapse disorder (hereafter CCD) – the worldwide death of multiple hives of *Apis mellifera*, honeybees²¹⁴. In addition to providing honey for human nutritional and medical use, bees play a vital role in agriculture, pollinating crops worldwide²¹⁵ and are essential to the stability of the global food chain²¹⁶. Therefore, their sudden, unexpected decline has been a cause of significant international concern to beekeepers, farmers, environmentalists and public authorities. Although dwindling numbers of these pollinator bees is generally accepted to have multiple underlying causes, including disease and habitat loss²¹⁷, the use of pesticides has become the focus of the problem, in part due to a series of mass-killings of bees, following inappropriate application of these products²¹⁸. The bee mite *Varroa Destructor* is widely accepted as a major

²¹⁴ MAAREC, D. van Engelsdorp, D. Cox-Foster, M. Frazier, N. Ostiguy, and J. Hayes, 'Colony Collapse Disorder Preliminary Report', Mid-Atlantic Apiculture Research and Extension Consortium (MAAREC) - CCD Working Group (1 May 2006)

²¹⁵ It is estimated that 90% of crop species are reliant on pollinators – see A.M. Klein, B.E. Vaissière and J.H. Cane, 'Importance of pollinators in changing landscapes for world crops' (2007) 274 *Proceedings of the Royal Society (B) Biological Sciences* 303

²¹⁶ A. Alemanno, 'The Science, Law and Policy of Neonicotinoids and Bees: A new test case for the Precautionary Principle' (2013) *European Journal of (2) Risk Regulation* 191 <<http://dx.doi.org/10.2139/ssrn.2276168>> accessed 10 April 2022

²¹⁷ L. Dicks, 'Bees, Lies and Evidence Based Policy' (2013) 494 *Nature* 283.

²¹⁸ Alemanno (n 216) 191 In 2008, in Germany, millions of honeybees died in an incident the authorities blamed on clothianidin pesticide; there was a problem in the seed treatment process and mass deaths of bees resulted. During seed treatment with pesticide, there is supposed to be application of an adhesive but this step did not take place and so when the crop was sown, a mass-release of pesticide into the air resulted, causing winds to carry pesticide to bee colonies – 11,500 colonies were killed. For the European Environmental Agency (EEA) discussion of these types of problems with pesticides, see L. Maxim and J. van der Sluijs, 'Seed-dressing systemic insecticides and honeybees' in EEA Report 1/2013, 'Late lessons from early warnings: science, precaution, innovation' (2013) 369

cause of colony decline since the 1970s, but there is a lack of consensus amongst scientists about the origin of contemporary CCD; the use of pesticides is one factor that has come under scrutiny, in particular, neonicotinoids.

Pyrethroids were the original product of choice as insecticides in Western agriculture, but over the last fifty years they have been replaced by neonicotinoids²¹⁹, which are now the world's most commonly used pesticides²²⁰. Widely acknowledged as being less toxic to mammalian and avian species than their predecessors, neonicotinoids are applied to food, ornamental and energy crops as well as being used in domestic pets for killing fleas and ticks²²¹. These pesticides bind strongly to nicotinic ACH receptors in the central nervous system of insects, which leads to overstimulation of their nerve cells, paralysis and death²²². Neonicotinoids are generally applied to the seeds of plants meaning that, as the plant tissue grows, the chemical is distributed into its stems and leaves and can affect any insect feeding on the plant. However, the chemical will also be present in the pollen and nectar of the plant. Despite the fact that insects are most susceptible to neonicotinoids, the ability of these substances to impact upon non-target species remains a significant concern amongst scientists and consumers.

EU Plant Protection Product Regulation

The overarching EU legislation in this area is Plant Protection Product Regulation (EC) 1107/2009 whose preamble states:

'The purpose of this Regulation is to ensure a high level of protection of both human and animal health and the environment and at the same time to safeguard the

²¹⁹ *ibid*, Alemanno (n 216)

²²⁰ P. Jeschke and R. Nauen, 'Neonicotinoids—from zero to hero in insecticide chemistry' (2008) 64 *Pest Management Science* (11) 1084

²²¹ J. Sills, 'Call to restrict neonicotinoids' (2018) 360 *Science* 6392. For a discussion of imidacloprid in small animal veterinary medicine, see N. Mencke and P. Jeschke, 'Therapy and Prevention of Parasitic Insects in Veterinary Medicine using Imidacloprid' (2002) 2 *Current Topics in Medicinal Chemistry* (7) 701

²²² M. Tomizawa and J.E. Casida, 'Neonicotinoid insecticide technology: Mechanisms of Selective Action (2005) 45 *Annual Review of Pharmacology and Toxicology* 247. The neonicotinoid chemical binds less strongly to nicotinic ACH receptors in birds and mammals making it relatively safer for them.

*competitiveness of Community agriculture. Particular attention should be paid to the protection of vulnerable groups of the population, including pregnant women, infants and children. **The precautionary principle should be applied** and this Regulation should ensure that industry demonstrates that substances or products produced or placed on the market do not have any harmful effect on human or animal health or any unacceptable effects on the environment*²²³.

Notably, the Regulation also states that ‘*substances should only be included in plant protection products where it has been demonstrated that they present a clear benefit for plant production and they are not expected to have any harmful effect on human or animal health or any unacceptable effects on the environment*²²⁴, indicating a high level of protection is required before the use of any substance is permitted. The Regulation does allow for exceptions – similar to derogations in EU animal welfare legislation – with respect to situations arising where use of unapproved pesticides may be authorised for a short period, in the face of emergency situations of plant protection²²⁵.

It is interesting to note that, although plant protection is of huge significance with respect to the human (and production animal) food chain (because there is a need to ensure a constant supply of plant produce globally), the Regulation nonetheless takes a strong approach to risk and protection with respect to the use of pesticides, prioritising human health. It might be argued that this approach could be mirrored in animal welfare. Although it is often said that animal welfare is important, but feeding the meat-eating population and economic considerations have to take priority, this approach has clearly not been taken with plants. The EU stance is that a high yield of crops protected from pests is important but preventing harm to human health is even more important. This thesis argues that the EU could create welfare legislation in the same way, requiring a higher level of animal protection, similar to that of plant

²²³ Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC [2009] OJ/L 309/1[8]

²²⁴ Ibid (10)

²²⁵ Regulation (EC) No 1107/2009 (n 223) 53. For a discussion of such situations, see Y. Epstein, G. Chapron and F. Verheggen, ‘What is an emergency? Neonicotinoids and emergency situations in plant protection in the EU’ (2022) *Ambio A Journal of Environment and Society* < <https://doi.org/10.1007/s13280-022-01703-5> > accessed 10 April 2022

products. Following Regulation 1107/2009 it would be possible for welfare legislation to stipulate that *the precautionary principle should be applied and any regulation should ensure that industry demonstrates that an animal production system or husbandry regime being utilised within the EU does not have any seriously harmful effects on animal health or animal welfare.*

Concerns surrounding Neonicotinoids

In 2010, Dutch toxicologist Henk Tennekes published a book in light of his research findings on neonicotinoid toxicity; the book discussed how these chemicals affect bee immunity, thus facilitating spread of infection within colonies, as well as exploring the broader effects of neonicotinoid use, on the entire food chain²²⁶. At the same time, other researchers began focusing on the effects of neonicotinoids on bees, discovering that even low levels of the chemicals can have adverse effects on pollinators and can negatively impact on their ability to gather pollen, locate their hives and reproduce²²⁷. It has never been in doubt that high doses of these substances are fatal for bees, but the difficulty has always been extrapolating data on lower doses from lab studies to colonies of bees in the 'real world'. This challenge is also faced by animal welfare researchers who have tried to extrapolate data from experiments on small groups of animals in trials to the thousands living in an intensive production system. The link between lower doses of neonicotinoid and harm to bees - in environments where numerous other risks are present - has proven refractory to identification, in a similar way that making definitive causative links between intensive production input factors and negative welfare outcomes has proven challenging. Given increasing public concern about the use of these chemicals in light of scientific findings, in 2011 the EU Commission requested that the EFSA consider the risks associated with the use of neonicotinoids used in Europe²²⁸, proposing a two stage

²²⁶ H.A. Tennekes, *The Systemic Insecticides: A Disaster in the Making* (ETS Nederland BV 2010)

²²⁷ There is a vast body of research on the subject; see for example C.W. Schneider, J. Tautz et al, 'RFID Tracking of Sublethal Effects of Two Neonicotinoid Insecticides on the foraging behaviour of *Apis Mellifera*' (2012) 7 PLOS (1) e30023 and T. Blacquièrre, G. Smagghe et al, 'Neonicotinoids in bees: a review on concentrations, side-effects and risk assessment' (2012) 21 Ecotoxicology 973. See also V. Girolami, M. Marzaro et al, 'Fatal powdering of bees in flight with particulates of neonicotinoids seed coating and humidity implication' (2012) 136 Journal of Applied Entomology (1-2) 17

²²⁸ In line with Article 21 (2) of Regulation 1107/2009 (n 225) – with respect to review of approval for a substance in light of new scientific data or technical knowledge: 'The Commission may ask the Member States and the Authority for an opinion, or for scientific or technical assistance'

approach: (i) the provision of an EFSA Opinion on the science behind the risk assessment for bees²²⁹ and (ii) development of a guidance document on risk assessment for bees, this being published in July 2013²³⁰. Most significantly, in 2012 EFSA was mandated by the Commission to provide Conclusions regarding risks to bees with respect to three neonicotinoids, in order to reconsider risk assessment as regards acute and chronic effects of these substances on colony survival / development, specifically bee larvae and bee behaviour, and also the effects of sub-lethal quantities of the substances.

5.4.5.1 The EFSA Approach: PPR Panel Opinion

The EFSA as well as the EFSA Panel on Plant Protection Products and their Residues (hereafter the PPR Panel) has undertaken a large volume of research, peer review and discussion with respect to neonicotinoids over a period of years. However, for the purposes of this subchapter, the EFSA findings of January 2012-2013 form the focus of discussion.

The PPR Panel was tasked with providing their Opinion on the science underlying the development of a risk assessment of plant protection products on bees; this was to provide the scientific basis for the EFSA Guidance on risk assessment in this area. The PPR Panel made several interesting observations, but the consistent theme running through all its recommendations is that, at present, there are significant gaps in scientific knowledge and also in methodology, meaning our current understanding of the direct effects of plant protection products on bees is limited.

Within the Conclusions and Recommendations²³¹, the Panel states that: *'the final decision on protection goals needs to be taken by risk managers. There is a trade-off between plant protection and the protection of bees. The effects on pollinators need*

²²⁹ EFSA Panel on Plant Protection Products and their Residues, 'Scientific Opinion on the science behind the development of a risk assessment of Plant Protection Products on bees [*Apis mellifera*, *Bombus* spp. and solitary bees]' (2012) 10 EFSA Journal 5:2668

²³⁰ EFSA Guidance Document on the risk assessment of plant protection products on bees [*Apis mellifera*, *Bombus* spp. and solitary bees] (2013) 11 EFSA Journal 7:3295. For a detailed discussion of the stages of EFSA assessment, see D. Auteri, M. Arena, S. Barmaz et al, 'Neonicotinoids and Bees: The case of the European regulatory risk assessment (2017) 579 Science of the Total Environment 966, 967

²³¹ EFSA PPR Panel (n 229) 131

to be weighed against increase in crop yields due to better protection of crops against pests'. This is in marked contrast to the AHAW Panel's approach, which is far more prescriptive – the AHAW Panel stating, for example, in their Opinion on the Welfare of Sheep and Goats at Slaughter that '*slaughter without stunning should not be practiced, as during slaughter without stunning all animals have to endure the welfare consequences resulting from remaining conscious during neck cutting and bleeding and therefore experience severe pain, fear and distress*'²³². In fact, the PPR Panel offers no opinion on whether neonicotinoids should be permitted or banned / restricted. This is important because the EU went on to ban neonicotinoid use (albeit with some derogations) but they were not advised to do so by their own scientists. Meanwhile, in the animal welfare sphere, despite strong advice to the contrary from EFSA scientists, non-stun slaughter continues to be permitted. However, the advice from the PPR Panel is more consistent with that offered by EFSA scientists with respect to seal killing, where the AHAW Panel pointed out possible welfare compromises yet also acknowledged many gaps in the available data. Despite these gaps, the EU chose to legislate, albeit citing public morality as the underlying driver for legislation.

The PPR Panel also advised that further research was needed with respect to²³³:

- Pesticides: clearer understanding of mode of action upon, and metabolism / detoxification by, bees in the field
- Development of precise analytical models to measure bee exposure to pesticides via water, dust, pollen, nectar, wax etc.
- Tests to establish toxicity and lethal dose of pesticides for bees

The EFSA Guidance on Risk Assessment for plant protection products for bees²³⁴ was written in light of this Opinion. It is complex and sets out detailed mechanisms for assessment of bees and the impact of substances upon them; discussion of the details lies out-with the scope of this thesis but the relevant element is the reiterated acknowledgement that full understanding of risks, hazards and outcomes for bees are

²³² EFSA Panel on Animal Health and Welfare (AHAW) Scientific Opinion on Welfare of Sheep and Goats at Slaughter (2021) 19 The EFSA Journal 11:6882, 5.4 (5)

²³³ EFSA, (n 229) 135

²³⁴ EFSA (n 225)

not fully understood or able to be assessed. The Guidance highlights a need for test protocols for bumble bees and solitary bees and, whilst it offers suggestions for protocols, it states the importance of developing fully validated test protocols in future²³⁵.

In 2013 EFSA subsequently published a risk assessment for each of the three neonicotinoids under assessment, clothianidin, thiamethoxam and imidacloprid²³⁶, and for each substance, considered data that had been submitted previously at EU level with respect to product authorisation as well as other monitoring data and relevant research findings²³⁷.

As had been observed in the PPR Opinion, in common with the AHAW Panel's Opinion on the killing of seals²³⁸ (and as would be expected in a relatively novel area of scientific research), EFSA was compelled to point out that there were many areas where a high level of uncertainty remained, with respect to assessment of risks relating to use of the three neonicotinoids²³⁹. Much of the data that had been reviewed was generated before concerns were raised and since risk assessment for plant protection products and bees was still under development, the EFSA evaluation had limitations²⁴⁰. For each of their conclusions, tables of concerns / risks are set out, but for many, 'assessment not finalised' had to be stated.

The risk assessments considered three key exposure routes for bees – (i) via pollen and nectar in the flowers of neonicotinoid-treated plants, (ii) via dust during sowing of treated seeds or from application of neonicotinoid granules and (iii) via guttation fluid²⁴¹

²³⁵ *ibid*, 2

²³⁶ EFSA, 'Conclusion on the peer review of the pesticide risk assessment for bees for the active substance clothianidin (2013) 11 EFSA Journal 1:3066', 'EFSA, Conclusion on the peer review of the pesticide risk assessment for bees for the active substance thiamethoxam' (2013) 11 EFSA Journal 1: 3067 and EFSA, 'Conclusion on the peer review of the pesticide risk assessment for bees for the active substance imidacloprid' (2013) 11 EFSA Journal 1:3068

²³⁷ Alemanno (n 216) 196

²³⁸ Scientific Opinion of the Panel on Animal Health and Welfare, Animal Welfare Aspects of the killing and skinning of seals (n 187)

²³⁹ The introductory summary of each Conclusion states that there are many data gaps and that full risk assessment was not possible due to a lack of information with respect to various areas of concern.

²⁴⁰ Alemanno (n 216) 196

²⁴¹ Fluid expelled from flowers or plants

produced by treated plants²⁴². Despite the limitations in data and available information / ability to fully risk assess, EFSA nonetheless identified high, acute risks to bees from dust exposure from certain crops, from residues in contaminated nectar and pollen with respect to certain crops and from exposure to maize guttation fluid. EFSA also concluded that it was not possible to exclude unacceptable risks, due to acute or chronic effects on bee colony development and survival due to data gaps. Three key findings for all three neonicotinoids arose from the risk assessment²⁴³:

- Nectar and Pollen exposure: only use on crops not attractive to honeybees could be viewed as acceptable
- Dust Exposure: risk to honeybees was indicated / was not able to be excluded, with some exceptions
- Guttation Exposure. only minimal risk assessment could be completed - for thiamethoxam-treated maize. In that scenario, studies demonstrated an acute effect on honey bees.

5.4.5.2 Precautionary Approach and Justification

In light of the EFSA Risk Assessment, the Commission elected to restrict the use of plant protection products (and treated seeds) in relation to those containing the three substances clothianidin, thiamethoxam and imidacloprid. The amending Commission Implementing Regulation (EU) No. 485/2013²⁴⁴ restricted uses of the three products, provided specific risk mitigation measures for bee protection and limited the use of products containing these active substances to professional users. Specifically, use was prohibited for crops attractive to bees and for cereals.

Although the words 'precaution' or 'precautionary' are not found in the Regulation, the Commission's decision to act on the basis of the PP, is evident. The Regulation states

²⁴² EFSA, 'EFSA Identifies risks to bees from neonicotinoids'

<<https://www.efsa.europa.eu/en/press/news/130116>> accessed 15 April 2022

²⁴³ *ibid*

²⁴⁴ Commission Implementing Regulation (EU) No 485/2013 of 24 May 2013 amending Implementing Regulation (EU) No 540/2011, as regards the conditions of approval of the active substances clothianidin, thiamethoxam and imidacloprid, and prohibiting the use and sale of seeds treated with plant protection products containing those active substances Text with EEA relevance [2013] OJ L 139/12

that ‘*the Commission has come to the conclusion that a high risk for bees cannot be excluded except by imposing further restrictions*’²⁴⁵ and foliar treatments with products containing the three pesticides were also prohibited, with greenhouse and post-flowering exceptions – the assumption being that these could theoretically pose risks analogous to seed treatments / granules, pending additional EFSA assessment²⁴⁶. This approach is consistent with precaution – leaving the door open for additional research and data to allow further assessment of risks and hazards.

Once the EFSA Opinion had been considered, a final risk assessment scheme was developed on the basis of the Opinion and also in light of specific protection goals, agreed by Member States’ own risk managers in a discussion organised by the Commission²⁴⁷. Ultimately, the protection goal of ‘negligible effect’ was agreed upon and following additional EFSA research²⁴⁸, a total ban on outdoor use of these neonicotinoids was introduced in 2018²⁴⁹.

Whilst research continues, the complex relationship between neonicotinoids and bee mortality is not fully understood and, in some quarters, the risks posed by these pesticides are contested. Unsurprisingly, there was opposition from industry and legal challenges were raised with respect to the bans. The Court of Justice rulings provide interesting commentary on the use of the PP and the sub-chapter now turns to consider the *Bayer* case on neonicotinoids.

²⁴⁵ *ibid* (10)

²⁴⁶ Regulation (EU) No 485/2013 (n 238) (8)

²⁴⁷ Auteri (n 230) 996

²⁴⁸ EFSA, Technical Report: Evaluation of the data on clothianidin, imidacloprid and thiamethoxam for the updated risk assessment to bees for seed treatments and granules in the EU (2018) EN-1378

²⁴⁹ Commission Implementing Regulation (EU) 2018/783 of 29 May 2018 amending Implementing Regulation (EU) No 540/2011 as regards the conditions of approval of the active substance imidacloprid (Text with EEA relevance [2018] OJ L 132/31, Commission Implementing Regulation (EU) 2018/784 of 29 May 2018 amending Implementing Regulation (EU) No 540/2011 as regards the conditions of approval of the active substance clothianidin (Text with EEA relevance) [2018] OJ L 132/35 and Commission Implementing Regulation (EU) 2018/785 of 29 May 2018 amending Implementing Regulation (EU) No 540/2011 as regards the conditions of approval of the active substance thiamethoxam (Text with EEA Relevance) [2018] OJ L 132/40

5.4.5.3 Bayer Crop Science AG and Others v European Commission²⁵⁰

In August 2013, Bayer CropScience AG and Syngenta Crop Protection AG²⁵¹ initiated legal proceedings against the European Commission. Their aim was to have Regulation (EU) No. 485/2013 repealed (or at least annulled with respect to imidacloprid and clothianidin) and challenged the ban on use of the three named neonicotinoids²⁵². It was argued that the Commission, who had acted to review the risks from these pesticides in line with the provisions made in Article 21 of (EC) Regulation 1107/2009²⁵³, was in breach of the requirements for review of product use because there was no new evidence to justify reassessment at that stage. Bayer and Syngenta also argued that the PP had not been applied appropriately due to errors in procedure – the risk assessment had been rushed and there was a lack of scientific basis for the measure²⁵⁴.

Having considered the various arguments, the CJEU rejected Bayer's argument that the risk assessment failed to take important scientific data into account²⁵⁵ and also rejected the allegation that the Commission's approach to risk was hypothetical, commenting that the risk assessment with respect to neonicotinoids was scientifically sound since there was no evidence that the Commission process was defective²⁵⁶. Ultimately, at appeal stage, the Court upheld the Regulation and ban on use of the three neonicotinoids (and by 2018, the restrictions on their use became even stronger²⁵⁷). Whilst detailed discussion of this case is not the primary focus of this sub-chapter, the Court's judgment provides some useful insight into the application of the PP which potentially opens doors for its use in animal welfare policymaking.

²⁵⁰ Joined Cases *T-429/13 and T-451/13 Bayer Crop Science AG and Others v European Commission* ECLI:EU:T:2018:280

²⁵¹ Along with various others including the National Farmers Union (NFU) and the European Seed Association (ESA)

²⁵² For an overview of the Court's approach see E. Bozzini and E. Stokes, 'Court Upholds Restrictions on Neonicotinoids – A Precautionary Approach to Evidence' (2018) 9 *European Journal of Risk Regulation* 585

²⁵³ (EC) Regulation 1107/2009 (n 218) Article 21 allows the Commission to review and perform reassessment of risks and hazards posed by a pesticide, on the condition that new evidence has come to light that suggests the protection goals (established in Article 4) are not being met

²⁵⁴ Cases *T-429/13 and T-451-13 Bayer* (n 250) para 101

²⁵⁵ *ibid* paras [355-382]

²⁵⁶ Cases *T-429/13 and T-451-13 Bayer* (n 250) para 390

²⁵⁷ Commission Implementing Regulation (EU) 2018/783, 2018/784 and 2018/785 (n 249)

CJEU Judgment and possible application to Animal Welfare Policymaking

Citing various cases²⁵⁸, the General Court in *Bayer* first clarified that ‘*The precautionary principle is a general principle of EU law requiring the authorities in question..... to take appropriate measures to prevent specific potential risks to public health, safety and the environment, by giving precedence to the requirements related to the protection of those interests over economic interests*²⁵⁹. This is a remarkable statement because it appears to place trade and the internal market firmly into second place, after safety. Although this concerns public health and environment rather than animal welfare, the approach is nonetheless notably different from the early animal welfare cases, such as *CIWF* and *Hedley Lomas*²⁶⁰ where preservation of internal market integrity was prioritised over all other concerns. If the Court is prepared to accept that under some circumstances, risks take precedence over economic considerations, is argued that this precautionary approach could be adopted with respect to serious animal welfare concerns.

Secondly, the Court confirmed that ‘*[w]here there is scientific uncertainty as to the existence or extent of risks to human health or to the environment, the precautionary principle allows the institutions to take protective measures without having to wait until the reality and seriousness of those risks become fully apparent or until the adverse health effects materialise*²⁶¹. This uncontroversial statement of the PP both acknowledges the presence of scientific uncertainty in policymaking and also confirms that the PP can be invoked to prevent harm where there is inconclusive evidence but a suspicion of risk. This scenario is reflected in animal welfare science and policymaking and therefore the approach could be used in protection of welfare.

Finally, the Court stated that where the PP is being applied during creation or amendment of policy, three stages are identifiable²⁶²:

²⁵⁸ Including *Artegoda and Others v Commission*, T-74/00, T-76/00, T-83/00 to T-85/00, T-132/00, T-137/00 and T-141/00, EU:T:2002:283 [183-194] and *Solvay Pharmaceuticals v Council*, T-392/02, EU:T:2003:277 [121] and case law cited

²⁵⁹ Cases *T-429/13 and T-451-13 Bayer* (n 250) para 109

²⁶⁰ Case C-1/96 *R v. Minister of Agriculture Fisheries and Food ex parte Compassion in World Farming* [1998] ECR I-1251 and Case C-5/94 *R v. Ministry of Agriculture, Fisheries and Food, ex parte: Hedley Lomas (Ireland) Ltd.* [1996] ECR I-2553

²⁶¹ Cases *T-429/13 and T-451-13 Bayer* (n 250) para 110

²⁶² *ibid* para 111

- (i) identification of the potentially adverse effects arising from a phenomenon
- (ii) assessment of the risks to public health, safety and the environment which are related to that phenomenon
- (iii) action whereby when the potential risks identified exceed the threshold of what is acceptable for society, risk management by the adoption of appropriate protective measures is initiated.

Of particular interest to this thesis is the phrase '*what is acceptable to society*'. In fact, this concept appears numerous times in the Court's judgment ²⁶³, and it is clear that although there is an attempt to base policy on sound scientific data (albeit with some knowledge gaps) public opinion of what is 'acceptable' plays a major role. This is a fascinating approach because it can be argued that the basis of precaution is the concept of acceptable risk i.e. the acknowledgement that risk exists leads to creation of a threshold of risk that should not be exceeded; however whereas the risk assessment would generally be accepted as the role of scientists and policymakers, the Court is saying that the public can influence this threshold of acceptable risk. If the public is able to influence policy to the extent that the General Court will take into account their perception of what risk is appropriate in the context of plant protection and public health, it is hard to argue that the public is not entitled to also have their view on risks to animal welfare heard.

This thesis argues for science as the basis of welfare policy while still acknowledging that public concerns can act as a powerful driver for legislative change. With this in mind, it is suggested that the PP could be applied in animal welfare scenarios, not least because public morality is often more focused upon risks to animal welfare than risks to the environment²⁶⁴. This would not mean disregarding the science but, rather,

²⁶³ Cases *T-429/13 and T-451-13 Bayer* (n 250) for example at paras 111-12, 122-125, and 551

²⁶⁴ A 2020 study on meat consumption found that 89% of consumers stated animal welfare was important to them whilst 81% said environmental impact was important – AHDB, Agriculture and Horticulture Development Board, Understanding Consumers' Attitudes to Animal Welfare <<https://ahdb.org.uk/news/consumer-insight-understanding-consumers-attitudes-to-animal-welfare>> accessed 10 April 2022. See also J. Finch, 'Shoppers care more about animals than climate' *The Guardian* (London 4 February 2008) <<https://www.theguardian.com/money/2008/feb/04/consumeraffairs.climatechange>> accessed 10 April 2022 - 21% of respondents said that animal welfare was their ethical priority whereas 4% said the environment was their primary concern

utilising a two-pronged approach to policymaking, of scientific data backed up by public morality. Precaution is essentially a 'better safe than sorry' approach, and adding subjective public opinion to this already, arguably, vague concept indicates a willingness on the part of the Court to incorporate societal concerns alongside (and sometimes ahead of) the scientific view, which this thesis argues is difficult to justify in the context of evidence-based policymaking. Confusingly the Court also states that: *'[t]he responsibility for determining the level of risk which is deemed unacceptable for society lies, provided that the applicable rules are observed, with the institutions responsible for the political choice of determining an appropriate level of protection for society. It is for those institutions to determine the critical probability threshold for adverse effects on public health, safety and the environment and for the degree of those potential effects which, in their judgment, is no longer acceptable for society and above which it is necessary, in the interests of protecting public health, safety and the environment, to take preventive measures in spite of the existing scientific uncertainty'*²⁶⁵; this suggests that the institutions concerned should ultimately determine what is an unacceptable risk. Nonetheless, given the current prominence of animal welfare in European political and social spheres, it is difficult to argue that the precautionary approach, harnessing social opinion, would be unsuited for application to animal welfare policymaking, in conjunction with sound scientific data.

Importantly the Court also confirmed that *'[i]n addition, it must be noted that it may prove impossible to carry out a full scientific risk assessment because of the inadequate nature of the available scientific data. However, that does not prevent the competent public authority from taking preventive measures in accordance with the precautionary principle'*²⁶⁶. This comment is particularly relevant to animal welfare assessment of the more complex aspects of husbandry systems; as discussed earlier in the chapter, forming definitive causative links between input and outcome factors can be very challenging, often impossible. If the use of the PP was open to welfare policymakers, adopting this approach would facilitate implementation of measures to protect welfare despite it being impossible to identify the extent to which each individual management factor leads to negative animal welfare outcomes.

²⁶⁵ Cases T-429/13 and T-451-13 Bayer (n 250) para 122

²⁶⁶ *ibid* para 118

Examination of the Court's judgment highlights the fact that the scientific situation with respect to data in the environmental and human fields is comparable to that in animal welfare science. Scientists within all of these areas of discovery have accepted and acknowledged that certainty is a rare commodity and therefore it is commonplace for knowledge gaps or inadequate assessment methods to be highlighted to policymakers. Given that the PP provides a pragmatic, reasonable method by which policymakers can thus act to prevent risks in the absence of scientific certainty, it seems logical to propose that the precautionary approach is well-suited to application in animal welfare policymaking. Before considering animal welfare scenarios for application of the principle with respect to AHAW Conclusions Two and Three, there has been some subtle hints from both the Court and the Commission itself to suggest that the scope of the precautionary principle lies beyond that of environment and public health and could be applicable when legislating to protect animal welfare.

5.4.6 Potential scope of the Precautionary Principle

Although various academics have made arguments for applying the PP to areas of EU policymaking other than environment and public health²⁶⁷, there is no official EU policy that defines the scope of its application. However, in its Communication on the PP²⁶⁸ (2000) the Commission confirms that the principle can enjoy a broad scope of influence:

*'The precautionary principle is not defined in the Treaty, which prescribes it only once - to protect the environment. But **in practice**, its scope is much wider, and specifically where preliminary objective scientific evaluation indicates that there are reasonable grounds for concern that the potentially dangerous effects on the **environment, human, animal or plant health** may be inconsistent with the high level of protection chosen for the Community'*²⁶⁹.

²⁶⁷ See, for example, Birch (n 136) and J. Koplin, C. Gyngell ad J. Savulescu, 'Germline gene editing and the precautionary principle' (2020) 34 *Bioethics* 49. See also A. Akins and P. Lyver, 'The Universal Precautionary Principle: New Pillars and Pathways for Environmental, Sociocultural, and Economic Resilience' (2019) 11 *Sustainability* 2357

²⁶⁸ European Commission (n 143)

²⁶⁹ *ibid*, 2

As explained in Chapter Four, animal health - the physical and physiological experiences of an animal – forms part of its overall welfare assessment therefore given the above statement, it is reasonable to suggest that the PP can be applied in situations where measures are necessary to prevent practices that cause detrimental effects on animal health; these could include scenarios involving mastitis, foot disease, developmental abnormalities or pain / discomfort; in other words, most of the intensive production systems. Notably, with reference to Legal texts, the Commission also comments that:

'At Community level the only explicit reference to the precautionary principle is to be found in the environment title of the EC Treaty, and more specifically Article 174. However, one cannot conclude from this that the principle applies only to the environment (Annex I, Refs. 2 and 3). Although the principle is adumbrated in the Treaty, it is not defined there. Like other general notions contained in the legislation, such as subsidiarity or proportionality, it is for the decision-makers and ultimately the courts to flesh out the principle. In other words, the scope of the precautionary principle also depends on trends in case law, which to some degree are influenced by prevailing social and political values'²⁷⁰.

The acknowledged influence of social and political values further strengthens the argument that the PP can be applied to animal welfare policymaking, since animal welfare is a topic of widespread social, and political, concern. The above statement implies that, in an area of law where strong social values are present, there is justification to invoke the PP. In fact, it could be argued that a precedent for this approach has already been set by the Seal Products Case with respect to precaution, since, in that scenario, the available science was incomplete, so public opinion was cited as the driver for legislation to prevent inhumane killing of seals and therefore a precautionary approach to the evidence was adopted, facilitating the introduction of protective measures²⁷¹.

²⁷⁰ European Commission (n 143) 9

²⁷¹ As discussed in Chapter Three, the AHAW Panel had highlighted various areas where the available data was either incomplete or biased, as well as acknowledging that monitoring for compliance with appropriate killing and skinning techniques would be challenging; within the Seal Products Regulation (EC) 1007/2009 the Commission did not allude to the AHAW conclusions on incomplete data but instead focused on the inability to monitor slaughter for compliance with suitably humane techniques – *'Although it might be possible to kill and skin seals in such a way as to avoid*

The CJEU has also provided confirmation that the scope of the PP is broader than simply environmental and public health law. In *Procureur de la République v Blaise and others*²⁷² - a case that challenged the validity of Regulation (EC) 1107/2009 with respect to the PP and alleged that in permitting sales of glyphosate pesticide in weedkiller, the EU was failing to protect public health. The Court stated that:

*‘It must be noted, first, that, while Article 191(2) TFEU provides that the policy on the environment is to be based on, inter alia, the precautionary principle, that principle is also applicable in the context of other EU policies, in particular the policy on the protection of public health and where the EU institutions adopt, under the common agricultural policy or the policy on the internal market, measures for the protection of human health*²⁷³.

Although the Court’s focus was examples of the PP being utilised to protect human health²⁷⁴, there is no sense that animal welfare – or any other area of EU policy – is to be specifically excluded from its scope.

5.4.7 Proposed Pathway Two: Precautionary Approach to Animal Welfare Policy, applicable to AHAW Conclusions Two and Three

In order to create stronger policy addressing serious welfare issues arising from complex husbandry systems, where scientific uncertainty precludes identification of definitive causative links between elements of the system and harm to animals (reflected in AHAW Conclusions Two and Three) the following sub-chapter explores creation of a pathway, based on a precautionary approach.

unnecessary pain, distress, fear or other forms of suffering, given the conditions in which seal hunting occurs, consistent verification and control of hunters’ compliance with animal welfare requirements is not feasible in practice or, at least, is very difficult to achieve in an effective way, as concluded by the European Food Safety Authority on 6 December 2007’ [11]

²⁷² Case C-616/17 *Procureur de la République v Blaise and others* [2019] ECLI:EU:C:2019:800

²⁷³ *ibid* para 41

²⁷⁴ The Court cited various examples including Joined Cases C-154/04 *Alliance for Natural Health and Others* and C-155/04 *National Association of Health Stores and Others* [2005] EU:C:2005:449 para 68 and Case C-77/09 *Gowan Comércio Internacional e Serviços* [2010] EU:C:2010:803 paras 71-71

Conclusion Two: there is evidence of welfare compromise but the link between management factors and animal outcomes has not been fully established, meaning more research is required before introduction of measures to protect welfare can be advised.

Conclusion Three: at present there is a lack of knowledge and understanding in a particular area of welfare, meaning advice cannot yet be provided and measures are not introduced with respect to welfare

Both the Commission and CJEU have acknowledged that the PP can potentially be applied to areas of Union policymaking beyond environment and public health. Using the approach to precaution endorsed by the Commission, a possible pathway to address AHAW Panel Conclusions Two and Three is suggested, below. Whilst every area of welfare science being considered as the basis for policy creation or change will require individual risk assessment and risk management evaluation, this thesis proposes the following steps for applying the PP:

1. The scenario in question is consistent with Von Schomberg's requirements²⁷⁵:
 - The application of the PP is a normative risk management exercise which build upon scientific risk assessments
 - Any provisional measures have no fixed expiry date and can be lifted or amended when scientific knowledge allows a move from former uncertainty to defined, acceptable levels of harm / damage*

* It should be acknowledged that within the context of the WTO SPS Agreement, provisional measures should not be permitted to extend beyond a reasonable period of time, whilst additional objective data is sought.

2. The Commission's Approach in its Communication from 2000 is adopted²⁷⁶:

²⁷⁵ Von Schomberg (n 190)

²⁷⁶ European Commission (n 143) 12-17

- Step One: Firstly decide whether to take action or not – dictated by the presence of factors triggering recourse to the PP. This step involved identifying negative effects, scientific evaluation and consideration of areas of uncertainty²⁷⁷
- Step Two; Decide how to act – measures should be proportionate, non-discriminatory, consistent, consider cost benefits or action / inaction and examine all scientific developments²⁷⁸.

5.4.8 Pathway Two: Banning Enriched Cages for Layers

This thesis proposed Pathway One for situations where a single input (management) factor could be identified and directly linked to animal pain, creating a mechanism to facilitate prohibition of unnecessary surgical mutilations. In scenarios where a single input factor cannot be identified as the cause of harm but negative welfare is observed beyond reasonable doubt, in a complex multifactorial management system, a different approach is needed to prevent animal suffering.

Chapter One of this thesis explained that the Council of the European Union, via Council Directive 1999/74/EC²⁷⁹, banned battery cages. From 1st January 2003, no new cages were to be installed; by 1st January 2012, all original battery cages had to be replaced with ‘enriched’ cages. However, the enriched cages offer only minimal improvements for birds – hens are provided with a slightly larger area for movement as well as a nest box; yet overall, the extra space provided is only approximately 50cm² (the size of a drinks coaster) and normal behaviour is still greatly restricted²⁸⁰. In recent years there has been a groundswell of opposition to the use of cages in intensive farming systems and the European Citizen’s Initiative, ‘End the Cage Age’²⁸¹ campaign, conducted between 2018 and 2021, saw over 170 European organisations join the campaign to prohibit the use of cages for farmed animals, including hens,

²⁷⁷ *ibid* 12

²⁷⁸ European Commission (n 143) 17

²⁷⁹ Council Directive 1999/74/EC (n 91)

²⁸⁰ G.B. Tactacan, W. Guenter, N.J. Lewis, J.C. Rodriguez-Lecompte, and J.D. House, ‘Performance and welfare of laying hens in conventional and enriched cages’ (2009) 88 *Poultry Science* 698

²⁸¹ End the Cage Age <<https://www.endthecageage.eu/>> accessed 20 April 2022

rabbits, sows and calves²⁸². In June 2021, The Commission committed to *'table, by the end of 2023, a legislative proposal to phase out, and finally prohibit, the use of cage systems for all animals mentioned in the Initiative'*²⁸³. Given the strong public feeling regarding animal welfare and the detrimental effects of cages, and the recurring reference to the significance of public opinion by the EU, the use of cages for laying hens provides a particularly appropriate model for application of a precautionary approach via proposed Pathway Two.

1. Von Schomberg's Requirements

Firstly, as with most animal welfare scenarios, the example of cages is consistent with Von Schomberg's requirements i.e. application of the principle to the use of cages involves a normative risk management exercise which builds upon scientific risk assessments. Via Article 13 TFEU the standard set is to pay full regard to the welfare of animals, given their sentience, and a large volume of data is available on the subject, to which EFSA AHAW scientists can apply risk assessment. Secondly, a ban could be a provisional measure, without a given date of expiry, based on the currently available science (which has some knowledge gaps), leaving the possibility to amend or lift any restriction on enriched cages, should additional evidence come to light. As explained earlier in the Chapter, it is highly unlikely that future research would yield findings to contradict the evidence supporting elimination of cages, but incorporation of additional research is a key element of precaution and is a suitable route to follow.

2. Utilising the Commission Approach - Step One

The first step in the Commission's accepted approach would be the decision to take action or not with respect to prohibiting cages. The Commission has stated that *'the appropriate response in a given situation is thus the result of an eminently political decision, a function of the risk level that is "acceptable" to the society on which the risk is imposed'*²⁸⁴ and it would be fair to say that European citizens have consistently expressed the desire for strong animal welfare protection, in other words a low level of risk to welfare.

²⁸² End the Cage Age, Our Campaign <<https://www.endthecageage.eu/#ourCampaign>> accessed 20 April 2022

²⁸³ European Commission, European Citizen's Initiative: Commission to propose phasing out of cages for farm animals <https://ec.europa.eu/commission/presscorner/detail/en/ip_21_3297> accessed 23 April 2022

²⁸⁴ European Commission (n 143) 15

Although the public morality element of animal welfare is clearly important to the EU, the decision to act (or not) requires the presence of suitable evidence of risk, and there is significant scientific data confirming welfare risks associated with cage systems, supporting the need to improve animal protection. From the cases discussed, above, it would appear that where risk is identified but some uncertainty persists, public opinion can then be triggered to bolster measures.

Identification of Negative Effects

Although enriched cages were an improvement on the original battery cages, which gave even less space than currently provided in the newer system²⁸⁵, they are nonetheless associated with numerous welfare problems. Hens in enriched cages only have minimal opportunity to move around (leading to weak bones²⁸⁶) and are unable to fly; although scratching material are sometimes provided, these are kept to a minimum to prevent high levels of dust formation. Dust bathing, a normal behavioural activity, is precluded and perches are generally not of a sufficient height to provide a sense of security or safety²⁸⁷. The position of some perches can encourage aggression and territorial behaviour²⁸⁸. Stocking density also limits normal movement such as wing flapping and the inability to perform natural activity leads to stress and abnormal behaviour such as feather plucking.

Any one of these welfare issues could trigger a scientific evaluation of available data – indeed, a precautionary approach is beneficial because numerous welfare issues are associated with enriched cages, where a single input (management) factor cannot be clearly identified as causing the observed damage, meaning scientific uncertainty. Observation of the effects of the entire system with all the associated negative outcomes can, therefore, be considered when evaluating existing legislation or considering new policy.

²⁸⁵ G.B. Tactacan (n 280)

²⁸⁶ C.C. Whitehead and R.H. Fleming, 'Osteoporosis in cage layers' (2000) 79 Poultry Science 1033

²⁸⁷ Compassion in World Farming, 'Why the EU must stop caging farm animals'

< <https://www.ciwf.org.uk/media/7434596/end-the-cage-age-why-the-eu-must-stop-caging-farm-animals.pdf>> accessed 20 April 2022

²⁸⁸ A. Mishra, P. Koene, W. Schouten, B. Spruijt, P. van Beek and J.H.M. Metz, 'Temporal and sequential structure of behavior and facility usage of laying hens in an enriched environment' (2005) 84 Poultry Science 979

Scientific Evaluation

The most recent EFSA AHAW Scientific Opinion on the welfare of laying hens was published in 2005²⁸⁹ and since that time research into layer welfare has been on-going. Even at the time of publication, it was clear that caged systems involve a plethora of management factors and husbandry choices which all interact and affect the ultimate outcome for the bird. In 2005, acknowledged risks included feather pecking, cannibalism, mortality, osteoporosis and inability to perform normal behaviours such as dust-bathing and foraging²⁹⁰; The European LayWel project²⁹¹ still regularly conducts studies into hen housing systems and has published research findings on the impact of caged systems. It is important to note that non-cage or outdoor systems are not without their own problems; in fact, risks such as mortality or parasitic disease are greater in outdoor systems (although the level of parasitic disease will depend upon the individual Member States' approach to treatment and management²⁹²). Whilst there is no such thing as a perfect system, this thesis argues that the benefits to hens from greater space - ability to perform normal behaviours and opportunity to move freely or move away from unwanted social interactions - outweigh the increased risks from disease or predation²⁹³ and proposes that reassessment of the currently-permitted enriched cage system is indicated.

Consideration of Areas of Uncertainty

As explained in Chapter Four, the EFSA approach to acknowledgement of uncertainty within a particular scientific area is complex and detailed; for the purposes of this sub-chapter it is sufficient to concede that causative links between multiple input factors

²⁸⁹ EFSA Panel on Animal Health and Welfare, 'Opinion on a request from the Commission related to the welfare aspects of various systems of keeping laying hens' (2005) 197 *The EFSA Journal* 1

²⁹⁰ *ibid*, 95-96

²⁹¹ The Laywel Project <<https://www.laywel.eu/>> accessed 22 April 2022

²⁹² For a comparison of systems, see B.Y. Dikmen, A. Ipek et al, 'Egg production and welfare of laying hens kept in different housing systems (conventional, enriched cage, and free range)' (2016) 95 *Poultry Science* (7) 1564 The study found that hens in the free range system had more space meaning optimum comfort as well as better feather and bone traits, however this group also had a greater dirty egg ratio and more foot lesions than in caged systems.

²⁹³ D.L.M. Campbell, S.M. Bari and J.-L. Rault, 'Free-range egg production: its implications for hen welfare' (2020) 61 *Animal Production Science* (10) 848. For an interesting experiment which considered the placement of chickens in a free-range woodland environment, see T. Jones, R. Feber et al, 'Welfare and environmental benefits of integrating commercially viable free-range broiler chickens into newly planted woodland: A UK case study' (2007) 94 *Agricultural Systems* (2) 177

and observed negative outcomes in intensive production systems have not, to date, been definitively identified, which is precisely why a precautionary approach to protect welfare is indicated.

Utilising the Commission Approach - Step Two

✓ Proportionality

Proportionality is a general principle of EU law²⁹⁴; the Commission explains proportionality as the Union only taking action that is required, and no more²⁹⁵. Policy makers must be able to demonstrate that their measures are proportionate and the Commission has advised that: *'[t]he measures envisaged must make it possible to achieve the appropriate level of protection. Measures based on the precautionary principle must not be disproportionate to the desired level of protection and must not aim at zero risk, something which rarely exists.'*²⁹⁶

In the context of enriched cages, in common with any husbandry system, zero risk would never be attainable; the keeping of large groups of animals necessarily involves losses²⁹⁷ through disease, inter-group fighting and accidents, or illness, competition for resources and challenging social interactions. Nonetheless, whilst an 'ideal' system may not exist, this is not in itself an excuse to allow a damaging system to continue. Since serious, chronic welfare issues have been observed in enriched cage systems across a wide range of scientific studies, it can be viewed as proportionate to consider prohibition of this system. Although the actions of individual countries are not necessarily determinative, Switzerland banned the use of cages for laying hens in 1992²⁹⁸ and Austria and Luxembourg have recently banned cage systems for hens²⁹⁹;

²⁹⁴ For a detailed discussion see T. Tridimas, 'The Principle of Proportionality' in R Schütze and T. Tridimas (eds) *Oxford Principles of European Law, Volume 1, The European Union Legal Order*, 243

²⁹⁵ European Commission, Proportionality, <https://ec.europa.eu/regional_policy/en/policy/what/glossary/p/proportionality> accessed 14 May 2022

²⁹⁶ European Commission (n 143) 17

²⁹⁷ In fact, mortality is a routine measure taken in all farmed animal systems; for a discussion of mortality as a performance indicator in pig herds see I. Chantziaris, J. Dewulf et al, 'Factors associated with specific health, welfare and reproductive performance indicators in pig herds from five EU countries' (2018) 159 *Preventative Veterinary Medicine* 106

²⁹⁸ P. Balsiger, 'Moral Struggles in Markets: The Fight against Battery Cages and the Rise of Cage-free eggs in Switzerland' (2017) 57 *European Journal of Sociology* (3) 419

²⁹⁹ Poultry Network, J. Davies, 'Europe aims to ban caged hens by 2027' (30 June 2021) <<https://poultry.network/7162-europe-aims-to-ban-caged-hens-by-2027/>> accessed 22 April 2022

since other countries with comparable agricultural infrastructure have been able to ban cages, the proposal to outlaw enriched cages for laying hens cannot be viewed as a disproportionate measure. A decision to phase-out cages would be indicated to allow farmers time to adapt to new systems, as was seen when battery cages were banned, but a ban could be argued as proportionate.

✓ Non-discrimination

The Commission has advised that '*the principle of non-discrimination means that comparable situations should not be treated differently and that different situations should not be treated in the same way, unless there are objective grounds for doing so*'³⁰⁰. Addressing enriched cages would not be a problem with respect to discrimination, since the provisions for enriched cage size are defined with EU Regulation and therefore any measure would be designed to specifically address this particular husbandry system³⁰¹. As with any EU Directive, its provisions would apply to all Member States and ensure a uniform result, with individual states free to choose the manner in which to achieve compliance³⁰².

✓ Consistency

Commission guidance on consistency states '*Measures should be consistent with the measures already adopted in similar circumstances or using similar approaches*'³⁰³. In the field of European animal welfare legislation there is already some precedent with respect to total prohibition of certain animal husbandry systems. For example, the initial ban on battery cages entered into force in 1999 (prohibition having effect from 2012³⁰⁴) and was introduced on the basis of research reviewed by the Scientific Veterinary Committee³⁰⁵, with assessment of risks to welfare and in light of significant

³⁰⁰ European Commission (n 143) 18

³⁰¹ Council Directive 1999/74/EC (n 91) of the Directive requires that '*at least 750 cm² of cage area per hen, 600 cm² of which shall be usable; the height of the cage other than that above the usable area shall be at least 20 cm at every point and no cage shall have a total area that is less than 2000 cm²*'

³⁰² Article 288 TFEU

³⁰³ European Commission (n 143) 18

³⁰⁴ For discussion of the history of the ban, see Appleby, M.C. 'The EU ban on battery cages: History and prospects' in D.J. Salem & A.N. Rowan (eds) *The state of the animals II*: 2003 (Humane Society Press 2003) 159

³⁰⁵ Council Directive 1999/74/EC (n 91) 7

public concern about the system. This was a considerable time before the introduction of Article 13 TFEU which now places welfare and animal sentience at the heart of EU policymaking. In addition, in 2008, following strong campaigning from animal welfare NGOs, the EU also elected to prohibit breeding sows in individual stalls³⁰⁶, with an exception for the use of this housing in the first four weeks of pregnancy and the week before giving birth (the ban came into force in 2013). Sow stalls³⁰⁷ are restrictive, narrow cages that limit sow movement to the extent that they cannot turn. The negative impact on the mental, physical and social lives of sows in these conditions was confirmed by evaluation of scientific data via EFSA AHAW with associated risk assessment and identification of hazards to sow welfare³⁰⁸. It is undoubtedly the case that a ban of enriched cages would be a measure consistent with previous animal welfare measures in terms of scope and available evidence. In fact, it is important to acknowledge that the ban on battery (unenriched) cages originated from assessment of scientific data which did not focus on individual management input factors (e.g. substrate used, ventilation, lighting, hen genotype [breed]). Rather, it simply acknowledged that the stocking density and size of cages led to numerous negative welfare outcomes, with the subsequent decision to outlaw the system. This ban was not expressly based on the precautionary principle but it is undoubtedly the case the scientific evidence on links between management factors and negative outcomes had not been fully established, meaning some uncertainty was present. The EU view of the unenriched cage system – as stated in the Directive – was that *‘welfare conditions of hens kept in current battery cages and in other systems of rearing are inadequate and that certain of their needs cannot be met in such cages; the highest possible standards should therefore be introduced, in the light of various parameters to be considered in order to improve those conditions’*³⁰⁹. Although the minutiae of input factors, causation and output were not fully established, the EU nonetheless took more of a precautionary approach than was actually stated and elected to prohibit battery cages. If this approach was suitable in 1999, it would be equally appropriate now, especially given the greater volume of data now available on hen welfare.

³⁰⁶ Council Directive 2008/120/EC (n 56)

³⁰⁷ Stalls had already been banned in Sweden in 1994 and in the UK in 1999

³⁰⁸ EFSA Panel on Animal Health and Welfare, ‘Scientific Opinion on a request from the Commission on Animal health and welfare aspects of different housing and husbandry systems for adult breeding boars, pregnant, farrowing sows and unweaned piglets’ (2007) 572 The EFSA Journal 1

³⁰⁹ Council Directive 1999/74/EC (n 91) 7

- ✓ Benefits and costs of action (or inaction) and examination of scientific developments

The Commission explains this final element as follows: *'[t]his examination should include an economic cost/benefit analysis when this is appropriate and feasible. However, other analysis methods, such as those concerning efficacy and the socio-economic impact of the various options, may also be relevant. Besides the decision maker may, in certain circumstances, be guided by non-economic considerations such as the protection of health'*.³¹⁰

The public morality factor is again present, and the Commission guidance appears to offer policymakers some freedom to take legislative action that might be deemed appropriate because of public concerns, despite a potentially significant economic impact. As with previous measures taken to prohibit battery cages and sow stalls, there would be a significant cost to producers in changing husbandry systems; a 2020 Czech Republic study suggested that a move from enriched cages to non-cage systems, country-wide, would cost between 3.1-4.6 billion Czech Korunas, while the actual costs to producers could be between 1.55-2.3 billion Czech Korunas (the lower figure being due to expected subsidies)³¹¹. An American study suggested that the move to cage free from caged systems would lead to farm-level costs being 40 to 70% higher³¹². One additional element to consider is the fact that earlier bans on battery cages and sow stalls were not necessarily viewed as provisional by operators and producers, despite the fact that the full scientific picture was not established; although the lengthy period for implementation of the enriched cage systems was primarily to allow operators to adapt, it might also have been viewed as a period to review or revisit the measure and any new data. In fact, these bans have proven long-lasting and this thesis suggests that a similar route could be taken with phasing-out enriched cages.

³¹⁰ European Commission (n 143) 19

³¹¹ Research Institute for Sustainable Business, Analysis of economic consequences of the ban on enriched cages for egg-laying hens (31 January 2020)
< <https://risb.econ.muni.cz/en/aktualne/analysis-of-economic-consequences-of-the-ban-on-enriched-cages-for-egg-laying-hens>> accessed 20 April 2022

³¹² D.A. Sumner, H.R. Gow et al, 'Economic and market issues on the sustainability of egg production in the United States: Analysis of alternative production systems' (2011) 90 Poultry Science 241, 245

Finally with respect to scientific developments, *‘[t]he measures should be maintained as long as the scientific data are inadequate, imprecise or inconclusive and as long as the risk is considered too high to be imposed on society. The measures may have to be modified or abolished by a particular deadline, in the light of new scientific findings’*³¹³. The nature of husbandry system research is that data will likely always be imprecise or inadequate with respect to the experiences of animals in intensive systems or the connections between management factors and negative outcomes; nonetheless, any proposed ban on enriched cages could always make provision for new evidence to be considered and acted upon, if necessary. If enriched cages were to be outlawed using a precautionary approach, a willingness to review new data would form part of the process. However, it is also important to remember that the Commission stated in Council Directive 1999/74/EC³¹⁴ that the *highest possible standards* should be introduced, meaning that any retrograde steps with respect to welfare would be highly unlikely.

In following the steps proposed, above, there is ample evidence to suggest that a precautionary approach can be applied in animal welfare policymaking. Although the example of a ban on enriched cages has been used in this sub-chapter, proposed Pathway Two could be applied to other areas where AHAW has advised that additional research is required before legislative action can be taken (Conclusion Two) and it could also be applied to areas where scientific knowledge is limited, but harm is suspected (AHAW Conclusion Three). With respect to Conclusion Three, a precautionary approach would be particularly relevant to fish sentience, a rapidly developing field where there is a lack of specific protective legislation but much evidence to suggest that fish experience pain and distress in farming systems and at slaughter³¹⁵.

³¹³ European Commission (n 143) 19

³¹⁴ Council Directive 1999/74/EC (91) 7

³¹⁵ A large amount of research is being carried out in the field of fish sentience; see for example, L.U. Sneddon, J. Lopez-Luna et al, ‘Muddying the waters (2018) 21 Animal Sentience (1) and M.L. Woodruff, ‘Pain in fish: Evidence from peripheral nociceptors to pallial processing’ (2018) 21 Animal Sentience (2). See also J.L. Saraiva and P. Arechavala-Lopez, ‘Welfare of Fish - No Longer the Elephant in the Room’ (2019) 4 Fishes (3) 39

5.5 Chapter Conclusion

This chapter has encouraged a pragmatic acceptance of scientific uncertainty and acknowledgement of the futility in searching for ‘truths’ or definitive facts, in a field of discovery as complex and diverse as animal welfare. A pragmatic approach is necessary to avoid the stalemate identified within EU animal welfare policymaking, whereby the desire for certainty is repeatedly cited as a barrier to the introduction of stronger legislation yet due to the complexity of husbandry systems, scientists are unable to provide definitive causative links between management factors and negative welfare. The chapter has argued that in adopting a threshold of evidence of ‘beyond reasonable doubt’ with respect to available data, policymakers will have a suitable threshold of justification on which to base welfare policy.

The chapter has proposed two pathways which have the potential to facilitate stronger animal welfare protection legislation, utilising scientific data that is beyond reasonable doubt as the basis for policy.

Pathway One, designed to address AHAW Conclusion One, provides a mechanism by which management factors demonstrated to cause acute and chronic pain can be outlawed, on the basis of current knowledge and to ensure compliance with the duties to welfare and sentience enshrined in Article 13. The pathway utilises the approach of the EU to welfare at slaughter as a template, and incorporates evidence of harm, risk assessment and expert opinion in the process of considering scenarios suitable for stronger legislation.

Pathway Two addresses AHAW conclusions Two and Three, where greater scientific uncertainty is present. The pathway utilises the Precautionary Principle to facilitate stronger welfare protection and is designed on the basis of guidance from the European Commission and its advisors. Having reviewed commentary from both the Commission and the Court of Justice, the chapter has demonstrated that the scope of the Precautionary Principle could be extended to animal welfare policymaking. The pathway was applied to a potential ban on enriched cages for hens but would be suitable for any scenario where there is evidence of negative effects on welfare from a husbandry system and where there is uncertainty as to exact mechanisms of action

or causation. The pathway would also be suitable for use where there is limited scientific knowledge in a particular area of welfare but some evidence of pain or distress has been identified.

Although the Commission's traditional approach to animal welfare legislation has been to enshrine only minimum standards in law, whilst protecting trade / the internal market and perpetuating the request for additional scientific evidence before considering the adoption of stricter regulatory measures, this thesis argues that application of a precautionary approach would be appropriate for animal welfare policymaking.

In common with earlier sections of this thesis, Chapter Five has once again highlighted the recurring theme of social concerns and public morality in EU policymaking; the Commission's remarks and CJEU judgments with respect to the Precautionary Principle demonstrate that both institutions believe a significant role is played by public opinion. As was seen with both non-stun slaughter and the ban on seal products, the EU has been willing to forego its quest for scientific certainty in the face of religious freedom or public morality but there is a lack of consistency in these approaches that is difficult to justify. The final, concluding chapter of this thesis aims to draw together the threads of science, religious and cultural derogations, public morality and policymaking, in order to summarise the current position within the EU and consider what lies ahead.

‘Science is at no moment quite right, but it is seldom quite wrong, and has, as a rule, a better chance of being right than the theories of the unscientific. It is, therefore, rational to accept it hypothetically’¹.

‘The power of the people is much stronger than the people in power’²

6. Conclusion

This thesis has examined the relationship between animal welfare science and animal welfare policy-making in the EU, in order to assess the validity of the Commission’s frequent proclamation that the EU animal welfare legislative model is evidence-based, i.e. underpinned by sound scientific data. The primary focus has been the role played, and degree of influence wielded, by science in EU policy-making.

The historical development of animal welfare science was first explored, it being capable of characterisation as a distinct area of discovery, albeit with strong links to numerous other scientific disciplines, including advances in agricultural science. Indeed, in the context of animal welfare policy-making, agricultural science exerts considerable influence because protection of domesticated animals – particularly those which are bred and farmed for human benefit – lies at the core of the European legislative framework. Modern, intensive production systems were created to ensure a constant supply of affordable animal produce; but, as the examples of intensive chicken, pig, rabbit and fish farming demonstrated, they are also associated with numerous, severely detrimental animal outcomes, and serious welfare compromises. These compromises exist despite the presence of a legislative framework which claims to provide protection against harm and a long-established, scientific database confirming the risks to welfare; this paradox was the stimulus for the research.

A detailed examination of the contemporary EU regulatory framework for farm animal welfare has been provided. Importantly, animal welfare policy has featured in EU law-making since the 1970s and has flourished as a policy field since the late 1990s. Article 13 TFEU can be described as the most significant recent development in primary EU legislation, enshrining animal welfare as a provision having general

¹ Bertrand Russell, *My Philosophical Development* (Routledge 1959) 13

² Wael Ghonim, Computer Engineer and Internet Activist

application and requiring the EU to pay ‘full regard’ to animal welfare during the formulation of Union policy. Article 13 is also an acknowledgement of the sentient nature of animals, a legal recognition that they have capacity to experience feelings that are positive and negative, including joy, pleasure, pain and distress. The introduction of Article 13 in the Lisbon Treaty is often cited by campaigners as bringing animal welfare to a position of priority in EU animal protection policy-making; yet, until new animal welfare regulations are introduced, the accuracy of this assertion is unclear. In fact, the most recent farm animal welfare instrument was introduced in 2009 (with respect to welfare at slaughter), with the result that the last thirteen years have provided little clarification as to any direct influence Article 13 might wield over policy creation.

There is a perpetual clash of values with respect to farm animals in Europe; on the one hand, Article 13 defines them as sentient creatures, whilst Article 38 places them firmly in the category of goods, being defined as agricultural products. This renders animals subject to the fundamental EU principle of Free Movement of Goods, which in turn presents significant challenges for Member States attempting to protect welfare, where any measures restricting export or import of animals may be interpreted as barriers to trade. Pan-European concerns regarding the treatment of farmed animals come from citizens, welfare charities and NGOs, and public opinion has stimulated the presentation of legal challenges concerning animal welfare to the CJEU.

Early case law, primarily *CIWF* and *Hedley Lomas* made little mention of scientific evidence, but it did see discussion of the concept of public morality (citizens’ concerns for animals) as a potential driver for animal protection policy. During that period, there was clear reluctance on the part of the CJEU to accept public morality as justification for welfare measures which were viewed as indefensible barriers to trade. The desire for smooth running of the Internal Market was a clear priority over welfare concerns. However, Article 13 has undoubtedly altered the animal welfare landscape in the context of the CJEU, as this thesis explained. Since 2018, three key cases pertaining to religious, non-stun slaughter have been heard. The EU Slaughter Directive requires that all animals be stunned prior to slaughter, but permits derogations from this provision for religious slaughter. The cases concerned specific questions about the prohibition of such religious slaughter in Member States. Article 13 and animal sentience were cited in all three as justification for the upholding of bans on religious

slaughter practices. Interestingly, in comparison with earlier animal welfare cases, science played a far more central role in these rulings; in *CIWF* science is mentioned only five times, primarily by the appellants, whereas in *Centraal Israëlitisch Consistorie van België and Others*, scientific opinion features in fifteen sections of the judgment. In *Liga van Moskeeën*, the Court confirmed that '*science and technical progress are regularly made with regard to the handling and restraining of animals at slaughterhouses*', indicating a willingness to consider additional research findings. In that case, it was ruled that the available scientific evidence proved legislators wishing to impose compulsory reversible stun methods in religious slaughter were acting in accordance with TFEU provisions and, in particular, in compliance with the spirit and requirements of Article 13. This particular judgment is pertinent in the assessment of the degree of influence exerted by science because the CJEU acknowledged scientific evidence as a mechanism by which Member States can ensure compliance with their Article 13 responsibilities to animal welfare. Moreover, in a more positive manner than was seen in earlier welfare case law, the Court also acknowledged the role and significance of public opinion in policy-making, public morality featuring as a constant thread throughout this thesis.

Minimum standards legislation is the EU's preferred model in farm animal policy-making and, whilst the benefits of setting out universal levels of minimum welfare was undoubtedly an important first step, it must be acknowledged that the underlying motivation for this approach was uniformity of production standards and costs, rather than welfare itself, although Member States remain free to implement higher standards if they wish. Although the desire to offer flexibility to Member States with respect to the upper level of welfare is understandable, this thesis argues that having any tiered system of welfare is inappropriate, since it diminishes the value of research. There is little sense in establishing what husbandry or management factors bring optimal comfort and happiness to animals, if these findings are not then universally applied. Whilst animal welfare may not be fully analogous to human rights, welfare is nonetheless considered an objective tenet of such significance that the EU has chosen to enshrine it in law, in light of contemporary understanding of sentience. Just as human rights apply universally, animal welfare needs (within each species and sub-species) are applicable to all individuals. Research is carried out to establish the best conditions for animal welfare; therefore, once certain welfare benefits are confirmed,

it is contradictory to then afford these benefits to some, but not all animals entrusted to our care. For example, whether a chicken carcass will be purchased by a customer of a bargain supermarket or by a customer of a Knightsbridge delicatessen, its welfare needs are identical. Whether a sheep is a cross-bred mutton mule or a champion Texel ram, their welfare needs are the same. The application of minimum standards means that, despite the knowledge that better systems are available, millions of animals are condemned to sub-optimal welfare conditions, usually for economic reasons. This thesis proposes that, once animal welfare requirements are established via research, they should not be altered or minimised by citizens' subjective opinions, financial circumstances or religious views. However, as the thesis has repeatedly demonstrated, such factors carry significant influence in animal welfare policy-making.

The relationship between science and law was considered, with a focus on the EU's move towards evidence-based policy. This concept, which became particularly favoured during the Blair years in the United Kingdom, is the mechanism by which policy-makers review evidence on a topic being considered as requiring legislative intervention, then utilise the relevant data as the justification or basis for introduction or amendment of policy. Modern scientific principles and research protocols were explained, with acknowledgement of the gap between, on the one hand, citizens' – and policy-makers' - expectations of science as an infallible discipline, which always brings 'answers' and, on the other hand, the reality of it being a human enterprise, beset with subjectivity and bias, encumbered by political agendas and societal pressures. The recent COVID-19 pandemic and public response to the uncharted territory of a novel virus which left scientists unable to provide a complete epidemiological picture or agree on a definitive approach to disease management, epitomises the gradual awakening of society to the limitations of science and the acceptance of working from likelihoods rather than certainties. This thesis argues that this is a difficult, but necessary, process for modern Europe which should not be viewed as a negative or retrograde step. Whilst human beings crave definitive proof, absolute certainty is rarely available, so embracing evidence at a threshold of 'beyond reasonable doubt' (as utilised in criminal law), or, 'on the balance of probabilities' (as utilised in civil law) is the only practical way forward. In fact, scientists are generally comfortable with uncertainty, but policy-makers find it challenging to make reasoned judgements when faced with incomplete evidence.

The difficulties faced by policymakers under such circumstances was demonstrated via analysis of the EU Seal Products case. This reflected the EU's approach of requesting scientific opinion on available data from a panel of experts - AHAW in the case of animal welfare - in order to assess if legislation can be justified. The Seal Products case is arguably an exercise in contradiction, revealing the difficulties where scientific uncertainty and strong public opinion collide, leaving policy-makers to balance the two entities. With respect to the killing of seals, AHAW advised that there were multiple knowledge gaps in the available scientific data and further research was required, but that it was likely that seal welfare was compromised during some hunts. The EU elected nonetheless to introduce a ban on seal products and this thesis argues that, whilst the decision to take this protective action in the face of scientific uncertainty might appear a precautionary approach at first blush, the underlying desire was appeasement of the general public. Indeed, when the ban was challenged via the WTO dispute process, the EU cited public morality as justification for the measures taken. The EU approach to seals was markedly different from their usual method; generally where there are gaps in data, further research is advised and taking legislative action is deemed unjustified; or a precautionary approach is adopted on the basis of available evidence (despite a lack of scientific certainty) so as to prevent harm. In this case, citing a precautionary approach would have been more appropriate, given the EFSA opinion that it was likely seal welfare was compromised; instead, the EU chose to intervene and ban seal products, concentrating on the argument that European citizens were so concerned about seal welfare at the time of killing that action was necessary. At first glance the approach driven by public morality appears reasonable, but on second glance it could be considered problematic and not to stand up to scrutiny. Firstly, public morality was offended by the process of baby seals suffering head trauma via picks or clubs, but the derogations for Inuit and other indigenous groups meant that this process was allowed to continue. The European public wanted an end to the clubbing to death of seals – yet, by introducing the derogation, the EU permitted continuance of the very practice that outraged citizens in the first place. The fact that an Inuit is killing the seal, rather than a Norwegian, makes no difference to the outcome for the animal and allowing derogations precluded the outright ban sought by campaigners. Secondly, whilst the action of a percussive blow to an animal's head is unpleasant for people to consider, it is the same process carried out in abattoirs every day, to stun farm animals. Indeed, although there are

many safety protocols in place during commercial slaughter, stunning does not always proceed appropriately and no slaughter technique is without potential problems or difficulties – but the EU has not banned slaughter of farm animals despite widespread concern amongst citizens regarding animal welfare in abattoirs. It has been suggested that another factor was at play - the lack of negative economic consequence from the ban on European trade, since seal harvesting was never a flourishing industry within the Union. A final interesting element was the fact that seals are wild animals; in *Centraal Israëlitisch Consistorie van België and Others* the CJEU highlighted that the Slaughter Directive provisions do not apply to hunting or fishing (the Recital stating that the Directive does not regulate the killing of wild animals or fishing / hunting); in other words these are areas not covered by EU animal welfare law. It seems paradoxical, therefore, that the EU elected to offer such a high level of protection to a group of wild animals, compared with the lower level applicable via the religious freedom derogation to farm animals who can experience non-stun slaughter, and the associated welfare detriments.

Animal welfare science is a complex, developing field where much is yet to be learned about animal psychology and emotion. This thesis explained that the physical and physiological experiences of animals are, broadly, well understood. That said, whilst sentience is accepted, there are significant gaps in our comprehension of their mental and emotional lives. This means that any scientific assessment of farm animal welfare is generally incomplete with respect to the entire experience of the individual; although much useful information can be obtained from research, there is still a large amount of knowledge missing. In addition, the complex nature of husbandry systems means that any analysis of welfare has to factor-in numerous management choices which all affect the animals within the system in different ways. Nonetheless, under certain circumstances it is possible to identify a causative link between an input (management) factor and an identifiable, negative outcome in an animal, and this thesis has proposed that single input factors with a direct causative link to welfare compromise are easily identifiable and should be addressed more effectively in EU welfare legislation.

Although the EU animal welfare framework has been the subject of legal analysis in recent years, the research and commentary have generally been the work of legal academics or political scientists, who accept the scientific opinion at face value. When

EU animal welfare law features in the scientific or veterinary contexts, the legal position is stated and discussed, but only on a superficial level. However, to date, there has been no real attempt to consider the entire process holistically, from scientific research, through AHAW opinion, to policy-making. Therefore it was the aim of this thesis to consider the process in its entirety, in order to understand the scope and degree of influence wielded by science. Previous analyses have discussed the approach of policy-makers in light of AHAW Opinions, but have failed to scrutinise the Opinions themselves or evaluate the conclusions drawn by the AHAW Panel and consider their impact on subsequent policy decisions. Investigation of the large volume of AHAW scientific output, which has, in reality, resulted in a relatively small (although significant) framework of legislation, inevitably brings into question the statement that welfare policy is evidence-based. Although the role and approach of the Panel has occasionally been discussed in EFSA publications, there has never been extensive analysis of their methodology or the conclusions they reach; this thesis has sought to clarify the AHAW segment of the animal welfare policy-making chain and consider its potential scope of influence.

Whilst the EFSA Panels do not carry the authority to insist upon legislative intervention, they are in a position to provide advice and highlight risks, hazards and areas of specific concern, as well as making recommendations to policy-makers. When the AHAW Panel reviews contemporary research from welfare studies in order to advise the EU institutions, it follows a process of analysing available data and acknowledging any areas of uncertainty before advising where further research is indicated and identifying serious issues that may require legislative intervention. The EFSA has published various reports on their protocols as well as their standard approach to uncertainty in science; but, again, these have not been subject to critique or detailed examination.

In recent years, the AHAW Panel has provided Scientific Opinions on various elements of the main European intensive husbandry systems – broiler and laying chickens, pigs, dairy cattle and rabbits – as well as analysing available data on welfare at slaughter and during transport. To date, all the opinions have confirmed areas of uncertainty or incomplete data within the scientific research available, which is to be expected given the evolving nature of welfare science. Nonetheless, they have also featured some notably strong conclusions and recommendations and this thesis argues that policy-

makers have failed to act upon elements of AHAW advice, or have applied the recommendations inconsistently. AHAW opinions have confirmed numerous negative welfare outcomes in intensively farmed animals including acute and chronic pain, fear, distress, behavioural abnormalities and numerous health problems including mastitis and lameness.

Following detailed analysis of the relevant AHAW Panel Opinions, this thesis found that three types of Conclusion are consistently drawn, with Conclusion Two being adopted in the vast majority of cases:

- Conclusion One: there is sufficient evidence that a management practice can be linked to welfare compromise and therefore amendment or prohibition is advised.
- Conclusion Two: there is evidence of welfare compromise, but the link between input factors and outcome factors has not been established, meaning more research is required before action to protect welfare can be advised.
- Conclusion Three: at present there is a lack of knowledge and understanding in a particular area of welfare, meaning advice cannot yet be provided.

Conclusion One, the most prescriptive, is found in the Opinions on welfare at slaughter (cattle, sheep and goats, pigs), whereby the Panel states several times that *all* animals should be stunned prior to slaughter, to prevent pain and suffering. This kind of guidance from the Panel is the most helpful to policy-makers because it provides clear direction on which to base policy decisions. However, despite this forthright advice and clear instruction, the derogation for religious non-stun slaughter remains in EU law. Similarly, although the Panel has advised that suitable techniques for seal slaughter must be in place, indigenous hunts continue. As the most frequently encountered summary, Conclusion Two was found by this thesis to play a significant role in a vicious circle present in welfare policy-making over the last few decades: AHAW advises that more research is needed on certain aspects of a potential welfare issue >> policy-makers cite the lack of conclusive evidence as justification for not introducing or amending legislation >> policy-makers request more definitive evidence via further research >> this evidence cannot be provided, due to the multifactorial nature of husbandry systems. And so the circle continues with no positive progress, whilst farm animals experience systems that are detrimental to their welfare.

Conclusion Three is primarily found in the context of novel areas of welfare research, such as fish and cephalopod sentience, where much is yet to be discovered in order to achieve stronger understanding of the experiences of these farmed species.

Given the vast amount of research into animal health, behaviour and welfare over the last fifty years, scientists have already provided ample proof of welfare compromise within intensive production systems; this knowledge has already been accepted in numerous AHAW Opinions - and therefore a further aim of this thesis was to consider mechanisms by which the current pool of scientific knowledge can be incorporated into stronger policy without further delay. It is proposed that a pragmatic approach to science-based policy-making should be adopted, since certainty is a rare commodity and an unrealistic benchmark for evidence-based legislation; if we wait for certainty, progress will never be made. This thesis considered the concept of 'beyond reasonable doubt', which is applied in many social, legal and political arenas, and advocates its use as the threshold at which data should be incorporated into policy i.e. if there is evidence, beyond reasonable doubt, that a management practice or system causes harm to animals, there is justification to introduce welfare protection policy.

In order to address the three Conclusions found in AHAW Opinions, the thesis proposed two Pathways to facilitate stronger animal welfare policymaking.

Pathway One was created using the EU's legislative approach to welfare at slaughter as a template. The Slaughter Directive was chosen as the basis for this model because it is a legislative instrument that features a provision to prohibit a detrimental practice (non-stun slaughter) which has been consistently demonstrated beyond reasonable doubt (via decades of research) to cause harm. Importantly, the provision banning non-stun slaughter involves identification of a single management factor that can be shown to directly cause negative effects on animals, including pain and distress. This thesis asserts that, if there were a hierarchy of welfare issues, enduring pain would sit at the top of the list and therefore the purpose of Pathway One is to allow elimination of management practices shown to cause acute or chronic pain. All sentient animals experience pain; therefore the duty to ensure prevention is enshrined in Article 13 and the policy-making duties contained therein. Pain is a physical, physiological and psychological experience that has been studied for many years and scientific understanding of pain renders it easily identifiable in the majority of situations.

Pathway One features four key steps: (i) identification of a single input factor (management practice); (ii) identification of hazards to welfare with identifiable or observed animal-based measures (ABMs) which lead to pain; (iii) evidence that data supportive of welfare compromise is beyond reasonable doubt, with supportive specialist or expert opinion; and (iv) justification for the policy in light of Article 13 TFEU.

Proposed Pathway One incorporates scientific data and a suitable threshold for inclusion of that data into policy – beyond reasonable doubt - as well as expert opinion and a legal basis for the action to be taken. It is argued that Pathway One could facilitate introduction of stronger welfare legislation to prohibit surgical mutilations such as tooth clipping, beak trimming and tail docking. These practices constitute a single input factor which can be demonstrated to cause negative impacts on welfare. Although such mutilations can be performed under local anaesthesia and with analgesia, this thesis rejects this option in the majority of cases because local anaesthesia has a short duration of action and these practices generally lead to acute and chronic pain which cannot be addressed without additional medication. In addition, the practicalities of administering local anaesthesia to every animal in a herd or flock would likely mean this option is unfeasible. Pathway One would provide suitable justification for animal welfare legislation prohibiting painful management practices on the basis that the evidence of welfare compromise is beyond reasonable doubt - bringing an end to procedures that have been accepted, for too long, as routine and acceptable. Nonetheless, it is essential to recognise that surgical mutilations were integrated into management schemes as a mechanism to prevent trauma caused by undesirable behaviours (such as fighting, stereotypies and cannibalism), yet the undesirable behaviours arise as a direct result of intensive production housing which exposes animals and birds to overstocking, lack of mental stimulation and inability to move freely. This thesis argues that surgical mutilations should be outlawed immediately, while also asserting that they would not be necessary if stocking densities were reduced. Therefore in light of the available evidence of welfare compromise, the time has come to rethink intensive production systems. Recent research into fighting and mortality in broiler chickens has led some European researchers to propose breeding from less aggressive stock or exploring alternative methods for beak trimming; in fact, the obvious and simplest solution is also the most

appropriate – significantly reduce the numbers of birds being housed per shed, and offer them an enriched environment. With respect to pigs, the AHAW Panel commented that it is unlikely the benefits of tooth clipping could ever mitigate the severe pain and distress it induces, and this is true of all current surgical mutilations. Where the option exists to reduce stocking densities and enrich environments, there is simply no justification in the 21st Century to allow these systems to continue.

Pathway Two is designed for use where AHAW Conclusions Two and Three apply, i.e. there is evidence of harm to animals, but incomplete or insufficient evidence available to allow definitive conclusions to be drawn on all aspects of the welfare scenario being considered. These conclusions usually arise where researchers are trying to make links between one management practice and a negative welfare outcome in the context of a complex, multifactorial husbandry system where there are numerous input and outcome factors. Historically, these situations have seen policy-makers reluctant to act without certainty. Yet, given the difficulties associated with reaching definitive conclusions on causation with respect to welfare compromises in complex husbandry systems, this thesis has proposed that protective action could be taken by invocation of the Precautionary Principle. Using a precautionary approach allows acceptance of the fact that definitive causative links in complex systems are rarely detectable.

The Precautionary Principle was essentially designed to facilitate legislative measures to prevent harm in the face of scientific uncertainty; although more frequently associated with environmental and public health policy, there is nothing in the EU legislative framework to preclude its application in the field of animal welfare and both Commission and CJEU have acknowledged that its potential scope is broad. In *Pfizer*, the CJEU commented that, if EU institutions were precluded from taking preventative measures for protection until research was completed, the Precautionary Principle would be devoid of purpose, since its very aim is to prevent harm. Given the EU's stance that welfare legislation is science based, it would be paradoxical to assert that the Precautionary Principle should not apply in this area of law. The thesis considered, in detail, the Commission's Communication (2000) on use of the Principle as well as its guidance on practical application of precaution, and asserts that there is no evidence that the principle cannot be put to work in the field of animal welfare. In reality, as explained above, the EU has already been seen to act in a precautionary

manner with respect to scientific data in the Seal Products Case. Whilst public morality may have been cited as the driver in that case, there was, nonetheless, a call for scientific opinion and examination of available data; with respect to the scientific aspect of the legislative process, the evidence, albeit incomplete, was suggestive of harm, so protective action was taken; this is supportive of a precautionary approach.

Analysis of the EU's application of the Precautionary Principle also reveals an interesting emphasis on public perception of risk and what levels of risk are deemed acceptable to society. Again, the subjective views of citizens are afforded considerable weight. Not only does this mirror the Commission's approach to legislating in certain areas of animal welfare policy where public morality has been placed at the forefront of debate (seal slaughter, dog and cat fur), this strategy also provides a useful, additional justification for invoking the precautionary principle in animal welfare. If public morality or public risk perception can be afforded significance equivalent to (or even greater than) scientific evidence in environment and health situations – as has been observed with GMO produce, neonicotinoid chemical and beef hormone bans – consistency would require the same approach to be available with respect to animal welfare, a topic of central concern with respect to the public.

Pathway Two facilitates a precautionary approach in the assessment of complex intensive production husbandry systems associated with detrimental effects on animals, following, firstly, Von Schomberg's requirements for the scenario under consideration (a normative risk management exercise built on scientific risk assessment, together with provisional measures open to amendment on the basis of new research) and, secondly, adopting the Commission's approach from 2000 in implementation of the principle. This methodology is useful because, unlike Pathway One, it could be applied to a husbandry system in its entirety and facilitate stronger welfare protection where negative outcomes are identified even although exact causative links between input and outcome factors cannot be established. The example of enriched cages was utilised because birds housed in this system experience numerous welfare problems which cannot easily be attributed to one particular input factor. This thesis argues that a precautionary approach to such systems allows acknowledgement of certain harms - and the likelihood of other harms – that are sufficiently serious to justify preventative action being taken. If Pathway One can address individual management factors, Pathway Two provides justification for

prohibition of the relevant hazardous system. In June 2021 the European Commission announced its intention to phase out the use of cages for farmed animals, following the European Citizens Initiative, 'End the Cage Age', largely the result of a three-year campaign by NGOs and citizens. With this decision, the thesis once again finds public morality at the core of European policymaking, despite the fact that recourse to scientific data over the preceding twenty years could have facilitated prohibition of cages and other intensive production systems long ago.

Welfare science has developed to a point where the serious, detrimental effects of intensive production systems on animals can be confirmed, although there are some elements so complex that definitive causal links between hazard and harm remain elusive. Since the 1990s there has been ample evidence that intensively farmed animals experience acute and chronic pain from surgical mutilations, health problems associated with being pushed to their metabolic limits and numerous psychological / behavioural frustrations. On the basis of a legislative framework of minimum standards, the EU has repeatedly stated that their animal protection laws are based on sound science but the research in this thesis has found this to be a misleading claim; whilst some of the most damaging systems, such as battery cages and sow stalls, have been outlawed, many other hazardous practices and systems remain, despite a scientific catalogue of data demonstrating pain and suffering. In recent years, the EU approach to welfare has been to cite the positive steps taken and promise more research and funding into areas of concern, to ensure policy based on sound scientific evidence. For the average citizen, this approach seems reassuring and, in the absence of deeper analysis, will satisfy most people that the system is working for farm animals. In fact, as this thesis has shown, available data and AHAW Opinion is not being applied to maximum efficacy and much could be done to immediately improve farm animal welfare.

The use of derogations in animal welfare legislation is one of the most frustrating and paradoxical aspects of the EU approach. The act of prohibiting any practice in law is a significant step and is generally done to prevent a serious harm. This is the case with non-stun slaughter, which the EU deemed unacceptable in commercial slaughter settings, taking steps via Regulation (EU) 1099/2009 to ban the practice. Given the AHAW Panel's conclusions – in numerous Opinions – that non-stun slaughter is associated with pain, distress and severe welfare compromise, it is remarkable that

the EU elected to ban the practice, but then include a derogation to allow its continuance within religious slaughter settings. Unfortunately this approach is consistent with the Article 13 TFEU requirement to respect '*the legislative or administrative provisions and customs of the Member States relating in particular to religious rites, cultural traditions and regional heritage*'. Nonetheless, the CJEU has adopted a different approach and found a mechanism, harnessing Article 13 and the concept of sentience, to allow limitation of religious slaughter practices. This thesis argues that, since welfare needs and proven welfare standards are universal, they should be afforded to all animals, irrespective of the subjective culture or religious beliefs of their keepers. It is inconsistent to prohibit non-stun slaughter in some settings, but permit the practice in others. The approach to seal killing was equally inconsistent, with indigenous community slaughter of seals being accepted, but the same methods rejected in the context of other communities. As with religious slaughter, the derogation and cultural respect elements were applied, but they are inconsistent with evidence-based policy. In both cases, the scientific evidence was acknowledged, but then applied in an illogical manner; in addition, despite its assertions, the EU also failed with respect to public morality.

Public morality is a thread that has been woven throughout this thesis; it is present in welfare campaigns, media reporting and the political sphere. Commission publications, judgments of the CJEU (and WTO), as well as EU guidance on the use of the Precautionary Principle, confirm that public concerns for the welfare of farmed animals lie at the heart of EU policy-making; but therein lies further contradiction. By including derogations in legislation, as seen in the regulation of slaughter, the EU respects religious morality but not the morality of the majority. In the case of welfare at slaughter, most European citizens wish to see an end to non-stun slaughter in every context. In fact, since stunned slaughter has been standard in commercial settings for many years, the area of concern for most citizens is religious slaughter, yet this affront to public morality is currently permitted under EU law. Similarly with seal slaughter, citizens do not wish to see any baby seals slaughtered with picks or clubs, yet the EU accepts these killing methods from indigenous populations.

The practice of alluding to public morality where animal welfare is concerned raises a more fundamental question: is public morality a more suitable basis for legislation than science? From the evidence presented in this thesis, it appears that there is a strong

desire within the EU to demonstrate awareness and acknowledgement of issues that are important to citizens. In early CJEU cases, such as *Jippes*, public morality was swiftly dismissed as a justification for protective measures but it is evident that public morality with respect to sentience now carries weight with the CJEU, with Commission guidance on precaution in law-making bringing public morality and risk perception to the forefront of policy analysis. The Commission's communication on the precautionary principle suggests that public perception may wield more power within the EU law-making process than science, despite the latter being proclaimed as the basis for legislation. This thesis argues that, whilst public morality can provide much needed impetus in the overall process of policy-making, its inherently subjective nature renders it unsuitable as a basis for law. As was demonstrated by the Seal Products Case, citizens showed great concern for baby seals experiencing a percussive blow to the skull, but the same citizens do not generally express the same level of concern when farm animals are stunned in a similar way prior to exsanguination at slaughter; this is likely due to a knowledge gap but is nonetheless illogical. There are many examples of citizens' contradictory approaches to animal welfare and this is not a criticism of the population at large: it is simply acknowledgement that animal welfare is a complex subject which requires objective, scientific analysis rather than emotive, subjective value-based opinion. Legislating on the basis of what citizens desire, rather than objective analysis or data, is a dangerous path to tread and this thesis asserts that animal welfare science should form the foundation of welfare policy.

This thesis concludes that, whilst animal welfare science played a significant role in early EU minimum standards policy-making, its influence has slowed in recent years, although some positive steps have been made by the CJEU with respect to Article 13. Serious welfare compromises are regularly observed in contemporary intensive production systems; this data has been reviewed and the issues confirmed by the EU's own scientists, yet no legislative intervention has been forthcoming. The EU needs to now adopt a pragmatic, consistent, science-based approach to welfare policymaking. It has been demonstrated that immediate prohibition of painful surgical mutilations is essential given the available evidence,

and that the phasing-out of damaging husbandry systems is now justified. With respect to husbandry systems, this thesis proposes that a precautionary approach should be adopted to phase-out any contemporary system associated with negative welfare (such as enriched cages). The burden of proof should be placed firmly with those advocating the use of an intensive system; in other words, prohibit the damaging system until it can be proven beyond reasonable doubt that it is not detrimental to animal welfare. This thesis also argues that this approach would also be suitable with respect to non-stun slaughter i.e. universal prohibition of the practice with scope to review any scientific data supportive of the assertion that the practice does not cause pain and distress.

Given global concerns over climate change and resource management, the days of intensive farming are numbered. The coming years will inevitably see many changes in our approach to farming as well as our understanding of the emotional lives and needs of the animals in our care. The time to act is now and the European continent has the opportunity to lead the world in promoting stronger animal welfare. It is no longer possible to hide behind ignorance of animals' experiences or argue against their sentience. The EU is in possession of welfare data sufficient to justify revolutionary changes in our management of farmed animals. It is hoped that they will act sooner, rather than later; to do nothing would be unconscionable.

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List of Abbreviations

- ABM** – Animal Based Measure
- AHAW** – Animal Health and Welfare
- BSE** – Bovine Spongiform Encephalopathy
- CAP** – Common Agricultural Policy
- CIWF** – Compassion in World Farming
- CJEU** – Court of Justice of the European Union
- DEFRA** – Department of Environment, Food and Rural Affairs
- DG SANTE** – Directorate General for Health and Food Safety
- EEA** – European Economic Area
- EFSA** – European Food Safety Authority
- EU** – European Union
- FAWC** – Farm Animal Welfare Council
- GATT** – General Agreement on Tariffs and Trade
- NGO** – Non-Governmental Organisation
- PP** – The Precautionary Principle
- RSPCA** – Royal Society for the Prevention of Cruelty to Animals
- TEU** – Treaty of the European Union
- TFEU** – Treaty of the Functioning of the European Union
- UK** – United Kingdom
- US** – United States
- WTO** – World Trade Organization