An Exploration of Zimbabwean and British Chickenscapes to Understand Food Safety and Supply

Patience A N Muchada

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Abstract

Global consumption of chicken meat is on the rise. The intensification and industrialisation of chicken rearing has enabled the increased production to keep pace with demand. However, there are growing concerns over the rise of zoonotic infections associated with chicken such as Campylobacter and Bird flu. This thesis *explores the spaces of human and chicken (meat) interaction, in order to understand the implications for safe chicken meat supply and consumption*.

In order to gain perspectives from the Global North and the Global South, the study is set in the UK, and Zimbabwe. In a departure from the typical node to node supply chain study, this thesis engaged a *follow the thing* approach and explored various '*chickenscapes*' - defined as the wider landscape of people, processes and institutions associated with the chicken industry, linking producers and consumers. Based on the collection of interview and observational data in Zimbabwe, and the analysis of archival life story interview data from the UK, the following three themes are identified as informing key practices within chickenscapes, which in turn have implications for food safety. First, the thesis shows how the ***valuations*** that people place on a chicken or chicken meat, based on registers of value (such as monetary, sensory, or ethical), have implications for how they interact with it. Secondly, the thesis argues that ***governance and regulation*** - explored through standards - dictate where and how people handle chicken and chicken meat, with resulting consequences for food safety and supply. The final empirical chapter identifies approaches to ***managing disease*** as key to chicken meat safety and supply. The use of biosecurity, vaccines, antibiotics and alternative ethno-veterinary practices in chicken growing spaces are explored, together with the commercial and domestic chicken processing and raw meat handling practices in light of Campylobacter awareness.

In conclusion, the thesis argues that a core issue in ensuring food safety is the understanding and acknowledgement of ***multiple forms of knowledge*** at play in different chickenscapes as it is from these knowledge forms - local, traditional, indigenous, scientific, experiential or rational – that practices are informed and justified.

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Declaration

I, Patience Muchada, confirm that the Thesis is my own work. I am aware of the University's Guidance on the Use of Unfair Means (www.sheffield.ac.uk/ssid/unfair-means). This work has not been previously been presented for an award at this, or any other, university.

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Abbreviations and Acronyms

AMA	Agricultural Marketing Authority
APHA	Animal and Plant Health Agency
BRC	British Retail Consortium
BSE	Bovine spongiform encephalopathy
CAC	Codex Alimentarius Commission
CFU	Commercial Farmers' Union
ZCFU	Zimbabwe Commercial Farmers' Union
CODEX	Codex Alimentarius collection of food standards
Defra	Department for Environment, Food and Rural Affairs
EFSA	European Food Standards Agency
FAO	Food and Agriculture Organization of the United Nations
FSA	Food Standards Agency
FSAB	Food Standards Advisory Board
FSSC	Food Safety System Certification
FSMS	Food Safety Management Systems
G.A.P.	Good Agricultural Practice
GFSI	Global Food Safety Initiative
GMP	Good Manufacturing Practices
GHP	Good Hygienic Practice
HACCP	Hazard Analysis and Critical Control Point
IFS	International Featured Standards
ISO	International Organisation for Standards
LMAC	Livestock and Meat Advisory Council
RSPCA	Royal Society for the Prevention of Cruelty to Animals
SAZ	Standards Association of Zimbabwe
SQF	Safe Quality Food
UKAS	United Kingdom Accreditation Service
WTO	World Trade Organisation
ZFRPA	Zimbabwe Free Range Poultry Association
ZPA	Zimbabwe Poultry Association

PREFACE

From curiosity -to fear -to thesis

I talk about following chicken, and I will, over the course of this thesis, attempt to do so, taking you along with me on this journey. I would like to kick off this journey, therefore, by sharing the event that set me on this particular path.

Full disclaimer: I eat chicken meat, I quite enjoy it, and pride myself in knowing how to *handle* and cook it well. In the past, I have helped raise chickens – for meat and eggs. In October 2015, standing in the refrigerated goods aisle of a supermarket in Sheffield, United Kingdom, I found myself staring at a seemingly straightforward instruction, that left me with more questions than I had ever had about my favourite meat.

DO NOT WASH RAW POULTRY

Figure P.1 Whole chicken bought from a UK supermarket (Source: Nicole Lam)

Why? Another disclaimer: where I come from, all meat is WASHED before cooking. The warning would eventually make sense after I got some context but at that moment, for me, having arrived in the UK only a week prior, and this being the first time I had ever seen a BOLD warning on chicken, my curiosity was piqued. The image in figure P.1 was posted by someone who had a similar encounter to mine and was looking for more information regarding the warning in bold print. It will be referred to again in the thesis as I unpack the

warning. I want to say I did not buy the chicken that day but as I stated earlier, I was quite a fan of chicken meat.

The morning after my supermarket visit, I would read about a bacterium called Campylobacter, and contaminated chicken, and alleged fraudulent activities in chicken supply systems, and the Food Standards Agency (FSA) campaigns, and by the end of the day, I had decided I did not know chicken, the bird, as much as I thought I did. Even more so, some of the images and videos I came across online had me doubting whether I even liked chicken meat! It was then, that I decided to follow chicken, only I didn't quite call it *following* then. I just wanted to study this bird / food that the UK, and the rest of the world, was eating more and more of.

In the rest of this thesis, I share how I followed chicken - this chicken that I was not supposed to wash - satisfied my curiosity, scared myself off eating chicken meat for a season, and eventually wrote this thesis.

1 Introduction

1.1 Background

Poultry meat is currently the world's second most consumed meat, after pork, but it is forecasted to be the number one consumed meat by 2030 (OECD-FAO 2015; Roppa, 2020). Chicken meat is the most widely consumed form of poultry meat. With a standing population of 22 billion (Food and Agriculture Organisation, 2017)[1], domesticated chickens are the most numerous birds in the world. Statistics of chickens slaughtered annually peg them at an order of magnitude larger than that of cattle or pigs (Bennett et al., 2018). The continuously rising demand for chicken meat has resulted in shifts in production practices. The most apparent is the intensive production systems that have become synonymous with commercial chicken production globally. Jackson (2015, p. 172) calls this intensification the "defining example of industrialization of food production." In summary, not only is the chicken industry on the rise, consumption is increasing too.

Whilst supplying a ready market with over 65 billion chickens slaughtered annually (Bennett et al., 2018), the chicken industry has faced critique on subjects such as animal welfare, and the commodification of nature (Jackson, 2015; Miele, 2011a; Potts, 2012; P. Smith & Daniel, 2000). Large-scale operations of intensive poultry production also have a notable environmental impact though emissions of ammonia into the atmosphere and soils (Gerber et al., 2007; Mottet & Tempio, 2017a). From a health perspective, intensive chicken production has been associated with noise and air pollution[2]; the increased spread of diseases and pathogens (Carron et al., 2017; Onono et al., 2018; Rushton et al., 2018; Wasley et al., 2017); and the rise in antimicrobial usage in food animals (Chauvin et al., 2005; Hao et al., 2014). Thus, this growing industry is fraught with challenges.

[1] http://www.fao.org/poultry-production-products/production/poultry-species/chickens/en/

[2] https://www.theguardian.com/environment/2017/jul/17/uk-has-nearly-800-livestock-mega-farms-investigation-reveals

In recent years in the United Kingdom (UK), one of the cases of focus in this study, the chicken meat supply chain has been the subject of interest in the national news regarding food safety issues. In 2017, the Guardian newspaper exposed alleged fraudulent practices in one of the country's largest chicken processing plants.[3] Reported allegations included tampering with food safety dates on chicken packaging, which eventually prompted an investigation by the Food Standards Agency (FSA), an independent Government department responsible for ensuring food safety in the UK. Earlier in 2014, news headlines reported that two thirds of fresh chicken meat for sale in the UK supermarkets were contaminated with Campylobacter (the Guardian[4], 2014), which the national newspaper and other tabloid outlets referred to as "superbugs resistant to some of the strongest antibiotics" (the Guardian[5], 2018) and "mutant superbugs" (the Sun[6], 2018).

Campylobacter, the UK's number one food borne illness-causing agent, is a genus of a bacterial species commonly found in the intestines of warm-blooded animals, especially in birds such as chicken and other poultry. Over 55,000 cases of human infection with campylobacter, i.e. Campylobacteriosis, were recorded the UK in 2017 (UK Government, 2017[7]; FSA 2020[8]) and 250,000 in the EU in 2018 (EFSA, 2018[9]). An estimated 20% to 30% of such cases are accounted

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[3] https://www.theguardian.com/business/2017/sep/28/uks-top-supplier-of-supermarket-chicken-fiddles-food-safety-dates

[4] https://www.theguardian.com/world/2014/jul/23/-sp-revealed-dirty-secret-uk-poultry-industry-chicken-campylobacter

[5] https://www.theguardian.com/environment/2018/jan/15/british-supermarket-chickens-show-record-levels-of-antibiotic-resistant-superbugs

[6] https://www.thesun.co.uk/news/7207033/supermarket-meat-antibiotic-resistance-colistin/

[7] https://www.gov.uk/government/publications/campylobacter-infection-annual-data/campylobacter-data-2008-to-2017

[8] Food Standards Agency (2020). Foodborne Disease Estimates for the United Kingdom in 2018. www.food.gov.uk/sites/default/files/media/document/foodborne-disease-estimatesfor-the-united-kingdom-in-2018.pdf

[9] https://efsa.onlinelibrary.wiley.com/doi/10.2903/j.efsa.2019.5926

for by the handling, preparation, and consumption practices associated with the production of broiler[10] meat (EFSA, 2010). Essentially, a globally favoured food, whose production and consumption is on the rise, poses a potential threat to human health.

These concerns about chicken meat production, quality and supply are also noted in other parts of the world. Poultry production and consumption, particularly chicken, has been on the rise in many African and Asian countries (Windhorst & Wilke, 2014). In Zimbabwe, the main focus of concern in this thesis, chicken meat production and consumption has also been increasing. Production of the most commonly grown chicken, the broiler chicken, was around 2,320,000 birds per month, over the years 2002 to 2007, translating to approximately 2,600 tonnes of broiler meat per month. By 2017 to 2018 production statistics, this figure had increased to more than 10,000 tonnes of broiler meat per month (Zimbabwe Poultry Association, 2019)[11]. These figures represent the formal production channels but there has also been an increase in domestic or backyard chicken growing activities, which also contribute to the supply chain. In many developing countries, nearly 80% of poultry stock are raised in backyards, in both urban and rural settings (Pym et al., 2006; Sonaiya, 2007).

The popularity of chicken meat in Zimbabwe can be attributed to a number of factors. Animal husbandry has an important socio-economic role in low income countries and chicken, is the most widely kept food animal across households in Africa, in general, and Zimbabwe, in particular (FAO, 2000; Ta & Mb, 2021). It is common to find chicken being raised in most village homesteads in Zimbabwe and other African countries in Sub-Saharan Africa. These are often referred to as village chickens and the practice is widely studied (Guèye, 1998). A culmination of intensive droughts, political reforms in farm-land ownership, and general decline in economy has seen a continuous rural to urban migration particularly among the productive demographic of

[10] The broiler chicken is a chicken raised specifically for meat production and is often kept in restricted housing on a feeding schedule to attain a desired slaughter weight by around 6weeks of age.

[11] http://www.livestockzimbabwe.com/Updates/ZPA%20newsletter%20March%202019%20(1).pdf

Zimbabwe (Cliffe et al., 2011; Gororo & Kashangura, 2016a; Scoones, 2018). High unemployment rates (estimated at 16.9 % of total labour force by the ILO in 2019[12]), have forced many Zimbabweans to seek alternative sources of livelihood among which chicken rearing is common in the urban areas. The relatively low space requirement, high feed to meat conversion rate, and potential quick return on investments, compared to cattle or goat rearing, makes chicken husbandry a popular income generating and food source option for many households particularly in urban and peri urban areas (Gororo and Kashangura, 2016).

Unfortunately, rapid expansion in agricultural production, mostly through intensive farming, often comes with an increase in reports of disease and infections among livestock. The danger with diseases in chicken is that the rate of spread within a flock is often very quick. In 1998, Zimbabwe experienced a countrywide outbreak of Newcastle disease in chicken. Figure 1.1 shows a map of Newcastle disease outbreaks in Zimbabwe in January to April 1998. In 2017, an Avian Influenza outbreak affected the country's largest supplier of commercial day-old chicks, and chicken meat. The company is reported to have incurred a loss of nearly $7.3 million due to the outbreak (Charteris & Musadziruma, 2017).

[12] http://www.ilo.org/ilostat-files/Country_Dashboard/ZWE.html

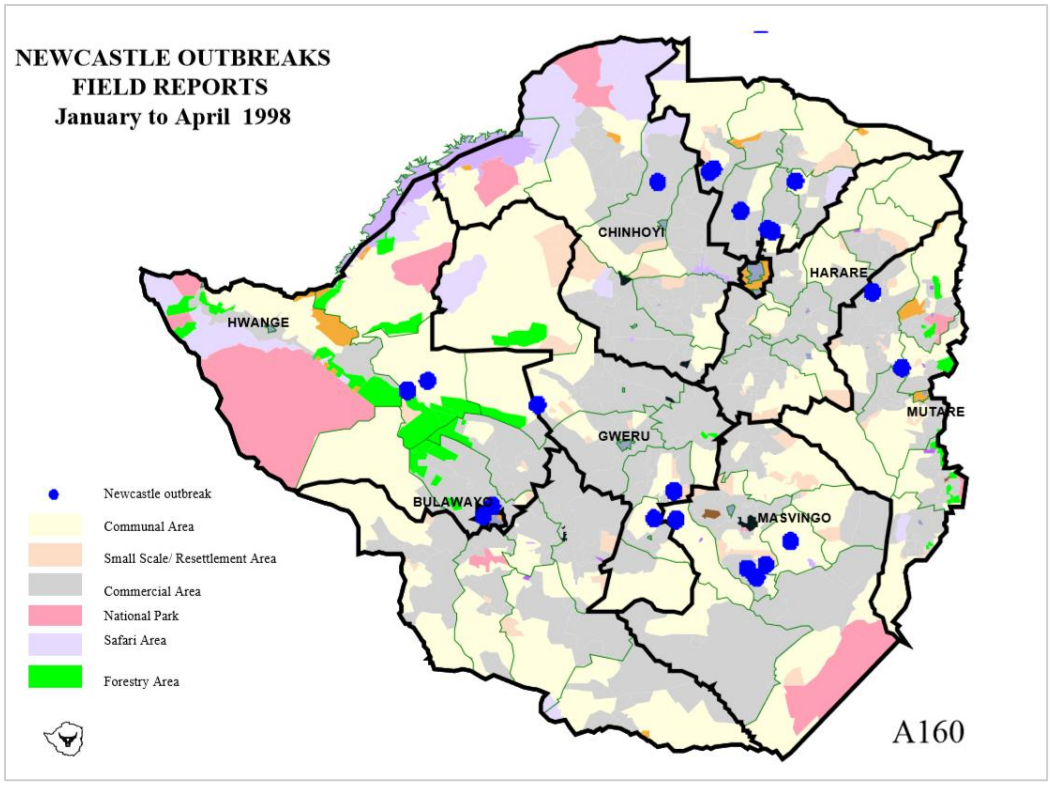

Figure 1.1Map of Newcastle disease outbreaks in Zimbabwe in January to April 1998 (Source: Department of Veterinary Services, Zimbabwe, 1998)

According to (Greger, 2007), "a common theme of primary risk factors for the emergence and spread of emerging zoonoses[13] was the increasing demand for animal protein, associated with the expansion and intensification of animal agriculture [and], long-distance live animal transport…" (ibid 2007, p. 247). This description fits the practices in the chicken supply sector in Zimbabwe.

Concerns over foodborne illness are also on the rise in this age of greater chicken meat production and consumption. There is much research on the topics of global and national (British) chicken

[13] Zoonoses are diseases that can be transmitted from animals to humans

production, consumption and chicken meat supply chains (Manning et al., 2007; Yakovleva & Flynn, 2004) as well as food safety, and particularly on Campylobacter in chicken (see review by Soro et al., 2020). These studies, however, tend to highlight or focus on specific parts of the supply chain e.g. farm level (Pearson et al., 1996), processing and packaging (Lee et al., 1998), or consumers (Haysom & Sharp, 2004). There is a consensus that any success in combating Campylobacter requires the collaborated efforts of all actors in the supply chain in implementing multi-targeted interventions (Wagenaar et al., 2013). The UK Research and Innovation Strategy for Campylobacter in the food chain (2010)[14] called for research that focusses on human behaviour in production processes and on farm and human transmission, e.g., Packaging; Practice in the kitchen - preparation and cooking; and Consumer/retailer attitudes to interventions. This means studying all stages in the chicken supply chain from production on farms, through processing, to consumer practices.

Although there are some key explorative studies which cross disciplines on the subject of chicken (Dixon, 2002; P. Smith & Daniel, 2000; Squier, 2010), these are mostly based in the Global North or developed countries. There is a dearth of empirical qualitative research on the subject of safety in chicken meat supply chains from resource-restricted countries or Low to Middle Income countries (LMIC) especially in the Global South. Campylobacter is classified as an endemic infection on the African continent, with children and young adults being particularly vulnerable (Kaakoush et al., 2015). It is therefore essential to have more studies that look into chicken meat production, consumption and safety in the continent, particularly in Sub-Saharan Africa, where poultry meat has seen the fastest expansion relative to other meat (Mottet & Tempio, 2017). This study addresses this gap by focusing on the UK and Zimbabwe, 'following' chickens along the supply chain from production to consumption.

[14] https://bbsrc.ukri.org/documents/100717-campylobacter-strategy-pdf/

1.2 Research aim and Questions

1.2.1 Aim

Following the above background, the aim of this study was therefore to *explore spaces of human and chicken (meat) interaction, in order to understand the implications for safe chicken meat supply and consumption.*

1.2.2 Scope

Although chicken meat is consumed globally, to make the study feasible, I had to narrow the scope spatially. I chose to look at two case studies, one from the Global North (the UK), and another from the Global South (Zimbabwe), in order to understand the influence of various geographical, economic and sociocultural contexts. There is high chicken consumption in the United Kingdom (UK) and in the past four years, the UK government has held campaigns[15] against Campylobacter, whose impact on human health has been previously mentioned. This made it an interesting case study where most of my research could be based on secondary data. I was born and raised in Zimbabwe; a southern African country where chicken is one of the most popular meat choices. The Zimbabwean chicken industry has also battled with recorded disease outbreaks such a Newcastle (Rushton, 1996) and most recently, avian influenza[16]. This made Zimbabwe a logical choice for the Global South case study as there would be relative ease of navigating the study area based on the researcher's familiarity with the local terrain, culture and language. It ultimately became the main case study, based on my own primary research.

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[15] The FSA launched the 'Acting on Campylobacter Together' (ACT) campaign to bring the whole of the food chain together to tackle Campylobacter https://veterinaryrecord.bmj.com/content/174/26/645.2

[16] https://www.thepoultrysite.com/articles/the-wider-cost-of-zimbabwes-bird-flu-outbreak#:~:text=In%20June%202017%2C%20reports%20of,other%20countries%20in%20southern%20Africa.&text=The%20company%20has%20since%20had,by%20veterinary%20authorities%20in%20Zimbabwe.

1.2.3 Research Questions

In order to achieve this aim, I attempted to answer the following questions

What factors inform practices in spaces of human – chicken interactions during food production, processing and consumption of chicken and chicken meat in the UK and Zimbabwe?

What implications do these practices have for meat supply and for food safety?

How does a 'follow the thing' approach help to address these questions?

The *first* question triggers the journey of following chicken. The objective is to a)find and explore the spaces where chickens are grown, and chicken meat processed, sold and consumed, noting how, and by whom; as well as identify the human, infrastructural and socio-economic resources and conditions in these spaces; and b) investigate the factors that influence practices expressed as the decisions, choices, and actions within the spaces mapped. This is important because as the *second* question states, I intend to understand what the implications of these practices are for the amount, type, quality and safety of the chicken meat produced and consumed, given the concerns raised in section 1.1 about food borne illnesses vectors such as Campylobacter. The *final* question introduces the research methodological approach taken for the study, which is outlined in chapter 2, and expanded in chapter 3.

1.3 Approach

This is an explorative study with a qualitative research approach. According to Mason (2002), qualitative research allows one to explore various "dimensions of the social world, including the texture and weave of everyday life, the understandings [and] experiences" of research participants, as well as "the ways that social processes, institutions, discourses or relationships work, and the significance of the meanings they generate" (Mason, 2002a, p. 1). A qualitative research approach thus enabled me to follow chicken into various 'chickenscapes' - defined as the wider landscape of people, processes and institutions associated with the chicken industry, linking producers and consumers - towards gathering an understanding to answer the research questions. The idea of 'chickenscapes' is outlined more fully in section 2.2.3.

As discussed in section 1.2, the study was made feasible through the use of two case studies, the UK and Zimbabwe, further described in chapter 3. For this multi-sited, multi temporal research design, I employed semi ethnographic and archival research methods to obtain primary data for the Zimbabwean case study, and secondary data for the UK case study. The secondary data was from existing interview transcripts and (consumer) survey reports, and document analysis of publicly available documents. The bulk of this data is archived at the British Library, and in the public repositories of the FSA. I collected the primary data through interviews with chicken growers, field observations, site visits to abattoirs, and participation in farmer training courses in Zimbabwe. See Chapter 3 for a more detailed discussion of the research methods.

1.4 Structure of this thesis

The rest of the thesis adopts the following structure. Chapter 2 is a review of literature, beginning with a look at how the interdisciplinary subject of food geography has emerged and continued to grow within the field of geography. Geographies of food literature has managed to create a stronger and clearer connection between food production and consumption through a focus on supply chain and commodity chain research on food. The evolution of both supply chains and commodity chain research is briefly discussed, which leads to a discussion on the UK food supply system. The chapter particularly discusses the concept of *following the thing* (Appadurai, 1986; Cook, 2006a), and gives examples of food research that has adopted this approach. Using the example of the broiler filière by (Watts, 2004a), the chapter then highlights the complexity of the chicken supply chains, re-emphasising the suitability of commodity chain research for food studies. The concept of chickenscapes is then introduced, mentioning its origin in Appadurai's (1990) work on *scapes*, which has been applied in other social science concepts such as riskscapes and foodscapes. The subsequent sections discuss literature on the subject of chicken, starting from global chicken studies to literature on British and Zimbabwean chicken, highlighting the scarcity of literature on backyard growers in Zimbabwe who are a significant actor in the country's chicken meat supply chain. Food safety is a core theme of the thesis therefore the chapter also looks at literature on food safety and risk, particularly discussing foodborne illnesses, food scares, and research into

consumer practices. The conclusion of chapter 2 summarises that chicken consumption is on the rise, and with it, intensive farming which may increase food safety risk. It also highlights some gaps in literature, particularly for the Zimbabwean case. The final section in the chapter heralds the subsequent methodology chapter by concluding that a geographies of food approach, using a *following the thing* lens in various *chickenscapes*, is a suitable theoretical framework for this study. To clarify my use of these terms, 'following the thing' was employed as a methodological tool for exploring the archival, life history and observational chicken data and spaces, across several different 'chickenscapes' (from production to consumption).

Chapter 3 describes the methodology beginning with a justification for deciding on a qualitative research design that uses case studies. The chapter then provides a brief description of the two cases, before describing the data collection process in each case, with particular emphasis on the fact that the study is not a 1:1 comparative study methodologically as the comparative aspect only emerges in the discussion of the analysed data from the two cases. I also discuss the use of archival life story interview data for the UK case, before moving on to the data analysis approach. The chapter concludes with a section reflecting on the research process including discussion on positionality, ethical considerations, and limitations of the study.

The next three chapters are the empirical chapters, focusing on the themes of valuation, governance, and management of disease. These themes emerged during data analysis so are not discussed in the Literature Review in chapter 2. Instead each of empirical chapter begins with a discussion of literature relevant to the theme under discussion. The themes cut across different chickenscapes rather than having chapters devoted to each 'scape' in turn.

Chapter 4 addresses the questions raised in chapter one and is about **valuation**. Here, I argue that the value that people/ society place on chicken, or on chicken meat, has implications for how they treat or interact with it. Using the *registers of values* concept introduced by Heuts & Mol (2013), I present the different considerations people make in valuing chicken and chicken meat. I also discuss the value of chicken beyond its edibility.

Chapter 5 is about **governance**, which I argue is a key factor in informing practices within the chicken meat supply sector. The chapter begins by discussing how food governance has shifted from a previously mainly national and public system to the current hybridised form of governance, involving international and private governing bodies. This is followed by an overview of food regulation in the two national cases, which leads to a discussion on the use of standards in governance. The chapter then discusses the challenges and benefits of standards, and how they are experienced in the chicken meat supply sector in both countries.

Chapter 6 is the final empirical chapter. It focusses on **disease management**, which I argue is an important factor in food safety considerations. The chapter begins with a discussion on shifts in chicken meat supply chains, in the two countries, where intensive production and increased chicken meat consumption has become the norm. I then discuss diseases in chicken, and the use of vaccines and antibiotics, followed by a discussion on the use of alternative medicines in ethnoveterinary[17] practices. The chapter then looks at biosecurity measures in chicken farming at various scales. The final section is on food safety, and looks at the retail and consumer nodes of the supply chain, addressing the implications that practices in these chickenscapes have for transmission and mitigation of foodborne infections and illnesses that humans can acquire via chicken meat. The chapter also focuses on the multiple and competing forms of knowledge that are at play in these national (UK and Zimbabwean) chickenscapes. Rather than assuming that one form of (scientific, rational) knowledge is superior to other forms of (traditional, indigenous) knowledge, the chapter examines the logical but contrasting basis of different forms of knowledge, showing how ethnoveterinary practices in Zimbabwe may be as logical and effective as 'scientific' disease management in the UK, and how common domestic practices such as washing chicken

[17] The term "ethnoveterinary" refers to traditional therapeutics prepared by humans for the purposes of maintaining or restoring animal health. https://ethnobiomed.biomedcentral.com/articles/10.1186/s13002-015-0020-8#:~:text=The%20term%20%E2%80%9Cethnoveterinary%E2%80%9D%20refers%20to,include%20plants%2C%20animals%20and%20minerals.

remain prevalent in both countries despite persistent efforts from food safety authorities to eradicate them. Understanding the 'local knowledge' that informs such practices represents a significant contribution of the thesis.

In chapter 7, I conclude the thesis by revisiting the research questions and discussing how they have been addressed. The arguments for valuation, governance and disease management as some of the key factors informing practices in chickenscapes are summarised. The use of the 'follow the thing' and 'chickenscapes' concepts is discussed. The chapter concludes with a discussion of the contributions of the thesis and reflections on the research process.

2 Literature Review

2.1 Introduction

The review of literature for this study was done in two stages - prior to undertaking the fieldwork and then during the data analysis phase. This latter phase of the literature review focussed on the themes that had emerged from my data analysis and is reflected in my interaction with existing literature at the beginning of each empirical chapter.

In this chapter, I mainly present output from the former, which is a review of the key studies I deemed relevant to the subject of the thesis during the research design phase. As the subject of this study is very broad, ranging from chicken, to food supply chains, to disease and safety among others, what I present here is by no means a comprehensive coverage of the substantive body of work that exists in these fields. The aim was to outline the concepts and arguments in the field and highlight gaps in literature, which my study could address.

The first section (2.1.1), looks at literature on food studies in the discipline of geography where I also discuss following the thing and other relevant theories and concepts in food studies. Next is a section on supply chain and commodity chain studies (2.2.2), since my study addresses the production, supply and consumption of a single commodity (chicken). Section 2.2.3 outlines the concept of 'foodscapes' and the related idea of 'chickenscapes'. The next section (2.3) addresses prominent studies on the subject of chicken. In section 2.4, I discuss food safety and risk, before concluding with a brief mention of the literature that has informed my theoretical and methodological approach to the study, in section 2.5.

2.2 Geographies of food

2.2.1 Geography and food

The study of food by geographers has evolved over the years and continues to do so. Food is very broad topic and the study of it can be interesting yet complex because "food can tell us about anything and everything" (Cook, 2006b). The interdisciplinary nature of Geography (Gorraiz et al., 2016; Warf & Arias, 2008; Whatmore, 2017), makes it suited for studies of food and food

systems. The focus of food research in geography has been wide ranging, from studies that examine global scale agro- food trends (Goodman & Watts, 1997a; Marsden, 2008; Marsden & Morley, 2014) to more localised work on alternative food networks (Kneafsey et al., 2008) and community gardens (Turner, 2011).

Perhaps one of geography's greatest contributions to food studies has been its attempts to create stronger, clearer and closer connections between consumers and the source of their food- i.e., people (producers), means (methods and resources) and place. This has been largely the result of a shift from economic centred agro food studies towards cultural geography studies focussing on the manufacturing of meaning along the commodity chain.(Boltanski & Thévenot, 1991) In his (2003) progress report on the agro-food sector, Winter argues that this new focus on examining "issues along the food chain" was partially a derivative of developments in the political economy approaches of the 1980s which saw farmers or producers being encouraged to think beyond just the production aspects of their produce (Winter, 2003). He then highlights the idea of *reconnections* between farming (and the raw materials from it), and food (the product created and passed on along the supply chains) and eventually consumption. This has also been the focus of major government reports such as the Curry Commission's review of the future of food and farming (Policy Commission on the future of food and farming 2002).

Cook et al. (2006) highlight the reconnection of food production and consumption by reviewing studies that follow food. In doing so, the paper furthers the argument for food research that is not limited to disciplines but focusses instead on the product (food) by following it along their commodity chains, gathering and learning from their biographies, which will in turn shed light on broader issues such as politics of produce standards and international trade (S. E. Freidberg & Freidberg, 2004); gender inequalities and globalization (Barndt, 2008), and even food safety and food scare issues (Stassart & Whatmore, 2003). Cook et al. conclude this discussion by defending the potential effect that ethnographic, multi sited, commodity following research can have in building and maintaining empathy, and inspiring change, in the various actors along the supply chain, including the researchers themselves; and encouraging more research of this nature.

Follow the thing

The idea of 'following things' was inspired by Appadurai's influential study of commodities in cultural context where he argues that to fully understand commodities/ things and their value and circulation,

> …we have to follow the things themselves, for their meanings are inscribed in their forms, their uses, their trajectories. It is only through the analysis of these trajectories that we can interpret the human transactions and calculations that enliven things. Thus, even though from a theoretical point of view human actors encode things with significance, from a methodological point of view it is the things-in-motion that illuminate their human and social context.

(Appadurai, 1986, p. 5)

This concept of following from Appadurai's work has generated a series of single-commodity studies such as Cook's work on papaya (2004), Barndt's on tomatoes (2008) and Freidberg on French beans (2004). It has also generated a series of studies of transnational connections between places much of which has focused on food (Crang et al., 2003). These studies offer important insights about the meanings and value (beyond economic) that commodities carry along their trajectories. Cook (2004a) follows papaya fruit, grown in Jamaica but retailed in UK supermarkets to consumers in London, discussing the socio-economic, political and cultural connectedness between the producers and the consumers, despite their geographical separation. Similarly, Barndt's account of tomato's journey from Mexico to Canada illuminates relationships between the production and consumption ends of the chain, and also pays attention to the dynamics between health and environment, and biodiversity and cultural diversity. In following the tomato, Barndt also manages to highlight the roles and views of women working in the tomato industry. For a recent review of the conceptual and methodological implications of 'following the thing', see Evans (2018).

Scholars in other disciplines, including anthropology and sociology, have also studied geographies of food. For example, there are studies in which food as physical matter, is studied with the body as the site/locale of interest through consumption of the food (Mol, 2008), or bodily reaction to physical contact with food (Cook, 2004b) or even associations of food with memory (Sutton, 2001)). Elspeth Probyn's work on food, sex and identity, Carnal Appetites, (Probyn, 2000) also raises questions about intimacy and bodily boundaries that have clear geographical resonances (Sutton, 2001). There are also creative food geographies such as those featuring culinary creativity (Imai, 2010). These all further substantiate the post-disciplinary turn in food geographies which Goodman (2016) argues geographers have taken in an exploration of food as "more-than-food" by analysing the "visceral nature of eating and politics" (Jackson et al., 2009). There is also increasing scholarship in food geography focussing on food waste including studies that examine the identification of food as food or waste, depending on social practices (Evans, 2011) or on location such as Coles and Hallett's (2012) study on salmon heads. This is interesting when studying the chicken meat consumption practices in the two case studies.

Other relevant theories and concepts in food studies

There continue to be many approaches used by researchers to study food. Popular theories include the System of Provisions theory (Fine et al. 1996), which emphasised an economic-driven perspective, which features "vertical structuring in food production and horizontal relationships in food consumption" as reciprocal elements (Domaneschi, 2012). It is, however, criticized for not fully including the materiality of food. Convention theory (Morgan et al., 2008), assumes the existence of agreements between producers and consumer and therefore includes political and moral considerations (Boltanski & Thévenot, 1991). Actor-Network Theory (Law, 2009), promotes integration between nature and culture, agri-food studies and social science studies (Goodman & Watts, 1997b). ANT considers the complexities of having multiple actors (human and non-human actants) and interrelated rationalities. Examples of its use in agrifood studies include studies on wine production (Krzywoszynska, 2012), food scares (FitzSimmons & Goodman, 1998), and rapeseed (Busch and Tanaka 1996). ANT has received various criticisms, including the attribution of intentionality to non-human actants (Winner, 1993).

There is also growing use of Practice Theory in agrifood research. With many exponents, among which Bourdieu, Giddens, Shove and Schatzki, all with their own definition, there is no single definition of practice theory. Bourdieu introduced the concepts of doxa and habitus and his books *Outline of a Theory of Practic*e (1977) and *The Logic of Practice* (1990) form core literature in making the case for practice theory. According to Sherry Ortner, practice theory "...seeks to explain the relationship(s) that obtain between human action, on the one hand, and some global entity which we call 'the system' on the other "(Ortner, 1984, p. 148). Contemporary theorists among which are Reckwitz, (2002); Schatzki (2002) and Shove et al., (2012) have built on this in the growing literature on theories of (social) practice which seems to have moved towards a focus of analysing the practices themselves as a way of understanding the interconnected culture, elements and environments within which they are practiced. Reckwitz's definition of a practice as "a routinized way in which bodies are moved, objects are handled, subjects are treated, things are described and the world is understood" (Reckwitz, 2002: 250) combined with the argument that practices are made up of interconnected elements including material objects, practical and mental knowledge, and emotions (Reckwitz, 2002 p.249) make practice theory a good framework for studying food production and consumption. Notably, Alan Warde (2005) argued for the use of practice theory in empirical research on (food) consumption and many studies have since been published in that sector including on the human consumption of insects (House, 2016), vegan diets (Twine, 2017), food safety (Watson & Meah, 2012) and sustainable consumption practices (Evans & Jackson, 2008)). Halkier and Jensen also advocate for use of practice theory in empirical consumption research (Halkier and Jensen, 2011). The application of practice theory in the production sector of food research has however been less successful, with a few exceptions such as Saputra's work on fishing (Saputra, 2020). This may be due to the complexities that production chains often have (see Figure 2.1 on the broiler supply chain from Watts, 2004).

All of these theoretical approaches have their strengths and weaknesses, but the current study has chosen to focus on Appadurai's 'follow the thing' approach because of its emphasis on studying commodities in comparative cross-cultural perspective, and on 'chickenscapes' as my own adaptation of the wider literature on 'scapes' in general (also from Appadurai) and 'foodscapes' in particular (see 2.2.3, below).

2.2.2 Commodity chains

The concept of commodity chains, as it has come to be applied in agro-food studies and geography, can be traced to two sources (Jackson et al., 2006). The first comes from economic history and sociology, where commodity chains are defined as "a network of labour and production whose end result is a finished commodity" (Hopkins & Wallerstein, 1986, p. 159). This approach was further developed by Gereffi and Korzeniewicz (1994) who also highlighted differences between producer-led chains and those driven by the buyer. The second source is the commodity system's approach by Friedland et al. (1982) in their work on technological change within US farming, which was widely applied in studies on globalisation, and furthered in studies about the international food system. These two sources have together, yet in parallel, contributed to commodity chain research. A "genealogy of 'commodity chains'" can be found in Jackson et al. (2006), while Bair (2009) offers a detailed account of further variations, and progressions of the commodity chain theme over the years, including the systems of provision; (Fine, 1994), the French *filière* approach, global production networks, and global value chains, among others.

There have since been many studies in commodity chain analysis in other sectors such as furniture (Kaplinsky et al., 2003). Jackson et al. demonstrate how commodity chains have further been widely applied, often in parallel understandings and contexts, within food policy dialog and research, yet they "remain a legitimate focus of academic enquiry" (2006, p. 140).

Closely related to commodity chain research is the study of supply chain management, a term coined by Keith Oliver in 1984, to refer to the "management of a chain of supply as though it were a single entity, not a group of disparate functions" (Laseter & Oliver, 2003). Now generically defined as the flow and management of resources across an enterprise in order to maintain the business operations profitably (Sehgal, 2009), the main focus of supply chain research is often on the flow of product or service pushed by the producer, demand from the consumer end, and sometimes, the flow of information between them. Research on supply chain studies, is largely dominated by studies on economics and logistics management but lately, themes of sustainability, food safety, and even ethics, are being considered in supply chain management.

UK food supply chains (FSCs), largely dominated by large supermarkets, have seen a lot of consolidation and integration e.g. in meat processing (Mead, 2004; Thankappan & Flynn, 2006) towards efficiency and consistency (O'Keeffe & Fearne, 2002). The poultry industry has seen tremendous growth yet there are relatively few large-scale producers (Yakovleva & Flynn, 2004). According to Kumar et al. (2013), key trends that have shaped FSCs in the UK are increasing visibility between the supply chain actors with information being shared; closer relationships between actors (e.g., producers and processors); and improved traceability pathways, often as a result of vertical integration; and consumer demand for food provenance.

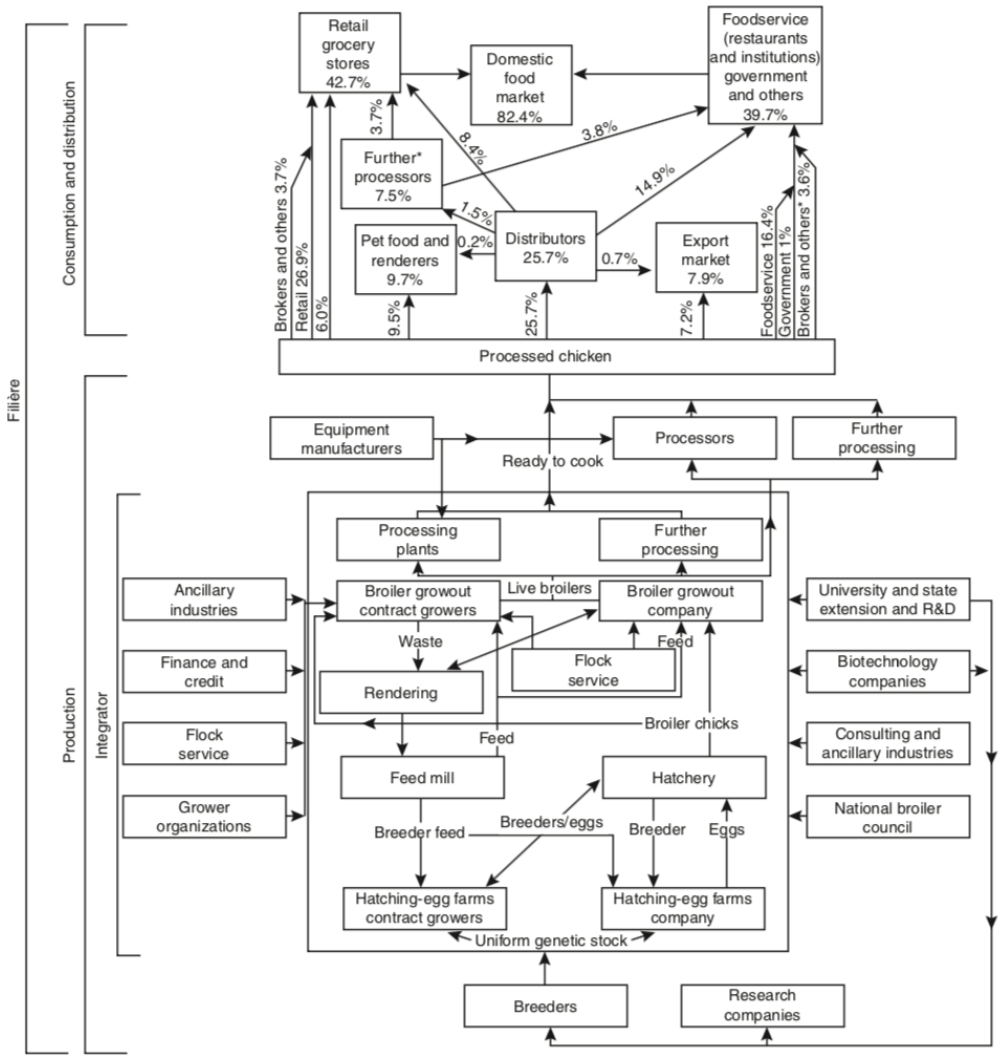

Figure 2.1

The broiler filière (Source: Watts 2004:44)

The typical supply chain encompasses all processes and communications involved in flow and transformation of goods from the raw materials stage, through to the end user (Handfield & Nichols, 1999). Figure 2.1, depicts a broiler supply chain, showing how complex the activities and flows can be and many studies exist, which highlight and address this complexity. While various nodes of the supply chain are interesting as they represent the various actors involved in the supply of this commodity, the arrows between them are also an integral part of the system as they represent connection and flow. What flows from node to node evidently varies along the chain and could

even be more than the labels in Figure 2.1 depict. Jackson et al. (2010, p. 164) proposed a newer approach to commodity chain research that identified "where and how distinctive cultural meanings of food are created and negotiated", in a shift from economic value addition and profit.

Research on commodity chains has also been used to highlight the points in the chain at which food safety issues may arise, where profits are extracted, or labour exploited. This has generated practical interventions such as Hazard Analysis and Critical Control Points (HACCP) (see Mortimore, 2001), as well as debates about the 'veiling' or fetishisation of commodities (Hartwick, 2000). The need to spatialize commodity chains has been emphasised by Reimer and Leslie (1999), a point which this study seeks to develop through comparative research in the UK and Zimbabwe.

2.2.3 Foodscapes and Chickenscapes

This thesis seeks to explore the idea of chickenscapes - defined as the wider landscape of people, processes, perceptions, and institutions associated with the chicken industry, linking producers and consumers - to understand the implications of practices in these spaces, for food supply and safety. The term chickenscapes extends past the more commonly used 'supply chain' to encompass the structural and physical spaces of chicken production and consumption; the social relations involved (including human-to-chicken interactions); tangible and non-tangible resources; regulatory functions; as well as non-restrictive scales of operation such that an individual experience will count in the analysis. According to Mikkelsen (2011), "Food and meals in our environment are embedded in complex physical, social and cultural contexts". Therefore, presenting the subject though a "scapes" lens, (Appadurai, 1990)[18], suggests the idea of a more "fluid, irregular" subject, where multiple perspectives are considered; perspectives influenced by multiple factors such as history, politics and even cultural elements.the subject though a "scapes"

[18] Appadurai (1990) refers to five 'scapes' - (a) ethnoscapes, (b) mediascapes, (c) technoscapes, (d) financescapes, and (e) ideoscapes, encompassing the multiple, "imaginary worlds" that are "constituted by the historically situated imaginations of persons and groups spread around the globe," that form the "five dimensions of global cultural flow".

lens, (Appadurai, 1990)[19], suggests the idea of a more "fluid, irregular" subject, where multiple perspectives are considered; perspectives influenced by multiple factors such as history, politics and even cultural elements.

The idea of 'scapes' has since been applied in other social science studies. For example, the concept of Foodscapes, is used in Geography, Urban studies, Public Health, and Sociology to refer to "urban food environments" and "institutional arrangements, cultural spaces, and discourses that mediate our relationship with our food" (MacKendrick, 2014). Müller-Mahn and Everts (2013; 2018), discuss Riskscapes which include "socio-spatial images of risk". They emphasise how a combination of both physical and material components of risk, together with the interpretative components as expressed in practice, combine to form a Riskscape.

In food studies, similar concepts have been deployed by Rick Dolphijn in his Deleuzian analysis of international foodscapes (2004) and in Helene Brembeck's work on children's food choices in Sweden (Brembeck et al., 2013). With a wide range of definitions from Freidberg's "actual sites where we find food" to Johnson et al's "social construction that captures and constitutes cultural ideals of how food relates to specific places, people and food systems", many studies have applied the concept (S. Freidberg, 2010, p. 1869; Johnston et al., 2009, p. 512). Much of this research has focussed on public health nutrition particularly assessing food choice, behaviour and agency within food environments while other studies have assessed sustainability within food systems (King, 2009) or considered virtual foodscapes such as the media coverage of food (Panelli & Tipa, 2009).

With these various applications, it is clear that the scape approach can be useful in understanding "complex social systems in which humans, artifacts and environments interact" (Mikkelson, 2011 p.210) as well as studying "phenomena that are 'unevenly distributed in space and appear in a

[19] Appadurai (1990) refers to five 'scapes' - (a) ethnoscapes, (b) mediascapes, (c) technoscapes, (d) financescapes, and (e) ideoscapes, encompassing the multiple, "imaginary worlds" that are "constituted by the historically situated imaginations of persons and groups spread around the globe," that form the "five dimensions of global cultural flow".

variety of shapes and contexts'" Brembeck and Johansson (2010). This complex formulation of scapes to include non-tangible, often subjective aspects such as culture, knowledge, perception, experience, among others, makes the concept of chickenscapes an interesting lens to explore in this current study.

2.3 Studying Chicken

"Chickens are ubiquitous both in terms of their physical selves — United Nations' estimates put the world chicken population at any given time at about 19 billion — and in terms of their cultural significance" (Hamilton, 2014, p. 124), and this ubiquity is very much reflected in the academic literature. Smith and Daniel (2000) offer a comprehensive account of the chicken in their aptly titled, The Chicken Book. The product of an interdisciplinary collaboration led by a biologist and a humanist, the book details the origins of chickens and their early domestication, chicken genotypes, through to industrialised intensive chicken farming while also discussing the socio-cultural significance of chicken including in the culinary sphere. Jane Dixon (2002) uses the chicken to explore the evolution of culinary culture, and shifting power relations in Australia, as well as complexities in global food systems, while Boyd & Watts take the US broiler industry as the archetypal example of commodified food production. A common thread in these books and chapters is an acknowledgment of the way chicken has become arguably the most intensively farmed organism or rather the symbol for industrialisation (Jackson, 2015). Squier critiques this development towards an intensive or "post-pastoral" form of agriculture (Squier, 2010) while Haraway (2008) describes how some intensively raised chicken are genetically manipulated and forced to mature in such a way that they fail to do the most basic things like standing up or walking.

2.3.1 British chicken

Until the Second World War, chicken in the UK had been predominantly a source of eggs and for the occasional consumption of chicken meat. However, production grew exponentially between 1950 and the late 1960s, with annual production figures expanding from around one million birds to over 200 million. While chicken growing had mostly been a domestic, backyard activity, studies

cite [20]Geoffrey Sykes' venture into farm-scale broiler chicken growing as the trigger that set off the British interest in broiler farming (Godley, 2014). There is a general consensus in literature that the success and growth of broiler farming in the UK was due to people like Sykes importing techniques and skills learnt in the USA into the country (see review by Godley, 2014; Tessari & Godley, 2014).

Antony Fisher's construction of the first broiler shed in the UK in 1953 marked a turn in the industry from being a localised cottage industry into a 'highly concentrated and industrialised sector with production and distribution dominated by a relatively small number of economic actors' (Yakovleva & Flynn, 2004, p. 229) in just about fifty years. One of the major actors facilitating the sector's growth were Fisher's Buxted Chicken, a broiler company which was handling more than 17000 chickens a day, after just five years of its existence and was a multi-million dollar business by 1968 when it was sold (Jackson, 2015).

Technology has, on many levels, been a key enabling factor for the growth and expansion of poultry production in the UK and globally. Yakovleva and Flynn (2004) detail the technological evolution in breeding, hatching and rearing practices in the chicken supply chain that enabled mass production, e.g., the development of the Cobb500 breed by the UK breeding programme of Cobb Breeding Co. in 1970 (2004: 233). Cobb remains to date, an internationally recognised breed in commercial chicken production.

UK retailers have played a major role in the developments within poultry farming in the country, as detailed by Jackson (2015) in his account of the technological changes that helped shape the modern chicken farming and supply sector. Besides being involved in chicken breed selection, Sainsbury's, one of the UK's leading retailers, is credited with leading the "development of 'ready-to-cook' frozen chicken" and by extent, encouraging their suppliers to develop improved

[20] Geoffrey Sykes introduced scientific chicken farming in UK, having learnt about it during his studies in the USA (See Godley and Williams, 2009)

processing and freezing technology (Jackson, 2015, p. 58). A series of technological developments catapulted the UK chicken industry into a different, some may argue better, trajectory, compared to the system in the USA (Tessari & Godley, 2014). The popularity of frozen chicken meat enabled more actors, in all parts of the country to participate.

Another notable contribution by a UK retailer is the mass retail of fresh chicken, enabled by Marks and Spencer, through the development of the cold chain. In a bid to differentiate themselves from their retail rivals, Marks and Spencer embarked on improving the refrigeration systems in their supply chain, not only in store - with refrigerated counters, but also in transit -with refrigerated distribution vehicles, a move which enabled them to introduce 'fresh not frozen' chicken to the market (Jackson, 2015, p. 61). This introduction of fresh chicken meat into supermarkets, in addition to the growth in production, was matched by an increase in chicken meat consumption rates across the country. According to the Ministry of Agriculture, Fisheries and Food, the average weekly poultry meat consumption per capita trebled between 1960 and 1980 (Ministry of Agriculture, Fisheries and Food, 1991).

2.3.2 Chicken studies in Zimbabwe and the developing world

There are far fewer studies of chicken in the developing world. Notable exceptions include the work on village chicken production systems in Africa (e.g. Guèye, 1998; Hailemichael et al., 2007; Kitalyi, 1998), studies on the economic benefits of keeping chicken (Munyanyi, 2018); research on disease outbreaks, drivers and barriers to poultry production (Hailemichael et al., 2007), and more recently work on the broiler chicken value chain in Kenya by Carron et al. (2017). Such studies often offer the empirical evidence about the trends revealed and /predicted by global studies on poultry such as the works of (Chaiban et al., 2020; Mcleod et al., 2009; Mottet & Tempio, 2017a; Narrod et al., 2007). Chaiban et al. (2020) argue that there is still limited understanding of the agricultural intensification in smallholder livestock practices in LMIC countries, compared to the rest of the world, and this is reflected in the availability of literature.

In the case of Zimbabwe, earlier studies reflected a focus on the village chickens with Faranisi (1995) studying their breeding while Kusina et al. (2001) looked at causes of loss in village chicken

flocks. Other studies on village chickens have also highlighted the constraints to production (Mapiye & Sibanda, 2005; Muchadeyi et al., 2004) including high mortality and slow growth (Mcainsh et al., 2004), and predators and disease outbreaks (Ndiweni, 2013). The consumption patterns typical of most village chickens has also seen them called scavenging chickens in some studies especially those focussing on feed resources (Pedersen et al., 2002).

Poultry - and particularly chicken - keeping, has been highly credited for its contributions to household income and food security in LMICs (Carron et al., 2017; Muchadeyi et al., 2004; Narrod et al., 2007). Women in particular, are often in charge of the flocks (Mcainsh et al., 2004), especially in communal areas, and some studies further show how the income generated from this practice can act as a tool for women's financial empowerment and gender equality promotion (Fattah et al., 2000). In most cases however, the income is ploughed back into the family's nutrition, education and health needs (Gororo & Kashangura, 2016b; Mcainsh et al., 2004).

Besides the village chicken, Zimbabwe has also seen a growth in production of the more commercial broiler chicken. Tembanechako et al.(2015) assessed the marketing and financial management skills and practices of smallholder broiler chicken farmers in a rural community in Mazowe district, Zimbabwe and concluded that there could be improvements made in financial record keeping and marketing reach. Other areas explored in the broiler chicken production sector in Zimbabwe included use of alternative feeds for broilers e.g. cassava ((Tada et al., 2004) and sweet potato (Maphosa et al., 2004). Mudzonga (2009) also detailed the impact of cheaper, GM-grain fed, imported chickens on the local poultry market. On a national scale, Zengeni (2015) analysed the competitiveness of the country's poultry industry in the context of trade liberalization and highlighted the effects of imported chicken products.

A less studied aspect of the poultry sector in Zimbabwe is the growing backyard-chicken-growing practice in the country's urban residential areas. This is particularly important as this sector has been noted as the only agricultural activity in urban areas with a significant impact on the livelihoods of the households practicing it (Kutiwa et al., 2010). Backyard chicken growers absorb around 65% of all day-old broiler chicks produced (Gororo et al., 2014). Notable studies on

backyard chicken growing include Kelly et al.'s (1994a) study in Chitungwiza, which investigated the diseases and management of the flocks. More recently, and perhaps closer to the goals of this study, Gororo and Kashangura (2016) documented the technical, socio-economic, and demographic characteristics of the broiler production activities in an urban area in Zimbabwe.

These studies have largely been quantitative in nature, reporting the statistical and economic information about the sector. Munyanyi (2018) carried out one of the few qualitative studies on backyard poultry keeping in urban zones while investigating the keeping of poultry as a source of food and livelihood. Her study however focussed on the growers who were all female. There is therefore a need for wider-reaching, qualitative research into other nodes of the supply chain with broader representation of the population in its participants e.g., through the involvement of male participants working in the sector.

2.4 Food safety and risk

As Richard Milne (2011) put it, "eating involves potential exposure to an astonishing range of food-borne illnesses, from *Campylobacter* to *Salmonella, Escherichia coli, Norovirus* and *vCJD*" (Milne, 2011:485)[21]. The idea of a mundane act such as eating chicken being a potential source of harm speaks to Ulrich Beck's argument about the links between risk and modernity - the Risk Society- where risks are often hard to trace: borne on the wind, carried in the water and in the very food we eat as "stowaways of normal consumption" (Beck et al., 1992, p. 40)

The relevance of these ideas about the underlying risks of the food system have been highlighted by the occurrence of a series of 'food scares' from BSE to the horsemeat scandal, which have exacerbated anxieties in consumers, particularly in the Global North (Jackson & Everts, 2010). For the UK, these food scares and recent food scandals have contributed to some key changes in food supply chains (FSCs) in terms of increased scrutiny from food regulatory actors such as Department for Environment, Food and Rural Affairs (Defra) and FSA. The horsemeat scandal

[21] vCJD is short for the human variant of Creutzfeld–Jakob Disease

revealed the complexity of FSCs; weakness of regulatory bodies (e.g., unpreparedness for food fraud detection); lack of transparency and trust (Kjærnes, 2010). Some of the complexities in the FSCs has been attributed to globalization which tends to lengthen the chain - e.g., through introduction of intermediate food brokers, and meat traders which the Elliot Review labels as "highly vulnerable links" (2014)- and makes it tougher to regulate (see discussion on governance in Jackson 2015:96). I pursue this argument in chapter 5 as I address safety regulatory structures in chicken meat supply chains in the UK and Zimbabwe.

The alternative argument has fed into increasingly growing false assumptions that shorter supply chains are inherently more transparent and safer which can be argued gains much support from the AFN studies (Goodman et al., 2012). I explore this through the multiple chicken meat supply routes at hand in Zimbabwe, as well as in the discussions on food safety regulation.

Research on risk has questioned the tendency to 'blame the consumer' for food safety issues such as *Campylobacter* and Salmonella, perpetuating the view of the kitchen as site of infection (Redmond et al., 2004; Worsfold & Griffith, 1997). This is because research on consumer behaviour with regard to food safety tends to focus on the 'wrong doings' of consumers with phrases like *critical safety violations*, *gaps in food safety knowledge* (Jevšnik et al., 2008), *unhygienic* or *temperature abuse* (Derens-Bertheau et al., 2015) often used. These all carry a connotation of blaming the consumer and placing the responsibility of food safety in their hands. However, in case of *Campylobacter* one may question if this indeed should be the case given that the bacteria manages to escape even the regulated environments of food processing plants.

Ethnographic studies of people's kitchen practices have shown how consumers' so-called 'unsafe food handling behaviours' are influenced by their knowledge and beliefs. For example, Meah (2014), concluded that there are "different knowledges at work in people's everyday kitchen practices" such as whether or not to wash chicken before cooking it. Experiential knowledge, based on past experiences, or motivational knowledge may fuel actions which lead towards avoiding or attaining a particular outcome. It is also important to acknowledge the growth of other 'modern era' sources of knowledge and their influence of food safety practices. A Canadian national review

by Nesbitt et al. (2014, p. 162) showed that prior to 2010, "family and friends as well as television/radio were generally the most common sources of food safety information or knowledge" but the internet has since become a common source. According to Rutsaert et al. (2013), much more food safety information seeking, and incidental information acquisition is occurring online. They also suggest that social media applications are new and potentially powerful ways to reach consumers. These forms of knowledge may contrast with more expert knowledge - scientific, microbiological - therefore understanding their formation and avoiding assumptions of the superiority of one form is crucial for better communication and implementation of food safety interventions. These themes of the role of knowledge forms and sources in consumer food safety are further developed in chapters 6 and 7 of this thesis.

For a number of Zimbabwean consumers, food safety has unfortunately often become a secondary concern. A combination of environmental factors (droughts and floods) see, and major political upheavals in recent years have further affected the food security of a country that was still recovering from the effects of the land reform program of 2000 (see Scoones et al., 2010 for overview). In 2019 the World Food Program reported that Zimbabwe was "facing its worst hunger crises in a decade" (WFP, 2019)[22]. This scenario means access to food gets priority over concerns for safety. This compromise on safety, for access, is discussed in Pswarayi et al.'s (2014) situational analysis of the food control systems in Zimbabwe. The study outlines how the national food control system is fragmented and lacks coordination since multiple government ministries each try to regulate food control. There is therefore much redundancy and inefficiency. In chapter 5, I expand on the structure of this food safety and control system.

According to Bhat et al., food safety is typically realised through "ensuring that food is free of pathogenic microorganisms or chemical contaminates that can negatively impact human health" (2014, p. 1). For chicken meat, the *Campylobacter* bacteria introduced in chapter 1 presents a major food safety issue as it has been persistent throughout the supply chain from farm, through

[22] https://news.un.org/en/story/2019/12/1052621

to retail stage (Strachan et al., 2012; Wimalarathna et al., 2013). Although sparse, literature shows isolation of strains of *Campylobacter* in the chickens that are sold live on street markets in Zimbabwe (Simango, 2013). This presents a live risk being passed on to the buyer or consumer. This lends itself as useful evidence to a discussion in chapter 6. Interventions to combat the spread of *Campylobacter* have been proposed including improved on-farm biosecurity measures (Lin, 2009; Meunier et al., 2016; S. Smith et al., 2016a). This is further discussed in chapter 6 on managing disease.

2.5 Conclusion: following chicken

Having reviewed the literature cited above and more, the ubiquity of chicken in our age is confirmed. With the evidenced continuous increase in global chicken consumption trends and the associated increase in the scale of production, particularly intensive chicken farming, continued understanding of the existing and potential threats to the supply of sufficient and safe chicken is imperative, especially in light of all the diseases and outbreaks that continue to plague the sector. The review of disease and food safety in the chicken sector illuminated the key areas of concern within the chosen case studies but also highlighted the current response approaches being utilised in the field. The studies by Potts (2012) and Dixon (2002) also show how studying a defined product (chicken) can offer a broader understanding into many aspects of society and how culture and environment may have a role in shaping and informing practices. To the best of my knowledge, there are currently no such studies for chicken in Zimbabwe, therefore this thesis could be a starting point.

I also conclude that the research questions posed in chapter 1, can indeed be addressed in the geographies of food framework, using some of the tools identified in the literature. Cook et al. (2006) call researchers to consider following things/commodities/produce through more multi-sited ethnographies. This approach to commodity following creates the opportunity to go beyond exploring the supply chain from node to node, looking for economic value addition. Rather, this study seeks to be 'led by the chicken' into spaces and places – chickenscapes - where interactions with chicken, and chicken meat, occur.

In heeding this call to following things, Evans (2018) further argues that researchers should aim to create "more comprehensive biographies of things" through "integrated studies that are designed with the intention of following something all the way through" (2018: 119). This approach calls for not only going beyond following a commodity from producer to consumer, but doing so holistically, into the consumers' homes as well, and even beyond consumption, where meanings manufactured around the commodities can be explored.

It is therefore on this backdrop that I launched into the design of this study, presented in the following chapter, towards a thesis that follows chicken into various chickenscapes, to observe and understand practices within these spaces, and their implications for sustainable and safe chicken meat supply and consumption.

3 Methodology

3.1 Introduction

In this chapter, I describe and discuss the methodological approach I took in the research work leading to this thesis. I present my research design as well as provide the rationale for my methodological choices; and a description of my case studies. In the remaining sections of this chapter, I present an overview of the research process and detail the specific methods of data collection and analysis. I conclude with my reflections over the whole research process.

The thesis used a variety of data, both primary and secondary, from the UK and Zimbabwe. It includes secondary analysis of archival data (in the UK), including both qualitative data such as life-history recordings and quantitative data such as reports of rates of *Campylobacter* infection from the FSA. In Zimbabwe, there is more emphasis on primary data, from interviews and field-based observation. These data sources were brought together, using the concepts of 'following the thing' and 'chickenscapes' (discussed in Chapter 2). While there is only limited use of direct comparisons between the UK and Zimbabwe, the secondary data analysis of UK data enabled me to identify certain key themes to explore through the analysis of primary data in Zimbabwe. This also enabled me to identify the key analytical themes for the main empirical chapters which focus on valuation, governance and disease management.

3.2 Research Design: Qualitative study

In this section, I outline the research design of this study. The design was modelled around the core questions introduced in Chapter 1, the nature of which I deemed could be best answered by a qualitative research approach. With explorative questions focussing on how decisions influence practices, and experiences in the chicken meat supply chain, a qualitative study seemed the best way to produce a "better understanding of social realities and to draw attention to processes, meaning, patterns and structural features" (Flick, 2009:1). According to Smith and Bowers-Brown (2010, p. 112), "As a rule, if your research question includes the words 'how' or 'why' or you wish to explore ideas and experiences with your participants, then qualitative research is likely to be the approach that you want to use." The aim of this study was to *explore spaces of human and chicken*

(meat) interaction, in order to understand the implications for safe chicken meat supply and consumption.

There may be an argument for considering quantitative research especially for the research question which looks at production and safety within the supply chain, but I determined it would be more valuable to first get an understanding of these matters before attempting to quantify them. Additionally, for the UK, there have been many quantitative studies carried out on disease and safety in the chicken supply chains (Battersby et al., 2016; Burfoot & Mulvey, 2011), and for Zimbabwe, there are two relatively recent economic studies that included backyard chicken growers in urban - parts of the country (Gororo and Kashangura, 2016; Munyani, 2018). It therefore seemed more beneficial to attempt a qualitative approach instead. I will at this point note that some quantitative data is referenced in the course of this thesis, but I did not personally collect nor analyse any quantitative data.

3.2.1 Case Study Approach

As discussed in the thesis introduction, the subject matter, chicken, is such a ubiquitous element that a study of it could potentially be a global one but for the sake of feasibility, I chose a multi sited approach to try and cover as much spatial and temporal breadth as I could. To achieve said feasibility, I opted for a case study approach using two cases: the UK and Zimbabwe. Case studies involve investigation of a phenomenon within its real-life context and often employ a combination of different data collection methods: for example, interviews, observations, text analysis, and questionnaires (Eisenhardt, 1991). They tend to provide practical, situated knowledge, and are essential for building expertise on a subject (Bazeley, 2020; Yin, 2014).

There are multiple debates over what constitutes a 'case' which can range in scale from a single person to a nation-state (see (Tight, 2021)). According to Punch (2005)

> almost anything can serve as a case, and the case may be simple or complex. But… we can define a case as a phenomenon of some sort occurring in a bounded context. Thus,

> the case may be an individual, or a role, or a small group, or an organization, or a community, or a nation (p. 144)

There are many examples of studies from various fields where whole nations are used as case studies e.g. Kimaro & Nhampossa's comparative study of health information systems challenges in Mozambique and Tanzania (2004) or the analyses of environmentally sustainable diets in Vietnam and Kenya by Heller et al. (2020). In this study, the UK and Zimbabwe were approached as two cases with bounded national contexts within which chicken meat production and consumption occurs. Within each case, I identified numerous chickenscapes (defined in the introduction), for example chicken growing scapes, within which multiple sites were investigated. The figure below is a graphical representation of the relationship between the two (national) cases and the multiple chickenscapes and specific sites within each case.

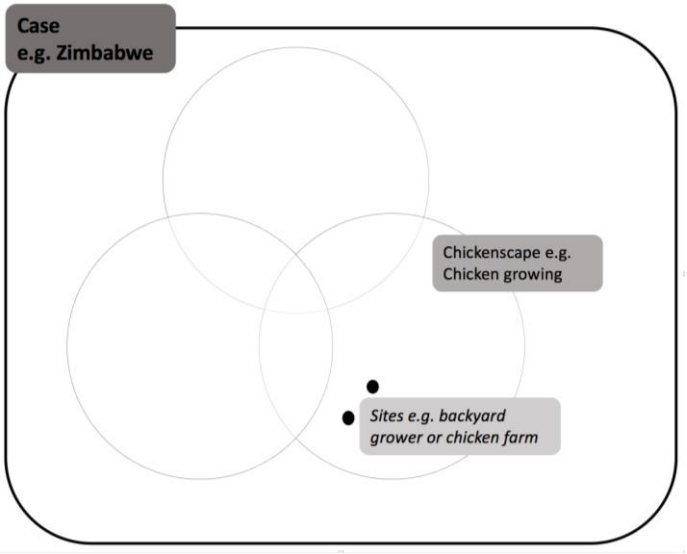

Figure 3.1 Graphical representation of the case studies, chickenscapes, and sites

As discussed in section 2.2.3, chickenscapes were the wider spaces encompassing the socio-cultural and infrastructural interactions, processes and resources, and within them, I managed to identify particular sites of interest that I visited or analysed. In the motion of following the chicken, these various sites provided actual points and moments for pause, data gathering, and analysis.

Having a country as a case study therefore allowed for some definition of boundaries within which data gathering and analysis occurred.

The use of a case study approach also allowed for a comparative study. According to Ward (2010), comparative research enables the exploration of multiple places or activities, with the aim of developing theories that can be articulated across these different events. I sought to achieve this through my two case studies. The reader will however notice that this present study was not a 1:1 comparison for multiple reasons. The resource allocation between the two case studies was not equal and the methods employed in either case study were not always directly comparable. Due to the lower amount of existing research in Zimbabwe on the study subject, Zimbabwe was the primary case study for the research, and constituted the bulk of the research load compared to the UK. A review of existing, and accessible relevant data also led to the decision to seek primary data for the Zimbabwean case study, and secondary data for the UK case study thereby implying the former case required more time and physical presence. As will be obvious in section 3.3.3, the methods of data collection employed would therefore vary, although an effort was made to ensure the sourced data would ultimately prove useful in answering the research questions. The non-equal division of resources and variation in the acquired data are also be reflected in the discussion sections of the data chapters as emphasis alternates between the cases based on available supporting evidence. For example, one advantage presented by the UK secondary data ultimately used in this study was an opportunity to make some multi-temporal analysis since there was data from nearly two decades prior in addition to recent data[23].

[23] 'Multi-temporal' refers to the use of life story interview data from around the year 2003, together with FSA report data from 2015-2018, and primary data collected in Zimbabwe in 2017.

The comparative nature of the study is not in the design of the data collection phase but in the information emerging from the analysis of the data from the individual case studies. Ultimately, despite the differences in the type and amount of data collected for the case studies, it was possible to build enough understanding of the subject matter in each case study to allow for comparative review of the themes that emerged across the different spaces.

While there could be an argument for just focussing on Zimbabwe as the main study, the UK case was key to this study for multiple reasons. The colonial history between the UK and Zimbabwe has had core influence in the agricultural sector of Zimbabwe, including the chicken growing sector where UK-bred chicken breeds continue to be parent stock for commercially raised chickens in Zimbabwe to date. Additionally, as discussed in the introduction, the core matters of food safety in chicken meat supply, particularly *Campylobacter* contamination levels, were topical in the UK at the time of designing this research, thus making it a relevant point of comparison. Ultimately, the sum of the two cases offered broad, varied and interesting insights into the subject matter, as well as research methods, which made their overall combination relevant in answering the research questions.

3.3 Description of my case studies

3.3.1 The UK

The UK was the second largest importer of chicken meat in the EU in 2016, after Germany, with imports of about 378,285tonnes (FAO, 2018). The average broiler chicken meat consumption per capita in the UK was 23.2 kg/yr in that year, an increase from the 2015 (AVEC annual report 2018). This makes the country one of the largest consumers of chicken meat in the region. Production of chicken in the country is also relatively high as the UK was responsible for nearly 2% of global chicken meat exports in 2016 (FAO, 2018). Chicken production and consumption has thus become a relevant subject in the UK. The figures presented above made me curious about chicken meat production in the UK, but the popularity of the subject also meant many studies have been carried out on the country to date. It was therefore important to find a new and interesting

take on the subject of chicken production in the UK. The existence of the archival data on the chicken meat supply chain from the early 2000s presented this interesting take.

My UK case study is therefore a multi-temporal gaze into various chickenscapes of British chicken meat production and consumption. Using archival data from the National Life Stories collection at the British Library, I visit the chicken growing, processing, and retail chickenscapes of parts of the UK from nearly two decades ago, complemented with the more recent reports on chicken meat production, retail, food safety and consumption practices, published in the last five years. The variety of data sources included also make it a multi-spatial study hence the decision to call it a UK case study since the chickenscapes addressed are spread across various parts of the country.

Using life story interviews from a chicken grower in Dorset, England; a meat processor from Scotland; and various food technologists and managers from a major retailer with supermarket branches all over the UK, I gained insight into the production spaces in the UK. The more recent reports and national survey data give a broad overview of the current British chicken supply chain even extending into practices within domestic kitchens of consumers.

3.3.2 Zimbabwe

As discussed in chapter 1, chicken meat is one of the most consumed meats in Zimbabwean diets. Located in Southern Africa, the country provided a good contrasting case to the UK through presentation of data from the Global South. The country occupies over 39million hectares of land and more that 33 million of that is designated as agricultural land. Urban zones and reserved parkland for nature and wildlife constitute rest. In a nation of approximately 12.1 million inhabitants are agriculture employs more than 60%, of them and contributes about 17% of the country's GDP (FAO 2020[24]). Livestock production is a significant sector and with more that 80%

of rural households owning chicken. While the indigenous breeds mentioned in chapter 2 are a common feature in rural households, it is the broiler chicken that has dominated the country's chicken sector.

Broiler chicken in Zimbabwe

After decades of a dual production system, namely large-scale commercial production and small-scale subsistence production by private growers, there has been a shift in Zimbabwe's chicken meat production scape. There are currently multiple 'routes' in the commercial chicken meat supply chain. They include large-scale commercial chicken producers such as Irvine's Zimbabwe Private Limited (Irvine's), the country's largest poultry breeder and producer established in 1950. With a long history in the business, Irvine's set up breeding partnerships with international breeders such as Cobb (a UK company), as well as building their own hatcheries, chicken farms and processing plants. This has allowed them to expand their services to 14 countries throughout West, East and Southern Africa. New companies have since joined the large-scale commercial chicken production sector for example Drummond Chickens in 2004, and Surrey Huku (established in 2006, a subsidiary of Surrey Meats Group), among others. This has seen tremendous amounts of chicken meat being produced at commercial scale per annum with the 2016 estimates for broiler chicken meat reaching 180million tonnes (Zimbabwe Poultry Association, 2018)

These large-scale producers grow some of the produce on their own as well as outsourcing the chicken growing to "contract growers". This has created a model for a second category of chicken growers, the medium-scale grower, producing about 2000 birds per cycle (Zengeni, 2015). An example of this is an arrangement under Irvine's economic empowerment initiatives, where about 60% of their day-old-chick production is supplied to indigenous contract farmers who grow the chickens on behalf of the company, and bring them back to Irvine's processing plant for slaughter. The company, Irvine's in this case, supplies the day-old-chicks, feed, vaccines, medication and cleaning chemicals as required while the grower provides the infrastructure, labour, litter, brooding requirements and water for the birds. The birds are kept on the grower's site and upon achieving

target slaughter weight are collected by Irvine's. The grower is then paid an agreed price per live bird. Some of these medium-scale growers eventually invest in processing equipment to become independent processors as well.

Despite the existence of so many large-scale commercial chicken producers, a desk study by the Livestock and Meat Advisory Council (LMAC) in 2013 showed that 65% of all commercial day-old-chicks produced in Zimbabwe go on to be raised by relatively small-scale (informal) producers (Sukume, 2013). This presents a third pathway for chicken meat supply. Nearly three quarters of these producers reside in urban and peri-urban areas, and keep small flocks in their backyards (Gororo & Kashangura, 2016; Kelly et al., 1994), but there is also a significant presence of chicken growers in rural parts of the country (Scoones, 2015). Scale of production varies, depending on available space for the chicken housing, capital to purchase the day-old-chicks and required feeds and medications, time and labour power among others. This group of private, small-scale, informal chicken producers are the backyard growers.

Most backyard chicken growers are 50-plus year old, possibly because they are homeowners and thus have the space to raise the chickens. Usually, females tend to dominate the backyard chicken growing scene. If men are involved, it is usually in a 'financier' capacity and less hands on. This could be an effect of gender-defined roles in Zimbabwean culture where women tend to be responsible for tending to the home (family, house, garden and pets) while men bring money home from formal employment. Chicken rearing is then seen as one of the 'home projects' that the female can do, in addition to vegetable growing, as a source of food and additional income. Interestingly, when a man was the lead grower, the 'project' tends to be much bigger than the usual size and is often termed a 'business'.

My Zimbabwean case study therefore includes a cross section of large scale, medium scale and backyard chicken growers. The research was mainly carried out in and around Harare, the capital city. Backyard growers included in the study were mainly concentrated in Chitungwiza, a high-density suburb 25km away from Harare. This location was chosen for factors such as the researcher's familiarity with the terrain, the high population density which offered higher chance

of possible research participants, and the existence of a study on backyard chicken growing carried out in the same city in 1992 (Kelly et al., 1994b), among others. As with the UK case study, I also sought to expand the research to other chickenscapes beyond the meat production sector, therefore the study also incorporates observation data from chicken meat consumers in domestic and public spaces in and around Harare.

3.4 Overview of research process

Following the definition of my research questions and the selection of my case studies, the next step was the actual implementation of the research design. The following sections offer an overview of the research process, which is also summarised in a flow chart detailing the research process (see Figure 3.2). I decided on an explorative and flexible research design, allowing use of multiple methods, which complement each other by unearthing various forms of data. The sections thereafter give more detail of participant sampling and the actual data collection methods I used in the field.

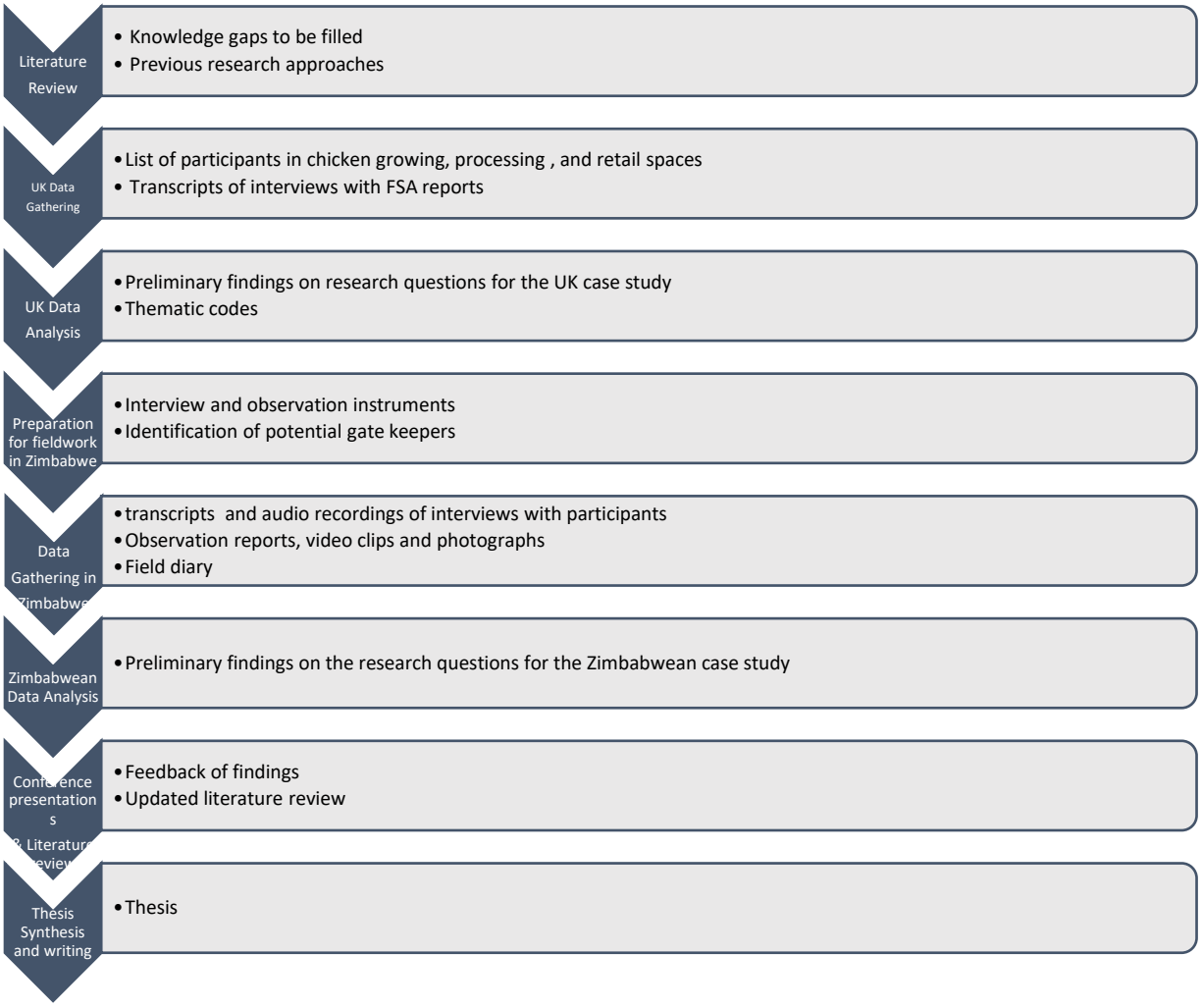

Figure 3.2 Overview of the research process

I initially undertook a broad literature review on subjects relating to the questions I had proposed and in order to understand what other studies had been carried out on the subject. The result of this desk exercise was some useful information on potential knowledge gaps I could attempt to fill with my study, and more practically, some guidance on methods to use. This proved useful in the preparation for fieldwork. The next step was to embark on the data gathering. In the literature review phase I became aware of a wealth of existing data available on my subject matter, which I could readily access and use for the UK case study. This secondary data, some of which was more than 10 years old, gave a unique opportunity to get an insight into chicken supply chains evolution

over time once combined with recent data. The data used was mainly in the form of transcripts and audio recordings of interviews with chicken growers, processors, and retailers; reports from the Food Standards Agency (FSA) and the Department for Environment, Food and Rural Affairs (Defra), both of which are government agencies with a key role in the chicken meat supply industry. I therefore selected the data relative to my UK case study, and went on to analyse it. Results from this analysis led to preliminary findings for the UK case study, as well as useful themes, questions and points of interest. Some of this output was instrumental in the preparation for the fieldwork on the Zimbabwe case study, informing the interview techniques and questions.

Based on a combination of output from the literature review and the preliminary findings from the UK case study, I came up with the initial interview themes and questions, as well as the observation sheets (see example in Appendix B) I used during the fieldwork period in Zimbabwe. These were adjusted as I gained new insights during the fieldwork phase. Output from this fieldwork included audio recordings and transcripts of interviews with chicken growers, retailers, consumers; observation reports; photographs and a field diary with reflections on my experience of the whole process. Analysis of this data yielded the preliminary findings for the Zimbabwean case study. Opportunities to present these preliminary findings to a public audience arose in the form of oral and poster presentations at an agrifood conference as well as at a food fair and I benefitted from the questions and feedback arising from these audiences with varied backgrounds.

In the final phase I combined the feedback from all these interactions, with additional information from a subsequent literature review to perform a final analysis and synthesis of all the findings before writing up this thesis. In the following sections I provide more details on the data collection and analysis processes.

3.5 Data Collection and Analysis

As discussed in section 1.2, the aim of this study was to explore spaces of human and chicken (meat) interaction, in order to understand the implications for safe chicken meat supply and consumption. The research questions particularly sought to understand the factors that inform practices within chickenscapes, as well as the implications these practices have for chicken meat

supply and safety. Therefore, in terms of data collection, there were three main focus points; a) it was important to ensure that sites of chicken meat production, processing, and consumption were represented in the data collection, and b) the issue of safety, therefore the subject of disease, both in the chickens being grown and safety and contamination during commercial processing and domestic handling of chicken meat were also key data points of focus and c) collecting data to determine the factors influencing any decisions or practices within the selected chickenscapes. The data collected is presented in the following sections, together with an overview of the chickenscapes within the two cases.

3.5.1 Data Collection in the UK

For the UK case study, all data used was secondary data. This was mainly because the UK was a minor case study with less time resources allocated to it for reasons discussed in section 3.2.1. Additionally, the availability and relatively easy accessibility of the secondary data, in multiple formats, from multiple sources justified this choice. Besides availability and relevance to the study subject, another factor considered in selection of data used was the ability to provide a decent representation of various chickenscapes within the British chicken meat supply chain. In the following sections, I present the various sources of data I relied on for the UK case study. Table 3.1 gives an overview of the selected data and what value they were deemed to bring to the research.

The life story interviews were the main source of data as these were available in original transcript form as well as audio recordings of the interview, both of which I could directly analyse in raw state. I used the rest of the data for context building as these were mostly reported findings from other projects. In the following sections I discuss the data collection process in detail.

Table 3.1 Overview of the selected data type and source

DATA TYPE	SOURCE AND METADATA	CHICKENSCAPES Addressed
Life Story Interviews transcripts and audio recordings	British Library National Life Story Archives Data collected by Dr Polly Russell between 2003 and 2004	-British Chicken farms -Chicken processing sector -Retail sector
Reports conclusions on levels of *Campylobacter* on chickens at retail	FSA - nearly 2000 samples of whole, UK-produced, fresh chicken tested for Campylobacter, between August 2016 to July in 2017 and in 2018 -Oct - Dec 2018, the FSA carried out a data gathering survey	Retail
Kitchen Life Study project report	An ethnographic study of domestic kitchen practices in 20 UK households	Domestic settings, consumers' kitchens
Food and You Survey report	-FSA Statistics and analysis conclusions from a survey of 3,163 interviews with adults across the UK carried out between March and August 2010	Domestic settings - consumers' kitchens

Life Story Interviews

I used archival data from the British Library National Life Stories archive. The data is accessible in digital (transcripts) and audio format of life story interviews conducted between 2003 and 2004 by the original researcher, Dr Polly Russell, with multiple individuals in the food manufacturing and processing industry. The original research project was titled 'Manufacturing meaning along the commodity supply chain' and was funded by the AHRC-ESRC Cultures of Consumption programme: http://www.consume.bbk.ac.uk/research/jackson.html. The research focused on two commodities (chicken and sugar) and conducted life history interviews with key actors along the supply chain for each of these commodities. For the chicken industry, this included people who worked in hatcheries, chicken growers, processors, food technologists, product developers, technical directors, buyers and category managers, most of whom worked for the British retailer, Marks & Spencer. The life history interviews were deposited at the British Library as part of their

Food: From Source to Sales Point archive which has more than 130 recordings.[25].The breadth and depth of the life story interviews collected by Dr Polly Russell (2003) on the poultry sector in the UK, presented a wealth of data that I would otherwise not have been able to personally collect.

Participant Sampling

By listening to audio recordings of the interviews, reading the interview summaries, available on the British Library website, and communicating with other researchers who were familiar with the data, including the original researcher, I was able to identify potential participants for my research. The sampling strategy was mainly to ensure that there was enough interviewee material to shed light on the practices occurring at each stage of the supply chain, from growing to retail of chicken. I also selected interviews where there was discussion of disease occurrence, and food safety. I eventually used 6 life story interviews, with individual text lengths of between 80 to 315 pages each, or an average of 5 hours length of audio recording.

The fact that the original project focused on the commodity chicken and included participants from various nodes of the supply chain met my requirement for representation of various chickenscapes. It also resulted in interview responses from which I could answer my own research questions on practices, diseases and safety within the chicken production and processing in the UK.

[25] This project was initiated in 1997. Its aim was to chart the revolutionary changes which have occurred within the UK's food industry in the course of the twentieth century and beyond. The technological and social changes which have affected the production, distribution and retailing of food are explored through recordings with those working at every level of the industry. Interviews cover amongst other areas, the fields of butchery and chocolate production, biscuit production and aspects of 'ethnic' food in the UK. Some of the interviews were recorded as part of the AHRB-ESRC "Cultures of Consumption" project on the chicken industry led by Professor Peter Jackson of the University of Sheffield. https://sounds.bl.uk/Oral-history/Food/

The following Table gives a summary of the participants with a brief description of their role in the chicken supply chain. This selection of interviewees allowed for a representation of various chickenscapes in the chicken meat supply sector in the UK.

Table 3.2 List of UK participants

Role in Poultry industry	**Name and year of birth**	**Description of work/duties**	**Period and location of interview**
Farmer	Audrey Kley (1930)	-Started raising chickens for eggs in 1949 but moved into growing meat (broiler) chickens in 1965, in a family run business -Supplied ready for slaughter chickens to local processor	September 2003 Audrey's home - Dorset, England
Processor	Fred Duncan (1942)	- In 1978, he acquired a bankrupt chicken growing business and revived it into a 4000-birds-a-week operation selling live, and processed birds to local butchers, markets and processors. -in 1982 expanded his business and processed frozen chicken for supply to retailers such as Tesco, Sainsburys - At the time of interview, he ran a billion-dollar business in food (meat) processing	March – June 2004 At the British Library, London
Food Technologist(s)	Mark Shippey (1955) and Mark Ranson (1967)	-Joined Marks and Spencer(M&S) in 1977 and 1997 respectively Duties include - product quality management - product innovation i.e., creating new (chicken) products -product safety assurance	March – August 2004 at Marks & Spencer Head Office, Baker Street, London
Meat and Poultry Category Manager	Andrew Mackenzie (1957)	Joined M&S in 1977 -Worked in various departments before becoming a category manager - supervises the work of product developers and buyers -makes category decisions based on the company's goals for his category	February – April 2004 at Marks & Spencer Head Office, Baker Street, London
Director of food technology	David Gregory (1963)	Joined Marks and Spencer in 1983 - Oversees all areas of product quality, innovation, risk management and relationship management	February – April 2004 at Marks & Spencer Head Office, Baker Street, London

Life history interviewing is a research method that is designed to record an individual's biography in his or her own words (Jackson and Russell, 2010). The process by which the oral life interviews,

conducted and captured is summed up in the following definition of the oral life history method by Don Ritchie

> Simply put, oral history collects spoken memories and personal commentaries of historical significance through recorded interviews… Tapes of the interviews are transcribed, summarised, or indexed and then placed in a library or archives. These interviews may be used for research or excerpted in a publication, radio or video documentary, museum exhibition, dramatisation, or other form of public presentation

(Ritchie, 1995, p. 1).

With roots in anthropology, sociology and social history (Thompson, 1978) oral history as a means of data collection has, over the decades, been adopted by many other fields of study. In Geography, although uptake of the method has been low, some researchers have employed it for example Buttimer's Dialogue project (1978-89) recorded the 'life-journeys' of geographical thinkers while McDowell employed the method in her work with Latvian women from multiple generations, living in The UK (McDowell, 2004). Smith and Jackson (1999) also utilised a life story interview approach in their research on the 'imagined community' of Ukrainians in Bradford. Of particular interest to me was the use of this approach in PhD research (see Roberts' (2005) exploration of men's narratives of health and place in a low-income neighbourhood in Sheffield) and more relevant to my study, Russell's (2003) study of British culinary culture.

Benefits and constraints of using oral life interview data

There are a number of advantages of using life history interview data. For example, "its capacity to shed new light on current geographical issues by demonstrating the importance of social change within living memory and by highlighting the role of memory in the narrative construction of personal identity". Through tapping into the memories of participants, a researcher has immediate access to not only past/historical events, but also personal experiences that can hardly be captured using a survey or questionnaire approach. The process of conducting a life story interview in itself, in terms of the open-ended questions; the trust or confidence building process between the interviewer and interviewee, and the non-rushed atmosphere created by the often-generous time

allowance in terms of duration of interview, allows for the collection of such in-depth data. This makes it possible for the interviewer to not only grasp the 'facts' of a subject matter, but also capture the context, settings, and/or atmosphere during which certain past events transpired. As Jackson & Russell, (2010, p. 177) shared, the life history method allowed them to "explore the emotions, feelings and ambiguities associated with modern poultry production with people central to implementing change within the poultry business" thereby avoiding the "purely sanitised version of events that rarely goes beyond what is already on the public record" which is often typical of structured interviews output.

There are however challenges with using this data. For example, the much-celebrated length and inclusivity of the transcripts also often translates to large volumes of data. As mentioned above, some of the transcripts I used were as long as 300 pages. Effective coding and analysis of such large volumes of data requires much time resources. In addition, the wide breadth of subjects or topics brought up within a life story interview, often spanning the interviewee's life with detailed descriptions and often moments of reflection, may pose challenges in enforcement of rigorous boundaries, and present a risk of limited depth to certain subjects of interest, in comparison to structured interviews, due to time constraints. In studies involving a collective experience, recounted by multiple interviewees, the researcher may also be faced with the challenge of "respecting the integrity of each individual life-story and the comparative analysis of multiple life histories in pursuit of an understanding" of the 'truth' since memory is subjective and passage of time can affect the recounting of events[26] (Jackson and Russell, 2003). On a practical level,

[26] In some instances, the accuracy of the individual memories may not necessarily be the most important factor. As Jackson and Russell (2003) argue: "Whether many people have a clear or first-hand memory of chicken 'as it used to be' is debateable. Whether poultry in the past – more often chickens sold at the end of their laying life and not bred primarily for consumption -- tasted 'better' is questionable. But the accuracy of the memory here is of less significance than its widespread deployment and what it reveals about contemporary food production and the past as a terrain for the 'creation of meaning' with commercial implications."

conducting a successful life story interview calls for development of a level of trust and understanding between the interviewer and interviewee which is often not easy to achieve or may require time to develop. This aspect also extends to the challenges of handling the collected data as it tends to include more personal details than an ordinary interview. I discuss more on this last point in the section titled ethics of reuse of data.

On the (re)use of archival/ secondary life story interviews

My approach to using archival or secondary life story data may also fall into the long-standing debate over practicality, ethics of reuse, relevancy, and even usefulness of data that was often collected by someone else for subsequent, possibly unrelated research projects (Geiger et al., 2020). However, in this technological age allowing for collection and storage of data, in multiple formats, and on many platforms, there is an inevitable surge in the amount of data available. This archival turn has created a rich source of data whose depth and richness makes it "inconceivable not to consider utilising the archive", with notable emphasis, of course, on "the importance of fully documenting and making visible to future researchers the context of the interview" (Nyhan & Flinn, 2016, p. 28). On the last point, Jackson and Russell (2003) suggest that oral historians be aware of the potential use of their interview recordings as primary sources by unspecified audiences in the future.

In my case, the use of this data also proved beneficial in terms of access. As a (foreign) student, carrying out my study in present day, gaining access to the participants, some of whom are now dead or have retired from the industry, would have been either difficult or impossible. The availability of audio recordings in addition to the transcripts helped in understanding some of the responses of the interviewees as well as to give a sense of the context in which the interviews took place.

On the other hand, some challenges emerged in attempting to analyse the data. For example, given this data was in form of life story interviews, the content contains a lot of historical information or narrations of the interviewees' recollections of past events. My usage of this data in the present day, given the passage of more than a decade since the interviews occurred, created additional time steps. Essentially, I was analysing historical data about historical data in order to potentially explain current phenomena. Creating the link between the reported events from at least 13 years ago to the present without equal depth of data for the present was a challenge.

The information given in the interviews is broad and rich but at times the question one wants to address was only answered superficially or indirectly, and there is no chance to probe for a deeper answer or ask follow up questions. There is also no direct verification method for some of the responses which can easily lead one to subconsciously assume them as truth, thus introducing bias in the analysis.

Ethics of reuse

Other important factor to consider in the reuse of archival data include issues of accountability, permissions and ownership of data. Larson (2013) questions how ethical it is for research, despite existence of clear copyright agreements, to reuse interview data especially when "the chronicler could not have foreseen a particular possible use". Fortunately, the data used in this study was collected with clear consent and understanding on the part of the participants that their information would someday become part of public records in collections archived in the British Library. For individuals not wishing to have their information made public, their particular interviews are closed or still under embargo until an agreed date. The British Library also takes data protection rights seriously by ensuring that access to the archival data is controlled as one has to seek formal permissions to access the life story recordings.

Audio listening sessions

An advantage of using a well-archived dataset as I did in this case is the availability of good quality audio recordings of the life story interviews which are accessible by the public on request. I managed to schedule listening sessions at the British Library and could actually hear the voices of

the participants. There are subtle cues that one can pick up from tone and sound that would otherwise not be obvious when one simply reads and analyses a printed transcript. Some of the frustrations that a farmer felt, or pride that a retailer had over his product were clearly audible in the fluctuation of voice along the interview and added an essential layer of context and understanding of the material.

Secondary data reports

I complemented the interview data with wide ranging documentation relevant to the chicken supply chain in the UK. This included official government data statistics and reports from the FSA and Defra, academic research reports, and data. This content was visited both during the initial stages of the study as a source of background information and context, as well as in the later stages of data analysis in an iterative process to complement the findings from the interview data.

3.5.2 UK data Analysis

The main data to be analysed for the UK case were the life story interviews. As these already existed in transcript and audio format, I proceeded to thematically analyse the interviews. This turned out to be a five-step process with some iterative parts. Initial step was to read the interviews repeatedly and where possible, I listened to the audio recordings at the British library to capture the mood and tone of the interview. This helped to note key elements such as sarcasm or frustration evident in the tone of the participants' voices but not necessarily visible on the transcript.

In the next step, I re-read the transcripts and materials and tried to, objectively, identify biases, such as my preconceived imaginations, and ideas of farming practices. I also had the key phrases from my research questions on hand, - for example "*inform practices*" , "*food safety*", "*meat supply*"- and used them as guides in my reading . Going through the transcripts, I began the process of manual coding and interpretation whereby I highlighted or underlined 'direct quotes or words

from the participants'[27] and noted my own understanding of such quotes[28] as codes in the margin. As the list of codes grew, there were some co-occurrences of codes across transcripts which then helped me to build the themes around which my data chapters were built.

In the final step in my analysis of the interview data, I revisited my research questions to make sure that the themes I had built up were addressing the questions. I had to refine one of my questions because the data had highlighted a more relevant question beyond what I had initially asked. It was particularly beneficial to go through this process of refining my questions at this stage because it gave me a clearer focus in the main case study in Zimbabwe.

Analysis of the reports from the FSA survey reports from the *campylobacter* surveys, The food and you report, and the Kitchen life study was also a multi-step process which involved reading the texts and coding the data. As this data was not in a raw state similar to the life story interview transcript, I used apriori codes created from the research questions, and the preliminary analysis of the interview data (e.g. safety, contamination, knowledge, disease) to help code the data. I eventually performed axial coding (Strauss & Corbin, 1990) to determine the linkages between the themes identified before moving on to the writing up the results in the empirical chapters.

3.5.3 Data collection in Zimbabwe

The primary data for this study focused on the case of Zimbabwe. As discussed in section 3.2.1, Zimbabwe is the main fieldwork site with the majority of the data used for this case study being primary data that the researcher collected personally. This fieldwork was carried out in two phases, March to June 2017, and October to December 2017. The interim period allowed for assessment of collected data, identification of missing data, and re-evaluation of methods and tools before going in for a second data collection phase. In the following sections, I discuss this process of data collection in Zimbabwe, presenting both the methods used and the preliminary results from the

[27] Descriptive or emic codes
[28] Analytic or etic codes

observations to give a detailed picture of some of the chickenscapes in Zimbabwe. The main purpose of the interview was to explore issues of food safety, contamination and chicken disease. This meant that I asked them specific questions about their chicken handling practices, their experience of chicken rearing and disease management, their marketing strategies, and bookkeeping, as well as any encounters with local authorities or regulators.

Participant Sampling in Zimbabwe

According to Moser and Klostjens (2018, p. 10), "qualitative research projects start with a broadly defined sampling plan" thereby allowing the researcher to "include a variety of settings and situations and a variety of participants" towards obtaining rich data. My research therefore broadly targeted private small-scale chicken growers (hereafter referred to as backyard growers), medium-scale growers, large-scale chicken processors, and consumers, especially individuals who buy live chickens for slaughter, processing and consumption at home. I also discovered other non-grower participants who have key roles in the chicken supply chain and created an additional group of experts and specialist services providers. Ultimately, my combined group participants allowed me access to a broad overview of the chickenscapes in Zimbabwe. Actual numbers of participants per category are unequal with some categories having as few as three participants but the researcher ensured that each category's participants list was only finalised when some level of data saturation[29] was noted. I am aware of the long-standing debate on using data saturation to determine participant sample sizes in qualitative research (see Onwuegbuzie and Leech, 2007; Charmaz, 2005). However, Patton (2002: 242-3) states that "Sample size depends on what you want to know, the purpose of the inquiry, what's at stake, what will be useful, what will have credibility, and what can be done with available time and resources". With endless resources, researchers can always continue to collect data but for the purposes of the current study, the

[29] Data saturation is reached when no new analytical information arises and the study provides maximum information on the phenomenon (Moser and Korstjens, 2016)

presented sample size provided rich enough data to address the research questions. Table 3.2 shows a summary of my participant list for the Zimbabwean case study.

Participants for the Zimbabwean case

Chicken growers

The classification used for the chicken growing production systems was based on flock size, location of the growers and the overall scale of operation in terms of infrastructure, personnel, and registration status or lack thereof. This classification was arrived at as a combination of the FAO characterisation system (as used in Moredaa and Mesekel 2016) and the local (Zimbabwean) terminology applied in chicken farming circles. Table 3.7 presents a summary of this classification.

Backyard growers

Backyard growers were identified either from local knowledge (from their customers and/or competitors), or by noticing "Chickens for Sale" signs displayed at their gates. I would then approach the grower and introduce myself, and the purpose of the visit before asking if the individual was willing to take part in the study. Where a positive response was given, the interview would then take place, or an appointment set for the interview to take place at a time convenient for the participant. In such cases, I would then ask for an opportunity to have a look at the chicken housing. A total of 8 backyard growers participated in, on average, 1-2 hour long interviews, observations and in one case, a slaughter session with the researcher also assisting.

Medium-scale growers

Medium-scale growers were mostly identified during farmer training courses which the researcher attended. These courses presented an open platform where I was able to identify Harare based growers, approach them for recruitment and ultimately settle on the participants listed in the medium scale participants list. Additional interaction with a large group of medium scale chicken growers was established through online WhatsApp groups created by the organisers of the farmer training courses. While not all members of these groups were eventually sampled as participants,

I viewed the space as a source of valuable contextual data and discuss this interaction further in the section on contextual data

Table 3.3 Small scale (Backyard) Chicken growers

Name	Age	Sex	No. years [30]	Largest Flock size; type	Material collected
Mrs Chirombe	67	F	31	100 broilers	30-minute interview with notes Photographs
Mr Gatsi	60+	M	28	100 broilers 25 traditional chickens 200 layers	45-minute interview with audio recording Notes
Mrs Masoko	65+	F	30	200 broilers	1,5 hr interview with Observation notes Participant observation Photographs
Mrs Nhowe	50	F	12	200 broilers	30minute interview Photos
Mrs Tsamba	67	F	25	100 broilers	2X 30minute interviews with notes Photos
Tichaona	24	M	2	25 broilers 50 layers	15-minute interview
John Mukoma		M	2	40 plus Road runners 100s of Quail 6 turkeys Incubation and hatchery service	25-minute interview Photos
Mai Bee	25	F	1.5	-25 off layers sold off for meat	Several short conversations

[30] Number of years of experience

Table 3.4 Medium scale chicken growers

Name	Age	Sex	Years of experience	Largest Flock size; type	Material collected
Terera	63	M	8	3000 broilers; 1000 traditional chickens	30-minute interview with notes; Photographs
Chivaura	60+	M	10	6000 broilers; 3000 traditional chickens, hundreds of quail	45-minute interview with audio recording Notes
Mai Ropa	30	F	4	2000 broilers, 200 traditional chickens, 80 layers	1,5 hr interview with audio recording Photographs
Rogers	28	M	2	2000 broilers	30minute interview Photos
Muzvare Makoni	70+	F		1000 traditional chickens, hundreds of quail	2X 30minute interviews with notes Photos
Elizabeth	60+	F	10	6000 broilers; 3000 traditional chickens, hundreds of quail	45-minute interview with audio recording Observation notes Photos
Elton Ancillia farms	28	M	10	4000 broilers	Notes from a 20minute tour of the facility
Mai Memo	28	F	6	3000 broilers; 1000 traditional chickens	1 hr interview with recording Photos

Large-Scale Producers

Based on my classification system, only a handful of companies fell into this category of large-scale growing and processing companies in and around Harare. I therefore requested permission to carry out my research in most but only got positive responses from three of them (see table 3.8). I visited all three but access to the production areas was only granted in two of the premises. In the third case, I was only allowed to interview a senior employee whose duties extended between production and management.

Table 3.5 Consumers (home visits)

Name	Age	Gender	Chicken status	Activity observed
Mai Tino	Mid 20s	Female	Live	Slaughter and dressing and butchering
Penelope and Simba Simboti	Mid 30s	Female and Male (couple)	Live	Slaughter and dressing
Runyararo	Early 22	Female	Dressed, frozen	thawing
Catherine	Late 40s	Female	Frozen chicken feet	Cooking and eating

Table 3.6 Experts/ specialist services

Name	Age	sex	Expertise	Years of Experience in post	Organisation	Materials collected
Nzenza	58	M	Chick supplier	33	Hukuru Chicks	20-minute interview with audio recording Notes from 30minute work shadowing exercise.
Emilia	48	F	Quality Assurance	-	Irvine's Zimbabwe	Notes from a 30minute interview
Phatera	35	M	Abattoir Manager	3	Drummond	Audio recording and notes from a 15-minute guided tour of the facility
Nyashanu	42	M	Quality Control Manager Abattoir	8	Surrey Huku	Audio recording, photo and video footage, and notes from a 30-minute guided tour of the facility
Muzvare		F	Hatching services	1,5	Self	Notes from a 15-minute interview
Masocha	45	F	Hatching services	4	Self	30minute facility tour with audio recording
Chivaura	60+	F	Hatching services		Self	10-minute tour of hatchery
Rumanga	45	M	Farm Manager	30	Drummond	30minute facility tour with audio recording Photos
Jiji	58	F	Farmer Trainer	4	ZFRPA[31]	4 hr audio recording of training session

[31] ZFRPA is the Zimbabwe Free Range Poultry Association, an organisation facilitating training, and support for free range poultry production.

Table 3.7 Classification of the different poultry production systems

Category	Backyard growers	Medium scale	Large scale
Flock size	200	1000 – 10000	≥10000
Location	Urban	Peri urban	Peri urban; farmland
Operational Status	Commercial but unregistered	Commercial, with some type of farmer registration	Commercial and registered

Table 3.8 Large scale chicken producers

Name	Established in	Operations	Material collected
Irvine's Zimbabwe	1950s	Hatchery and Day old chicks supply; Broiler chicken production, egg production, feed mill	Interview notes from a 45 minute interview with a senior employee.
Surrey Huku	2006	Chicken meat processing	Video footage from a guided tour of the abattoir
Drummond Chicken	1985	Chicken growing; Chicken meat processing	Audio and visual recordings from interviews with two senior employees -Guided tour of the farm and abattoir.

Experts and specialist services providers

Hatcheries and chick suppliers

For the longest time, Irvine's Zimbabwe was the main, and at times sole, supplier of day-old chicks to chicken growers across the country. Procurement entailed placing an order with Irvines Zimbabwe and waiting a week or two before one could collect the chicks. From my initial interaction with growers, I learned that the scenario has since changed. At present, more companies have entered the chick supply sector for example Navgen and Hukuru who now supply many small

and medium scale commercial chicken growers. Another interesting development is the rise of small-scale private hatchery services across the city of Harare (see figure 3.4). These are private individuals who have purchased incubators and offer hatching services for private clients. Therefore, in a combination of snowball and theoretical sampling strategy (Moser and Klostjens, 2018), I decided to include them in my research. Details of the three hatchery services I visited for interviews and observations are included in table 3.3 on expert services.

Abattoir managers

In two of the three large-scale production companies I included in the study, I also got to interview the abattoir managers who oversee the slaughter, processing and packaging processes on the chickens.

Quality control managers

This group of experts were only associated with the large-scale producing companies. I managed to meet with the quality control managers from three such companies. Despite the similar titles, the duties of these managers varied from one company to the next as I discuss further in chapter 6.

Consumers

For the other chickenscapes, beyond chicken growing spaces, I included different forms of consumers of chicken, from whom I managed to gather primary data and contextual data. The first group of consumers were recruited using snowball sampling through referrals from backyard growers and comprised four families who purchased their chicken, in live or slaughtered state, from the backyard growers. A secondary set of consumers wasva a set of 33 women of ages 22-39 who I interacted with online via a ladies group, set up by an online marketing agent. Additional consumers were those observed in public places where chicken consumption occurred such as public barbeque places where chicken is prepared and sold to members of the public in open spaces. These participants were randomly encountered and rarely approached; therefore, I refer to the data gathered from these sessions as contextual data (discussed further in the section on *Contextual Data*).

Figure 3.3 Broiler chicks, 1.5 weeks old broiler cage at a backyard grower's home

Figure 3.3 shows cage with chicks at a backyard grower's home. The cage housed 50 chicks at the time of my visit. First impressions were that 50 6 week old broiled would struggle to survive in a cage of such dimension. However is an interim cage where Mrs Masoko rears the broiler chicks for the first 14 to 20 days before moving them to the bigger shed. Apparently this was done for the welfare of the. Birds as this cage had better air circulation than the permanent housing.

Figure 3.4 Chick support officer inspecting the bedding in the shed at a client's farm

Figure 3.5 Private hatchery specialising in indigenous breeds

3.5.4 Methods of data collection

Semi-Structured Interviews

For this case study, I used interviews as the main method of primary data collection. Interviews allow researchers to understand not only the participants' experiences but meanings of central themes in the world of the participants as well (Hitchings, 2012; Mason, 2002a; Moser & Korstjens, 2018). As an interactive exercise between the interviewer and interviewees, interviews offer an opportunity for knowledge sharing and construction (Longhurst, 2010). This information was particularly important for addressing the research question on valuation processes along the chicken supply chain (discussed in Chapter 4).

The interviews conducted were semi-structured interviews. I prepared an interview guide (see Appendix A) beforehand (Brinkmann & Kvale, 2015), with headings such as Introduction, Historical background, Typical daily routine, among others, used as guidelines for the type of information required. The guide helped me to focus on specific topics with all participants. The type and order of actual questions varied based on how the conversation flowed as well as the response style of the participant. The conversational nature of interviews enabled me to seek out more detail from the participants, by requesting that they expand on certain answers or clarify some details in their responses (Arksey & Knight, 1999; Cloke et al., 2004).

Audio recordings of the interviews were made using an Olympus voice recorder and a voice recording application on a mobile telephone (iPhone 6). Photographs and video footage were recorded using the same mobile phone. During interviews, the recording gadgets were usually kept out of sight, but within sound range. This was done to limit the sense of intrusion and attempt to make the participants less conscious of being recorded. After each interview session I listened to recordings to ensure all content had been captured as well as to reflect on the data I was gathering and preliminarily identify the key themes emerging from it as well as use each encounter to potentially shape the content and approach of the next one (Holloway & Jefferson, 2000). All recordings were eventually manually transcribed, with translation to English where necessary, by the researcher. Informed consent was sought and obtained from all participants, as per standard ethical practice, prior to each interview (Bryman, 2016). As all interviews were carried out at the participants' properties, each encounter presented an opportunity for observation and notes were made. I also made additional field notes on my reflections on the interviews

Observation and Participant observation

Another means of data collection was observation. Observational designs are encouraged for research studies where the main aims include understanding the happenings within a selected setting. In such designs, the researcher aims at noting the day-to-day practices within the study space by spending time there in person and observing with as little interference to the 'usual' processes as possible.

There are calls promoting the use of information from observational studies to design and implement interventions against zoonotic infections such as *Campylobacter* common in chicken and chicken meat (WHO, 2013). I therefore undertook to observe chicken growing and processing practices in the chicken farms and processing plant in and around Harare, Zimbabwe. I prepared an observation list (Appendix B), which I used as a guide during each visit to capture notes.

For a qualitative study, researcher involvement in observed activities can be at fully involved, active, moderate, or complete observer level. Depending on the topic, one may apply all four. I performed participant observation in the premises of backyard chicken growers in order experience the conditions that shape the participants' practices in raising and handling chicken. This involved my participation in the feeding broiler chickens, and in the dressing of chickens slaughtered for sale (see Figure 3.1).

Figure 3.6 Defeathering and dressing chicken(participant observation at a backyard grower's home)

According to (Jorgensen, 1989, p. 12), participant observation is especially appropriate for exploratory and descriptive studies as it makes it "possible to describe what goes on, who or what is involved, when and where things happen, how they occur, and why—at least from the standpoint of participants—things happen as they do in particular situations". Such access gave me some insight into how local and external circumstances may 'force' participants to perform certain tasks in particular ways.

Contextual data

As previously mentioned, I decided to compliment the above data with some auxiliary contextual data collected in a less structured manner. For this data, I utilised methods such as public observation and less conventional online data collection methods.

Observation

There are various chickenscapes in and around Harare where transactions involving chicken take place. These include for example, the sale of live chickens and/or chicken cutlets at street side informal market stalls, by non-registered vendors or the sale of chicken meat for barbequing by butchers at public barbeque centres. Dahlberg and McCaig (2010, p. 123) support the argument that, "Direct observation as a research method is most appropriate to open, public settings where anyone has a right to be or congregate". I therefore made some direct observations of human – chicken interactions each time I was in such places so as to build up some contextual data on the chickenscapes in Harare. I focussed on how the live chickens were kept and fed in their cages, waiting for buyers. Where the chicken meat was sold, I tried to observe how the raw meat was handled by both the sellers and their customers, the efforts made to keep it "fresh", as well as the general standard of hygiene observable by an onlooker. Where barbeques were included, l tried to observe the cooking practices employed. This data was mostly collected in form of mental observation notes or digital notes made on my mobile phone, which I would then later on expand on after further reflection, interpretation and analysis.

Online chat groups

In social science research studying the way of life of various groups of people, the online dimensions of those lives are becoming an increasingly serious factor to consider. Many researchers are conducting online ethnographies as online spaces have become central sites of experience in many aspects of everyday life (Coleman, 2010) and enable the exploration of new cultural formations that emerge online (Hine, 2017) as well as offer access to largescale datasets on daily activities.

There is a growing use of social media in Zimbabwe and online chat groups on platforms such as the WhatsApp mobile telephone application are some of the most popular means of communication and information sharing in the country. In 2017, WhatsApp was responsible for about half of all internet data usage in the country[32]. For my study, I therefore decided to expand my collection of contextual data to include online content from WhatsApp group interactions. One interaction was with a group of chicken growers with whom I attended chicken rearing and feed formulation training courses in Harare. At the end of the session, a WhatsApp group was created so as to serve as a platform for further information dissemination to, and knowledge exchange among the course conveners and training participants. As I was physically present when the group was created, I introduced myself to all members and made my identity as a student researcher transparent. There were no objections to my being added to the group and I have been a member since May 2017. As a general chicken growing group, postings vary with examples ranging from chicken rearing advice, questions on market prices of inputs and outputs, requests for tips and advice when facing challenges in the practice, as well as marketing of chickens and eggs. The group administrator, the course organiser, often posts announcements of upcoming training courses. Being part of this group has allowed me to have a continuous glimpse into the chicken growing sphere, and practices, in Harare.

[32] https://qz.com/africa/1206935/whatsapp-is-the-most-popular-messaging-app-in-africa/

Another WhatsApp interaction was with a group of women of ages 22-39 belonging to an existing online marketing WhatsApp group. This group was interesting to me as they represent the average demography of wives and mothers, typically, in a Zimbabwean setting at least, the ones responsible for determining their families' diets, including chicken meat purchases. When I was added to the group, I introduced myself to the group administrator and sought permission from group members to discuss the subject of my study and ask some questions. The questions I posed centred on source, preparation and frequency of consumption of chicken meat by the group members. Initially, members of the group responded at will, independently offering answers to the questions in a questionnaire response manner before a brief discussion ensued over other food related (chicken meat included) matters. As the initiator of the discussion, I eventually thanked the respondents for their feedback, shared some information about my research before the group conversations returned to the usual subjects of product sales.

While both experiences with these WhatsApp groups were merely for contextual data gathering, I have realised some merits, as well as challenges, to the use of online research methods. Such methods can offer a type of instant ethnography (Ferrell et al., 2008) with great outreach for less resources. There is also the ability to look back at old discussion within the group to see if something (e.g., opinions and practices) has changed over time since the group chats remain on the platform. However, boundaries also become more challenging to define as the researcher has to determine the extent to which they participate in the group chats or limit it without major epistemic purchase or compromising on ethnographic interpretation (Garcia et al., 2009). There is also a consideration of the ethical implications for group members who join or get added at a later stage, after introductions and permissions have been granted.

3.6 Zimbabwean Data Analysis

In the following sections, I discuss the analysis of the data collected in Zimbabwe, detailing how the various data types were processed and eventually integrated to result in the findings and conclusions presented in the subsequent data chapters.

Data organisation

Before I began the actual analysis process, I spent time organising the data into a workable format. I formatted all the interview transcripts into an A4 wide format, before printing, to make room for my notes and comments in the margin. I did the same for the audio notes made during observation, which I had transcribed. I did not transcribe my research diary but instead just referred to the original entries during the analysis phase. For the other contextual data, namely the WhatsApp data, I interacted with the data in its original state, on the online platform, reading it for context such as reactions to changes in products pricing, as I did not have written consent from all group members to download it or recapture it into another format. As mentioned before, most participants were aware of my presence in the group as a researcher as the group administrator had introduced me to the participants. For confidentiality purposes, some participants in the Zimbabwean case study preferred pseudonyms so I created unique reference numbers for the files linking the original name to the pseudonyms.

Coding

Interview data

As discussed earlier, the initial data to be collected and therefore analysed was the data for the UK case study, particularly the life story interviews. Analysis of the interview data from Zimbabwe was also through a thematic analysis approach similar to that described for the UK data analysis (section 3.5.2), and ultimately came up with the findings presented later in this thesis.

The process of coding allows for a systematic means of analysis which allows for a stepped interpretation process, thereby helping the researcher to avoid jumping to premature conclusions (Jackson, 2001).

Contextual data analysis

The themes I developed during the interview data analysis, became the lens through which I viewed and analysed the rest of the data I referred to for this study namely observation notes and photographic material, my research diary, and content from WhatsApp groups. I therefore did not

engage processes like visual data analysis for the photographs. Rather, as the subtitle suggests, I used these datasets to understand the context in which the interview data was created. I was also conscious of the different epistemological status of different kinds of data. So, for example, the WhatsApp data were treated as relatively ephemeral data, intended for a specific and temporary audience, while the life history data were collected for documentary purposes, as part of a national archive, recorded for posterity, with unspecified future users in mind.

A note on multiple data sources

From the previous sections, it is apparent that I collected varying data types from multiple data sources in this study. I therefore had to give careful thought to the analysis of these different data types. Main issues to consider were the fact that some of the data was primary data while the rest was secondary data. Some of the secondary data included some quantitative data figures whereas the core of the data was qualitative in nature. On this note, I had to give thought to the long-standing debates on reliability, credibility, weight of qualitative evidence in comparison to quantitative data (Bryman & Burgess, 2002; Mason, 2002b; Miles & Huberman, 1994). For example, laboratory test results from a national project measuring quantities of *Campylobacter* bacteria on retail chicken could be viewed as more credible or of more weight in comparison to a consumer's oral account of a food poisoning incident based on memory. However, the aim of research is to answer questions or solve puzzles with the most accurate data for each situation and the key is to identify the appropriate data type. There are questions that the most accurate of statistics could not answer, for example questions on the rationale behind certain practices by a chicken grower, meanwhile only accurate laboratory tests could verify the efficacy of an intervention on reducing contamination levels on supermarket retail chicken. Validity and credibility can still be checked in both qualitative and quantitative data collection processes, for example through methods of triangulation and repetition respectively. In this particular study, due to the earlier mentioned decision to undertake a qualitative research design, the bulk of the data was thus qualitative data, mainly interview data and observational notes. The quantitative data referred to was mostly in secondary data reports and therefore did not require any computations.

3.7 Reflecting on the Research Process

In this section, I reflect on the research process described in this chapter, particularly discussing the influence I, as the researcher, may have had on the research, as well as acknowledging some limitations of the study.

3.7.1 Analysis approach choices

The process of coding qualitative will always be subjective and different analysts could come up with different codes and themes from the same data sets but the iterative, and step by step nature of interpretation inherent in manual coding can at least help to remove bias and make the qualitative analysis more objective.

There are also data analysis software that can be used for the coding process such as NVivo. I opted for manual coding because for the UK dataset, I needed as much interaction with the transcripts as possible, given that they were secondary data; and for the Zimbabwean dataset, some interviews were conducted in Shona therefore I often had to refer to the original, pre- translation data, in order to stay true to the participants' responses and meanings.

3.7.2 Positionality

My biography and research philosophy probably had some influence on the research process. As mentioned in the Preface, the curiosity to carry out the research was triggered by the food safety concerns of a chicken meat consumer. Therefore, while I was the researcher, I was, and am, also a consumer-existing in the very chickenscapes that I was studying. I also have some chicken growing experience as I have helped to raise chicken in the past. I was therefore aware of scenarios where what I heard or observed related to or contradicted with my own experience or knowledge. On a similar note, I also had to process the emic/etic balance of being a Zimbabwean, but not resident in the country. Some of the questions I presented to the participants were met with confusion or an assumption that I should be aware of the responses. With the UK case, while I was resident in the UK, and a consumer of the potentially bacteria-carrying chicken from UK

supermarkets, I was mostly studying archival data on chicken meat production practices from nearly two decades ago.

3.7.3 Ethical considerations

I received approval for this study after an ethical review conducted under the auspices of the University of Sheffield's Research Ethics Committee (UREC). I also consulted with the Ministry of Agriculture Mechanisation and Irrigation Development in Zimbabwe (MAMID[33]) before I commenced the fieldwork in the country. I have used pseudonyms for my participants to protect their identity. Consistent with principles of informed consent, all interviewed participants were provided with an information sheet (Appendix C) and asked to sign a consent form (Appendix D) to permit the use of any data collected for this research.

3.7.4 Limitations and challenges

Some of the challenges have already been mentioned but in this section, I discuss some specific challenges faced during the fieldwork and data analysis. While the choice to study two significantly different cases had its merits as earlier discussed, the collation and analysis of the data proved more challenging, especially when dealing with the temporally varied datasets. I collected primary data for the Zimbabwean case but relied on archival data for the UK case, supplemented with more recent reports published by the government.

During the actual fieldwork trips in Zimbabwe, the main challenges were in terms of delays and access. During the first phase of fieldwork, the process of receiving permission to conduct research in the country included multiple visits to the MAMID offices, taking up nearly two weeks of the time allocated for the trip. The second phase of fieldwork coincided with a major political event in the country which saw the national army seizing control of the nation before the former president

[33] Following a restructuring of the Zimbabwean government in November 2017, this ministry is now the Ministry of Agriculture

resigned from office. During this period, the country was put under lockdown with any non-essential movement restricted. Prior appointments with participants had to be moved or cancelled. Besides consuming some of the time meant for the fieldwork, this major event also created a tense atmosphere and infused fear which saw some intended participants declining to participate or refusing to be recorded. Zimbabwe has been a nation where mistrust is generally high due to political tensions, and association with a foreign-based researcher could be misconstrued for other activities therefore some interviews and site visits had to be cancelled.

In 2017, the year I carried out my fieldwork, Zimbabwe's largest chicken processor experienced an Avian Influenza outbreak. As a result, visits to the company's premises were restricted as part of their revised biosecurity measures. My intended site visit was therefore cancelled. I was, however, eventually granted audience for an interview with a manager at the company.

3.8 Conclusion

3.8.1 Following the thing' in UK and Zimbabwean chickenscapes

The 'follow the thing' approach discussed in chapter 2 was applied in this study as a methodological approach, following the archival and empirical data to analyse specific chickenscapes. While following the chicken across multiple sites, the decision to combine this with a chickenscapes framework created a flexible explorative tool with enough motion and pause to gain an understanding of not only the physical or infrastructural components but also the socio-cultural elements of chicken meat production and consumption. This flexibility was particularly useful given the complexity of the chicken supply chain as depicted by figure 2.1, as well as the multiple pathways of chicken meat supply that exist in Zimbabwe.

Additionally, by initially working with archival data from the life story interviews before moving on to assessing recent reports in the UK and subsequently collecting empirical data in Zimbabwe, I essentially followed chicken research not only spatially by also temporally, through the decades.

The sequence of the research phases as presented in Figure 3.2 also had many benefits. The earlier access to, and analysis of, the UK data created early insights into the chicken supply chain.

Analysing the interview transcripts also helped me to finalise the fieldwork instruments for the Zimbabwean interviews and observations. As discussed earlier, the results of the thematic analysis of the data revealed three key themes that have implications for safety and supply of chicken meat namely valuation, governance and management of disease. In the following chapters I present and discuss these findings using empirical information from both case studies.

4 Valuation: Value of chicken

"*…what things are worth can be manifold and change—and these values can be conflicting or not, overlapping or not, combine with each other, contradict each other. All, or almost all, depends on the situation of valuation, its purpose, and its means."*

(Claes-Fredrik Helgesson and Fabian Muniesa 2013)

4.1 Introduction

In this chapter, I discuss the value of chicken. In following chicken into various chickenscapes, it became clear that the above-quoted words by Helgesson and Muniesa (2013) rang true for chickens as well. What a chicken is worth; how one derives its value, and why; are all part of a process of value formation, and ultimately have implications for food supply and food safety. As with many other goods, products and even services, there is an inherent valuation process people generally participate in, intentionally or subconsciously, as part of choice making or worth-bargaining. This process can be complex, multi-level, multi- faceted and quite subjective to context, purpose, and expectation, among many factors. In the context of the current study, based on the data from archived life story interviews with actors in the British chicken supply sector, observations made in the chickenscapes of Zimbabwe, and interviews with chicken growers and consumers in Zimbabwe, I argue that various forms of value ascribed to chicken may influence the practice of rearing and handling chicken, decisions on processing, distribution, and (non) consumption of chicken meat. And this has implications for safety. The value of chicken beyond its edibility benefits is also discussed.

In the following sessions, I introduce the practice of valuing (4.2) as a ubiquitous activity that actors in various chickenscapes along the supply chain engage in. In section 4.3 I employ Heuts and Mol's (2013) concept of registers of values to present and explain some of the valuation processes I observed in this study. In section 4.4 I discuss the tensions and trade-off between these

values. I then briefly discuss the value derived from non-meat or by-products of the chicken meat sector (4.5) before concluding the chapter (4.6).

4.2 Practices of valuing

Almost every decision one makes includes a form of valuation, be it of the worth of the object, their level of interest in a product, or even the risk involved in partaking a certain meal. A chicken farmer deciding to use ethnoveterinary treatments only in order to produce "purely organic meat", or a diabetic person choosing to follow a meat free diet may be based on their calculation of the benefits of their choice. According to (Claes-Helgesson and Muniesa (2013), performance of valuations is not only ubiquitous; their outcomes participate in the ordering of society, or in this case, the logic of actions in animal husbandry and meat consumption practices. The determination of what a good choice, or course of action is, is contestable and very subjective but can possibly be explained through considering what Heuts and Mol (2013) called "registers of value" in their study to determine what a good tomato is.

4.3 Registers of value

'Registers of value' is a system of valuing which departs from an economies-based worth-ranking (Boltanski and Thévenot, 2006), and instead uses the shared relevance of a product, based on different perspectives and situation to 'ascribe' value (see Heuts and Mol, 2013). The registers create a space where the relevance of an action, service, or product can be valued using multiple criteria, thereby helping us understand how certain practices are formed and developed /routinised, as well as why certain decisions are made. Unlike the case of a ranking system which would, on a gradient, list "best practice" or "most worthy outcome or product", with registers of value, value is ascribed in multiple ways. On one hand, this creates a less restrictive 'criteria' of valuing which may be seen as more relevant to the situation or the persons involved but on the other hand, in interactive situations, as most chickenscapes are, there can be a conflict or tensions between registers of value.

In their tomato study, Heuts and Mol (2013), identify a monetary register, naturalness register, a handling register, or a register of valuing based on historical time where the goodness of the tomato

is associated with a past experience. Their fifth register of value is the sensory register whereby goodness is based on the tomato's appeal to the senses like taste or sight. They discuss how in determining the "goodness" of a tomato, multiple registers of value can affect a grower or a consumer's decision. The values of naturalness (organic tomatoes being more natural and better) and taste (sweet tasting tomatoes being desired) clash when it is revealed that adding the element potassium to growing tomato plants increases their sweetness but immediately disqualifies them from being labelled as "organic" produce. This scenario presents a situation where the tomato cannot be labelled as "bad" in either state as it satisfies the expectation of at least one register of value. More examples include the value of taste versus cost, where their respondents would describe a certain tomato variety as tastier than most, yet they would not necessarily purchase it because it cost much more than other varieties.

In the rest of this chapter, I present, with examples, the registers of value that came through in my search of the material on chicken. These were determined by sifting through the available data and identifying themes that inferred some performance of valuation. The registers are multiple and tended to vary from one chickenscape to the other, as well as depending on whether it was a grower, a processor, or a so-called consumer performing the valuing. The registers of value discussed in this chapter are the Monetary register; Sensory register based on sensory cues such as taste or visual appearances; the Health register; a Standards based register; the Convenience register; and the Socio-cultural register. I present the implications of each register on chicken production and consumption practices. The potential combinations and/or conflicts between registers of value are also discussed.

4.3.1 The Monetary Register

The monetary register is probably the most obvious register of value as it has to do with monetary costs. This register is widely shared across actors and scenarios within chickenscapes as most transactional activity has a monetary component to it. 99% of the chicken growers I interviewed for this study said they were doing it for financial reasons - as a main business or as an income generating side project, next to their formal employment. Even the few who claimed they had started it as a hobby or pastime activity were quick to mention how they immediately enjoyed the

"benefit of not having to pay for (chicken) meat from a butchery" (e.g., Mrs Tsamba- a small scale backyard grower). At the time of the interview, she was also selling off the extra chicken that her family did not consume. She did this mostly to "recover the operational costs" such as feed purchases. With production costs typically classified under fixed costs, and variable costs, the backyard growers rarely logged in expenses associated with labour or construction and maintenance of the chicken housing. The most common costs they considered were in terms of purchase of day-old chicks, vaccines and feeds i.e., typical direct costs. Non-direct costs such as water and energy (for lighting or consumed by the deep freezers used to store the slaughtered birds at the end of a growing cycle), which were typically non-separable from the usage within the rest of the household, were rarely accounted for. One wonders if inclusion of such costs, as well as labour hours, would have seen a successful revision of final price that the chickens were sold for. At the time of the study, a full chicken, generally weighing 1,5 – 2,5 kg, was being sold for about 6-7 US dollars among backyard growers.

Based on my observations in the field, accounting or bookkeeping records tended to become more extensive as the size of operation increased especially wherever the chicken growing practice was an official business venture. Mr and Mrs Chivaura, medium scale chicken growers in Harare, had records of all costs, dating back to the expenses incurred in the construction of their three chicken houses in 2010. Mr Chivaura explained that this record keeping was particularly essential since they had obtained a bank loan to begin the chicken business and had to account for money spent. This accounting system apparently helped them to decide a profitable value of their chickens when they got a contract to supply a local supermarket chain with chicken meat. Mrs Chivaura weighed the daily feeds given to the chickens and recorded them so as to determine an optimal feeding schedule and allocation. Her explanation was, "every ounce of feed is money! If the chickens have reached their daily requirement, any extra feed offered is money wasted. The help don't understand that so I write it down for them" (Mrs Chivaura, medium scale chicken grower).

Interestingly, these variations in costing, and in growing pathways between the different scale growers, also reflected in the cost of a chicken at the end of the production line. In theory, two chicks, hatched in the same batch at Irvine's but separated at the day-old chick purchase point, can

potentially be sold off at different cost when they are 6 weeks old, depending on where and how each was raised. Conversely, this potential final retail price can influence the investment that the grower puts into the raising of the chicken, in terms of resources, energy and time.

The monetary worth of chicken tends to be calculated differently by a consumer. And even among consumers, the valuation systems may differ. When offered the choice between buying a live chicken and a dressed one, as is often possible when purchasing from a local backyard grower, one customer mentioned that she always buys the live chicken so that she can get "full value for every cent" (Mai Tino, a stay-at-home mother of two). By this, she meant she would also get the chicken head, offal, and legs which most backyard growers tend to retain when they sell off dressed chickens. In this sense, Mai Tino did not regard a dressed chicken as a "full chicken", even though the growers sell them at the same price. Interestingly, the offal and chicken feet are often sold separately, by the chicken growers, or in some instances, offered as "payment" to the people hired to slaughter and dress the chickens. Ironically, there are other consumers who do not consider the offal and chicken feet or head as edible, and when they are faced with processing a live chicken on their own, they discard these parts with the rest of the "waste" such as feathers. Thus, a pack of chicken feet and livers can go from being valuable meat to Mai Tino, to assuming a monetary worth as payment for a casual labourer, or downright waste, depending on who is in possession of them. Even something as seemingly objective as monetary value can be subjective and even determine how chicken and chicken meat is handled. Many sustainable eating advocacy groups with a 'nose to tail'[34] eating philosophy would probably applaud Mai Tino's stance of consuming every edible piece of the chicken but the notion of what is edible will vary from place to place.

[34] Nose to tail eating essentially means consuming many different parts of an animal, so that it does not go to waste. This became popular in the Global North due to a book by Fergus Henderson that deals with how to cook every part of a pig, including parts rarely used in American cuisine, such as offal (see Henderson and Bourdain, 2004))

Most of my British and European colleagues cannot imagine eating chicken feet or, worse, the intestines. To them, chicken meat equals breast fillet, drumsticks, chicken thighs and the occasional wings. Chicken breast fillet is the highest priced cut of chicken meat in the UK today[35] going for about £5.25 per kg in Tesco, and Mark Shippey described how the chicken breast was quite popular. Discussions with consumers in Zimbabwe revealed that they would more readily pay more for a pack of chicken thighs

4.3.2 Sensory-based valuing

Closely linked to the monetary register is the sensory register. This register refers to the value ascribed based on the senses, for example the visual appearance of chicken, or the taste or the smell of chicken meat. Retailers are aware of the impact of visual appeal in marketing products. The packaging of products is typically designed to ensure that the product shines through and sells itself. A former Marks and Spencer food technologist described how described how chicken cuts were packed trays with a see-through plastic covering on top and,

> "because you could see the products, it was more the visual appearance of the products themselves that sold them, and they just looked fantastic and different, rather than it being the packaging itself that sold the products."
>
> (Mark Shippey, 2003, then Marks and Spencer food technologist)[36]

A bigger looking bird is usually associated with more meat which, from a pricing point of view, is a positive thing. Most backyard growers interviewed in Zimbabwe, shared that the biggest looking birds always got picked first by consumers and generally, their flock sold faster when their

[35] Prices as of November 2020

[36] Interviewed in 2003 by Dr Polly Russell for the British Library's NLS project

birds looked bigger than their competitor's. One grower, Mrs Nhowe, confessed to supplying extra feed to her batches in the final week to get bigger six-week-old birds.

In the same vein of 'tweaking' feeds, Mrs Masoko, a 69-year-old retired teacher and backyard chicken grower, shared her secret of how she introduces maize corn to her broiler chickens towards the end of their six-week cycle. The maize allegedly gives the meat a yellowish look which is apparently more appealing than the typical pale look of broiler chicken meat. More important however, is the alleged improvement in the taste of the meat due to the corn diet. "My clients keep returning to buy more meat saying my chickens taste better than most other people's chickens and I have realised it's due to the maize corn I feed them on. I never struggle to sell out a batch" (Mrs Masoko). Ironically, "yellow chicken, that would put me off completely I think" were the words uttered by a UK based chicken grower, Audrey Kley (interviewed in 2003), as she described how a neighbouring farmer fed his chickens with yellow corn, resulting in yellow looking chicken meat. Her negative association with yellow meat, and thus a huge factor in her valuation process, went back to her childhood where old cows, post-reproductive years, were slaughtered and their extremely fatty meat sold in butcheries. That fat was yellow! However, Mrs Kley's neighbour was successfully selling his yellow chicken meat at about £2 per pound of meat to other willing buyers.

Chicken meat is the UK's most popular meat protein source, but there are numerous retailers competing for the same customers. A food merchandiser at Marks and Spencer described how his company invested in producing a tastier, meatier chicken, Oakham chicken, which they sold fresh, at a time when frozen chicken was the norm. (Andrew Mackenzie, former Food Merchandiser at Marks and Spencer, interviewed in 2004). The allegedly tastier Oakham chicken is priced at a higher cost than other chicken.

The sensory register can however have a negative influence in valuing of chicken as many respondents in Zimbabwe recounted the large imported chicken that flooded the market 2008. The initial reaction by consumers was to ignore locally produced chicken meat and choose these imports which were not only bigger, but also cheaper, than the local produce. However, the popularity soon faded due to the reportedly bland taste of the huge chicken as well as some

consumer concerns about the "naturalness" of these rather atypically huge birds. Consumers also complained about the shrinkage in size observed once the birds were cooked. A study by Mudzonga (2009), revealed a 35% shrinkage which was later attributed to the high brine content in the birds for the sake of preservation. Locally grown chickens would typically shrink by just 10%. The terms 'unnatural' and 'GMO' (genetically modified organism), which most participants still do not fully understand, started to be used in reference to the imported chickens and their popularity faded. This talk of GMOs and naturalness brings me to the third register of value I call the health register.

4.3.3 Health Register

This register of value considers people's perceptions of what is healthy and how that affects their valuing of chicken and chicken meat. Studies have suggested that white meat, such as chicken meat, is a healthier source of protein compared to red meat like beef (Almeida et al. 2006). This however does not translate to consumers paying more for the healthier option as chicken meat tends to be cheaper per kilogram than beef, both in Zimbabwe and in the UK. When the large sized imported chickens from Brazil and South Africa flooded the Zimbabwean market around 2008, their initial size-based popularity was thwarted by the rhetoric of what my respondents generally referred to as unnatural, growth hormone filled GMOs which could make one sick over time. The allegations were that these large birds retained some of the hormones, and chemicals used to grow them in their system and consumption of such meat would transfer the hormones to the human body, and cause illness over time. The use GM crops like maize for animal feed is common in many parts of the world, including in South Africa, but the Zimbabwean government's ban on imports of GM maize almost fuels the public rhetoric and 'unfounded' claims about the dangerous GMOs. A temporary ban on GM fed chicken imports by the Zimbabwean government in 2009, which ironically was due to an Avian Influenza outbreak and had nothing to do with the GM feeds, fed into the public's belief that their earlier GMO related health suspicions were true despite no scientific evidence. This shift from a size-based valuing system to a health based one, with so-called natural chicken being labelled as healthier and better, also saw a willingness by many consumers to pay more for smaller, locally grown broilers. However, one could question how

naturalness is determined since in this example, a locally (Zimbabwean) produced broiler chicken was considered natural, relative to the larger looking, imported broilers.

In some circles, the term natural was used interchangeably with organic, which meant further exclusivity to only birds that had been raised in a chemical free environment, especially in terms pest or disease treatment. This saw a rise in popularity of the indigenous breeds of chicken, commonly termed "road runners" in Zimbabwe around the year 2005. These are breeds that are typically grown, in the rural parts of the country, in a non-commercial way, such that all processes of reproduction, egg incubation, hatchery, and even care of the chicks, are left to the chickens themselves. No commercial feeds are introduced, as the chickens scavenge for their own food, mostly stray grains, special weeds, and worms or insects. The owner may throw the occasional kitchen waste at the birds and usually just ensures they have some water source, and safe housing to sleep in, secure from predators like snakes, foxes, or thieves. By virtue of their lifestyle, these chickens fit the earlier mentioned definition of organic chicken so well that they are regarded as 'healthier chicken', healthier than the aforementioned 'natural' local broiler. For this reason, and perhaps as some may argue, for its tastier meat, a road runner chicken costs 50% more than a broiler chicken.

Growing demand for this type of chicken has seen some commercialised breeding and growing of the organic road runner. Mr and Mrs Chivaura, a couple who currently own at least 2000 road runners, grew their flock from some twenty-five 'road runners' they bought from their extended family living in rural parts of the country. By using an electric incubator and hatchery system, they have managed to increase their flock. They occasionally buy new cocks to avoid incestuous breeding among cocks and hens from potentially same parentage. These birds are allowed to roam freely, within the fenced outdoor area around their housing, in search for insects and food, for most of the day. Unlike their rural counterparts however, these commercialised road runners are supplied with scheduled feeds, store bought, or home made, typically comprising grains, seed and some protein source such as soya bean meal or fish meal. The Chivauras, as well as most other commercial road runner chicken growers, use vaccines and other chemicals to prevent and treat diseases amongst their flock. These practices are a huge departure from the way the traditional

road runner in a rural home is raised thus one could question whether the commercially grown road runners still meet the calibre of 'natural' or 'organic' typically associated with their breed. Does one method of animal husbandry produce a more valuable product than the other?

The standards register

A standard can be defined as a measure of 'goodness', based on set of ideals or expectations of what is good. Measuring a product or process against this standard or solidifying this set of ideals as an indication of the good product or the correct process of producing a product involves the process of *standardisation*. *The standard* is then a good/product, or process that meets the agreed standard, and can be used as the example of what is good.

The categorisation of food, chicken meat and chicken products in this case, according to how they were produced has become a marketing tool, especially in the global North. "Organic", "free range", "grain fed", are some of the terms used in reference to chicken, as standards become part of the valuing practice of some consumers. In some countries, there are clear guidelines on what is regarded as organic and there are often certification processes to 'guarantee' that produce meets the stipulated standard. These standards present another layer of valuing chicken. The standards register is often a marketing tool as they can impact pricing. In a recording of her interview, Audrey Kley[37], a commercial broiler chicken grower, mentioned how "…a certain number of housewives have got the sort of money to pay £1.50 a pound for a chicken" simply because it was marketed as organic chicken. The general price for chicken was much less than that at the time. However, Audrey also shared a story of how a local 'organic' farmer would sometimes approach her and buy her (ordinarily raised broiler) chickens, then sell them off at the local market as organic chicken. This sort of valuing system was flawed as there was no verification process about claims on products. There were however other standards which required an extensive verification procedure

[37] Interviewed in 2003 by Polly Russell for the BLNLS project

before a product could be accredited as Audrey described in her account of the numerous requirements they had to fulfil for her chicken farm to acquire a "Farm Assured[38]" status. I go into detail on these in chapter 5. A chicken from a farm assured grower appears to acquire a certain value, whose currency could be described as traceability and trust, as evidenced by how certain chicken processors, and even supermarkets only accept farm assured produce. The monetary value of a farm assured status is however not directly evident and may perhaps be only realised through the popularity of the product relative to that of competing products from non – 'farm assured' producers. Most 'farm assured' produce can be identified by a 'Red tractor[39]' label which is a logo from "the UK's biggest farm and food standards scheme" (Red Tractor website, 2018).

In Zimbabwe, consumers did not necessarily look for labels of certification or standardisation, but one consumer expressed her dislike for backyard grown chickens because of the flies she sees at her local backyard grower's home: "Tell me how they can keep all those flies away from the meat when they slaughter the chicken!" (Runyararo, 22-year-old newlywed housewife). Runyararo explained that she instead asks her husband to buy their chicken from the supermarket, on his way from work, because it is clean and packaged. The implication was that food sold in supermarkets is of a better standard in terms of cleanliness. Most of the supermarket chickens are frozen dressed chickens, or chicken pieces, neatly packed in sealed plastic packaging. The labels, Irvine's, Drummond, or Surrey Huku on the packaging denote which producer the chickens are from. I have visited some of these processing centres and indeed, flies were restricted to the landing rooms

[38] Farm assurance is quality control program where agricultural products are certified as having been produced in accordance with stipulated regulations for food safety, animal welfare, and environmental safety.

[39] The Red tractor was established in the year 2000 as a no for profit organisation run by the food industry "to ensure food comes from a trustworthy and safe source" based on regular standards checks by independent experts. https://assurance.redtractor.org.uk/who-we-are

where live chickens were off loaded from trucks. I did not see a single fly in the processing areas, but I would not rush to conclude that chickens processed in backyards are necessarily ‘‘less clean” based on that observation alone. Nevertheless, for some consumers, the remoteness of the commercial processing plants, thereby allowing them to replace the fly infested environment they see at the backyard grower’s place, with an imagined clean and sanitised industrial processing environment, justifies buying a frozen supermarket chicken, some frozen for over a month, over buying a freshly slaughtered and dressed chicken from the local backyard grower.

4.3.4 Convenience registers of value

The convenience registers of value address how chicken meat growers and producers decide that this practice is worth their time as well as how consumers may arrive at a decision to buy or eat chicken meat, against a sea of other protein sources, due to mere convenience. Jackson and Veihoff (2016) present a detailed systematic review of convenience food. A number of the backyard chicken growers I interviewed, do not have much land for agricultural activities yet they are able to grow an average of 75 chickens for their business and own consumption. For those growing broiler chickens, the time between bringing home day old chicks and selling a fully-grown bird is just weeks. This relatively low space requirement and short lifespan make (broiler) chicken a rather convenient choice for an urban backyard grower. The simplicity of processing a chicken, in some cases a quick three-minute job as I witnessed at one of my participants’ homes, also make it a worthwhile venture especially in the case of her clients who would request freshly dressed chicken. As for the general consumer, the convenience of a dressed chicken, although frozen as is typical in the sale of dressed chicken in Zimbabwe, may outweigh the value of extra pieces one would get if they bought a live chicken and slaughtered it themselves. Even economically, given the current cash crises in the country, the convenience of being able to use a bank card to pay for purchases in supermarket, albeit getting frozen chicken, may outweigh the value of having fresh chicken from a backyard grower who only accepts cash payments.

In UK supermarkets, the growing range of marinated-chicken, or stuffed oven-ready whole chickens, available in supermarkets and butcheries make it a convenient meat choice. In the current atmosphere where there is much anxiety about foodborne illnesses and risks of cross contamination

with *Campylobacter* from handling raw chicken meat, the convenience of buying ready cut chicken blocks ready for the wok, or pre-marinated chicken wings or skewers, ready for the barbeque, may see less people refraining from eating chicken as the contact with raw chicken is limited. Another example is Marks and Spencer's chicken Kiev, one of the retailer's first recipe dishes, in a collection of ready- to- cook packed meals. Its availability made it convenient for consumers to enjoy a relatively complex dish without the need for skill nor time to prepare it from scratch. The popularity of the chicken Kiev led to the development of a whole department of recipe dishes. Mark Shippey, a former Marks and Spencer's food technologist who was part of this development also concluded that chicken meat was a conveniently versatile protein by saying,

> "it probably is the easiest one or the most adaptable because you can use it in lots and lots of different products and sauces, you know, where it works very well, whether it's in Chinese food, Indian food, Italian food, you know, or sort of British food or classic French cuisine. It's probably the most adaptable out of all the proteins."

(Mark Shippey, a former Marks and Spencer's food technologist, 2004)[40]

This versatility of chicken makes it popular across cultures, and social classes, but the value of chicken in these various spaces sometimes varies.

4.3.5 Socio-cultural registers

In Zimbabwe, chicken meat, though one of the cheapest meat protein sources, remains the meat of honour and celebration. When I was growing up in the country, each time grandparents visited our home, despite having a freezer full of beef, fish and even chicken meat, my mother would send me to buy a live chicken from a neighbouring backyard chicken grower. This live chicken would then be presented to our esteemed guests as a welcoming gift and later on become part of the main course at dinner. My grandmother would do the same for us when we visited her home in the rural

[40] Interviewed by Dr Polly Russell

part of the country, except hers would be the 'tasty road runner' and not the broiler chicken we had access to in the city. This custom was common practice, and to depart from it implied a disrespect for one's important guest. The chicken was then the ultimate symbol of welcoming. Today, as my parents' generation are now the more and more becoming the family heads, there seems to be less fanfare about wielding a live chicken in one's living room for guests but rest assured, the main course remains a chicken dish. Weddings and parties are some of backyard chicken growers' favourite occasions as they can bring orders of 50 plus chickens in one purchase. It is also not surprising to find empty cooling displays and freezers in supermarkets' poultry aisles around Easter or on Christmas Eve, as chicken remains the meat of choice for parties. This symbolic, somewhat superior, status of chicken meat may explain the popularity of chicken growing as a business, and the high consumption levels of the meat in Zimbabwe. It may also explain why every new bride in my grandmother's generation was encouraged to have her own flock especially those living in the rural areas. While men owned and raised cattle, chicken were women's domain and a wife who failed to keep any road runners was seen lazy, after all, these are low maintenance, chickens that scavenge for their own food and only need shelter and protection from predators. The value of a healthy sizeable flock of road runners milling around one's courtyards was thus more than meat or eggs. It symbolised a resourceful housewife[41]. Some of the backyard growers I interviewed could be seen as the urban version of that resourceful housewife as their chicken businesses separate them from "those housewives who spend the whole day doing nothing" (Mrs Masoko, a chicken grower).

At the other end of the spectrum, there may be people who do not view chickens as meat, for example people following vegetarian or vegan diets. In some parts of the world, there is an almost an anthropomorphising of animals in a way that then challenges the consumption of animal

[41] This notion of 'judging' housewives' competence based on their 'interaction with chicken' interestingly came through in the comments of Audrey Kley, the British chicken grower. See further discussion in the chapter on Food Safety.

products, as well as the way chickens are sometimes raised in practice. When one values a chicken as a pet, or as a sentient being with feelings and rights, they tend to raise it in a different manner compared to a scenario where animals are seen as food. Growers' considerations for animal welfare are a major topic of concern. Debates on animal welfare tend to raise questions on the effect of welfare on the animal's productivity, quality of the meat and even health of both the animal and the consumers at the end of the supply chain. What then is the measure of a 'happy animal"? Are "happy animals", healthier animals; ensuring safer food for the consumer?[42] Miele (2011b) critics the commercialisation of 'animal-emotion-rated animal welfare' by marketers as it may lead to a neglect of other, potentially more important and measurable standards of welfare. Quite common is the association of animals' sense of freedom, as accorded by a free-range chicken operation, with their better welfare and health and there are indeed studies acknowledging that birds might get a better chance of good welfare in outdoor systems (Fraser, 2008). However, companies like Marks and Spencer who, according to their former food technologist, Mark Shippey, claim that they have always ensured that they source their chicken and other agricultural produce from farmers with good practice, also use chicken meat from intensive indoor farms. Thus, despite the having the same ideal, namely good animal welfare, the value ascribed to a chicken i.e., food animal, or pet, will affect what is considered good growing practices.

4.4 Relations, tensions and trade-offs

Multiple registers have been presented as contributing to the performance of valuing but at the end of the day, a decision is made. This section discusses how the various registers relate with each other. Such relations could mean a combination of registers leading to a relatively easy decision or conversely, a scenario where tensions exist between registers thus making a choice becomes a complex process. In their tomato study, Heuts and Mol (2013) found that the most tension exists

[42] The study by Miele (2011) addresses the debate on animal welfare and determination and measurement of its impact on animal and human health

between monetary and sensory valuing. For a Zimbabwean chicken grower, producing the tastiest meat would mean raising road runners in large piece of land where they can get enough exercise to firm up their muscles, whilst feeding them a special diet comprising mainly insects and worms plus various grains over a longer time span than the five to six months that is currently the norm. Such a business model would be too costly for the farmer in terms of land costs, cost of special feeds and delayed return on investment due to a lengthened batch cycle. Current prices for 'road runners' average USD10 per 1.5kilogram bird. In order to make any profit, this price would have to be higher. It is highly unlikely that majority of Zimbabwean consumers would be willing, let alone afford, to pay more than that for a chicken, regardless of how much tastier it may be. Thus commercial 'road runner' chicken growers constantly have to make a compromise between sensory value (exceptionally tasty meat) and monetary register (cost of production).

The monetary registers also often clash with the convenience register of value. Buying enough ready-to-cook Cordon Bleu from Marks and Spencer to feed a family of five costs more than making it at home but the convenience of having a meal ready in 25 minutes, no cutting or cooking skills required, may suit some consumers better. On the other hand, the convenience of dressed chicken purchase from a grower or a supermarket, instead of having to slaughter and process it herself, is not enough to justify the loss of extra chicken pieces (feet, offal, head) to Mai Tino. However, the skillset required to slaughter and process a live chicken into ready-for-the-pot meat is not necessarily possessed by all consumers thus the choice of a conveniently dressed chicken becomes almost inevitable.

Whether a farmer opts for a strictly ethnoveterinary approach to disease prevention and management within their flock, e.g., use of natural plants and remedies like aloe-vera, or ginger and garlic to cure any ailing birds, or they opt for the scientific medicines, is a consideration to be made against the focus on organic produce, or health registers. Efficacy of some of the ethnoveterinary remedies is not guaranteed thus there is a higher risk of spread of disease or loss of stock. However, successful avoidance of commercial medicines and restricted use of vaccines could yield the certifiably organic chicken produce.

The standards register also tends to 'clash' with the monetary register as 'certified products' often cost more than their competitors. A Red Tractor logo is typically seen on British grown chicken, which is an extra 'standard' that some consumers use to determine their purchases. Unfortunately, production costs tend to be higher in the UK compared to Brazil or Thailand where feeds and labour are more affordable. As a result, some consumers who may want to consume 'British chicken' or meals made with British meat ingredients are faced with the consideration of whether their product of choice is worth the extra £1 or 2.

In some instances, however, registers of value can combine in a non-opposing manner. For example, a focus on raising 'healthy' organic chicken, e.g., the traditional 'road runner' is often associated with tastier chicken meat than the allegedly bland taste of non-organic broilers thus the health and sensory registers of value satisfied on one product.

4.5 Value beyond the Chicken meat

Granted, the most valuable part of the chicken, to meat consumers at least, is the meat itself but there is much more value that can be realised from a chicken. Eggs are probably the most popular 'output' from chicken, after the meat. Nutritional benefits of consuming eggs are well documented, from helping to ensure increased birth weights, to encouraging muscle creation, due to their easy to digest, nutrient dense high-quality protein as well as vitamin and other essential nutrient content (Iannotti et al. 2014). The relative ease of production of eggs as well as their affordability compared to other food sources make them a valuable food source especially in poor communities. Commercially, eggs are increasing becoming a valuable source of income for suppliers. Mr Terera, one of the medium scale chicken growers I interviewed shared that his goal for his growing flock of chickens was to gradually move from chicken meat supply to becoming a commercial supplier of fertilised indigenous breed/road runner eggs. This is a slowly growing sector of the Zimbabwean chicken supply chain as incubator technology is growing and spreading in the big cities. This is a shift from the typical scenario 15 years ago when Irvine's Zimbabwe, the country's biggest chicken producing company, was the only commercial source of day-old chicks.

Beyond the edible benefits, chicken has other valuable by-products. Perhaps most obvious is the manure created from chicken droppings and the bedding used in chicken houses. Most of the backyard growers I interviewed either used the manure in their gardens or gave it to neighbours and friends. One grower, Mr Gatsi, sold his manure and explained that the proceeds from such sales covered the cost of the saw dust he used as bedding in the chicken houses. There may be health risks involved in use of chicken waste as vegetable manure, but these will be discussed in the chapter on Disease and Biosecurity. On a greater scale, growers like Audrey Kley, with at least fifty thousand chickens at any given time, would pass on their manure to maize farmers who used it as a fertiliser. Chicken manure also gives some of the highest yields when making biochar due to its high carbonization at low temperatures (Cely et al., 2015).

Other by-products of chicken include chicken waste meal[43], which can be used as fish food in aquaculture (Nandakumar et al., 2013). One farmer in Zimbabwe showcased an integrated system in which he fed chicken droppings into a fishpond to provide nutrition for his fish and in turn used water from the ponds to fertilise the fields that produced grain for use as chicken feed. Again, the health implications of such a system will be discussed in the chapter on diseases. Even the feathers from the chickens are allegedly useful as stuffing for mattresses and cushions, according to an employee at Surrey Huku, a large chicken processor in Zimbabwe. Some of the chicken feathers from their processing plant are collected by a mattress making company (Mr Nyashanu, Surrey Huku employee).

4.6 Conclusion

This discussion on the value of chicken emphasises, as stated in the quote at the beginning of this chapter by Helgesson and Muniesa (2013), how value is not a fixed factor but rather varies and is constantly being 'recalculated' depending on the individual or circumstances. The registers of

[43] Chicken waste meal (CWM) is the dry, ground, rendered clean part of chicken carcass, with some meat with trimmed fat.(Nandakumar et al. 2013)

value approach sheds light on how and why the performance of said calculations occur, and how a value may be arrived at. The various examples and scenarios presented may partially explain some practices within chickenscapes based on the value ascribed to chicken in different spaces. Such an understanding is invaluable in multiple circumstances. For example, marketing strategies of chicken and chicken products may be improved by an awareness of the value that the targeted consumer ascribes to the product. In an age where food security and food safety have become key matters of concern globally, this presentation of value, beyond a monetary sense, may present opportunities for revisiting chicken meat production and consumption practices and choices. Planning of interventions for food supply, or awareness-building for control of food-borne bacteria like *Campylobacter* certainly takes a new form when one considers the dual role of chicken intestines as food, or waste, depending on the consumer, for example. The application of the registers of value concept, from Heuts and Mol (2013), in this study, may also contribute to the growing literature on valuation studies.

5 Governance, Standards and Safety in chicken supply

5.1 Introduction

In this chapter, I introduce the concept of food governance and regulation, and discuss how this informs some of the practices in the chicken meat supply spaces of the UK and Zimbabwe. I begin by introducing definitions of food governance from literature as well as a brief discussion on the evolution of governance of food. I then introduce an overview of the food regulatory landscape in the UK and Zimbabwe, particularly focussing on meat production and supply. According to Delaney et al (2018) "Governance sets the rules by which resources and systems are managed". These rules often take the form of standards. Using empirical evidence from the case studies, I discuss the challenges, and benefits of standards in various chicken-scapes before concluding the chapter in section 5.5.

5.2 Evolution of food governance and regulation

Food governance is defined by Candel as the "formal and informal interactions across scales between public and/or private entities ultimately aiming at the realization of food availability, food access, and food utilization, and their stability over time" (Candel, 2014, p. 598). Whilst it was largely led by national government actors, recent developments have seen a "multitude and diversity of private actors and international organisations" (Havinga et al., 2015). This shift in the institutions and practices has typically been from a *national* and *public* (state) form of governance to a more *international* one with increased *private* actors resulting in a *hybridised food governance* system (Havinga & Verbruggen, 2017). Some of the factors contributing to these changes include i) Globalization of agri-food systems; ii) Scientific advances and developments; and iii) Public concern about food.

5.2.1 Globalization of agri-food systems

Globalization has seen food products, both fresh and processed, being produced in one country and consumed in another country or continent. From papaya fruit travelling from Jamaica to the UK (Cook 2004), South American grown tomatoes finding their way to the USA (Barndt, 2007),

French beans exported from Kenya to the UK, to Thailand farmed broiler chicken meat making its way into a tikka masala ready meal in a British supermarket (Freidberg 2004) these foods travel beyond national boundaries and may be subject to multi-state regulation such as the EurepGAP and Global-GAP schemes (discussed below).

5.2.2 Scientific advances and developments

Continual developments and advances in science bring new knowledge about food production, processing, preservation, packaging, transportation, preparation and storage, all of which can necessitate the need for new regulation to oversee the new developments. The preservation of chicken meat was at some point in the mid 1950s achieved through acronisation, a process whereby whole chickens were dipped in water baths with the antibiotic chlortetracycline (Barnes, 1994; McKenna, 2017) but present-day preservation techniques include chlorinated water baths, chilling and radiation. Advances in science may also include improved techniques and equipment, which enable better or easier detection of microorganisms thus raising more considerations for food safety.

5.2.3 Public concern about food

The public's concerns about food are broad and ever changing, and can be a driver for changes in food regulation. Food safety concern is influenced by multiple factors e.g., disease outbreaks such as the Bovine Spongiform Encephalopathy (BSE) crises in the UK (Hinchliffe, 2001; Millstone & Van Zwanenberg, 2005), bacterial contamination risks such as *Campylobacter* and salmonella in chicken (Wilson, 2002). Other concerns may develop from trust and transparency issues triggered by food scandals. The horsemeat scandal of 2013 for instance, generated widespread consumer worries about food adulteration and the credibility of suppliers (Havinga et al., 2015). Concerns about food may also be influenced by behavioural changes e.g., shifts towards an assumedly healthier organic or vegan diets (Mylan, 2018), may see the introduction of regulation to oversee authenticity of the products.

As these potential drivers for shifts in food governance are multiple and wide ranging, food regulation offered by the state might fail to address them all thus the need for the complimentary,

or even substitute, governance systems from non-governmental, international and /or private entities. This plurality of entities has resulted in a new *regulatory landscape* (Havinga 2015). In the following section, I present an overview of such for my two case studies particularly, for chicken meat.

5.3 Overview of the UK and Zimbabwean food governance/ regulatory landscape

5.3.1 Case of the UK

Standards and safety management systems in the UK chicken meat and food industry in general are a major interest for many groups. Figure 5.1 below shows different parties with an interest in ensuring safe food production and provision for the nation.

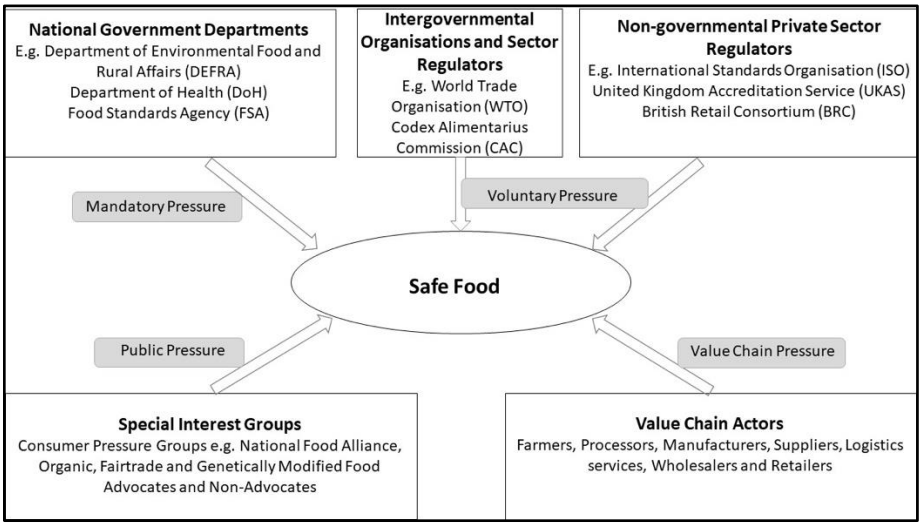

Figure 5.1 Major stakeholders in the UK food safety management system (Adapted from Mensah and Julien (2011))

National Government Departments

The UK government provides regulations and acts to guide the production and supply of safe food. Such regulations are presented and enforced by national government departments such as the Department for Environment, Food and Rural Affairs (Defra), the Department of Health, and the Food Standards Agency (FSA). In the case of chicken meat production, Defra publishes

regulations on poultry rearing standards as well as animal health requirements to be fulfilled by chicken farmers and breeders. These regulations include registration of all animal rearing activities, with the Animal and Plant Health Agency (APHA), even on a domestic scale, once the chickens or other livestock exceed a stipulated number (50). They also provide definitions of what counts as free-range and issue warnings of animal disease outbreaks such as avian influenza as well as advice on vaccination schedules. Compliance with the regulations stipulated by Defra is mandatory.

The FSA also provides regulations that meat processors and retailers are expected to follow in the meat supply chain. Prior to Brexit, the Agency was responsible for enforcing rules set by the European Parliament in Brussels, which in the case of most food business organisations, are policed via food hygiene and food standards inspections carried out by environmental inspection officers employed at local authority level[44]. FSA's own inspectors conduct the inspections at meat establishments. Failure to comply with such regulations is an offence that may see the perpetrators being fined or losing their license to operate. One of the UK's largest producers of chicken meat, 2 Sisters Food Group, was at the receiving end of a special inquiry by the FSA in 2018, after an investigation by undercover journalists from the Guardian and ITV News revealed gross violations of food safety standards in a 2 Sisters Food Group plant in West Bromwich. Alleged violations, revealed via video footage and employee interviews from the undercover investigation, included falsifying slaughter dates of chickens possibly with the intention of extending the meat's shelf life, mixing of supermarket returned/ rejected meat pieces with fresh meat for repackaging, and potentially false claims on packaging regarding the source of meat (the Guardian, 2018). The FSA inquiry found "several process weaknesses and regulatory failures" in one of the 2Sisters Food

[44] See Food Standards Agency: Innovation and Regulation. Accessed at https://www.food.gov.uk/sites/default/files/fsainnovationinregulation.pdf

Group processing plants but also indicated that the company was cooperating with the FSA advice to improve food safety measures in the plants (Parliamentary report, 2018).

Intergovernmental Regulators

There are also food safety regulators setting and enforcing food safety standards on an international and intergovernmental platform. These include the World Trade Organisation (WTO) whose primary purpose is to ensure beneficial trade amongst nations through the observation of commonly agreed trade rules. Such trade rules include guidelines of ensuring safe food trade. Another major regulator for safe food trade is the Codex Alimentarius Commission (CAC), a Food Standards Programme "established by FAO and WHO to protect consumer health and promote fair practices in food trade" (Codex Alimentarius, 2019). CAC provides *Codex standards,* which are guidelines to ensure food safety and quality for trade. These standards are co-signed by the 188 CAC member states among which are the UK and Zimbabwe. WTO and other trade organisations make use of Codex food safety standards to settle trade agreements between nations. Membership to WTO or Codex Alimentarius is voluntary but almost inescapable in modern day global food trade transactions.

Non-governmental Private Sector regulators

An additional set of voluntary food safety standards that has emerged and become a significant part of the UK's food sector is that of private sector and third-party accreditations and certifications. Examples include the British Retail Consortium (BRC) global food standard, which was established in 1998, or the more international ISO standards from the International Organisation for Standards. Most of these were established to develop uniform guidelines or standards of food safety for and by the business sector and are therefore voluntary. The basis of most of the stipulations in these standards is the Hazard Analysis and Critical Control Point (HACCP) system, which is an internationally acknowledged procedure for food safety management (Mensah & Julien, 2011). Henson and Humphrey (2009) argue that private standards develop as industry's way of mapping out clear instructions for ensuring compliance to the public, national and international standards. The drive for these voluntary standards is often from the

actors in the food production sector's efforts to define standards of good practice that can ensure production of good quality and safe food. A key example of this is the GlobalG.A.P, formerly known as EurepGAP, which was formed when British retailers decided to "harmonize their own standards and procedures and develop an independent certification system for Good Agricultural Practice (G.A.P.)" and has since grown into the "world's leading farm assurance program", recognised in many countries (GlobalG.A.P, 2019). The influence of private standards, operating on an international scale, such as EurepGAP, has been criticised by agri-food scholars such as Campbell (2005). Although voluntary, compliance with such standards is increasingly necessary for firms who wish to trade internationally, imposing costs that many smaller producers struggle to meet.

Industrial leaders

The competitive nature of business has also seen some businesses aspiring to attract a larger market share by promising higher standards of operational practice and product quality. For example, retailers may make a policy of performing their own in-house food safety and hygiene tests beyond mandatory tests administered by state agencies; or only accepting chickens from farm assured suppliers whose premises they have inspected.

Consumers

Perhaps as a culmination of experiencing food scares (e.g., BSE outbreaks in the 1990s) and food scandals (e.g., horsemeat scandal), and increased exposure to information on food production through media and the internet, British consumers are generating some pressure towards ensuring food safety. There is active participation of consumers in food safety regulation in both an official capacity as members of specialist consumer organisations with statutory status, and civil consumer advocacy groups. While the latter may not contribute to the setting of mandatory standards, they can influence company and industry approaches to food safety. Examples include Which? (the Consumers' Association) and Sustain (the alliance for better food and farming).

Case of Zimbabwe

The food safety regulation system in Zimbabwe paints a slightly different picture from the British system discussed above. At national level, there exists a Food and Food Standards Act which is the legal means or instrument

> "to provide for the sale, importation and manufacture for sale of food in a pure state; to prohibit the sale, importation and manufacture for sale of food which is falsely described; and to provide for the fixing of standards relating to food and matters incidental thereto."

(Zimbabwe Food and Food Standards Act Chapter 15_04)

Based on the stipulations of this Act, the Ministry of Health and Child Care is the lead institution of the multi-stakeholder consortium in charge of food control in Zimbabwe. The Ministry of Agriculture, under whose jurisdiction the food is actually grown, occupies a lower position than the ministry of Health in the consortium. Other legislative or state level members of this consortium include the Ministry of Industry and International Trade, and Municipal Local Authority offices. According to this Food and Food Standards Act, a key mandate for the chairperson, i.e., the Minister of Health and Child Care, is the formation of a Food Standards Advisory Board (FSAB).

The Food Standards Advisory Board

The purpose of the FSAB is to "advise the Minister on all matters relating to food standards," (Zimbabwe Food and Food Standards Act Chapter 15_04). Broadly, the FSAB advises the Minister of Health and Child Care on "all matters relating to Food and Food Standards" but more specifically, they are expected, among a longer list of tasks:

- To formulate food safety and quality policy, laws and regulation regarding "composition, strength, potency, purity, quality or other property of any food or of any ingredient or component part thereof,"
- To consider applications for use or introduction of new food products, ingredients or food articles on the market and advise the Minister accordingly.
- To certify food products for purposes of local sale, export and import.

- To carry out risk analysis for food contaminants and coordinate food safety control programme along the supply chain (farm to table approach)
- To assist in the education of consumers on food safety and quality issues.
- To function as the National CODEX Committee and to come up with Zimbabwe position on food standards issues.
- To create awareness of CODEX recommended codes of practices, guidelines and standards HACCP, GMP, GHP[45] and GAP among food producers.
- To make regulations for the methods, appliances and processes to be used in or applied to or not to be used in or applied to the manufacture, preparation, preservation or packing of food or any of its substances or ingredients.

(adapted and paraphrased from sections of the Food and Food Standards Act Chapter 15:04 Section 18 and The Zimbabwe Codex Alimentarius http://www.zimcodex.gov.zw/food-standards-advisory-board/)

This partial list depicts some of the FSAB's duties which include revision of laws and regulations, regulating Zimbabwe's observation of international food standards, public education on food safety, and even employee rights within the food sector. In order to adequately address these tasks, the FSAB consists of members from various government departments and ministries, and other sectors with an interest in food or safety namely: the Government Analyst Laboratory (Secretariat), Environmental Health and Port Health Department, Nutrition Department in the Ministry of Health, Veterinary Department, Plant Protection Department, the Ministry of Industry and International Trade, the Municipal Health Association, Biotechnology Authority of Zimbabwe as well as four representatives from Food producers, manufacturers, packers and retailers, a representative from the consumers, and one representative from the Standards Association of Zimbabwe[46]. Unlike the FSA in the UK, the FSAB is only an advisory body and therefore cannot enforce the regulations. It therefore relies on government institutions to do so by way of inspection of food production and processing procedures and facilities.

[45] GMP = goof manufacturing practices, GHP = good hygiene practices.

[46] (http://www.zimcodex.gov.zw/food-control-in-zimbabwe/).

Non-State independent standards setting bodies

Besides the regulations set by the government, there are many non-state entities that have assumed a position of influence within the Zimbabwean agriculture who have set up some standards and regulations to be observed by their members. While there is no legal, state enforced requirement for farmers or food producers to subscribe to these entities, most farmers find themselves joining such groups due to other benefits such as financial, market and educational access opportunities. The Livestock and Meat Advisory Council (LMAC) functions as the main body for "Protecting, promoting and furthering the interests of those engaged in the Livestock and Meat Industry in Zimbabwe, ensuring the economic viability of the sector" (LMAC, 2019). LMAC is essentially a council made up of representatives from all main livestock producing, processing or retailing associations. Some of the associations which make up the membership of the LMAC include the Commercial Farmers Union, Pig Producers' Association of Zimbabwe and, of more interest to this study, the Zimbabwe Poultry Association (ZPA) and the Zimbabwe Free Range Poultry Association (ZFRPA). The ZFRPA is a relatively new member of the LMAC, having joined in 2017.

5.4 Specialized standards testing bodies

ny institutes creating standards, there continues to be some standards or accreditations that appear to hold more weight than others. These include accreditation by specialized standards testing bodies such as the Standards Association of Zimbabwe (SAZ). SAZ is a voluntary third-party certification body providing ISO and HACCP certification for food manufacturers. It is not an official regulatory body of the Zimbabwean government but is a key party in ensuring good safety standards and food quality. The SAZ does not set the standards but certifies companies on existing internationally recognised standards of manufacture, production or operation such as ISO standards. There is currently no service locally for certification for many international standards such as Global G.A.P which are valuable for food and meat quality and trade. Liesdek and Ansenk note(2020) provided a gap overview of food quality and safety certification standards required for export to the EU and Zimbabwe's standards environment (Table 5.1). Zimbabwean companies

seeking that certification have to work with accredited certification agencies in South Africa or elsewhere.

Table 5.1Food quality and safety certification standards required for export to the EU and Zimbabwe's standards environment (Source Liesdek and Ansenk 2020)

Topic	Standard	EU status	Zimbabwe status
Food safety and quality certification	GLOBALG.A.P.	• Required	• "No accredited certification body Voluntary Horticulture ZIM GAP certification provided by SAZ"
	BRC	• Required	• No accredited certification body
	IFS Food	• Required	• No accredited certification body
	SQF Food	• Required	• No accredited certification body
	FSSC 22000	• Required	• No accredited certification body
	HACCP	• Stops per 1 January 2021, now integrated in BRC, IFS and FSSC 22000.	• Voluntary certification provided by SAZ

Industry leaders

Some of the major operators in Zimbabwe's chicken supply chain have also come up with standards to guide their own in-house operations as well as those of their suppliers. Irvine's Zimbabwe, the country's largest chicken producer tries to maintain high levels of food control and safety by maintaining internationally accredited certifications e.g., HACCP and South African Business Standards (SABS) in addition to meeting the standards set by the country's FSAB. Irvine's also requires strict hygiene and safety standards from their contracted growers (Irvine's Zimbabwe, 2016). On the company's website, one can find clearly laid out standards for operation for their contracted growers including dimensions for constructing chicken housing and stocking densities.

Consumers

Another influential group when it comes to standards in food are the consumers. While they may not always have an official or direct say in the standard setting sphere, they certainly exercise some control as consumer preferences can put pressure on businesses to improve practices or products. The FSAB does have one member meant to represent the consumers. This may be someone coming

from the Consumer Council of Zimbabwe, but such representation can hardly be expected to cater for the country's whole consumer base.

5.5 Standards in practice

Following the brief overview of the regulatory landscapes in both countries, in this section, I discuss the challenges and trade-offs presented by these set up in practice, particularly for chicken meat supply sector. In section 5.5.1, I discuss the concept of standards as a site of struggle due to factors such as too many standards, and diverging goals amongst supply chain actors. I then discuss the economic costs of standards in terms of creation, adoption, maintenance, and enforcement standards (section 5.5.2) before moving on to benefits of standards (section 5.5.3) and conclusion (section 5.6).

5.5.1 Standards and regulatory spaces as sites of struggle

Borrowing from Julie Guthman's (1998) description of organic farming regulatory sphere as a "site of many struggles", I argue that regulatory spaces and chickenscapes in this study are often sites of struggle.

A crowded regulatory landscape

For Zimbabwe, the set of FSAB members in theory makes for comprehensive representation of most stakeholders in a nation's food sector. According to Table 5.2, there are clear mandates for each of the regulatory (ministerial) authorities on the FSAB, as well as the legal instruments that should guide their work. In practice, however, there is sometimes confusion caused by overlapping remits and conflicting interests. This may be partially due to the fact that with the various ministries each having their own form of food control or food safety regulation, there are often overlaps, and gaps in some aspects. For example, while the Government Analyst Laboratory within the Ministry of Health and Child Care is the official authority for tests on food for regulatory purposes, the SAZ, which is a member of the FSAB, also "provides technical services for the testing of manufactured foods and raw materials" (Pswarayi, 2015) while the Environmental Health

department in the Ministry of Health and Child Care also performs tests in its "inspection and enforcement of food regulation".

Table 5.2 Mandates and Food security instrument guides for Zimbabwean government authorities (source: ZimCodex, 2017)

Mandate	*Legal Instruments*	*Institution*
Plant Health	*Plant Quarantine Act*	*Ministry of Agriculture-Plant Protection Department*
Animal Health	*Animal Health Act*	*Ministry of Agriculture-Veterinary Department*
Food and Food Products Analysis.	*Food and Food Standards Act.*	*Min of Health -Government Analyst Laboratory*
Agricultural Produce Certification for Export and Import.	*Food and Food Standards Act.*	*Min of Health-Food Standards Advisory Board*
Crafting of Food laws and Regulations	*Food and Food Standards Act*	*Min of Health-Food Standards Advisory Board*
Ministerial Advice on Food Safety in General	*Food and Food Standards Act*	*Min of Health-Food Standards Advisory Board*
Inspection and Enforcement of Food Regulations (At national level, including water quality monitoring)	*Food and Food Standards Act, Public Health Act and related regulation*	*Min of Health-Environmental Health Department*
Inspection of Factories, enforcement of food regulations(In Municipal areas)	*Food and Food Standards Act, Public Health Act, Related food regulations, By-Laws.*	*Municipal and Local Authorities.*
Inspection at Ports of Entry	*Food and Food Standards Act, Public Health Act*	*Min of Health Port- Health Authority.*
Nutritional quality and regulation	*Public Health Act*	*Min of Health-Nutrition Department*
Quantity of packaged Foods	*Trade Measures Act*	*Ministry of -Industry and Trade*

Despite all these Ministerial departments and other regulatory bodies, Zimbabwe does not have a formal, implementable, food safety policy (Pswarayi, 2015; FAO/WHO, 2003) so coordination of food control at a national level remains a challenge. Figure 5.2 shows how multiple ministries run control checks and inspections independent of each other. A food producer or retailer importing food items may have to go through multiple checks to obtain clearance papers from the various government departments.

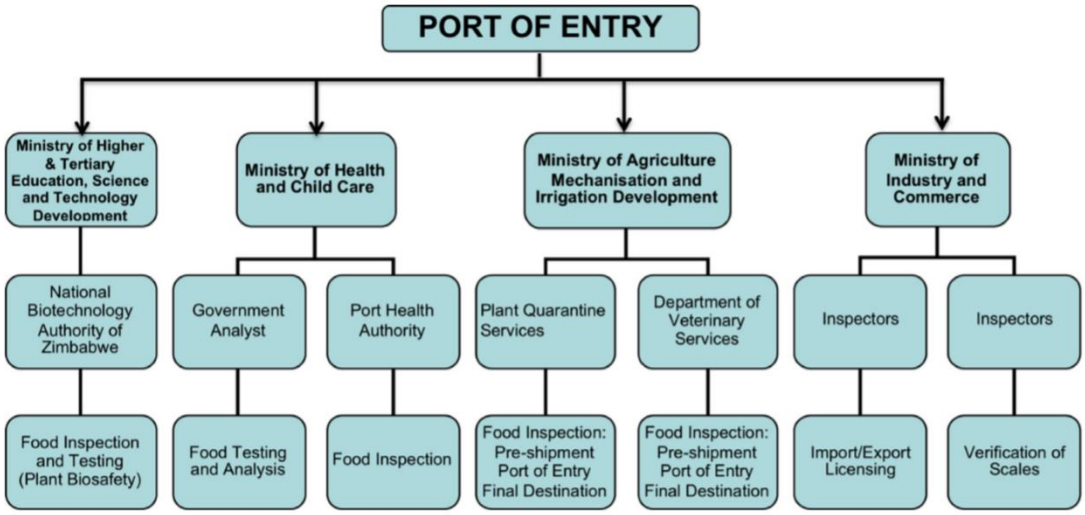

Figure 5.2 Several ministries and government departments are involves at ports of entry and operate independently. This fragmented, uncoordinated approach creates overlap (Pswarayi et al., 2014)

According to an analysis by Pswarayi et al. (2015), agents from different ministries may also turn up at a manufacturing company for hygiene inspections within days of each other resulting in confusion for the manufacturer as they are sometimes given conflicting advice on compliance. This has resulted in a disjointed approach with no coordination, much redundancy and limited results.

Since 1999, there have been efforts to develop a more coordinated approach to food control in Zimbabwe. An FAO funded and led initiative which ran from 1999 to 2002 had multiple stakeholder in the food sector, such as those represented in the FSAB, resulted in the proposal of a national Food Control Authority. Unfortunately, this has not been effected. Whilst the idea of a single, central food control body seems ideal, its implementation in a nation where the current system is fragmented may be more complicated. Questions of coordination amongst all the stakeholders, see Fig 5.3, reallocation of power and financing are some of the challenges to be addressed. Additionally, the sense of hierarchy amongst the agencies proposed to form the Food Control Authority is not clear. Some critics also suggest that the proposed Food Control Authority

is similar to the existing FSAB, except that the former would then be more than just an advisory body (Pswarayi et al., 2014). The *Food Control Bill 2011* which proposed the establishment of the Food Control Authority is yet to be passed in parliament of Zimbabwe.

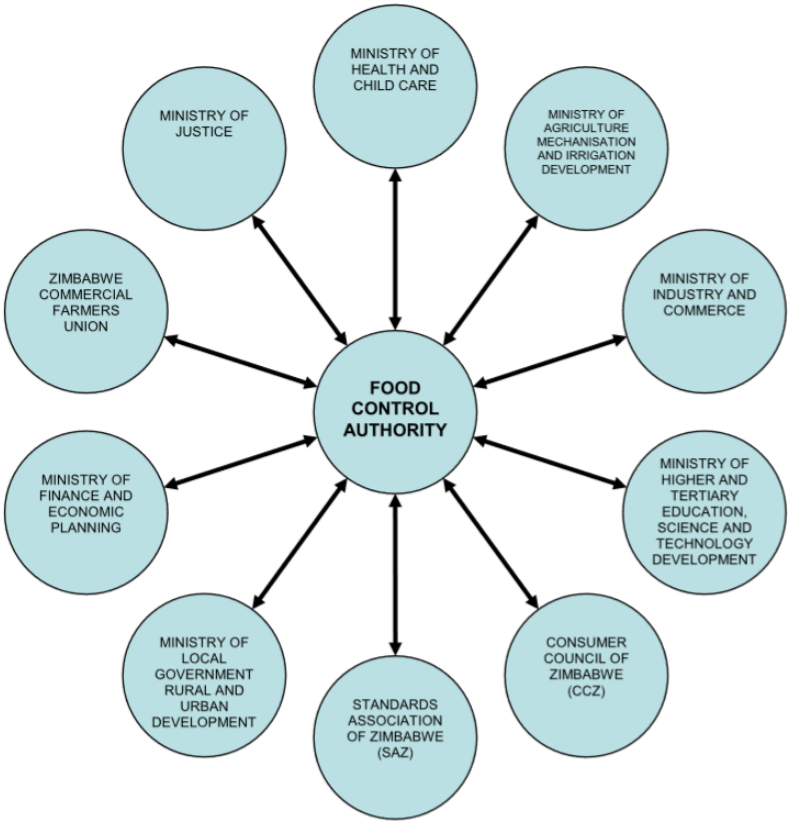

Figure 5.3 Proposed harmonised food control system (Pswarayi et al., 2014)

Food governance in the UK is also quite fragmented. Different departments carry different responsibilities and regulatory arrangements do not uniformly apply in different parts of the UK (Jackson 2015). As mentioned in section 5.3.1, the FSA, while "responsible for food safety and food hygiene in England, Wales and Northern Ireland", does not test food for safety (UK government, 2020). Testing is carried out at local authority level under rules currently set by EFSA. This division of responsibilities can result in confusion over the roles and remits of different regulatory authorities. According to the UK consumer organisation Which?, "Food issues in practice do not break down into simple delineations that are made between government

departments" (Environment, Food and Rural Affairs Committee, 2013: 3. 17). This argument was made during an inquiry following the horsemeat scandal in the UK in 2013 and clearly signifies the need for more coherence and coordination in food governance, lack of which can pose food safety risk, or in this case, allow for food (meat) adulteration to go unchecked.

Mismatch between standards-makers and practitioners

The multiplicity of goals, targets and standards make it difficult to arrive at a consensus regarding best practice in the production spaces. The goal of some standard-making bodies may not be shared by, or perhaps not align with, the goals of the chicken producers and retailers. For example, for a business like Marks and Spencer in the UK, their ultimate goal is to run a successful business so when it came to animal welfare standards, even though they were considered one of the leading businesses in being cognisant of animal welfare based on the meat suppliers they chose to work with, even they struggled to meet the acceptable standards of welfare set by the Royal Society for the Prevention of Cruelty to Animals (RSPCA). Mark Ranson, explained this disjuncture between standard makers and those expected to implement them in an interview with Dr Polly Russell;

> *the RSPCA's view on what it wanted as opposed to what the industry said it could deliver, was often poles apart, and I think at the end of the day the RSPCA was coming at it from a purist animal welfare viewpoint with very little commercial understanding of what the standards were trying to do*

(Mark Ranson, Marks and Spencer Food technologist)

Even though a common goal was shared, good animal welfare, the definition of what that means appeared to vary between the RSPCA, an animal welfare body, and meat retailers. The question then rises whether there should be compromises.

One chicken grower also had issues with the accreditation process for the Farm Assured accreditation as she voiced how dissatisfied she was about the process because in her opinion, the overall focus of the whole exercise - procedures, check boxes and even the quality of inspectors

performing the accreditation inspection- did not seem to add benefit to the goal of raising chicken well and producing safe meat;

> *And then, what is so annoying is that they're getting all these officials to come and look at your place, and see your books and everything, that are failures in the trade, you can't, you know, run...the bankrupt poultry farmers and pig farmers coming round to tell us what to do. And how some of them, I mean one of the chaps there last night, he didn't even know what a poultry farm was I don't think. So, I mean, it becomes a bit crazy doesn't it. Because, we're Farm Assured now, and that is, well you don't get anything for it; it's just that you have to apply, to abide by what rules they put in.*
>
> *.....it doesn't really apply to the actual chicken, producing a decent chicken.*

(Audrey Kley, UK chicken grower)

The mismatch between the grower's idea of what it takes to produce a 'decent chicken' and the standards-making team's idea of the standards necessary for successful quality farming is clear. This sentiment of practitioners having to comply with standards that they deem unnecessary was echoed in the way some of the chicken growers in Zimbabwe responded when I asked them about standards and accreditation. Most participants immediately discussed an inspection report or a certificate but not the process, giving the impression that for them it was also just another check box to tick. One farm manager at the chicken farm belonging to a large-scale chicken producer said,

> *I suppose they have to do what their books say and give us marks but I am not a book person. I did not go to school. I know chicken, I grew up here (on the farm) with them and I know what they need. A piece of paper does not see when the chicks are coughing. A person sees that. A person that knows*

(Brian Rumanga, Manager of chicken growing at a large-scale Zimbabwean chicken producer)

He went on to share how he had so much experience that he was often invited to train other farm managers in his region, with satisfactory feedback. He therefore did not think a piece of paper should be the evidence that he and his chicken rearing team were performing their duties well.

This struggle with standards and certification appears to be over the knowledge relied on, and the variables considered important and included, in the standards formulation. For growers like Brian and Audrey, this frustration over having to satisfy a list of requirements, often presented by someone they deem less experienced in the craft also raises an interesting question about the different kinds of knowledge that underpin standards. Packaged in a list, often created in a different location, the selected, officially-sanctioned norms are expected to outweigh local knowledge. When asked what she thought of standards, Audrey Kley responded;

> *Well I don't...it doesn't really apply to the actual chicken, producing a decent chicken. You have to write down on a piece, on a form, which you put in your chicken house, each time you go into the house. Well what is that going to do to produce a chicken any better? You've got to have wash basins or types of hand wash in each house, so that you wash your hands before you go in, you wash your hands before you come out, instead of having one point of, you know, wash, so that when you've finished with the chickens you just wash your hands in that particular point.*

(Audrey Kley, UK chicken grower)

While the stipulations in the certification process may be theoretically sound, some with scientific evidence to support them, for some practitioners, growers in this case, they may not seem relevant or practical. Audrey also complained about having to set up a specific number of fans in the chicken shed, and stipulated amount of water drinking space per bird in order to meet the Farm Assured certification requirements. These elements, she argued, were already seriously considered, and implemented, by any grower intending to raise their chickens successfully.

Similarly, for some of the growers interviewed in Zimbabwe, the idea of following a certification process seems a redundant procedure as there is tangible proof of "success" in the "big healthy

chickens" (Mrs Masoko, backyard grower) or feedback from peers and colleagues as in the case of Mr Rumanga. "The chickens speak for themselves" (Brian Rumanga, farm manager). The idea that a good product at the end of the supply chain is enough provides an interesting argument especially in an environment with claims of corruption[47], which may compromise the certification process.

5.5.2 Economic costs of standards

Economy is a crucial aspect of standards and regulation in food production. According to Abbott and Snidal (2009) the regulatory process is made up of at least five stages namely, agenda-setting (deciding that an issue belongs on the regulatory table), negotiation (bargaining, designing and promulgating the standard), implementation (implementing standards by the target practitioners), monitoring compliance, and enforcement (promoting compliance and policing non-compliance). In terms of private standards, there is also a stage of adoption, before implementation, since private standards tend to be presented as voluntary (Verbruggen & Havinga, 2017). All these stages carry a cost, economic or otherwise, which is borne by various actors within the supply chain. In this section, I discuss the economic costs of standards and regulation in the chicken supply chain.

Cost of negotiating and designing standards

The process of creating a food standard that may become part of a national law or achieve international recognition with recognised accreditation processes can be costly. Resources required include expertise from various stakeholders for example producers, processors, health experts and researchers in addition to legal teams for filing the actual documentation. The GlobalGAP procedure for developing standards outlines how the process can be an iterative one involving drafts, and re-drafts of the standard, multiple consultations with the public, feasibility studies and

[47] Corruption levels in Zimbabwe are reported to be very high. (See discussion in description of case study, chapter 3)

trial audits, before a new standard can be adopted (GlobalGAP, 2019). All these processes cost both time and money. With new scientific and technological discoveries, and knowledge, comes the need to revise and upgrade standards which is another costly yet necessary process. Funds for such activities can be from State funds, in the case of national standards, or in the case of private sector accreditations, from the certification and membership fees collected from parties seeking accreditation.

Cost of adopting, implementing and adhering to standards

The typical symbol of adoption and implementation of standards, which is often associated with good practice, is accreditation or certification by a regulatory body. This is a cost that many farmers and food producers have to pay for. Often times that expense can mean the survival of the whole business in an ecosystem of competition with peers for trade with other supply chain actors. Almost every chicken for sale in a UK supermarket will carry a certification logo such as Farm Assured or a Red tractor logo to indicate it was sourced from a Farm Assured producer. Mark Ranson, food technologist for Marks and Spencer (M&S), who had previously worked for the RSPCA describes how the Farm Assurance scheme came to be;

> *National Farm Assurance Schemes really start to come about then because the RSPCA at the time developed its own, a world first I think, in terms of an animal welfare Farm Assurance scheme, so basically devised a set of standards, one for each species: pigs, beef, lamb, dairy, egg laying hens, chickens, turkeys; which set out animal welfare criteria based production standards. So essentially, it was if you… if a farmer grew his livestock to those standards the retailers could then sell that product with a mark on the packaging which showed it was from high welfare standards and that called that the Freedom Foods, so it was the Freedom Food Animal Welfare Standards. So a lot of my role then was about developing of those standards and writing the standards and then going out to verify, I didn't actually do the farm audits, there was teams of individuals who did those… but I would, we would do random inspections to make sure that the standards were up and maintained.*

(Mark Ranson, Food Technologist at M&S)

The process of gaining that Farm Assured status is often a significant initial cost for farmers, especially small, family run businesses as they often have to make some changes or improvements to their infrastructure or processes in order to pass the certification inspections. Back in 2003, Audrey Kley, a chicken grower had to spend as much as £14,000 on such improvements in order to bring her farm to farm assured standards.

There is almost a sense of power play where farmers who may not agree with the process, only comply with the directives for accreditation so as to remain competitive in the industry where the certification is key. The question then is who stands to benefit from such an arrangement, as voiced in Audrey Kley's misgivings;

> *And, for instance, with this Farm Assured [scheme], Mark and I, I've been doing it since I was seventeen, I'm seventy-three; Mark has been doing it since he came out of Cirencester in '84, so that's ten, nearly twenty years isn't it. And we have got to go to, for a three-day course on how to keep chickens, because the Farm Assured people say you have to have a certificate. Now...*
>
> *I'm going to have to go, because that's one of the things we haven't passed in, on the Farm Assured, we aren't qualified to keep chickens, after fifty years of having done so. And we're going to be taught by perhaps some bloody little fool that's come out of college and doesn't know anything. Now is that sense? Is there... They're going to make money, aren't they, because it's about sixty quid you've got to pay to go for the course. And it's just give somebody a job, or making money to keep somebody in a job*.
>
> (Audrey Kley, UK chicken grower; interviewed by Dr Polly Russell)

Whether the ultimate goal of good animal welfare or safe food production is better attained through these farmers' training remains subjective, but there is definitely a cost in time and money resources that the growers have to bear. And even when participation /attendance to such courses was high, it was not always voluntary or appreciated by all participants, begging the question of

whether there may be cause for exploring other mutually beneficial steps to certification. This frustration over the costs of certification was also shared by Ray Moore, a hatchery manager who mentioned paying £1000 for the auditing processes with Freedom Foods, Farm Assured and Marks and Spencer.

Certification standards can sometimes be barriers of trade (Korinek et al., 2008) as some retailers or producers may impose food safety standards on their suppliers. Ray Moore shared how the Farm Assured scheme could cover the audits at the farm he worked at, yet M&S insisted on doing an audit themselves. He also told a story about an M&S auditor not knowing the difference between a good and bad chick, echoing Audrey Kley's frustration with inspectors and regulators that were less experienced and knowledgeable than the growers they audited. Interviews with M&S staff did confirm this organisation's culture of insisting on their own extra audits or inspections of their supplier as part of their ensuring desired quality standards were met by those in their supply chain. Growers and suppliers then carry the burden of not only satisfying mandatory state regulations, but also private schemes from the non-governmental actors like supermarkets. The latter are often stricter than the public regulation (Lutz et al., 2000) and are often "widely criticized by developing countries because they are significant barriers to their export" (Havinga et al 2015:16).

For many smaller farmers, improvement costs to meet certification stipulations can be unfeasible, thereby leaving them unaccredited in a system where such certification is crucial for gaining a supplier's contract with a chicken processor. In present day UK, slaughterhouses and producers of meat products, such as chicken, generally incur more costs on both one off inspections, and annual ongoing costs of inspections and compliancy measures. In a 2017 study by the KPMG commissioned by the FSA, a slaughterhouse reportedly spent a total of more than £32 million in a one-off cost to meeting food law requirements (KPMG 2018). Relative to other food business organisations, meat producers, particularly slaughterhouses tend to incur more costs, which are "primarily driven by upfront investments to meet specific requirements for their premises, equipment and food safety procedures" (KPMG 2018:5). The study also showed that while it was not a regulatory requirement, "95% of respondents indicated that that they did undertake their own regular checks/ inspections to assess their compliance with Food Law, with 25% employing

external consultants to assist them with this" as a proactive measure to reduce the risk of failing the FSA inspections (KPMG 2018:3)

For Zimbabwean producers, official recognition as a commercial producer or trader in agricultural goods (livestock and crops) requires a licence issued by the Agricultural Marketing Authority (AMA). AMA falls under the Ministry of Agriculture which is represented in the FSAB. Listed registration fees are US$1, US$110 and US$300 per annum for farmers, small scale traders and large-scale traders respectively. These figures seem relatively reasonable but in practice, a farmer trying to run a successful business in poultry production spends much more. As previously discussed in section 5.4.1, the crowded regulatory space in food production sees farmers and producers having to ascribe to multiple affiliations in order to navigate the production spaces with relative ease. Next to the AMA license, membership to recognized farmers' unions, certification with the previously mentioned certification bodies is an added cost that farmers and producers have to consider. The Commercial Farmers Union is a nationally-recognised union for Zimbabwean farmers and membership fees are between US$500 and US$1000 for farmers, depending on scale of operation.

Further costs are incurred in trying to meet internationally recognized certification standards such as the ISO standards which place the business in better standing for the export market. When I visited the Surrey Meats Group in Zimbabwe, in 2017, they were working towards achieving the internationally recognised FSSC 22000 food safety management certification. Three years later they have achieved this but according to the Chairman's feedback, the process involved major overhauls of processes, and infrastructure and personnel development (Surrey group, 2020[48]). Most agricultural businesses in Zimbabwe cannot carry the costs involved in such an undertaking.

[48] https://www.surreygroup.org/news/surrey-achieves-compliance-with-food-safety-system-certification-fssc-22000/

For the backyard chicken growers interviewed in this study, there was a clear disregard for public regulation, either from a place of ignorance, or indifference. There are by-laws concerning keeping of animals in residential areas which most of the participants were not aware of, while the two individuals who knew about them, did not think they were still relevant given that no one from the city council had approached them. Certification by authorized bodies was also deemed unnecessary as evidenced by a response from one of the growers; "*I think that is for butcheries and OK and TM. These broilers don't need inspectors because if you are not smart and clean with them they just die. You are the inspector yourself"* (Mrs Nhowe, raising about 300 broilers in her backyard). OK and TM are major supermarkets in the country. Mrs Nhowe's argument highlights a key separation between the backyard growers' chickenscapes and large scale commercial growers like Irvine's. Certification may be a necessary currency for communication of quality and standards for the latter, whereas in smaller settings like Mrs Nhowe's where a combination of the visible condition of her birds and the trust that her customers have in her husbandry practices suffice to communicate quality to her customers.

Cost of enforcing standards

Meat inspectors and health inspectors make up some of the people tasked with policing farms, abattoirs, meat processors' adherence to agreed standards of practice, safety or quality. One of the challenges raised on food safety in Zimbabwe (Pswarayi et al, 2015) and other developing countries (WHO/FAO 2005) is the lack of consistent surveillance or monitoring of safety practices among food producers. Some of the establishments selling chicken in Harare and Chitungwiza visited in this study, mentioned that they had not been visited by food safety inspector in the last six to twelve months. None of the backyard growers interviewed for this study had ever been visited by a regulatory officer with respect to their meat production and selling operations. Consensus speculation was that the food regulation authorities and inspectors had no resources such as inspection equipment or transportation to conduct the inspection trips (Liesdek and Ansenk, 2020).

The case is somewhat different in the UK where the FSA still oversees random inspections on food establishments. Costs of policing or enforcing standards result from training the enforcement

agents as well as providing resources to be used in the inspection. A scenario calling for continuous FSA officers' presence on the food producer's premises, as was the case with the previously mentioned 2Sisters Food Group example, means added pressure on both financial and human resources as said officers are not available for inspection of other companies.

There are however plans for the FSA to shift towards a risk-based enforcement system where industry actors may have more influence over the frequency of inspections they are subjected to. In this Earned Recognition program (https://www.food.gov.uk/business-guidance/earned-recognition-approved-assurance-schemes), the FSA approves selected private assurance schemes on food safety, then food businesses that comply with regulation of approved, private/industry assurance schemes earn recognition and benefit from less frequent inspections by authorities. The aim of the program is to focus the resources of regulatory authorities on less compliant businesses who will be charged for inspection costs.

Costs for non -government or voluntary inspections such as those for third party certifications often fall into the hands of the meat producers through certification fees. This ultimately contributes to the final cost that the consumers pay for the meat product.

5.5.3 Benefits of standards

The benefits of having a regulation system and standards in place cannot be overlooked. A functional governance system, with clear unambiguous regulation can have positive implications for issues such as food supply quantity and quality, food safety, and trade as well as animal welfare.

Regulation of practices within chicken meat supply has ensured safer meat for consumers globally. For example, the UK government's banning of antibiotic growth promoters in animal agriculture in 1971, following the Swann Report recommendations, was an essential step in the fight against AMR (Kamenshchikova et al., 2019; Kirchhelle, 2018). In the USA, although there are still debates surrounding non-medicinal antibiotic usage in agriculture, the government was quick to ban aquinising chicken, a proven cause for AMR (McKenna, 2017;). The alternative they opted for, however, is dipping the chickens in chlorinated water baths, a technique which is also used in commercial chicken processing in Zimbabwe but banned in the UK and EU. As the UK prepares

to leave the EU, it is not clear currently what the implications for food safety will be as the EU regulations will no longer be mandatory. This is particularly concerning given that "the EU had had a positive impact in the UK by improving food standards from the low levels that had previously prevailed" (Millstone et al. 2019:647). The clarity provided by a good regulatory system allows for easier accountability and investigation of, and quicker reaction to, breach of trust, or safety within food processing.

Increasingly, many food safety standards have additional elements such as social impacts and environmental welfare. This is common in private standards. For example, the *Marks and Spencer's way of doing business* that most participants in the life story interviews referred to included claims of only working with chicken growers and suppliers who practiced good animal welfare.

Standards, particularly certification, can offer competitive advantage through improved quality but also by eliminating the competition. Irvine's Zimbabwe is the only ISO 22000-certified hatchery in the country and that fact is advertised on their website[49], together with a promise that the customers get the best quality day old chicks from them. There is an implied connection between certification and product quality which works to their commercial advantage. Some private standards give the impression of improved safety, with certification providing a signal that consumers may perceive to mean safety. Words such as traceability and ecological, for example, may be included in the standards for the consumers (Henson and Humphrey, 2009). Accreditations and certifications may also allow growers or producers and retailers to add credence claims which consumers are more likely to believe.

[49] http://www.irvineschicken.co.zw/day-old-chicks/

Private standards are often more stringent than public or government regulation. While this is often viewed as a barrier to trade, the rigorous checks may be an advantage. Voluntary Private standards are sometimes taken up as a way to ensure farmers' practices are within compliancy with mandatory public standards (Hammoudi et al., 2009) usually to avoid losses due to fines or product recalls. In cases where standards are mandatory, which is usually the case with state/public standards, compliance is a prerequisite for entering the market.

In their celebration on attaining the FSSC 20000 certification, the Surrey Meats Group emphasised the fact that this is an internationally recognised accreditation, which makes them eligible for exporting their product. Standards can therefore be a gateway to certain markets. Mrs Jiji, the ZFRPA secretary also emphasized chicken growers with certified membership to the organisation can benefit from marketing channels, local and abroad, created through the organisations. This was mentioned in a training session for small to medium scale chicken growers which I attended (10 November 2017, in Harare). ZFRPA membership, and certificates received during training, are often used by the chicken growers as supporting information in bank loan applications or farmland application.

5.6 Conclusion

In this chapter, I discussed the evolution of food governance from a primarily public, mandatory, national regulatory system to a hybridised system that includes private voluntary standards with international recognition. I then gave an overview of the food regulatory sphere in Zimbabwe and the UK, which, though not identical, are both crowded spaces, leading to concerns of overlap, redundancy and inefficiency. The evidence painted this governance as a site of struggle - a complex and contested political landscape in both the UK and Zimbabwe, populated by different bodies and competing standards serving different interests. Concern over the effects of grades and standards has a long history (Busch 2000) and remains a key issue in light of the UK's exit from the EU.

The chapter has highlighted how the current regulatory landscape in the UK and Zimbabwe comprises a complex mix of public and private regulation. The chapter has also drawn attention to the gap between official regulations and their practical interpretation on the ground which can be

attributed to a range of factors including the contested authority between the different actors involved and to the cost of compliance.

Standards are influential to practice and there is a need to address several concerns raised in the chapter. Better coordination among regulators can help to reduce redundancy and confusion. There is also a need to improve communication between standards-setters and practitioners for more effective results. Evidence showed that official standards often do not recognise 'local knowledge' of those working in the industry and their accumulated experience, leading to a questioning of the legitimacy of the standards. Finally, the chapter discussed some benefits of standards particularly the implications for safer food production and supply. These benefits may offset their economic costs, although the costs and benefits may fall unevenly on smaller- and larger-scale producers. It is also important to note that food safety should not be assumed, even in spaces of good governance as was revealed by the horsemeat scandal or the events at 2Sisters Food Group in the UK.

6 Disease and safety

6.1 Introduction

This chapter looks at disease and disease management in supply chains for chicken meat. I investigated practices in various chickenscapes in the chosen case studies, trying to understand what informs them, as well as highlighting what implications these practices have for the spread of disease in the chicken supply chain, and food safety. I begin with a discussion on how chicken meat supply chains have evolved over the years with intensive production and increased chicken meat consumption becoming the norm I then introduce diseases, and the use of vaccines and antibiotics in the chicken growing spaces within of the two case studies. This is followed by a discussion on the use of alternative medicines in ethno-veterinary practices. Thereafter, I discuss biosecurity identified as one of the key aspects to disease prevention in farming, looking at the creation, understanding, observance, and policing of biosecurity measures in chicken farming at various scales. In the final section, which concerns food safety (section 6.5), I follow chicken into processing and consumer spaces, and address the implications that practices in these chickenscapes, have for transmission and mitigation of foodborne infections and illnesses to humans via chicken meat.

6.2 Evolving supply chains

The way in which chicken meat gets into homes has been evolving over the years. Particularly changing are the amounts, and frequency, of chicken meat consumption in not just the UK or Zimbabwe but globally. The last 40 plus years have seen a tremendous shift upwards in both production and consumption of chicken. Presenting chicken as "arguably the defining example of the industrialization of food production, the paradigmatic case of agricultural intensification", Jackson (2015, p. 57) outlines the evolution of the UK chicken meat supply. From making an occasional occurrence typically as a special treat or Sunday roast prior to 1960 to nearly three times as much consumption in a space of 20years (Ministry of Agriculture, Fisheries and Food, 1991), chicken meat consumption has grown at a revolutionary speed. Yakoleva and Flynn (2004) give a detailed history of the technological innovations and other developments within the UK

chicken industry that saw for example, the slaughter rates for broiler chicken grow from around 410 million chickens per annum in 1980 to just over 830million in 2002. In 2019, more than 1 billion broiler chickens were slaughtered in the UK (Defra, 2020)[50]. In the following sections, I discuss disease occurrence and management in chicken husbandry.

6.3 Diseases and disease management

There are many diseases that affect poultry and chicken in particular. Some of the most common ones today are listed in table in section 6.3.3. Greger (2007) provides a detailed review of diseases that have plagued the chicken sector globally, giving details of origins of the disease, how they have been handled, as well as the effect they have had on both animals and humans. In the following sections I focus on some of the disease outbreaks that have affected the UK and Zimbabwean chicken sectors.

6.3.1 National and International disease outbreaks and their effects

The UK poultry sector has experienced costly outbreaks of disease such as the Newcastle[51] disease outbreaks of 1984 and 1997 (Alexander et al., 1985, 1998) and Avian influenza (Avian flu), which is reported to have first sparked major concern in 1997 in Hong Kong (Nerlich et al., 2009). This outbreak is said to have cost six human lives and led to the slaughter of 1.6 million chickens (Cauthen et al., 2000). Avian flu occurs in various strains and the UK has recorded a number of scares and outbreaks over the years e.g. the H7N3 strain in Dereham, and the 2007 H5N1 outbreaks

[50] https://www.gov.uk/government/statistics/historical-statistics-notices-on-poultry-and-poultry-meat-production-2019

[51] Newcastle disease is "a highly contagious disease of the respiratory and nervous systems, mostly affecting chickens, but sometimes also affecting other poultry species, such as guinea fowls, ducks, turkeys etc. The disease is caused by a paramyxovirus, with the most virulent strains isolated in Africa" (see Guèye, 2002: URL: www.lrrd.org/lrrd14/5/guey145a.htm)

in Suffolk and East Anglia (Nerlich et al., 2009). The Department for Environment, Food and Rural Affairs (Defra) continues to practice close monitoring of Avian flu reports in the country.

The earlier mentioned nationwide Newcastle disease outbreak of 1998 in Zimbabwe saw thousands of chickens being culled, and introduced panic among consumers. Roadblocks were set up along most major roads and police officers searched public and private vehicles to ensure no one was transporting chickens from one part of the country to another, thereby risking further spread of the disease. Perhaps a positive outcome of this Newcastle disease outbreak was the increase in information disseminated via television, radio and local newspapers, on the importance of vaccinating animals. International organisations such as the FAO also sent in experts on fact-finding missions about the outbreak and ultimately to assist in setting up vaccination programs, especially in rural parts of the country where many households kept a flock of traditional chickens for food and small income through sales to neighbours (Abolnik et al., 2018; Rushton, 1996). The Avian Influenza outbreak that affected operations at Irvine's Zimbabwe's, the country's largest supplier of commercial day old chicks, and chicken meat in 2017 had a ripple effect into the country as measures to contain the disease such as culling of over 835 000 chickens, and shutting down of operations in two of the company's breeding sites resulted in shortages of day old chicks, chicken meat, and eggs on the market. Majority of the backyard chicken growers interviewed in this study shared that they were experiencing difficulties in accessing day old chicks. Further socio-economic impacts realized were in the form of job losses as Irvine's had to dismiss some contract workers or send them on forced leave, whilst the company was on mandatory shut down for investigations, and disease containment operations. There has not been an official report on the conclusions of the investigation regarding the source of the infection but there are speculations that it could have been a breach in biosecurity protocol. The company has since largely invested in biosecurity awareness campaigns and training for its employees.

6.3.2 Vaccines

Often times when farmers present their complaints to the Veterinary doctors, when asked if they have done any vaccination on their chickens? The answer is usually a big YES! "I have vaccinated my birds with Tetracyclines, enrofloxacillins, Sulphur drugs or I have given them stress pack etc". There is need to differentiate between medicating birds and vaccinating birds. (Marimira[52], 2018:10)

The quote above from Fritz Gerald Marimira, a company veterinarian at Irvine's Zimbabwe shows an allegedly common misinformation among chicken growers in Zimbabwe, regarding vaccination. In the commercial sector, where mainly broiler chickens are raised, there are clear set vaccination regimes that hatcheries and day-old-chick suppliers follow. Table 6.1 shows the vaccination schedule followed and advised by Irvine's for broiler chickens.

Table 6.1 Vaccination schedule for broiler chickens (source: Irvine's Zimbabwe website)

Disease	Age	Location
Infectious Bursal Disease Day	18-day old embryo (fertilized egg)	Done at Irvine's' hatchery
Infectious Bronchitis & Newcastle Disease	1 day old	Done at Irvine's' hatchery
Newcastle Disease	10 day old	On farm
Newcastle Disease	18 days old	On farm

When a chicken grower collects one day old chicks from the hatchery, they are already vaccinated against Infectious Bronchitis (IB), Infectious Bursal Disease (IBD), and will have received the first

[52] http://www.irvineschicken.co.zw/wp-content/uploads/dlm_uploads/2019/03/Irvines_ChickenTalk_Dec2018_Vol37.pdf

vaccine against Newcastle disease. The grower is then responsible for administering the second and third vaccines against Newcastle diseases when the birds are 10, and 18 days old respectively. These are the main diseases that are likely to affect the broilers within their six-week lifespan hence vaccination is seen as a step to ensure higher survival rates. Irvine's sells these vaccines, as do other veterinary drugs shops such as Farm & City and Fivet, but 80% of the backyard growers I interviewed did not bother with the follow up vaccinations. Part of the reasons was a general belief that the chicks from Irvine's were already vaccinated –which to some extent they were, having received the first 2 vaccines. However, vaccine cost was shared as the reason why some backyard growers skip the vaccination.

The case with the indigenous chickens, the road runners, is different as these birds tend to have a longer lifespan before they are slaughtered for meat. This extended lifespan, in addition to their flexible living conditions in free range care, tend to create more opportunities for exposure to diseases. The table 6.2 shows an advised vaccination scheme for road runners.

Table 6.2 Advised vaccination scheme for indegenous chicken (road runners)

AGE	VACCINE	MODE OF ADMINISTRATION	REMARKS
Day old	Mareks	Subcutaneous	**Hatcheries**
Day 10	Gumboro (1stdose)	Drinking water	
Day 18	Gumboro (2nddose)	Drinking water	
3 Weeks	Newcastle disease(1stdose)	Eye drop or Drinking water	
3Weeks (in hotspot areas), 6 Weeks (Other areas)	Fowlpox	Wing web stab	
8 Weeks	Newcastle disease(2nddose), Fowltyphoid	Eye drop or Drinking water, Intramuscular injection	
18 Weeks	(3rddose at point of lay)	Eye drop or Drinking water	**Repeat every 3 months**
19 Weeks	**De-worming**	**Drinkingwater**	**Repeat every 3 months**

(source: shared by instructors during a farmers training course. Harare, 2017)

Of all the participants interviewed who were growing traditional chicken, about 70% claimed to follow a vaccination schedule similar, to the one presented in table above. These were mainly chicken growers who raised traditional chicken for commercial purposes. The rest, who were raising traditional chicken for their own consumption, did not adhere to this vaccination schedule. One grower claimed that the traditional chickens were "so strong that they did not need medication like the weak broilers", (Mr Gatsi, backyard grower, personal communication). What he did admit to using in the event of sickness within the flock, were natural herbs such as Aloe vera. I discuss more on this subject in the section on Ethnoveterinary practices. This position that indigenous chickens are so strong that they do not need vaccinations seems to be a popular, long standing one as my own grandmother who also raised indigenous chickens all her adult life never used vaccinations. Many families, especially in the rural parts of the country who raise traditional chickens for meat do not make use of commercial medicines or vaccines for disease treatment or prevention. This observation was also made in other studies of traditional or village chicken production systems in Zimbabwe (Mlambo et al., 2011; Muchadeyi et al., 2004; Mwale et al., 2005); as well as in other African countries (e.g. Gu`eye's extensive studies on disease management in family poultry production systems low-income food-deficit countries in Africa and Asia (Guèye, 1998)). A scientific explanation for commercial broiler chicken's increased susceptibility to disease relative to the indigenous breeds in Zimbabwe may be the loss of genetic diversity in the former, due to increased use of breeding stock (Baenziger et al., 2006).

When I asked the indigenous chicken growers who used commercial medication and vaccines why they opted to do so, the common response was that for a commercially run poultry meat business, with intensive production set up, as well as tightly scheduled supply dates to customers, the risk of relying on the birds' so called inherent strength against diseases was too high to take. In addition, the flock sizes, ranging from about 200 birds to as many as 3000 birds per batch made it close to impossible to rely on the traditional medicines that some small-scale growers made use of. There was also more interaction with veterinary services resulting in implicit monitoring for programs on prevention of Newcastle or Avian flu outbreaks which often encouraged adhering to the publicized vaccination schedule.

6.3.3 Ethnoveterinary Practices

While uptake of vaccinations and commercial medicines in chicken production has somewhat become a normal part of the Zimbabwean chicken rearing process, there is an alternative school of thought on chicken disease management that some chicken growers use, namely, Ethnoveterinary Medicine (EVM). This refers to the use of indigenous practices and medicines for animal disease control and treatment.

The World Health Organisation estimated that at least 80% of people in developing nations relied largely on indigenous medicines or practices for disease control, and treatment, in not only animals but humans too (Iqbal et al., 2005). Most popular in poultry rearing is the use fresh Aloe vera (gavakava in Shona), which is crushed and added to drinking water, as a treatment for coccidiosis, respiratory problems as well as to boost immunity and vitality, in the birds. There are many other plant species used in EVM in Zimbabwe and table 6.3 below show some examples of common.

A general observation was that EVM continues to be confined to small scale chicken growers, mostly backyard growers due to number of factors. These may include scalability limitations, and ignorance. Erythrina abscinica leaves, when crushed and soaked into drinking water, are said to cure diarrhoea but there is no clear stipulation on quantities to be administered nor frequency. Access to the said leaves, especially with some of the source plants only suited to grow in particular climatic regions, is also a challenge compared to picking up a bottle of synthetic medication from an animal supplies store. Knowledge about EVM has largely been something that is passed down to the next generation by word of mouth and the risk of information distortions is high. Some Agricultural training programs in Zimbabwe are now including EVM modules in their curriculum, a move which may help in preserving and dispensing this knowledge though time.

Efficacy is another point of contention when it comes to EVM. Practitioners may well observe results as a number of my participants claimed to witness especially when using the popular Aloe vera plant for multiple ailments. Some studies have shown that EVM in poultry and other livestock is particularly widely used in rural parts of Zimbabwe with independent studies reporting similar findings from different parts of the country (Masimba et al., 2011; Mwale et al., 2005). However,

a lack of scientific evidence on efficacy, makes the EVM seem less reliable, and uptake remains low. This is a clear example of how one type of knowledge can be more acceptable, accessible or palatable than other forms of knowledge and what implications this has in practice. It is however understandable that until efficacy is proven, a medium to large scale chicken grower intensively raising 600 or more broiler chickens per batch would be hesitant to rely on EVM, especially during a disease outbreak.

Table 6.3Examples of common plants and herbs used in ethnoveterinary practices in Zimbabwe (source: personal interviews; Masimba et al. 2015; Mwale et al. 2005)

Plant	Vernacular Name	Application form	Disease Targeted
Aloe vera	Gavakava	Leaves crushed up and soaked in water	Coccidiosis Respiratory problems Wounds
Moringa	Moringa	Leaves crushed up and soaked in water	Various diseases
Parinaria curatefollia	Muchakata		Coccidiosis Diarrhoea
Erythrina abyssinica	Mutiti	Leaves crushed up and soaked in water	Coccidiosis Diarrhoea
	Msasa	Wax dissolved in boiling water	worms
Albizia gummisera	Mucherenje		Coccidiosis Respiratory problems Diarrhoea
Capsicum annum	Mhiripiri	Fruit chopped and soaked in water	Coccidiosis Diarrhoea
Lycopersicon esculentum	Tomato	Juice squeezed from plant and leaves	Eye problems
Cissus vitacea	Muvengahonye	Plant crushed to a paste	Wounds
Ficus exasperate	Muonde		Coccidiosis Diarrhoea
Allium sativum	Garlic	Chopped up and soaked in water	Coccidiosis Diarrhoea Lice
Soot	China'i	Mixed with drinking water	Coccidiosis Respiratory problems
Sarcostemma viminale	Chifure		Coccidiosis Diarrhoea
Allium cepa	Onion	Chopped and mixed with drinking water; Chopped pieces sprinkled in the chicken housing	Coccidiosis Respiratory problems Diarrhoea;Lice

With the increasing advocacy for cleaner, healthier eating globally, one could argue that adherence to EVM should be a core aspect to raising authentic organic chickens as this would avoid the use of chemicals and synthetic medicines in disease management. There is therefore an argument for increased research in the subject.

6.3.4 Antibiotics and AMR

The global use of antibiotics in Agriculture is on the rise and with studies showing that the USA farmers lead the way by heavily relying on antibiotics for disease control in intensive animal production systems (Finlay, 2004; Horowitz, 2004). By 1948, most chicken growers were feeding daily doses of antibiotics to their animals through antibiotic infused feeds, to fight coccidiosis (Campbell, 2008). Perhaps the most significant moment in the history of antibiotic use in agriculture was the discovery of animal growth promoting potential of antibiotics by Thomas Jukes in in 1949, which would see an exponential increase in antibiotic usage in animal husbandry as antibiotic growth promoters (AGPs) became popular (Kirchhelle, 2018; McKenna, 2017).

For the UK, large scale use of antibiotics in agriculture was legalised in 1953. In this year the Therapeutic Substances (Preventions of Misuse) Act which allowed use of antibiotics in animal feeds was enacted, and former restrictions on the import of feedstuffs were lifted thereby allowing more farmers to engage in animal husbandry (Kirchelle, 2018). This post war UK basically followed the above mentioned American route into an intensive farming system than maximised production by relying on AGPs and continuous antibiotic use for both prophylaxis measures, and disease treatment (Martin, 2000). The British poultry industry, whose exponential growth was mentioned in chapter 2, was a major beneficiary since the "transition from rearing chicks on a semi-commercial basis in mixed farms to the intensively reared broiler flocks of some one hundred thousand strong by the mid-1960s was only feasible because of their forced ingestion of large quantities of hormones, antioxidants, coccidiostats, and antibiotics, in addition to vitamins and mineral supplements" Godley and Williams (2009, p. 284).

Despite having these proven benefits in animal agriculture, antibiotics have been reported to mask poor practices in animal husbandry which would otherwise be made obvious through disease, and

more critically, they have been linked with antibiotic resistance (Hernando-Amado et al., 2019; Roskam et al., 2020). Antibiotic resistance or antimicrobial resistance (AMR) refers to bacteria adapting and growing, despite the presence of antibiotics, thereby becoming resistant to treatment by those and other antibiotics. Researchers from the Public Health Laboratory Service (PHLS) in late the late 1950's, as well as Marie Coates in 1962, raised warnings about the potential implications that antibiotic resistance developing in animal husbandry practices could have for human health since similar antibiotics were in use for both human and animals (McKenna, 2017; Kirchelle, 2018). However, the benefits from substantial increases in veterinary drug sales and increases in meat supply for the country though the growing intensive livestock farming (Corley & Godley, 2011) probably influenced some of the resistance by regulatory officials to consider the warnings about AMR.

A few events are credited for the government's eventual call for investigation into the impact of antibiotic use in livestock farming. These include the outbreaks of antimicrobial resistant E-coli in Middlesborough in 1967, and the increased incidents of salmonellosis outbreaks in humans from poultry consumption in the 1960s. Most concerning was the increase in drug resistance in salmonella bacteria from 3% to 100% in a space of 5 years (Mackenna 2016). The government eventually commissioned a Joint Committee on the Use of Antibiotics in Animal Husbandry and Veterinary Medicine in 1968, to investigate antibiotic usage in agriculture, which yielded the Swann report, named after the committee chair (Godley, 2009; McKenna 2017). The Swann Report "pioneered a new way of resistance-focused regulation by recommending the precautionary restriction of some widely used antibiotic feeds" and became the basis for much EU regulation on antibiotic usage in agriculture (Kirchelle 2018:318). In 1971, the UK and EU banned the use of AGPs in chicken and other livestock farming (Godley, and Williams 2009; Landers et al. 2012).

The 2016 O'Neill report, 'Tackling Drug-Resistant Infections Globally: Final Report and Recommendations—The Review of Antimicrobial Resistance' has played a key role in highlighting the gravity of AMR, not only in the UK but globally. Besides providing the grave estimates that "by 2050, 10 million lives a year and a cumulative 100 trillion USD of economic output are at risk due to the rise of drug resistant infections," the report also provides

recommendations of potential ways to tackle the problem of AMR (O'Neill, 2016, p. 4). A key point from the report's assessment is the way it makes clear that solutions against AMR in food systems require active input from not only the healthcare sector but other actors such as regulators, processors and retail. See Hughes et al., (2021) for a recent analysis of corporate engagement with AMR following the O'Neill report release.

6.3.5 Antibiotics in British chicken

While the ban on use of AGPs in The UK came in 1971, the intensive chicken production systems had begun a process of reducing antibiotic use prior to that with Sainsbury, a major retailor greatly influencing the process (Godley & Williams, 2009). Sainsbury essentially insisted that its chicken meat suppliers be more vigilant about the quality and standards of their product and processing practices, and "wouldn't allow them to use any form of penicillin or antibiotic in the chilling process, emphatically warning them not to do so" (ibid 2009, p. 288). This probably had a huge effect on the use of antibiotics in the chicken industry since Sainsbury had essentially engineered the supply chain that saw frozen chicken becoming a regular commodity in a supermarket.

The use of antibiotics in farming, especially intensive chicken farming, has continued in the UK. As Audrey Kley, the chicken grower whose interviews I used for this study stated

> *you cannot rear a bird sort of, you know, well without coccidiostat in the food, because the bird is very vulnerable at that time to getting coccidiosis, and you can have a mortality of 100 per cent if they've got a good, you know, dose of it, depending on how many...*

(Audrey Kley[53], UK chicken grower)

[53] interviewed by Polly Russell in 2003 for the Food: From Farm to Sale Point project for the British Library

The coccidiostat in the feed had the prophylactic effect of keeping chicken diseases such as coccidiosis at bay. Use of prophylactic antibiotics in feed was apparently acceptable and continues to be so. This statement was made during a discussion about organic chicken farming which Audrey believed had to be totally antibiotic free, an impossible fit according to her. She would go on to share how some organic chicken farmers actually bought her own chickens, raised with antibiotics, and sold them off as organic chickens.

Studies have indeed shown that chicken farmers' use of antibiotics will depend on other farm factors such as farm conditions, and farmers' interactions with veterinarians (Roskam et al., 2020). This view of better animal husbandry being a way to reduce antibiotic usage in chicken production was also expressed by Fred Duncan, a food processor with chicken and pig farms, also interviewed by Dr Polly Russell

Fred: *we were the first to take out antibiotic growth promoters out of our chicken feed in the industry*.

Polly *:But is that a welfare issue or is that a food, a sort of public safety issue?*

Fred: *That's a public safety issue. Not a welfare issue. Well, not a welfare issue because you could argue that antibiotics could be to the advantage of the animal in certain circumstances. But we try to avoid the use of it by using different, better husbandry methods and I think that is the right way forward.*

(Fred Duncan[54] UK food processor and Polly Russell, interviewer)

[54] interviewd by Polly Russell in 2003 for the Food: From Farm to Sale Point project for the British Library

The debate on whether antibiotics are better for the chicken's welfare remains a chicken and egg debate. A publication by Ruth Harrisson in 1964, which some have described as an expose on battery animals and intensive farming systems, presented the argument that if the welfare of chickens were improved, the incidence of disease would be so low as to not warrant the need for the prophylactic antibiotics that Audrey insisted were essential (Harrison, 2013).

6.3.6 Antibiotic use in Zimbabwe

There is very limited information on amounts and patterns of antimicrobial use in humans and animals in the country, despite evidence of widespread use. The partial information available through records tends to be incomplete thus making collation and analysis difficult (Zimbabwe Antimicrobial Resistance Core Group., 2017).

6.3.7 Antibiotics in Zimbabwean Chicken

Antimicrobials are used in Zimbabwean livestock sector for treatment of disease, and prophylactic application. However, unlike in the UK, there is still usage of antimicrobials for growth promotion, particularly in poultry and pig production. AGPs used in poultry include colistin, bacitracin and, virginiamycin, while the coccidiostats monensin is added to poultry feeds (Zimbabwe Antimicrobial Resistance Core Group, 2017). Tetracycline and penicillin are the most commonly prescribed antimicrobial in livestock. All chicken growers interviewed in this study were aware of antimicrobials, although at varying levels of awareness and experience with using them. The most mentioned was oxytetracycline and on a visit to one of my participants, I observed chickens being treated with the powder form of the drug (see Figure 6.2). The chicken grower, John, stated that

they had developed wounds around the eyes. Table 6.4 shows other antimicrobials used to treat Common poultry diseases in agriculture in Zimbabwe.

Table 6.4 Common animal diseases and antimicrobials reported used in agriculture in Zimbabwe according to results of FGD of active animal health and industry professionals

Animal species	**Common Diseases in this species (FGD)**	**Antimicrobials commonly used in this species (FGD)**
Layers/Broilers	Infectious Coryza E.coli Infectious Bursal Disease Salmonellosis Fowl Pox Respiratory illness Pasteurella	Anticoccidials Tetracyclines Sulpha drugs Tylosin Baytril
Indigenous chickens	Coccidiosis, worms Infectious Bursal Disease Fowl Typhoid Infectious Coryza Fowl Pox Pasteurella	Tetracyclines Sulpha drugs Tylosin Baytril

These antibiotics are sold over the counter at farm goods and veterinary medicine shops such as Farm & City and Fivet. An assessment by the World Organisation for Animal Health (OIE), of which Zimbabwe is a member, noted that easy access to antibiotics could create a chance for abuse and misuse (Zimbabwe Antimicrobial Resistance Core Group, 2017). Studies have shown that although farmers in Zimbabwe generally tend to practice good antimicrobial use, there were instances of famers not adhering to the manufacturer's specifications (Munengwa et al., 2020). Breaches include using an antibiotic meant for other animal species to treat chicken or ignoring the dosage and frequency instructions. John, pictured above, shared that he just estimated the amount to administer to the sick chicken.

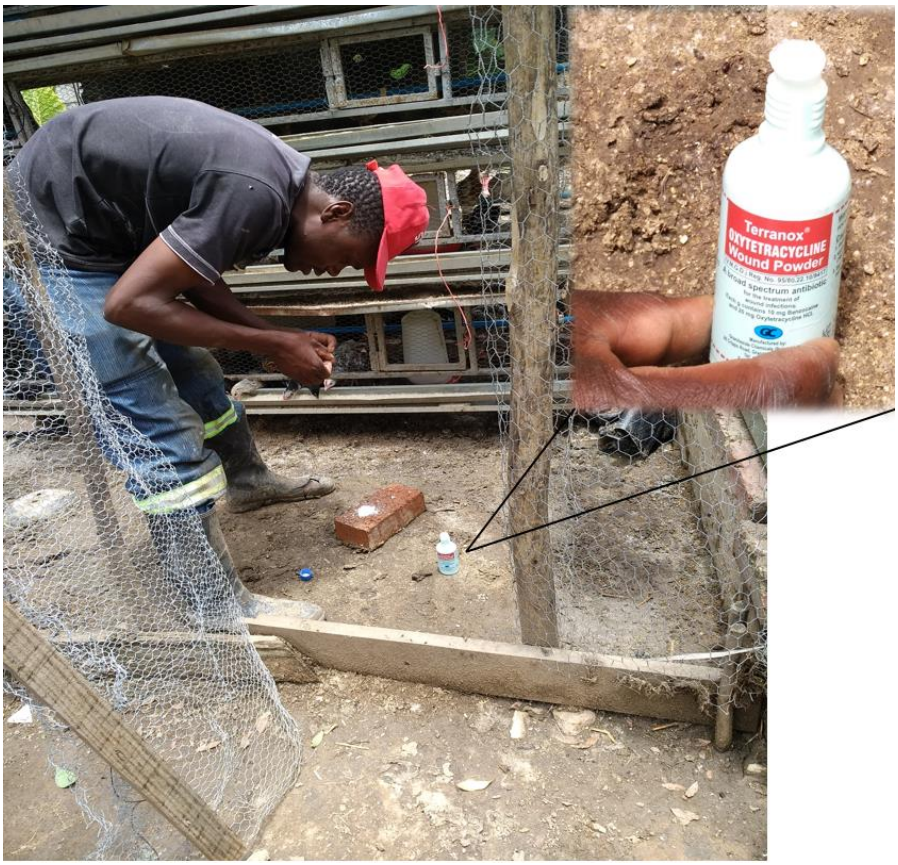

Figure 6.1 Backyard chicken grower, John Mukoma, administering oxytetracycline to sick chicken

Sharing of antibiotics among growers was also mentioned especially among backyard and small to medium scale farmers who tend to self-diagnose or consult other growers instead of calling in veterinary help. This is in a bid to avoid incurring costs for the veterinary services. Another growing trend is the reliance on peers (fellow chicken growers) online for assistance with diagnoses. A mentioned in chapter 3, chicken growers in Zimbabwe, created group chats on the online messaging platform WhatsApp. While the main activities are marketing of chickens, and related inputs, in my participation in such groups, I witnessed some growers seeking advice on diseases by posting photos of their chickens, or describing the symptoms presented by their diseased chicken. The 'diagnoses' from such interactions often lead to farmers purchasing the medication or antibiotics to treat the chickens, all without consulting veterinarians. Rutsaert et al.,

(2013) discussed the increasing usage of social media as a source of knowledge. This has implications for safety since there are usually no efforts to verify the posted information nor control over how the medications are administered.

A study by Munengwa et al 2020 revealed more examples of practices in AMU by farmers, influenced by their knowledge levels;

> *The majority of the respondents (64%) had the general misconception that antibiotics can treat viral diseases. The greatest proportion of farmers (51%) believed that increasing antimicrobial dosages improve treatment effectiveness. About 44% of the respondents did not know that prescription-only antimicrobials should only be used by a veterinarian or under his or her supervision. Similarly, most of the farmers believed that there are no side effects associated with using antibiotics on animals. Regarding the use of expired antimicrobials, 71% of the farmers were knowledgeable that they should not be used*

(Munengwa et al 2020:77)

These practices are concerning as they encourage AMR which is already being reported in Zimbabwe.

6.3.8 AMR in Zimbabwe

Concerns for AMR in Zimbabwe continue to grow since antibiotic use in the country is widespread in both humans and animals. In May 2015, the World Health Assembly adopted the Global Action Plan on AMR and since then, Zimbabwe set up the AMR National action Plan with the first step being a situational analysis (Zimbabwe Antimicrobial Resistance Core Group, 2017). There is limited surveillance of AMR in Zimbabwe but studies are revealing resistance to common antibiotics such as amphicillin, tetracycline (Makaya et al., 2012; Mhondoro et al., 2019). AMR in Zimbabwe particularly poses a great threat due to the high number of people living with chronic infections such as HIV which make them susceptible to opportunistic in such as diarrheal campylobacteriosis. A study by Simango (2013) showed that the antibiotic co-trimoxazole normally used for HIV patients as prophylaxis against *Campylobacter* infections was losing

effectiveness due the use of Bremamed TS1® in animals, an antibiotic so similar to cotrimoxazole, that AMR was registered (Simango, 2013). Bremamed TS1®, like many other antimicrobials, can be purchased in veterinary shops without a prescription, thereby increasing opportunities for misuse and abuse.

Besides direct effect on human health, AMR also poses a direct threat to animals as they may also carry resistant disease causing bacteria. For chicken in Zimbabwe, some tested isolates from avian pathogenic Escherichia coli (APEC) showed resistance to multiple antimicrobials such as "tetracycline (100% resistance), bacitracin (100% resistance), cloxacillin (100% resistance), ampicillin (94.1% resistance), as well as ciprofloxacin (100%) and gentamycin (97.1%)" (Saidi et al., 2012). APEC is responsible for illnesses such as Colibacillosis which can result in major economic losses for chicken growers.

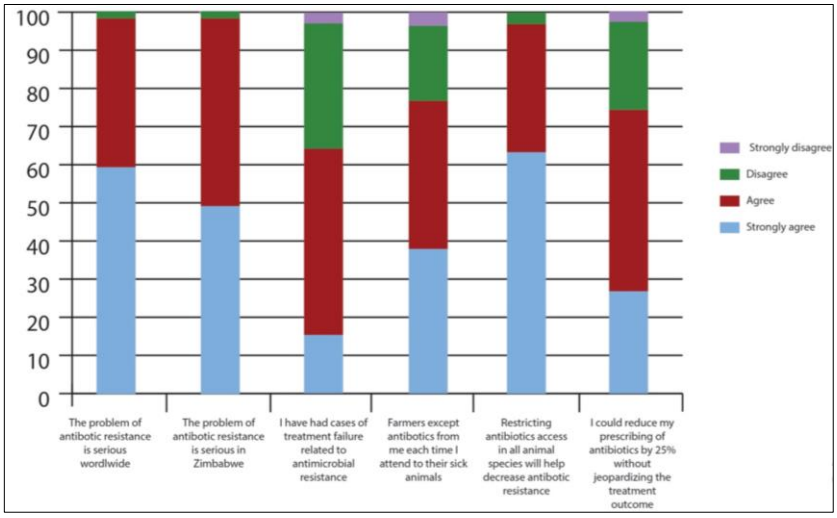

Figure 6.2 Knowledge, attitudes and beliefs of veterinary doctors (Source Zimbabwe Antimicrobial Resistance Core Group, 2017)

In a country where many bacterial infections are being treated without the establishment of an antibiogram[55] (Saidi et al., 2012), the risk of AMR is only growing and will need require action from all actors involved in the meat production sector. Veterinarians are a key part of the puzzle as they are responsible for prescribing treatments, especially in large scale commercial farming set up. Figure 6.3 shows the knowledge, attitude and perceptions of some veterinarians surveyed as part of the situational analysis carried out by the Zimbabwe Antimicrobial Resistance Core Group. While nearly all veterinarians are aware of the global challenge of AMR, there appears to be a few who do not acknowledge their contribution to the issue or how they could improve the situation. This may be due to the possibility that for some, this has become an economic issue as they allegedly get commission from drug suppliers (comments from chicken grower interviewed in Harare). There is therefore a need for better monitoring, control and awareness building around the use of antimicrobials in agriculture and as well as in humans because the threat of AMR is already a reality.

6.4 Biosecurity in chicken growing spaces

A commonly referred to term and practice in agriculture and disease management is biosecurity. Hinchliffe and Bingham (2008) discuss how biosecurity has been used to define practices such as a) the attempts to keep healthy livestock from diseased ones in agriculture, or b) attempts to prevent importation of foreign species into a space where they cause damage to native local species, and c) the preventative measures to stop the spread of biological weapons in terrorist attacks. The common thread in these definitions is the separation of one, undesired, life form from another, protected or important, lifeform, through active and conscious decisions and practices.

In chicken growing spaces, biosecurity generally refers to the practices implemented towards the reduction of risk of introducing diseases and disease agents into the farm from external sources, or

[55] a collection of data usually in the form of a table summarizing the percent of individual bacterial pathogens susceptible to different antimicrobial agents https://www.merriam-webster.com/medical/antibiogram

spreading them between different locations within the same farm or homestead. External sources may include wild birds and animals, suppliers, or even ordinary visitors coming to the premises. It is therefore an important factor for disease control in poultry. Some argue that biosecurity is the best strategy to prevent the colonisation and spread of *Campylobacter* in poultry farms (Hermans et al., 2011). The FSA and Defra provide guidelines for chicken growers in the UK to follow while for the Zimbabwean growers there are biosecurity guidelines published government, as well as private actors like Irvine's. I therefore found that when it comes to biosecurity in commercial chicken growing spaces, it is not necessarily lack of information, but rather the context of the chickenscapes in which the growers find themselves in, that inform and shape practices in these spaces. There have been many studies on on-farm biosecurity practices, particularly in the UK with respect to the spread of diseases therefore the following sections focus more on the Zimbabwean case.

6.4.1 Biosecurity for the social farmer

In November 2017, I attended a farmer training session in Harare titled Disease Management through use of Ethnoveterinary Methods. The training was offered by the Zimbabwe Free Range Poultry Association (ZFRPA), a non-governmental, farmer led group championing local production of free-range poultry at commercial level. In Zimbabwe, such birds tend to either roam freely in open air around the farmer's property or in demarcated sections of the property as farmers try to mimic a traditional "road runner" experience'[56] for their flock. While the non-confined lifestyle might be healthier for the birds in terms of reduced chances of proximity induced disease transmission, it can also expose the chicken to multiple sources of disease and other predators. The facilitator, introduced the session on biosecurity and diseases by saying;

[56] The road runner refers to the indigenous breed of chicken in Zimbabwe which is traditionally raised in unconfined spaces with the freedom to *run* around.

I should say step one is just keep infections out. Don't let your neighbour's chickens roam freely on your property in the spirit of being the generous or understanding neighbor. I know you lady farmers are the main culprits! You get so proud and excited about your growing project that you want to show off to all your neighbours and friends inviting them to come over and see your chickens. That is dangerous. Why do you think you can't just walts into Irvine's at your will? They know that visitors can bring diseases!"

(Mrs Jiji: poultry farmers training, 10 November 2017)

Mrs Jiji went on to explain how visitors and even other residents on one's farm or property may introduce disease and bacteria carried from other poultry to one's flock if allowed to interact with them. Some socio-cultural practices of social interaction or hospitality were highlighted and questioned as potentially risky breaches of biosecurity. For instance, a simple 'how are you doing' question posed by a guest may result in a tour of one's property or in this case, farm, to show the inquiring guest the host's success, progress, or lack thereof. A visit to the chicken housing, especially if they are equipped with the latest locally available technology such as automated drinkers, capped by the guest getting to hold a chicken or two to *feel* how big and heavy they are is a possible part of such a visit. Most of the farmers in Mrs Jiji's session confessed via confirmatory nods that they had at some point been guilty of such behavior. This scenario is a typical case where social and cultural context within which growers operate influence practices in these spaces. It also questions the earlier discussed notion of biosecurity as a matter of physically separating the wanted life forms from the unwanted. Hinchliffe et al., (2012) challenge this border/ wall building approach by discussing the complexity of separating small or invisible life forms like bacteria, or the complexities of bacteria that may already reside in the desired lifeform as is the case with *campylobacter* in chicken gut.

The concept of disease or bacteria carrying vectors is something that some of the growers in this study were mildly aware of yet not fully grasping the extent of potential impact on their chickens. When it comes to incoming traffic to their property, most medium scale and backyard chicken

growers are more concerned about robbers, than some invisible infection. Majority of the growers I visited had either a security guard at the gate asking for my name and the purpose of my visit. Post introductions, I would be given a tour of the chickens, their housing and in two cases, I was even shown the freezer full of frozen dressed chickens. In hindsight, I realise I was probably one of the worst visitors to allow onto the property given that I was sometimes visiting two growers in the same day. Most such growers would have a cat or two on the farm to keep mice, another potential vector for infections, away but hardly any other measures in place to prevent transmission of bacteria and diseases from humans or other animals.

It was also common to see multiple family members, and at times customers being allowed to enter the chicken houses of backyard growers. Mrs Nhowe would let a curious nephew join her into the broiler housing at feeding times because he was fond of animals and enjoyed playing with the little chicks. If a young customer came by to buy a live chicken, a teenager sent by their mother for example, Mrs Masoko often let them go into the chicken shed and catch the chicken themselves. They were after all better at chasing the chickens around and would get the chance to pick the biggest sized bird(s). Granted at this time, five to six weeks old, the broilers were less likely to succumb to serious infection before they were sold off, but this was still a risk. When I asked Mrs Masoko whether she was worried about diseases coming from the visitors, she explained that she had never dealt with any illnesses in her flock once the birds reached sale age.

6.4.2 Why biosecurity?

Reasons for this rather relaxed approach to biosecurity could vary. From my discussions with my interview participants in the backyard grower category, I realized that majority were just not aware of the risks posed by humans' interaction with their flock. Only three participants mentioned the word biosecurity. Mrs Tsamba had learnt of the word from her nephew, an employee of a major chicken company, who had helped her to set up her chicken growing, Tichaona had been advised about it by the sales representative from the new chick supply company that his employer was buying their day -old-chicks from, while Mrs Chirombe, a retired teacher recalled having read about it somewhere. Interestingly, despite this awareness, none of the three had necessarily set up biosecurity measures according to the supplied knowledge. However, a closer look at some of the

observed and reported practices showed some diligent efforts to ensure a clean environment for the chickens, especially the caged broiler chickens.

A shared view among all broiler chicken growers was that a broiler chicken cannot survive in an unclean environment. What this understanding translated to in practice included the emphasis on ensuring the feeding and watering troughs were frequently cleaned. Mrs Nhowe claimed she washed her drinkers "every other day, early in the morning before putting in fresh water". The floor bedding in the chicken housing also had to be changed, turned or refreshed whenever it got too dirty or too moist from the chicken droppings because "pests love that moist straw" (Mrs Masoko). A common practice I observed was the use of dedicated footwear for entering the chicken housing. According to the FSA and Defra in the UK, this is one of the "most effective methods available for controlling the transmission of pathogens on footwear" (FSA, 2006). All of the participants had a set of shoes, usually a worn-out pair, set by the entrance to the chicken housing. The reason for this dedicated footwear practice however, had nothing to do with pathogens but rather a solution to prevent spoiling the participants' other, better, shoes with chicken droppings.

This idea of knowledge forms, their sources and their implication for practice is a thread I continued to notice in many of my interactions with the participants at various scales. Among chicken growers, knowledge seems to be something one acquires or builds on from experience, and discovery over many years of practice. None of the backyard growers had ever attended any training on chicken rearing yet 80% of them had successfully raised chickens for commercial purposed for many years. A discussion on knowledge forms and sources follows in chapter 7 of this thesis.

6.4.3 Higher stakes, higher (bio)security

For the larger chicken breeding and processing companies in Zimbabwe, the approach to biosecurity is stricter. A visit to Irvine's, the largest chicken company in Zimbabwe, invites thorough scrutiny and safety procedures as I learned during my visit. At the main entrance to the premises, I had to go through a mini interview with two security guards, which only ended after a

call from the main office confirmed that my name was in the appointment book. A question regarding my previous whereabouts was brought up to ensure that I was not coming from another chicken growing or processing environment. This was then followed by a thorough wash of hands and dip of my shoes' soles into a disinfected bath, just to be allowed access to an office where I would conduct my interview- with an employee, no chickens in sight. Numerous efforts prior to this day and during this interview to seek access to the company's production spaces were denied as the company was still recovering from the Avian Influenza outbreak discussed in the previous chapter. That level of security and preventative measures is similar to what I observed at Surrey Huku[57], another large chicken meat processing company I visited. The vehicle I arrived in had to be sprayed with some disinfectant before driving into the company's premises. The long driveway to the offices was also punctuated with disinfectant dips for the wheels. Implementation of such strict biosecurity is perhaps essential due to the large size of workforce coming into contact with the chickens.

All these practices subscribe to what Hinchliffe et al. (2013) refer to as the "will to closure", which is the goal of keeping the disease causing agent away from the chicken through strict sanitation, surveillance and organisational integration. However, "a steady state of biosecurity - however much strived for - can never be reached" (Hinchliffe & Bingham, 2008, p. 1548). The experience at Irvine's Zimbabwe is testament to this as the company lost about 7000 birds to avian influenza before having to cull nearly 140 000 more, including their breeding stock (Daily News, 2017; ZPA 2018). At the time of this study, December 2018, investigations were still being carried out to determine the source of the infection. Suspicions of biosecurity protocol breach led the company to increase biosecurity measures at their other two sites. The company has since invested in employee training on biosecurity and safety, and also published articles on biosecurity in broiler production in their newsletter, Irvine's ChickenTalk.

[57] Surrey Huku is the chicken division of the Surrey Meat Group

At this point, I would like to draw attention to the fact that none of the backyard growers I visited reported any complaints regarding the avian flu outbreak that affected Irvine's. This is an important observation due to suggestions that low biosecurity practices in backyard chicken growing spaces are responsible for the spread of diseases. An article in Grains (2006) details how many governments targeted the small-scale backyard chicken growers in the wake of the H5N1 Avian Influenza outbreak in 2006. Egyptian officials in particular ordered the culling birds raised in backyards and on rooftops (Grain 2006)[58].

6.4.4 Challenges

The benefits of biosecurity have been widely studied (S. Smith et al., 2016b) and while many chicken farmers and companies appreciate the idea of improved health safety for their flock it brings, there are often challenges to its implementation. As earlier discussed in the case of backyard chicken growers in Zimbabwe, awareness or rather lack of it is, is a major factor in determining whether a grower follows certain biosecurity measures. It is essential that this awareness or knowledge goes beyond the '*what to do'* stage and includes explanations on *why and how* to observe biosecurity within their chicken growing practices. My discussions with some of my participants led them to understand how a single visitor could undermine all their efforts to keep infections out through diligent observance of hygiene.

Another major challenge for observing biosecurity is cost. During my ride along session with Mr Terera, a medium scale chicken grower, we visited a farm supply shop where he explained that prices of farm equipment and chemicals were constantly rising. On this particular day, he had gone in to purchase footwear and gloves for use in the new chicken housing he had constructed as an extension for raising more batches of chicken. In the space of a week, the price had more than doubled such that he could only afford a single pair shoes instead of the intended two, and no gloves. "They will have to share the gloves they currently have between the old housing and the

[58] https://www.grain.org/en/article/556-bird-flu-crisis-small-farms-are-the-solution-not-the-problem

new one until a payment I am expecting comes through," he said of his employees. Besides the price increases, one of Zimbabwe's main challenges at the time of fieldwork was a major shortage in hard currency or cash. With the majority of such goods being imported from South Africa and China, most shops were only accepting payment for goods United States dollars or South African Rands, in order to facilitate imports of future shop stocks. This economic situation is discussed in chapter 1, but the challenge for farmers was that a lack of USD cash often translated to compromises in some biosecurity practices. Mrs Nhowe, a backyard grower shared how she had at times used dish washing detergent to clean the drinking troughs in her chicken housing because she did not have cash to buy virakill, the recommended disinfectant. There is a risk of potential loss of chickens to diseases due to economically caused compromises in biosecurity standards. The growers appear aware of this and continue to rely on experience to raise a healthy flock. The value of growers' experience and past success is something Audrey Kley, the British chicken grower seemed to find more valuable in ensuring flock health than some of the regulated biosecurity protocol suggested by officials from the government.

Studies on disease management on UK chicken farms and homes (Karabozhilova et al., 2012) continue to highlight practices in these spaces. Given the continued experiences of outbreaks of disease despite all the advised biosecurity protocols, Hinchliffe et al.(2013) suggest an approach to biosecurity that acknowledges the interconnectedness of good (chicken, humans) and bad (pathogens, vectors) life forms; and works on culturing an environment where the two can securely core-exist without much destruction to the former.

6.5 Food safety

As the chickens go beyond the farm, or chicken shed in the case of backyard growers, we move into a phase of processing and retail, ultimately leading to consumers' interaction with chicken meat. While production standards were discussed in chapter 5, this section looks at the subject of food safety as the birds go through the transformative process turning them into meat, and ultimately into food. Food safety breaches in this part of the supply chain can pertain to many aspects including contamination with allergens during processing, faulty packaging, and labelling, and of particular interest to this study, bacterial contaminations which can lead to food poisoning.

6.5.1 The Case of Campylobacter

As alluded to in the thesis introduction, the decision to study chicken was partially influenced by the publicity around the role of chicken in the spread of *campylobacter* in the UK, around 2014 and 2015. In 2014, the FSA launched the Acting on *Campylobacter* Together (ACT) campaign which aimed to bring the whole supply chain together in fighting against campylobacter. Involving all actors in the supply chain was a more holistic approach after the agency's admission that "an initiative set up in 2009 to reduce the percentage of heavily contaminated chicken carcasses at the end of the slaughter process had little or no effect" (Williams, 2014)[59]. I introduced the implications of *campylobacter* for food safety and human health in previous chapters. In this section, I follow the chicken, as a potential vector for campylobacter, from the processing stages, through the retail sector, to consumer kitchens. By observing and analysing chicken handling practices in these various spaces, I explore the potential for invisible threats such as *campylobacter* bacteria to create food safety concerns. Although for Zimbabwean case, there were no direct *campylobacter* statistics on chicken meat for sale as in the UK available[60], I draw on observations from a collection of public and private chickenscapes in Zimbabwe and discuss how the handling of chicken meat may have implications for food safety.

When a bacterium outlives its host

As discussed in chapter 2, studies on *Campylobacter* contamination in chicken meat have revealed that live chickens can thrive whilst hosting bacteria yet human consumers of the chicken meat thereof can develop *Campylobacteriosis*, a sometimes-fatal condition. When a chicken is alive, the bacteria can colonise the intestines of the bird and may be transferred to the rest of the flock, and

[59] Williams, C. (2014) FSA renews efforts on campylobacter; Environmental Health News (published online 18-6-2014) http://www.ehn-online.com/news/article.aspx?id=11780

[60] A participant from a major chicken processing plant explained that were about to set up internal facility for testing for *campylobacter* on the chickens they process but these figures would not be available to external parties.

beyond, when faecal matter exits the guts. This can occur either naturally as the live bird passes out droppings or during processing stages of evisceration of the carcass. The former mode of transmission is what farmers and chicken growers try to contain with on farm biosecurity measures. The latter form of transmission is more complicated in that it poses a food safety risk to humans. By following the chicken from the stage of transformation from bird to meat, through to retail and even consumption, I studied chicken handling practices in these spaces to explore how the bacteria can outlive its host.

From bird to meat

To move from a live chicken to meat, the basic steps involved include killing or slaughtering the live bird, de-feathering it, and eviscerating it. However, in practice, depending on the context, the execution of these basic steps, and other additional steps deemed essential, tends to vary. In the UK, there are around 100 commercial processing plants with abattoirs. These are the main source of the British raised chicken sold in supermarkets. In Zimbabwe, on the other hand, commercial supply of chicken meat is via multiple pathways. Chickens are killed and processed by large-scale meat processors such as Irvine's' Zimbabwe or Surrey Huku; medium scale producers –usually a private farmer growing chickens and processing them on their farms to supply local butchers, restaurants or even supermarkets; or backyard growers selling to neighbours. Reviews of secondary data from the UK, and observations made in these chickenscapes in Zimbabwe, revealed some interesting insights and differences in the supposedly similar practice of processing live birds into chicken meat.

A key factor in determining how the processing proceeds is the volumes of chickens handled per unit time. For the large processing plants, live chickens are brought in crates of sometimes six or twelve chickens, stacked one on top of each other, on transportation trucks. Depending on the distance from the grower, chickens will defecate in transit or, while waiting to be off loaded, thereby releasing faecal matter, and potentially campylobacter, onto the other birds and into the environment.

Figure 6.3 Chicken processing plant in Zimbabwe (source: author in November 2017)

Volumes also determine the processing methods to be used i.e., whether manual, or semi-automated systems are used, as well as number of people involved. To process the thousands of chickens that they prepare for retail every day, the medium to large scale processors work with a conveyer belt system moving the chickens along various manual (e.g., hoisting, beheading, de footing, sorting, and chopping), and (semi) automated (e.g., hot water dip, plucking, rinsing, evisceration, cleaning, and chilling), stages of processing, as shown in Figure 6.4. This image was taken in the section of the processing plant where the eviscerated chickens emerging from the cold-water dip get their feet chopped off. They are then either sent for packaging as whole chickens or proceed to the chopping stages where many employees chop off designated parts of the bird and

sort the pieces for packaging. After this stage, the meat is sent to the chilling section for freezing. This system allows this processing company to process 16 000 chickens, per 8-hour shift.

The challenge in these high-volume production spaces is keeping the production line moving whilst maintaining stipulated standards of food safety such as those discussed in chapter five. In the previously mentioned 2018 Guardian newstory about 2 Sisters Food Group, the reported allegations included unhygienic practices such as throwing pieces of chicken that would have fallen to the ground back on to the production line for packaging (Guardian, 2018). Any bacteria or dirt from the floors of the processing plant was thus introduced to a batch of meat heading for packaging. The report also alleged the manipulation of kill dates[61] for some batches of chicken meat, so as to extend the legal shelf life of the meat. In some instance, meat slaughtered on different dates was allegedly mixed with freshly slaughtered meat, while meat returned from retailer distribution centres was said to be repackaged and dispatched again. Following the release of this report, accompanied by video footage depicting the allegations, the FSA launched an investigation into the operations within the processing plant, as discussed in Chapter 5.

In one of the processing plants I visited in Zimbabwe, there were large bins of chicken pieces waiting to be packaged. My tour guide explained that this was not their usual manner of operation as meat was not supposed to spend much time between slaughter and packaging. There was some ice strewn over the meat which he said they use to keep the meat cooled whilst awaiting packaging. This explanation however, suggested the chicken piece waiting bins were a routine step in the plant's processing line, and left me wondering whether the ice could sufficiently chill all the chicken. I had no other means of verifying the statements and explanations offered by the tour guide. This is unfortunately the reality with large to medium scale meat processing, that it all occurs behind closed doors. The consumer who is then presented with a packed product proceeds

[61] Kill date refers to the date of slaughter of the chicken and is used to determine the period in which the meat is safe to sell or consume

on the hope of good practice in the production line, verified - by food inspectors, and/or claimed by the processor – e.g., Irvine's Zimbabwe's "trust earned" company moto.

Figure 6.4 Dressed chicken from a backyard grower (left) and a medium scale processing plant in Zimbabwe (right) packaged and ready for freezing.

The backyard chicken growers in Zimbabwe work with lower volumes of production thus their processing tends to be more manual. For most growers, sales are usually one or two units per customer with a significant number of these being sold off live. Any of the remaining birds from a batch that is post six weeks old are then slaughtered. I described a typical slaughter day at a backyard grower's home in chapter 5. The chickens are thereafter frozen and later sold as dressed chicken. Figure 6.5 shows output from a backyard grower (a) and a processing plant in Zimbabwe (b), packaged and ready for freezing.

6.5.2 Clean section - Dirty section

Images from abattoirs and processing plants can be gruesome to view due to bloody feathers, blood and dead carcasses of once living beings. This was true of the video clips from the 2Sisters Food

group processing plant published by the Guardian in the UK. Similar scenes were observed at the processing plants in Zimbabwe as shown in figure 6.6

Figure 6.5 Dirty section separated from the clean section. Image from a medium scale processing plant in Zimbabwe

What was interesting to note these chicken processing plants was the strict separation of processing spaces into two sections with a cleaning water dip as the transition point. In one processing plant in Zimbabwe, they were literally referred to as the Clean and Dirty sections. All stages prior to the water dip are housed in the *dirty* section. According to their regulations, there may be no physical interaction between the two areas. Employees stationed in either area wear different coloured uniforms or may not cross over to the other section throughout the day's shift. The only thing allowed to cross this divide is the rolling conveyer belt of chicken emerging from the cleaning water dip. During my tour of the premises, permission to tour the full facilities was only granted on condition that we started in the clean area would not revisit it after the touring the dirty area. This is similar to the traditional form of biosecurity described by Hinchliffe & Bingham (2008).

6.5.3 Chlorinated chicken

Although other animal species can also asymptomatically host bacteria such as *Campylobacter* and move it around on their manure –encrusted hides, chicken may might be the top spreader of

the foodborne illness due to the fact that its skin, can be eaten with the meat (Greger, 2007). The cleaning cold water dip in Zimbabwean processing plants apparently also serves as the barrier for microorganisms invisible to the eye such as bacteria e.g., *campylobacter* as it chlorinated. This is a huge point of demarcation between the processing systems for the UK and Zimbabwe. Use of chlorinated water baths for chicken and other meats is prohibited in the UK and EU, while it is standard practice in Zimbabwe and other countries such as the USA.

According to Millstone et al., (2019), the EU's position is that chlorine should not be used on meat and proper hygiene and biosecurity practices in all prior stages of the supply chain leading up to processing stage should eliminate the need for chlorination. In Zimbabwe on the other hand, the chlorinated water dip is a routine part on the processing line just like in the USA. Critics of the chlorination approach, such as Monique Goyens, head of the Bureau of European Union of Consumers, advocate for intervening against the bacteria at each stage of farming rather than waiting for a chlorinated water dip at the end because "no chemical rinse will ever remove all bacteria from meat heavily contaminated as a result of poor hygiene" (Goyens, 2014)[62] . Other EU concerns include consumer opinions about eating chicken that has had a chlorinated wash. My fieldwork revealed that consumer attitudes in Zimbabwe seemed to be very trusting of the operations behind the processing plants' doors and had little to no awareness about the use of chlorine. A key point to consider is a study by Highmore et al. (2018, p. 9) that produced evidence to the effect that "the use of chlorine to decontaminate fresh produce is not only ineffective but permits virulent food-borne pathogens to reach the public undetected by standard methods". This is particularly important when discussing the issue of testing for *campylobacter* contamination on retail chicken further discussed in section on contaminated retail chicken.

[62] https://www.beuc.eu/blog/what-is-wrong-with-chlorinated-chicken/

In Zimbabwe, it is also common practice for consumers to purchase live chickens and process them at home. As discussed in chapter 4, reasons for choosing this option, instead of a dressed, ready-to-cook chicken, can vary. From ceremonial reasons, where a live chicken offered as a symbol of respect and welcome for an important guest, to religious -where one can ensure a *halaal* killing practice, and even economic as the consumer gets to keep and cook every part of the chicken, they deem edible- offal, feet, head- which are often sold separately. At two of the homes I visited during the kitchen visits phase of my fieldwork, I witnessed the participants slaughter live chickens for their own consumption

Figure 6.6 A participant slaughtering a chicken at home in Chitungwiza, Zimbabwe. The live chicken was bought from a neighbouring backyard chicken grower

Unlike the seemingly industrial or mechanical manner in which this process occurred in the commercial abattoirs, the home participants had a more relaxed approach to the activity. They also described it as a simple process; “all I need is hot water and a sharp knife. With a sharp knife it is a quick job, and you avoid soiling your feet with the blood of the chicken” (Mai Tino, stay-at-home mum of two, 32years old, participant). The reference to the feet becomes apparent when one sees the typical position assumed by many when slaughtering a chicken in a domestic setting. The bird’s wings are raised and made to touch the back of the chicken then placed under one foot of the person. The chicken feet, usually still tied together by a string that was meant to restrict the bird from running away, are then placed under the executioner’s other foot. This position apparently secures the bird, leaving the hands free to hold the knife and position the bird’s head and a neck for the fatal cut.

As previously mentioned, food preparation in the home, in Zimbabwe is typically done by women but as evident in Figure 6.7, it is common to have a male member of the household enlisted for the actual killing of the animal. In rural parts of the country where many families also own other types of livestock, a typical goat, or cow-slaughtering scene has only boys and men, no women. Interestingly, in the large-scale processers I toured, it was also male employees who slaughtered the birds. One participant explained that she always felt squeamish about killing a living creature and so always enlisted the help of her son.

Once the head is removed, the dead chicken is allowed a minute to bleed from the cut, sometimes held by the feet to let the blood drip out, before being dipped into a basin of hot water to start the feather plucking process. This process apparently calls for much dexterity because the furthers all have to be plucked off before the chicken cools down yet one should not keep the chicken in hot water for long else, they risk “cooking the meat in the hot dirty water” (Penelope Simboti, participant). One therefore requires the right amount of heat tolerance in the fingers, and speed, to de-feather the chicken. In both homes, and even at the home of a backyard grower, the slaughtering, de-feathering and the evisceration processes were performed outdoors and only a thoroughly cleaned, dressed chicken would be taken into the kitchen for further chopping. An actual physical separation of the clean and dirty areas thus. However, given the science behind

bacterial contamination of chicken meat during processing, the *clean* chicken can still potentially transfer bacteria from the dirty outside environment into the kitchen, as there is no chlorinated water bath involved in these at home slaughter sessions.

6.6 Contaminated chicken for sale

"Two-thirds of chicken 'has bug'" read the headline of BBC News article which claimed that two thirds of chicken meat for sale in the UK was contaminated with *Campylobacter* (BBC News, 2009). This was based on reports by the FSA who have been carrying out nationwide surveys to test for *campylobacter* contamination in retail chicken since 2001. The latest FSA led survey was a four-year long project with an annual testing and reporting frequency for *Campylobacter* contamination levels in whole, UK-produced, fresh chicken. Initial results found that nearly 70% of the chicken on sale carried the *Campylobacter* bacteria with more than 10% of the samples hosting above 1000 colony forming units per gram of meat (cfu/g). The goals of the campaign interventions such as ACT, mentioned in chapter 1, have been to lower this percentage even further. According to the FSA report for the final survey year,there has been a substantial decline in the levels of highly contaminated fresh, whole UK retail chicken (FSA, 2019)[63].

The FSA continues to work on strategies to reduce the *Campylobacter* contamination levels in UK retail chicken. One such strategy was the agency's decision to publish survey results for *Campylobacter* levels per retailer in what could be construed as a *naming and shaming* fashion. Figure 6.8 shows the percentage of chickens with high (1000cfu/g) levels of *campylobacter* in each of the named main retailers in the UK.

[63] https://www.food.gov.uk/research/foodborne-diseases/a-microbiological-survey-of-campylobacter-contamination-in-fresh-whole-uk-produced-chilled-chickens-at-retail-sale-y234

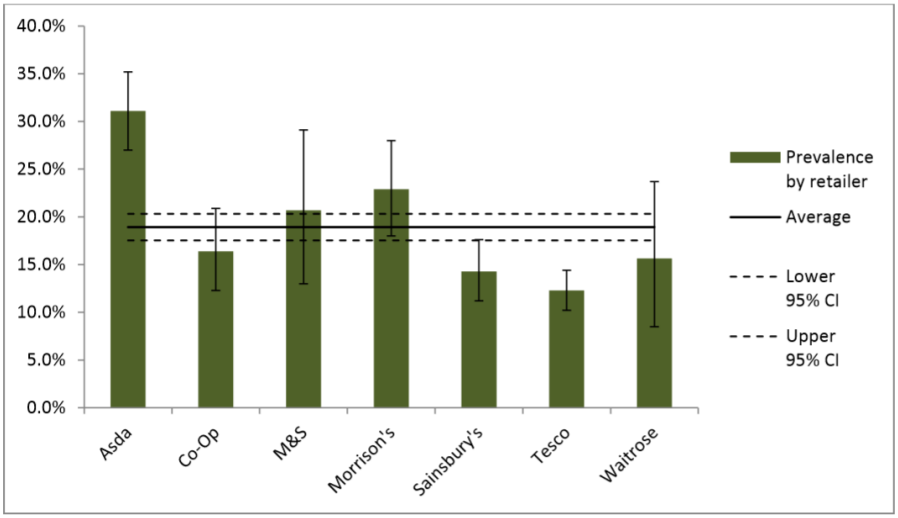

Figure 6.7 : Percentages of chickens with levels of campylobacter over 1000cfu/g (green bars) for the main UK retailers. Solid lines show the mean level > 1000cfu/g (Source: FSA)

The report advices caution in interpreting these results as the graph merely presents results of testing from the first three quarters of a year- long survey thereby acknowledging room for changes. However, the impact of such a visual cannot be underplayed. This controversial and debated approach served multiple purposes in the campaign against Campylobacter. For example, it moved *Campylobacter* from an abstract bacterium in the news to a tangible threat by giving it a location on the chicken in one's favourite supermarket. With reputations to protect, retailers increased their efforts to reduce *Campylobacter* contamination levels and continue to do so according to the declarations on some supermarkets' websites.

In September 2017 the FSA relinquished the *Campylobacter* sampling to the retailers who had to use FSA curated protocols and publish the results. As an independent quality check measure and perhaps to clear any scepticism around this self-policing approach, the FSA held a data gathering survey from October to December of 2018. The actual results for the average percentage of samples carrying over 1000cfu of *Campylobacter* per gram of meat from this survey were different from those reported by the retailers, 5.8% and 3.1% respectively. The FSA concluded that retailers had maintained reductions in contamination levels on the chickens for sale, relative to the results from the initial survey year. Differences in the results from the retailers were explained by

differences in samples sizes and testing laboratories employed. This move is the clear example of the FSA's move towards a more self-policing arrangement with business as discussed in chapter 5.

In the case of Zimbabwe, while there are no definitive studies to verify this, one could argue that levels of *campylobacter* contaminated whole chicken in major supermarkets are very low due to two major factors. The washing of the chicken in chlorinated water during processing and the subsequent freezing of both whole chickens some portioned chicken has been proven to reduce the amount of *Campylobacter* on chicken meat (Georgsson et al., 2006; Ritz et al., 2007). What may however be a source of great concern are the trays of chicken offal, which are sold fresh, not frozen. It is common to see trays of chicken livers, gizzards, hearts and even intestines in the cold shelves of many supermarkets. These products have a market in Zimbabwe due to their affordability relative to other chicken portions such as drumsticks or breasts or even whole chicken. However, as discussed earlier in this chapter, *campylobacter* tends to reside in the gut of the chickens therefore offal meat is more likely to be contaminated than other parts of the chicken. There is therefore heavy reliance on the chlorinated water to get rid of the bacteria during the cleaning process.

In the UK and other EU countries, some studies have revealed evidence of *campylobacter* on the packaging containing the fresh chickens for sale thus posing a risk for cross contamination onto all surfaces that come into contact with the chicken and its packaging, including the shopping baskets or trolleys, other groceries, and consumer hands (Burgess et al., 2005). This idea of carrying potentially contaminated food, and associated risks, from a supermarket into one's home almost beckons the retailers' extra efforts to list advice on handling raw chicken meat safely on their websites and perhaps more visibly, the DO NOT WASH RAW POULTRY stickers attached to chicken meat from ALDI supermarkets in 2016 (figure P.1 in the preface). This leads to the next section on chicken handling practices by consumers as I follow the chicken into consumer kitchens.

6.7 Consumer behaviour: chicken meat handling practices in the home

When a consumer brings home a chicken from the supermarket at the with potentially high *campylobacter* contamination levels, they are automatically increase the risk of food poisoning before even opening the package. This fresh food is an automatic food safety risk while the kitchens become arenas of struggle. The heightened awareness of risk is evidenced in responses offered by some British consumers when questioned about how they handle chicken meat. According to two separate national studies involving randomly selected British consumers, the Food and You survey(Prior et al., 2011), and the Kitchen Life Study project (Wills et al., 2013), which recorded reported and observed meat handling practices by consumers, majority of the participants viewed chicken meat as something to be handled with care be it in cleaning, cooking, consumption, and even storage. The reasons behind these perceptions and subsequent courses of action vary depending on the knowledge form from which the consumers draw their logic.

The FSA and retailer instructions on the packaging for British supermarket chicken advise against washing raw meat as this poses potential risk of cross contamination with *campylobacter* within the kitchen. However, over 40% of the participants in the Food and You survey, reportedly always washed their poultry before cooking. Participants from the Kitchen life study articulated there being a need to clean the meat from either residue or blood from the processing stages. The perception of cleanliness of the meat after removal of blood and residue mattered more to the consumers than the food safety risk posed by the invisible *campylobacter* bacteria. The elderly were participants were more likely to wash their raw chicken before cooking, suggesting a generational knowledge that could not be easily overridden by the expert or scientific advice from the FSA.

According to Prior et al (2011, p. 24), washing of raw meat was also found to be "a more common behaviour among respondents belonging to non-White ethnic groups, 63% of whom said they always did it, compared with 38% of White respondents" suggesting a cultural or heritage-based knowledge form in at play in contradiction to the scientific knowledge from the FSA and retailers. This argument could be supported by the observations I made in Zimbabwe during my kitchen visits as well as the feedback I received online from Zimbabwean consumers. Raw meat is always

washed before cooking, to clean the meat. This washing was sometimes a natural extension of the cleaning process after a consumer slaughtered the chicken at home as previously described, but even store-bought meat was always washed because "you never know who touched it or how it was packed" (Runyararo, interviewee). The influence that knowledge bases (personal, cultural, experiential or scientific) inform or translate into practices has clear implications for food safety.

Figure 6.8 Participant in Zimbabwe chopping a freshly slaughtered chicken into pieces for cooking

Beyond the dos and don'ts of washing raw meat, consumers also face potential risk of cross contamination during preparation of the meat for cooking for example cutting it into smaller portions or performing other pre-cooking activities such as marinating the meat. Figure 6.9 shows (Mai Tino, a 32-year- old participant handling raw chicken meat prior to cooking.

This involved chopping the chicken into smaller pieces, which were then *washed* before going into a pot for cooking. The whole process was carried out with an ease that contrasts the squeamishness that some consumers in the UK have developed over handling of raw meat (Audrey Kley, UK chicken grower interview). While the squeamishness may reflect anxiety about contamination from the raw meat (Jackson, 2015), the is also a question of knowledge and skill that the UK consumer does not possess but the Zimbabwean consumer has acquired due to the differing existing chicken meat supply pathway. The utensils used included a couple of basins and a knife which were all later rinsed with soapy sponge, under a running tap water during the clean-up process. Mai Tino explained that this was her usual cleaning up process when cooking and she would do the same had she cut beef, or tomatoes.

6.8 Conclusion

The growth of the chicken growing sector in both countries has been remarkable. I discussed the shifts in technology and knowledge that have enabled such transformation from a typically backyard activity in the early 1940s to its current intensive production status in just over half a century. Unfortunately, the intensive production system has been fraught with challenges particularly increases in incidence of disease. While common disease outbreaks have been recorded globally, e.g., Avian Influenza, Newcastle disease, the experience and management of disease has been varied depending on the chickenscapes. This was highlighted in the discussions on use of vaccines, antibiotics, ethnoveterinary medicines and in the approaches to biosecurity.

The breeding stock for Cobb 500 broiler breed which is grown in Zimbabwe is imported from the UK and according to Irvine's Zimbabwe, the breeding practice, and vaccination schedules they use follow the system used in the UK. Therefore, up to the day-old chick release stage, the practices are quite similar. This has been necessary for the success of the breeding program. The stages after

this, however, are subject to the chickenscapes contexts, which are quite different between and within the case study countries. Discussions with the backyard broiler chicken growers revealed that they do not perform any further vaccinations at home, despite the advice from the chick supplier. This observation is similar to findings by other studies on backyard chicken production (Gororo & Kashangura, 2016b; Kelly et al., 1994a). Reasons given include the cost purchasing extra vaccinations which are often sold in quantities suited for larger husbandry operations than the average 50 birds per batch that most keep. There was also the confidence in the vaccines that the chicks receive at the hatchery. Most backyard growers also argued that they had not experienced any challenges with their chicken that they could attribute to lack of vaccines. Medium and large-scale broiler chicken growers tended to observe strict vaccination regimes. Evidence showed that the reduction of risk of loss to disease, and in the case of contract growers, requirements by the processor, were common driver.

Similar dynamics were observed regarding biosecurity. The biosecurity measures implemented commercial growers' premises were stricter and cognisant of the larger risk presented by potential outbreaks of disease. However, as Hinchliffe et al., (2013) argue, even the best of biosecurity measures cannot guarantee complete safety from disease and vectors. Commercial chicken farming, particularly intensive production relies heavily on antibiotic usage. While EU regulations have controlled the use of growth promoting hormones in the UK, the upcoming Brexit might see some re-negotiation of agricultural regulations. In Zimbabwean chickenscapes, antibiotic use is less controlled. Evidence of misuse of antibiotic misuse was also found in cases where growers administered estimated dosages or used antibiotics to treat diseases they were not listed for. The implications for food safety from such practices are already being noted in the country as studies show a growing antimicrobial resistance to the antibiotics by strains of *campylobacter* (Simango, 2013).

The parallel husbandry of indigenous breeds for meat in Zimbabwe presented a different chickenscapes to study. The small-scale husbandry practises that have been associated with these breeds until recently, did not observe the biosecurity nor vaccination advice prescribed for the broiler. The higher resilience to disease that indigenous breeds alleged possess also meant little or

reliance on antibiotics. In their stead, was, and is, the treatment and prevention of various chicken diseases via ethno-veterinary practices that make use of natural herbs and plants. In light of the growing global challenge of AMR, ethnoveterinary medicine might prove essential. Studies are continually being made to test the efficacy to these alternative medicines (Mwale et al., 2005). Successes in this trajectory would see an interesting and crucial departure from the systemic conventional flow of knowledge from the Global North to the Global South.

This promotion of a bi-directional flow of knowledge is essential because the conventional trends are not without issues. An observed growth in the husbandry of indigenous chickens to meet an equally growing demand for their meat reminds one of the trends that led to the current prominence of the broiler chicken. While a boost to the indigenous breeds population is a good development, some of the extensive, and sometimes intensive broiler husbandry practices that being gradually adopted into the indigenous chicken husbandry sector can be likened to the descriptions of the development the UK broiler sector shared by in the life story interviews of Audrey Kley (UK grower) *[64]and Fred Duncan (UK meat processor) *, and from literature (Godley, 2014). There might therefore be a need for some governance, as well as cautious considerations and reviews, of the lessons learnt from the trajectory of the broiler chicken industry, especially on subjects of diseases and food safety.

The theme of multiple and arguably essential knowledge forms, and how they shape practices, is also prominent in the previous section of this chapter, which addresses the food safety in the processing of chicken and handling of raw meat. The processes involved in the domestic chicken slaughter process (and the backyard grower and at customers) contradict the FSA's advice to refrain from washing raw meat. Based on the scientific understanding about the cross contamination the FSA's advice is rationally sound, yet in the chickenscapes at hand, other contextual/empirical, cultural, social and experiential factors form a knowledge that provides a

[*]both interviewed in by Polly Russell in 2004

rationale for the practices at hand. Food safety studies often point to erroneous food handling practices by consumers as the weak link in an otherwise food supply chain but as the evidence reflects it is essential to examine the basis of different forms of knowledge. Similar conclusions were reached by Meah et al., (2014) who also highlight the importance of such considerations in policy making.

7 Conclusion

In this final chapter, I draw together and synthesise the findings and contributions of this thesis. I begin by revisiting the aim of the study and the research questions I set out in chapter 1, evaluating how they have been addressed and highlighting the key findings. I then build on this to outline the main contributions of this thesis. In section 7.2, I present a concluding discussion and summarise the contributions of my thesis to academia and to policy and practice. In the final section 7.3 I identify potential avenues for further research and discuss future dissemination of the work.

7.1 A Return to the Research Aim and Questions

7.1.1 Exploring Practices in chickenscapes

When I began this study, the purpose was to *explore chicken meat supply chains in order to understand the implications for safe chicken meat supply and consumption*. The aim here was to learn how chicken meat, like the one that had triggered my curiosity in that Sheffield supermarket, came to be including where, by who, and how was it being grown and processed. Also key, was to understand how answers to these questions affected the quantity and quality (particularly safeness) of this globally consumed meat.

Although I scoped my study to address the UK and Zimbabwean case studies, I tried to maintain a sense of explorative open mindedness by employing a qualitative research approach and opting to *follow chicken* along the whole supply chain but given its ubiquity, spanning across spaces, and the complexity of its supply chain, as depicted by figure 1 from Watts (2004b, p. 44), I decided it would be better to use the concept of *chickenscapes*. While 'following the thing' is a research methodology, adapted from Appadurai (1986), the concept of chickenscapes is an extension of the same author's identification of multiple 'scapes' (ethnoscapes, mediascapes etc) in his work on *Modernity at Large* (Appadurai, 1996, p. 33). These ideas have been applied to the study of 'foodscapes' by several authors (Brembeck et al., 2013; Dolphijn, 2004; MacKendrick, 2014). I then went on to outline the various 'chickenscapes' I had encountered in both my preliminary work in the UK and my fieldwork in Zimbabwe. The descriptions of chickenscapes presented in chapter

2 highlight the inter-connectedness people, places and resources, as well as the influences of contextual factors such as a) cultural norms e.g., women in Zimbabwe tending to be responsible for care of chicken in family settings, b) economic or political environment of a nation, c) advances in knowledge. The idea of chickenscapes proved to be a useful way of identifying the interconnections that exist at different scales and in different places (such as in backyard chicken rearing, industrial scale chicken processing plants and medium scale farms). Rather than discussing these places as isolated, the idea of scapes enabled me to focus on flows and connections between places (and the people and practices through which they operate) and the themes that cut across these sites.

7.1.2 Practices and their implications

To achieve the aim of the study, this thesis examined the following research questions, which were introduced in chapter 1;

What factors inform practices in spaces of human – chicken interactions during food production, processing and consumption of chicken and chicken meat in the UK and Zimbabwe?

What implications do these practices have for meat supply and for food safety?

How does a 'follow the thing' approach help to address these questions?

With these questions, I sought to determine the factors shaping the practices within the identified case studies; and understand what these factors meant for the supply of adequate and safe chicken meat. Using the concepts of chickenscapes and following-the-thing, introduced in chapter 2 and developed in chapter 3, I managed to collect empirical material from ethnographic observation and interviews as well as assembling the documentary, audio, visual and online data presented in the section on chickenscapes. From the ensuing data analysis, described in chapter 3, I argued that three core factors inform practices within chickenscapes in my study areas: Valuation, Governance, and Managing Disease. These three themes formed the core of my analysis in chapters 4-6, as I explored and expanded the discussion on each of the topics, using both empirical data and existing literature.

7.1.3 Valuation

In chapter 4, I discussed Valuation as a factor influencing practices in the studied chickenscapes. I began by positing that we are constantly performing acts of valuation with everything we encounter or in every scenario we find ourselves, to echo Helgesson and Muniesa (2013). Explored through the *Registers of values* concept by Heuts and Mol (2013), I argued that the value that people/ society place on chicken or chicken meat, has implications for how they treat or interact with it. Based on the analysis of my research material, I identified six registers of value, each representing a category of valuation criteria that the participants in the various chickenscapes relied on to make decisions. These were the Monetary register, Sensory register, Health register, Standards register, Convenience register, and Sociocultural registers of value.

Monetary registers of value cover criteria such as the cost of producing or buying a chicken; as well as the actual considerations for practicing chicken growing as a (main) source of livelihood or a hobby. Using empirical examples, I discussed how different growers practice financial accounting and bookkeeping, particularly highlighting how scale of production sometimes made the difference between the existence of an auditable accounting system and a mental, undocumented, cost tracking approach. Regarding the effect of money on meat supply and safety, the retail price of a six-week-old broiler chicken, when production costs are removed, returns a profit that has seen more people in urban and peri urban areas of Zimbabwe setting up their own backyard chicken *projects* over the years. This has created a significant supply of meat for the country, parallel to the formal, large-scale commercial chicken growers who supply supermarkets. The question of safety of meat from these private growers is less measurable than the meat from large processors, which goes through quality control assessments in production lines. The backyard growers use the lack of negative customer feedback as a marker for their product's safety.

For some consumers, the monetary register of value determines not only what type, or part of chicken meat they are willing to spend their money on and at what cost, but also what they actually consider meat. This is illustrated by the popularity, and hence higher purchase price, of chicken breast fillet in the UK which was not universally shared as consumers in Zimbabwe prefer, and will buy, meat on the bone e.g., drumsticks, before buying fillets. Additionally, the valuation of

what counts as meat for human consumption sees eviscerated chicken intestines being sold to consumers in Zimbabwe whereas in the UK, they are more likely to end up in dog food[65].

The sensory register of value considers how people's senses can influence what value they ascribe to chicken or chicken meat, as well as the implications this value has in practice. The visual appearance of a chicken, e.g., its size, or the colour of chicken meat for sale, influenced people's purchasing preferences. The evidence in chapter 3 also showed that this influence can be both negative and positive, depending on the context. Large sized chickens were customer favourites according to the backyard chicken growers in Zimbabwe, but large sized imported chicken from Brazil were met with suspicion. A chicken grower in the UK did not appreciate the yellow fat on the chicken meat, while it was associated with tastier meat by some participants in Zimbabwe. Supermarkets such as Marks and Spencer also appealed to consumers' sensory registers of values by ensuring aesthetically pleasing displays of chicken meat for sale. These factors ultimately affect growers and processors' practices as they aim to produce product to suit their customers' preferences.

I also discussed how other senses such as taste, and smell contribute to the valuation of chicken meat. Marks and Spencer's Oakham chicken was priced higher than other broiler chicken meat on the market but was a successful product because it was allegedly tastier. Both the chicken grower and the personnel from Marks and Spencer whose interviews I analysed agreed that for some UK consumers taste played a major role in the value they were willing to pay for chicken meat. In Zimbabwe, it was clear to see the effect that smell had on the value ascribed to chicken. In chapter 4, I discussed how the separation of farm and retail supermarkets seemed to influence some consumers' decisions to purchase the more expensive chicken meat from a supermarket, instead

[65] https://www.newstatesman.com/culture/food-drink/2018/11/case-disappearing-giblets-why-do-most-chickens-now-come-without-livers

of the neighbouring backyard grower due to the smell and flies that are commonly present around chicken runs, particularly in the hot summer months.

Valuation of chicken and chicken meat can also be based on the health register of value. I discussed how chicken meat's reputation as a healthy white meat may make it a preferable alternative to red meat. Consumers in Zimbabwe have been known to be sceptical of imported chicken meat, and food in general, because of genetic modification technology applied on the feeds used in animal husbandry abroad. This has seen locally grown chickens being favoured as healthier, among which, the indigenous breeds are even valued as healthier relative to the broiler variety. These indigenous breeds, which were traditionally village raised and survived on a scavenging diet, are seen as a healthier, organic meat source. Widespread consciousness for healthy chicken meat has seen the commercialisation of indigenous chicken, which, I argue, might ironically lead to husbandry practices that erode some of the health advantage.

I also discussed a valuation system based on standards, which influences marketing and purchasing practices in the chicken meat supply chains. Application of standards such as certification for organic produce, or the Red Tractor logo separates the British raised chicken meat from imported chicken with main UK supermarkets only selling chicken from certified producers. Consumer preferences are also influenced by such standards and certifications as some UK consumers were willing to pay more for an organic chicken. For some Zimbabwean consumers, the standards-based valuation was mostly voiced in terms of perceptions of hygiene standards in chickenscapes. The black box nature of the large-scale commercial supply chain which keeps all the processing stages hidden from the public, presenting only the neatly packaged chicken meat at the retail stage, can paint a cleaner picture when compared to the backyard growers' setup where the growing, processing and retail are all in one location and often visible to the public.

Convenience was also identified as a significant register of value within the various chickenscapes. Many backyard chicken growers in Zimbabwe appreciated chicken husbandry as a source of livelihood with low space demands, convenient for an urban setting, and quick return on investment. The convenience of chicken meat as a versatile protein for making various ready

meals saw the development and expansion of many chicken-based product ranges particularly in Marks and Spencer. This has seen chicken growing become the most popular meat within the UK retail space.

Some socio-cultural factors also influence the value ascribed to chicken and chicken meat, and thereby inform the practices around the growing and consumption of chicken. In the section on socio-cultural registers of value, I discussed how chicken meat has held a symbolic significance in Zimbabwean cultural and culinary family relations, which have implications for how chickens are raised, as well as why and when chicken meat is prepared. I also argued that a chicken kept as a pet or for eggs will receive different welfare compared to a chicken intended for slaughter at 6weeks old, highlighting the differences in animal welfare I observed during fieldwork.

I rounded off the discussion on registers of value by discussing the trade-offs and tensions between the various registers suggested. These tensions see practices within chickenscapes being negotiated between or among various registers of value. The commercial success of the Oakham chicken from Marks and Spencer, despite its higher price, suggested that some consumers were willing to pay more for the tastier and allegedly better-raised chicken, than the general broiler chicken. For the Zimbabwean consumers on the other hand, while there is a general consensus that the village chicken or road runner chicken tastes better than its broiler counterparts, the latter continues to be more popular due to the nearly 50% price difference. And while in choosing a bird to buy among a backyard grower's broiler chickens, size was usually a top-ranking decision factor; in chapter 4 I discussed how the health register of value became more influential when some consumers in Zimbabwe opted not to buy larger imported chickens citing health concerns. These scenarios show that the valuation process occurs continuously in various chickenscapes, with different registers of value influencing the decisions and practices at every stage.

In the concluding sections in chapter 4, I discussed the value of chicken beyond meat, citing how such activities are reshaping the chicken meat supply sector and chickenscapes in general. In Zimbabwe, egg production has expanded beyond table eggs through the emergence of private hatcheries specialising in indigenous chicken breeds, giving rise to the potential for medium to

large-scale indigenous chicken meat supply. Growers at various scales also shared how they are monetising chicken droppings by selling them off as manure or feeding them to fish, proceeds of which are invested back into the chicken growing projects.

Valuation systems therefore inform the type, and amount of chicken a grower raises, as well as the type of husbandry they practice, choices which may impact the supply of chicken meat. Processors and retailers also consider valuations in decisions such as packaging in order to appeal to their customers. Consumers are constantly weighing registers of value as they make decisions about chicken meat. Some decisions have direct implications for food safety, for example the consideration of chicken intestines and offal as edible meat when the gut of chicken has been determined as a natural habitat for bacteria such as campylobacter.

Governance

In chapter 5, I discussed governance as another factor informing practices within chickenscapes. Explored through the example of standards, I argued that sets of regulations can dictate where and how people handle chicken and chicken meat with resulting consequences for food safety and supply. I began by exploring the evolution of governance of food from a system that was primarily state controlled to a hybridised system that is international and has many private institutions playing an increasingly significant role in food governance. Existing literature has identified three key shifts that have contributed to this evolution, namely: i) Globalization of agri-food systems; ii) Scientific advances and developments; and iii) Public concern about food.

I then introduced an overview of the food regulatory landscape in the UK and Zimbabwe, to present an understanding of the context in which chicken meat production and supply regulation occurs in the two cases. In the UK, standards and safety management in the chicken meat and food industry in general are a major interest for many groups. At national level, Defra and FSA are the government departments that present and oversee food safety regulations at farm, processing and retail level, with the FSA extending food safety advice to consumers as well. Intergovernmental food safety regulation is overseen by international bodies such as the WTO and Codex Alimentarius Commission, among others, which both have a strong focus on ensuring safe food

trade between nations. While membership to the international regulatory bodies is optional, it is almost inescapable in modern-day global food trade transactions. This is also true of private sector and third-party accreditations and certifying bodies such as BRC, and Global G.A.P., ISO and HACCP among others, who provide internationally accredited certification that is increasingly becoming essential for both national and international trade. This puts pressure on most chicken growers, processors and retailers to attain such accreditations. The competition among peers has also seen some retailers and processors emerging as industry leaders who set their own standards of practice as I discussed in the case of the retailer Marks and Spencer. These standards are often transferred along the chain to the suppliers, producers, processors and growers working with the retailer.

In Zimbabwe, the Ministry of Health and Child Care is the lead institution of the multi-stakeholder consortium in charge of all food control in Zimbabwe. The Minister appoints members from various government departments and ministries, and other sectors with an interest in food or safety namely: the Government Analyst Laboratory (Secretariat), Environmental Health and Port Health Department, Nutrition Department in the Ministry of Health, Veterinary Department, Plant Protection Department, the Ministry of Industry and International Trade, the Municipal Health Association, Biotechnology Authority of Zimbabwe as well as four representatives from Food producers, manufacturers, packers and retailers, a representative from the consumers, and one representative from the Standards Association of Zimbabwe to form the Food Standards Advisory Board (FSAB**).** The FSAB is responsible for creation of laws and regulations, inspection of food production and processing procedures and facilities, regulating Zimbabwe's observation of international food standards, public education on food safety, and even employee rights among other duties.

Similar to the UK, there are also non-state, independent standard setting bodies as well as specialised standard setting bodies, membership to which, though voluntary, is becoming increasingly essential for actors in the chicken supply chain. These include the Zimbabwe Poultry Association (ZPA) and the Zimbabwe Free Range Poultry Association (ZFRPA) which also are members of the Livestock and Meat Advisory Council (LMAC). In addition, the internationally

recognised accreditations are also available through the Standards Association of Zimbabwe (SAZ) which certifies companies on existing internationally recognised standards of manufacture, production or operation such as ISO standards. Similar to the industry-led standards as discussed in the case with Marks and Spencer in the UK, Zimbabwe's leading chicken processor, Irvine's, has laid out their own standards for operation for their contracted growers to abide to. In both countries, there are also civil consumer advocacy groups which can influence company and industry approaches to food safety.

With this understanding of the food regulatory systems in the two cases, I then used empirical evidence from the case studies, to discuss standards in practice highlighting the opportunities, challenges, and trade-offs of standards in various chickenscapes, based on the argument that most regulation takes the form of standards. I identified the concept of standards as a *site of struggle* due to factors such as too many standards. I argued that the overview of food regulation presented for each country creates a crowded space of food regulation, ripe for confusion, as there are many bodies that food practitioners (have to) answer to. In Zimbabwe, Pswarayi et al., (2015) concur with this view, citing situations where multiple agents from different ministries would turn up at a food manufacturing company for hygiene inspections within days of each other, resulting in confusion for the manufacturer, due to conflicting solutions for compliance. In the UK, the multiplicity of goals, targets and standards make it difficult to arrive at a consensus regarding best practice in the production spaces. Additionally, a mismatch between the goals of the standards-makers and practitioners make standards a site of struggle as was the case in conflicts between Marks and Spencer, the retailer, and RSPCA, an animal welfare charity, regarding the treatment of chickens, or between experienced chicken growers and accreditation officers regarding good farm practice. These diverging goals amongst supply chain actors may create many challenges for food supply and food safety.

I then discussed the economic costs of standards incurred at various stages namely, agenda-setting, negotiation, adoption, implementation, monitoring compliance, and enforcement, which are borne by various actors within the supply chain. Using evidence from the UK case, I highlighted how adoption of and compliance with standards, usually in the form of accreditation schemes, can be

costly for small to medium chicken growers. Despite these challenges, the businesses are often forced to achieve the accreditations because powerful actors like retailors might stipulate them as a prerequisite for trade.

Finally, I discussed the benefits of governance, regulation and standards. When the regulatory system of a nation is good and functional, there is higher chance of safer food supply. Transparency and traceability afforded by a functional regulatory system can reduce the risks of food fraud. In terms of international trade, standards and accreditation schemes offer product quality assurances, and when in a highly competitive sector, businesses with certain accreditations may enjoy a competitive edge over the rest due to the signals of better quality that such scheme typically advertise.

Managing Disease

The final empirical chapter looks at disease and disease management in the production and supply of chicken meat. I investigated practices in various chickenscapes in the chosen case studies, trying to understand what informs them, as well as highlighting what implications these have for the spread of disease in the chicken supply chain, and food safety.

I began with a discussion on how chicken meat supply chains have evolved over the years with intensive production and increased chicken meat consumption becoming the norm. I presented a brief history of the emergence of broiler farming in the UK. I also presented figures showing the growth in chicken production in Zimbabwe, whose broiler production sector is continuously expanding.

I argue that the remarkable extent to which disease now plagues the chicken meat industry might be a negative artefact of the very expansion and intensification that is also celebrated. I thus discussed major outbreaks of Avian Influenza and Newcastle disease that continue to be threats to the flocks in the case studies. This was followed by a discussion on the use of vaccines in broilers as well as in the indigenous breeds in Zimbabwe which are allegedly more resistant to infections. The continuous breed selection and gene manipulation steps that produced the broiler chicken may have had an effect on the resultant bird's immune system.

As a disease management strategy, antibiotics are used in the chicken growing spaces within of the two case studies. I discussed the concerns this use has created, particularly the contribution to antimicrobial resistance. This was followed by a discussion on the use of alternative medicines in ethno-veterinary practices which, I argue, may be a valuable option especially in light of the rising threat of AMR. I then discuss biosecurity, identified as one of the key aspects to disease prevention in farming, looking at the creation, understanding, observance, and policing of biosecurity measures in chicken farming at various scales.

In the final section, which concerns food safety, I followed chicken into the processing and domestic chickenscapes. Particularly those in Zimbabwe, addressing the implications that practices in these spaces, have for transmission and mitigation of foodborne infections and illnesses in humans via chicken meat. Of key interest was the focus on the multiple and competing forms of knowledge that are at play in these national (UK and Zimbabwean) chickenscapes, which in turn inform practices such as washing chicken meat and have implications for the spread of foodborne illness causing agents like Campylobacter.

7.1.4 'Following the thing' as a methodological tool

The final research question asked how a 'follow the thing' approach could be helpful in addressing the first two questions. In chapter 1, I outlined how many food studies had adopted a follow-the-thing approach and how Cook (2006) called for more such research. Following the methodological design laid out in chapter 3, I showed how the qualitative research methods that are used in following the thing studies such as interviews and observation helped me to capture the detail expressed in the section on chickenscapes, which led to the reported empirical findings and the conclusions discussed in the previous sections. The approach allowed me to highlight the multiple pathways through which chicken meat is being produced in Zimbabwe as I let the chicken lead me through these various chickenscapes. These examples all demonstrate the benefits of a more complex and holistic chickenscapes approach, compared to more conventional linear supply-chain approaches.

7.2 Discussion and Conclusion

7.2.1 Discussion of findings

My exploration of the multiple chickenscapes in Zimbabwe and the UK revealed valuation, governance, and disease management as the main factors affecting food safety within chicken meat production and consumption. There are implications for the resulting quantity and quality of chicken meat because of these factors. A key common thread across these three factors is that they are informed and enacted into practice, based on multiple knowledge forms - local, traditional, indigenous, scientific, experiential or rational. To understand practices and, the associated supply and quality of chicken meat, there is need to acknowledge the role of these knowledge forms.

Studying chickenscapes in two national case studies helped to highlight the differences and similarities that culture and environment can introduce. For example, despite studying the production of meat from the same kind of chicken, the broiler, the evidence from the two case studies often showed different experiences from my participants' interactions with chicken. There were however common threads such as regulatory and governance issues that affected growers in both countries. Similarly, while disease is a shared concern amongst growers in both countries, it was interesting to see the varied approaches to the management of disease in chickens, particularly the broader use of ethnoveterinary medicines in Zimbabwe.

The study also helped to show that it is not a case of scientific or rational practices in UK or developed world and traditional or indigenous practices in Zimbabwe, as UK consumers adopt various practices (such as washing raw chicken) which food safety authorities regard as unscientific, while Zimbabwean producers use a variety of practices, from the 'local' knowledges that inform backyard growers to the 'rational' practices that govern large-scale producers like Irvine's. By making this a comparative study with the two nations, it was possible to highlight this.

7.2.2 Original contributions

In the beginning of this thesis, I stated a personal food safety concern, and more importantly, highlighted the costly problem of foodborne illnesses associated with chicken meat in a world where chicken meat consumption continues to grow. I then identified some key gaps in the literature in relation to a) the lack of studies that include all stages in the chicken supply chain from 'farm to fork'; and b) qualitative research on this subject of safety in chicken meat supply chains, in resource-restricted countries. In the following sections I discuss how the findings in this thesis address these gaps as well as other contributions from the study.

Empirical contribution

This study makes an empirical contribution to literature about chicken supply chains adding to existing studies which focus mainly on the UK and the US with an original study of chicken production (and consumption) in Zimbabwe. As discussed in the thesis introduction, much existing research on the chicken sector in Zimbabwe addresses village chicken production systems. The inclusion of material from all stages of the supply chain and at all scales of production from backyard growers to industrial scale producers offers insights on how governance and disease management are experienced in those various spaces. Such understanding is valuable in the making of policies and interventions to ensure chicken meat safety and supply. For the Zimbabwean case in particular, the inclusion of growers from different scales, highlighting their concerns, may provide the local and national regulators with key areas to consider acting on. Individual stories of less studied groups like backyard growers are rarely documented and this thesis provides insight into their practices and role in the chicken meat supply. Additionally, the activities of large-scale chicken producers such as Surrey Meats and Drummond, two of the sites I visited in Zimbabwe within the production chickenscapes, have, to the best of my knowledge, not been discussed in a scholarly context. This thesis provides this empirical information.

Although this study may not be a typical comparative study due to the imbalance in data and material used for each case, addressing these two case studies, is something that has not previously been done in qualitative studies on chicken, and provides a pathway to include a Global North and

Global South perspective in one study. This is particularly important as it allows an understanding of the implications that factors such as environment, place, culture or in this case governance approaches and valuation systems have for food supply and safety.

Knowledge forms

A recurrent theme in all the reported and observed practices, was that of multiple forms of knowledge that inform them. I presented valuations that are calculated through registers such as convenience, or health. Subjective concepts like that are formed based on the knowledge one has at hand. The tensions discussed around the accreditation procedures in chapter 5 also demonstrate the importance of different forms of knowledge at work in the chicken supply chain, where, for example, practitioners may not always share the logic of those who seek to govern them, regarding operational practices. When the experiential knowledge that growers and producers have is acknowledged during inspections, and where possible, incorporated together with scientific and theoretical knowledge in the preparation of best practice guides and standardization processes, the resulting guidelines might have a higher chance of uptake in practice.

The popularity of ethnoveterinary practices in disease management among backyard and medium scale chicken growers in Zimbabwe was a key finding particularly in its application in broiler chicken rearing. Previously typically applied in village chicken husbandry, knowledge about ethnoveterinary interventions is now commonly shared and encouraged in farmer training workshops, as well as on online platforms such as Farmers' WhatsApp groups. It is possible that increased uptake of ethnoveterinary medicines, particularly those that have been proven to be effective, could be essential in fighting global issues such as disease outbreaks and AMR. The fact that this practice is mostly common in the Global South highlights the importance of bi- or multi-directional knowledge flow (North-South, South-South etc)

It is this thesis' argument therefore, that a core issue in ensuring food safety is the understanding and acknowledgement of ***multiple forms of knowledge*** at play in different chickenscapes as it is from these knowledge forms - local, traditional, indigenous, scientific, experiential or rational – that food safety practices are informed and justified.

Following in chickenscapes

Combining the concepts of following the thing and chickenscapes creates a methodological and theoretical approach that can be used for qualitative research in various settings. The complexities of the Zimbabwean chicken supply chain -- such as the multiple pathways from which consumers can access chicken meat as well as the uniqueness of a backyard grower being a grower, processor and sometimes consumer all in one -- were also easier to capture using these concepts. The 'retrospective following' (through the archived life story interviews) and 'virtual following' (through WhatsApp contextual data) approaches in this thesis also represents a novel contribution, exploring the concept of following in a new way. They also provided access to sites that were otherwise inaccessible e.g., British chickenscapes in 2002, and to a wider reach of Zimbabwean chicken growers beyond those I physically visited. Unconventional methods of research and access are continually becoming necessary as global travel is facing challenges due to financial resource shortages, or most recently disaster/pandemic-related restrictions such as Covid-19 travel restrictions. Application of these methods is also possible for other disciplines such as anthropology where the principles and practices of multi-sited ethnography has been discussed for many years (Marcus 1995, Falzon 2009, Boccagni 2019).

David Evans' (2018) critique and expansion of the approach inspired me to think of applying the approach in non-conventional ways. This new kind of following includes the multi-temporal following approach for the UK case, which took me from the present-day concern of *campylobacter* in retail chicken, to practices in chicken supply chains in the 1990s through the life story interviews, and back to the recent fraud allegations in the chicken processing sector through the case of 2Sisters Food Group. This *retrospective following* helped to not only explain, but also challenge, some of the influence on, and practices in, the modern-day chicken meat supply chains.

Further, I also shared how I followed the chicken into virtual chickenscapes through my participation in the chicken grower WhatsApp groups online where practices such as marketing of eggs, chicks, chickens, chicken meat, and related products occurs. This kind of *virtual following* connects with the growing approach of virtual ethnography (Hine, 2017) and can extend beyond studies of chicken to other food studies.

7.2.3 Implications for policy and practice

This study highlights the importance of avoiding a 'deficit' approach, which assumes that consumers lack knowledge of food safety and related practices. Understanding the logic(s) that different actors follow in their commercial or domestic practices (e.g., the hygiene lapses at 2Sisters or the domestic washing of chicken) can lead to better-informed policy formulation for officials at FSA or the equivalents in Zimbabwe. This co-creation process can, in practice, involve on site workshops on chicken farms to allow for the combination of theoretical and practical knowledge, or invite contributions from consumers regarding subjects of safe food handling practices so as to understand the reasoning and motivations behind so called practices deemed scientifically unsafe. This kind of work has been undertaken in the UK where the FSA funded an ethnographically-informed study of domestic kitchen practices[66] but has not been undertaken in Zimbabwe or elsewhere in the Global South.

When policy makers and intervention designers are more cognisant of the above, the policy interventions become co-created products that are likely to be more widely adopted, leading to greater compliance with best-practice advice in practice. Co-creation may indeed require increased resources for example financially as well as time investment but for bodies such as the FSA in the UK, developing interventions together with the targeted stakeholders could improve their success in key areas such as the reduction of *Campylobacter* and *Salmonella* through clear, audience-conscious messaging. For the Zimbabwean policy makers, engaging stakeholders at various levels, particularly making efforts to include the often unrepresented backyard chicken growers, could help to create oversight on the informal livestock rearing activities. Such information is

[66] The study was led by Wendy Wills and is reported here: https://www.food.gov.uk/sites/default/files/media/document/818-1-1496_KITCHEN_LIFE_FINAL_REPORT_10-07-13.pdf

FSA have recently commissioned a follow-up study: https://acss.food.gov.uk/KL2

particularly essential for disease control e.g. during Avian influenza outbreaks as well as food safety control. A co-creation approach may also be particularly useful for the about UK food safety concerns associated with chlorinated chicken where greater, ethnographically informed, understanding of public trust in the food system could make a valuable contribution.

7.3 Future research and dissemination

Although I attempted to explore multiple chickenscapes in the UK and Zimbabwe, the limitations mentioned in chapter 1 signal that there are a number of tangents to follow and expand on following the conclusion of this research. For example, while consumers were present in the study, they were 'followed' in less depth and detail than other actors in the chickenscapes. Particularly in Zimbabwe, follow up studies using approaches such as kitchen visits or 'shop-alongs' (Evans 2018) might yield more insights into practices around food sourcing and preparation. There is currently a dearth of such studies and the resultant information will not only inform academic literature but might also be useful in understanding food safety in domestic foodscapes.

This study shows the value of a 'food systems' approach (as outlined by Horton et al., 2017) but also the gaps in such outlines, e.g., food packaging, cultural context, competing knowledge claims, which could be addressed. My emphasis on different knowledge forms, regarding chicken husbandry and food safety, can further be supported by studies that collate and compare these contrasting knowledge forms. Qualitative studies, assuming a practice theory approach e.g. Halkier (2009), can further unpack the cultural and environmental influences on the production, supply and consumption of chicken meat. Interdisciplinary research into the use of ethnoveterinary approaches and their efficacy in broiler chicken production could yield useful results particularly as antimicrobial resistance continues to pose a threat to human and animal health.

The methodological integration of the concepts of *scapes*, and *following the thing* can also be applied to other commodities such as coffee or cacao, whose complex national and global reach are increasingly becoming a subject of international political and ethical debate. Commodity chain approaches and studies of circuits and networks have been widely deployed in support of Fair

Trade and related work on ethical consumption, but studies of wider foodscapes, adopting a follow-the-thing approach, have been much less widely employed to date.

This work has sought to address different audiences, from food safety officials and fellow academics to the wider public. Some preliminary results of this thesis have been presented at the N8 AgriFood Conference on *People, health and food systems*, in 2018, in Liverpool, UK, as well as to a public audience at the Sheffield Food Festival. I also intend to prepare articles for publication in peer reviewed journals such as Food Control, One Health, and Valuation Studies. To reach a wider audience, I may prepare articles for a platform such as The Conversation. In Zimbabwe, the institutes that I worked with during my data collection, such as the ZFRPA and the large scale producers, are keen to receive feedback from the study. Publishing an article in Irvines Zimbabwe's quarterly magazine or on the Zimbabwe Poultry Association website will also facilitate dissemination of the findings to a wider popular audience.

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9 Appendices

Appendix A: Interview Guide for chicken grower interviews

A: Introduction

My name and affiliation

Project title and summary

Participant Information Sheet

Expectations and Participant Consent Form (Recording, notes…)

B: Historical questions

When and how did they begin keeping chicken?

Why they started keeping chicken (motivation)?

What resources did they begin with? [E.g. chicks, housing, feeds, personnel…]

What activities were involved?

What did they do in terms of marketing?

What challenges did they face and (how did they overcome them)

C: Current status

Why are they keeping chicken (motivation)?

How big is their current flock?

What resources do they use, including costs [E.g. chicks, housing, feeds, personnel…]

What activities are involved?

What do they do in terms of marketing?

What challenges do they face and (how do they overcome them)

D: Typical practice

What activities are involved in completing a Cycle (from 1-Day old to mature)?

Daily activities

Chick phase

Culling

Finishing

Processing

Storage

Marketing

Preparation for next batch

E: Specific safety Questions

If not addressed:

How to they ensure safety of their flock (from predators, elements, disease)

How are they of the main health problems in chickens?

How aware are they of the relevance of Salmonellosis, Avian Influenza, Campylobacteriosis and Newcastle Disease to human health?

F: Knowledge

Where does the knowhow to keep chicken come from?

Is there any interactions with professionals such a veterinarians, inspectors, and authorities?

What are their information sources for general advice, and when a health problem in the flock is present?

G: Observation

Request for tour if not offered at the beginning

Request for observation on a processing day

Refer to Observation guide during observation

Appendix B : Observation sheet for chicken growers

Flocks' characteristics	Size
	Age
	Breed composition
	Species homogeneity
Housing conditions	Size of flocks' premises
	Availability of a run
	Protection from adverse weather conditions and predators
	Bedding/litter
Husbandry practices	Provision of food and water
	Anti-parasitic treatments
	Manual handling of birds

Biosecurity	Cleaning routine
	Disinfection
	Use of separate clothes/shoes
	Personal hygiene
	Travelling patterns of owners with and without the flock
	Access of visitors and other animals to the flock
	Utilisation of poultry products
	Sharing of equipment and birds with other flocks
	Vaccination
	Disposal of dead birds

Appendix C: Participant Information Sheet

Food Safety and Standards: The Case of Chicken Meat in the UK and Zimbabwe

PhD researcher: Patience Muchada

Institution: University of Sheffield (UK)

Supervisors: Professor Peter Jackson, Dr Farida Vis, Professor Peter Horton

Purpose of the research project

My research was inspired by the health threat posed by *Campylobacter* in the chicken meat supply chain. *Campylobacter* is bacteria that may be found in chicken. The bacteria does not make the chicken sick but if people ingest it, they may fall ill. In the UK, this bacterium is listed as the leading cause of food poisoning. This awareness has led to this project, which explores the chicken meat sector in Zimbabwe and the UK to understand the factors that influence the production, supply and consumption of safe chicken meat. I will be studying the practices of people who are involved in the chicken meat supply chain e.g. farmers, processors, retailers and consumers, as well as others who contribute to the chicken meat supply chain within their spaces.

Why have you been chosen to take part?

You have been invited to take part because of your role in the chicken meat supply chain. I'm interested to learn about the way you handle chicken or chicken meat, in your day to day life.

Do you have to take part?

No – participation in the research is entirely voluntary. You are able to withdraw at any time. If you would like to participate in some parts of the research but not others – for example, you are happy to be interviewed once but not take part in further interviewing– this is absolutely fine. Please let me know if there are any parts of the research you do not want to participate in.

What will happen if you take part?

If you decide to take part, we will discuss what your participation in the research will involve in more depth. The maximum participation I would ask for would be to conduct **two interviews of around an hour each** and also to visit you in your place of work or home if possible, depending on where you interact with poultry (meat). If this is a home visit, the interview could be conducted in **your kitchen or in the place where you prepare meals.** The interviews will be scheduled for times that are convenient for you. It would also be useful if one of the interviews could be conducted **during the preparation of a meal**.

Unfortunately, I am unable to compensate participants but I will offer a token of appreciation for your time.I appreciate that you may not wish to participate in all of these activities, please feel free to discuss them with me prior to your participation.

Are there any risks to taking part?

There are no extra risks (other than those associated with day-to-day living) that you would need to be aware of as a result of taking part in this research.

Will photographs be taken?

With your permission I may take some photographs during the kitchen-based interview(s). This is mainly to help me to remember the context of our discussion. In

the event that I wished to use any photographs for any other purpose, **I will not do so without your explicit consent**.

Are there any benefits to taking part?

The results of my project will contribute towards a better understanding of campylobacter. Hopefully this will aid in reducing the spread of bacteria and therefore make reduce risk of poisoning.

Will my participation be kept confidential?

All personal details will be kept confidential and stored in encrypted password protected files separate from any audio recordings or notes that come out of the interview. Recorded material will also be kept in password protected files. At the beginning of the project I will ensure your contributions are anonymous by assigning an alias to you. From then onwards, all recording and transcripts will be filed under that name.

What will happen to the results of the study?

The results of the study will primarily be used for the completion of a PhD thesis. The results may also be disseminated through conference papers, articles in academic journals, book chapters and blog posts. All of these results may be available publicly – please ask if you have any questions about this. If you would like to receive an information sheet with key points from the research, please let me know and this will be sent to you following the completion of the PhD project.

Who can I contact if I have further questions?

If you have any further questions, please do not hesitate to contact me (Patience Muchada).

Email: panmuchada1@sheffield.ac.uk

Telephone (UK): +44(0)7731535061 (UK) / +263(0)772390966 (Zimbabwe)

You can also contact my primary supervisor if you want to verify who I am or to make a complaint:

Professor Peter Jackson Email: p.a.jackson@sheffield.ac.uk

Department of Geography

University of Sheffield

Telephone: +44 (0) 114 222 7908

Appendix D: Participant Consent Form

Title of project: Food Safety and Standards: The Case of Chicken Meat in the UK and Zimbabwe

PhD researcher: Patience Muchada

Institution: University of Sheffield (UK)

Supervisors: Professor Peter Jackson, Dr Farida Vis, Professor Peter Horton

Contact email: panmuchada1@sheffield.ac.uk

Contact telephone: +44(0)7731535061 (UK) / +263(0)712155799 (Zimbabwe)

Before we begin this interview, I agree to the following:

□ All personal information relating to me will be kept in a password-protected file separate from all recordings, transcripts and notes from these interviews. Once this consent form has been digitally stored the original will be destroyed.

□ This interview will be audio recorded. Any recordings, transcripts or notes relating to the interview/site visit will be kept in password-protected files separate from any personal information.

□ All recordings, transcripts and notes will be kept under a false name (alias) assigned by the interviewer. I will not be identified or identifiable in any reports that result from the research, unless I choose to be identified.

□ I am not required to answer any questions that make me feel uncomfortable.

□ If I do regret any answers given, it is my right for that information to be excluded from the project.

□ My participation in this project is entirely voluntary. I can withdraw from participation at any time.

□ Any recordings, transcripts or (observation) notes made from my participation in this project may be re-used for future projects, such as conference presentations and publications. The same processes to ensure anonymity will apply to all future projects involving my interview data.

Research participant full name:

_____

Contact details: _____

Research participant signature: _____

Date: _____

Patience Muchada's signature: _____