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Animals, People & Gods: Domestic, Civic & Sacred Consumption of Livestock in Hellenistic-Late Antique Messenia, Greece

by
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Abstract

Study of faunal assemblages in Greece has primarily focused on the Neolithic and Bronze Age periods, while published zooarchaeological reports from later periods are for the most part associated with ritual contexts and faunal reports for the Byzantine and later periods are particularly rare. The present study of the Early Byzantine urban assemblage from Messene and the Late Byzantine rural assemblage from a suspected farmstead in the Thouria theatre area, both located in the Messenia region of southwest Greece, contributes to filling this chronological gap. In addition, study of feasting debris from the Hellenistic Asklepieion of Thouria provides evidence for the cult of Asclepius for which no other faunal reports are available. The three different chronological periods represented and the varying nature of the assemblages allow for comparisons both diachronically and between sacred, urban domestic and rural domestic contexts.

Taphonomic analysis concluded that partial retrieval affected the anatomical representation of the assemblages substantially, but affected taxonomic representation only modestly. Post-discard attrition, mainly by scavenging dogs, did not have a decisive impact on assemblage composition and thus carcass processing procedures, especially for the extraction of within-bone nutrients, were largely responsible for fragmentation patterns. The anatomical distribution of butchery marks on the skeleton indicates that the four main livestock taxa (cattle, sheep, goats and pigs), the best represented species in every assemblage, were intensively butchered at all three sites to divide the carcasses into small parcels of meat. The extensive use of cleavers at the Hellenistic Asklepieion of Thouria hints at the employment of professional butchers during large events, while butchers were also likely active at Early Byzantine Messene although to a lesser degree. Management regimes differ between sites. The Thouria Hellenistic Asklepieion of Thouria, exclusively a consumption site, was characterised by purposefully selected young adults nearing their maximum meat weight, while dominance of males recalls the tendency of ancient Greeks to match the sex of the victims to that of the worshipped god. At the Early Byzantine nucleated settlement of Messene, sheep were reared for wool prior to slaughter for meat while pigs and goats were raised for meat. Moreover, the use of cows as draught animals implies small-scale land tenure. Finally, the zooarchaeological data offer some support for the view that the Thouria theatre site was the centre of a Late Byzantine elite rural estate rather than a simple farmstead. The discovery of a wine press, implying large-scale cultivation of vines, and the indications that the building included a second storey, favour the elite alternative, although this interpretation must be tentative pending full study of the site's portable material culture. The relative scarcity of cattle in this assemblage, perhaps due to the sale of these large animals (especially mature individuals) to nearby nucleated settlements, is compatible with either interpretation, but hints of the use of oxen rather than (or as well as) cows as draught animals, implying cultivation of large expanses of arable land, favour the elite estate interpretation. Finally, the slaughter of a relatively large percentage of young individuals of cattle, sheep, goats and pigs, that is of animals that a small productive farmstead might have been expected to sell in a local or regional market, again favours a rural estate with elite consumers.

While faunal insights into some of the issues discussed are provisional (given ongoing excavation and post-excavation study at both Messene and Thouria), they show the importance of zooarchaeological research and highlight its potential to enhance understanding of the economic, religious and social fabric of societies previously viewed overwhelmingly through the lens of written sources.

Acknowledgements

This four year long journey actually began years ago when as a toddler I did my very first “archaeological excavation” in an empty field behind my childhood home and continued through my school years when I picked up my very first archaeological book from the shelf of the local bookstore. It was the Greek translation of the now classic “*Archaeology: Theories, methods and practice”* by C. Renfrew and P. Bahn and even though it was too technical for me to understand at such a tender age, I was not deterred. The journey continued through my BA at the University of Cyprus when I fell in love with Environmental Archaeology, zooarchaeology especially. The final step that led me to my determination to do a PhD was my choosing of the University of Sheffield for a MSc degree, which unknowingly to me at the time became one of the most important decisions of my life thus far as it was the reason I met my mentor.

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Anatomical elements

A	Astragalus
C	Calcaneum
dP2	Deciduous mandibular second premolar
dP3	Deciduous mandibular third premolar
dP4	Deciduous mandibular fourth premolar
Fp	Femur proximal
Fd	Femur distal
H/A	Horncore/Antler
Hp	Humerus proximal
Hd	Humerus distal
M1	First mandibular molar
M2	Second mandibular molar
M3	Third mandibular molar
MCp	Metacarpal proximal
MCd	Metacarpal distal
MD	Mandible
MPp	Metapodial proximal
MPd	Metapodial distal
MTp	Metatarsal proximal
MTd	Metatarsal distal
NC	Navicular cuboid
P2	Permanent mandibular second premolar
P3	Permanent mandibular third premolar
P4	Permanent mandibular fourth premolar
PE	Pelvis
PH1	First phalanx
PH1p	First phalanx proximal
PH2	Second phalanx
PH2p	Second phalanx proximal
PH3	Third phalanx
Rp	Radius proximal
Rd	Radius distal
SC	Scapula
Tp	Tibia proximal
Td	Tibia distal
Up	Ulna proximal

Biometry

Bd	Greatest breadth of the distal epiphysis
Bp	Greatest breadth of the proximal epiphysis
Dp	Greatest depth of the proximal epiphysis
DPA	Depth across the processus anconaeus
GB	Greatest breadth
GH	Greatest height
GLl	Greatest lateral length
GLm	Greatest medial length

Inscriptions

IG	*Inscriptiones Graecae*
IvO	*Die Inschriften von Olympia* (Dittenberger and Purgold 1896)
LSCG	*Lois sacrées des cités grecques* (Sokolowski 1969)
SEG	*Supplementum Epigraphicum Graecum*

Other

MaxAU	Maximum Number of Anatomical Units
MinAU	Minimum Number of Anatomical Units
MNI	Minimun Number of Idividuals
PRAP	Pylos Regional Archaeological Project
UMME	University of Minnesota Messenia Expedition

1. Introduction

When my supervisor and I first started planning my PhD research proposal in 2015, it took a very different form to the completed thesis. Despite my previous zooarchaeological background in the Neolithic of northern Greece, I had always been interested in classical antiquity and thus accepted immediately the invitation from Dr. Xeni Arapogianni to study the faunal assemblage from the Hellenistic Asklepieion uncovered during her excavations at ancient Thouria in Messenia. Given the importance of animal sacrifice to recent discussion both of the civic institutions of ancient Greek city states or *poleis* and of meat consumption by their citizens, faunal material from a new sanctuary held great interest. After initial assessment of this material, however, it was clear that the assemblage (ca. 4,700 identifiable specimens) was too small for such a project.

A second, much larger faunal assemblage (ca. 30,000 identifiable specimens) was then kindly made available by Dr. Petros Themelis from his excavations at the neighbouring Hellenistic – Late Antique polis of ancient Messene. This assemblage covered a much longer timespan, partly overlapping with that of the Thouria Asklepieion, and included material from a range of sacred, civic and domestic contexts; the domestic component was considered particularly important, given the dominance of sacred and civic contexts in previous zooarchaeological studies related to early historical Greece. In addition, the sacred contexts uncovered at Messene included an Asklepieion, inviting comparison with that from Thouria and thus offering an opportunity for zooarchaeological exploration of the cult of Asclepius, for which published faunal data was limited to previous studies of the Messene Asklepieion (Nobis 1994; 1997; 2001).

Unfortunately, the building complex of the Messene Asklepieion was for the most part excavated by the late Athanasios Orlandos and his predecessors, who retained no faunal material from their excavations (normal practice at the time). On the other hand, the bones unearthed in Prof. Themelis' excavations and published by the late Günter Nobis could not be located in the Messene storage area so my planned comparative study of the Messene and Thouria Asklepieia had to be abandoned. Moreover, as I undertook a preliminary assessment of the faunal material stored at Messene, it gradually became apparent that some bags had deteriorated to the point of their contents becoming mixed, while the labels of others had become illegible. Most of the unmixed material with intact context information was derived from the uppermost levels of Messene and dated to a period of Byzantine occupation when the site's Greco-Roman monumental architecture (for example, as described by the 2nd century AD visitor, Pausanias) lay largely abandoned. This material is also derived from domestic contexts, thus precluding comparison of sacred, civic and domestic contexts from the same site. Given that published zooarchaeological material is substantially scarcer for the Byzantine than for the Greco-Roman periods, this development represented a not unwelcome opportunity, but also a fairly radical change from my original thesis plan.

A final change of plans came in 2016 after I had started work on my thesis, when excavations at ancient Thouria expanded from the Hellenistic Asklepieion to the Hellenistic theatre, above which a structure of agricultural nature started to come to light[1]. The structure, currently identified as a Late Byzantine farmstead, provided additional faunal remains. The excavator, Dr. Arapogianni, invited me to add these

[1] As of 2021, excavation of the farmstead is still ongoing and new animal remains continue to come to light with every new excavating season.

to my study, a proposal which I accepted given that this material complemented chronologically the bulk of what I was studying from Messene.

Study of these three assemblages (the Hellenistic Asklepieion of Thouria, Early Byzantine Messene and the Late Byzantine farmstead overlying the Thouria theatre) took place against the backdrop of prior research into ancient Greek agricultural economy (particularly animal husbandry) and diet (particularly the contribution of pre-Christian sacrifice to meat consumption). In highly summary form, although the staple diet of early historical Greece (8th c. BC – 7th c. AD) was heavily based on cereals, meat had huge cultural and social significance. Prior to the spread of Christianity, participation in civic sacrifices was a right and duty of citizens and the proper distribution of sacrificial meat a key ideological principle, while the extent to which meat from civic sacrifices dominated the meat intake of citizens in Archaic and Classical Greece has been a focus of recent debate. The spread of Christianity is assumed to have led to the abandonment of such sacrifices, with implications for patterns of meat consumption that also deserve investigation. Ownership of livestock was a source and symbol of wealth, while pasture rights led to treaties and conflicts between cities. Our knowledge of animal husbandry and meat consumption, however, comes largely from literary or epigraphic texts (e.g. Chandezon 2003; 2015; Detienne and Vernant 1989; Hodkinson 1992a; Schmitt-Pantel 2012) and images on marble reliefs or painted vases (e.g. Ekroth 2005; Stafford 2008; Tsoukala 2009; van Straten 1988; 1995), both biased towards Classical (5th – 4th c. BC) Athens and the ideals of rich men. Animal bone assemblages dated to the early historic era, although rich in information and less biased towards elite ideals and specific geographic areas and chronological periods, have seldom been studied. In addition, Byzantine archaeological research in Greece has tended to focus on ecclesiastical architectural remains – primarily churches and basilicas – and imagery. Only two small zooarchaeological assemblages have been published from the Peloponnese – both dated to the Early Byzantine period, that of mid 4th – mid 6th c. AD Nichoria in Messenia (Sloan and Duncan 1978) and that of the late 5th – early 6th c. AD Pyrgouthi farmstead in the Argolid (Mylona 2005). No faunal assemblages dating from the Middle Byzantine era onwards have ever been published.

Given these changes to the dates and contextual range of the faunal material at my disposal, my initial research questions had to be adapted as follows:

1) What was the scale of agricultural production?
2) Were sheep/goat herds intensively exploited for wool and/or milk and cattle for traction before they were slaughtered for meat?
3) Was the Thouria 'farmstead' literally a small productive unit exporting produce to near or distant urban consumers? Or was it part of an elite residence/estate that consumed the surplus of dependent farmers?
4) What was the status of the animals consumed in each assemblage (prime age animals or cast-offs)?
5) What was the relationship between agricultural production and the supply of sacrificial victims to the Asklepieion or the consumption of animals at the two domestic sites?
6) Were specialist butchers employed at any of the studied sites?
7) At the Asklepieion, did sacrifice take the classic form of god's portion followed by feasting and is there any evidence whether the latter involved egalitarian or inegalitarian distribution?
8) Did all the meat consumed at the Thouria Asklepieion originate from sacrificial victims?
9) At ancient Messene, is the presumed abandonment of Olympian sacrifice, under the influence of Christianity, confirmed by the faunal remains?

Although my research has taken an unexpected direction, in focussing on the Byzantine period in southern Greece and on an earlier sanctuary, it explores areas of early Greek history that have hitherto been dominated by written (literary and epigraphic) and iconographic sources with inescapable elite biases. Faunal evidence offers a welcome perspective that is less idealised and more socially inclusive, while both Byzantine assemblages are of a domestic character and thus address a particularly glaring gap in previous research. Finally, since ancient Messene retained an at least partly urban character in the Byzantine period, while the excavated complex overlying the Thouria theatre appears to have been a single farmstead, the three assemblages studied here offer some scope for examining faunal material from three very different contexts – urban, rural and, in the case of the Hellenistic Asklepieion of Thouria, sacred.

2. Historical and geographical context

Introduction

The aim of this chapter is to describe briefly the historical and geographical context in which ancient Messene and Thouria (Figure 2.1) were founded and subsequently thrived and declined until a terminal point of the independence of the Peloponnese from Ottoman control in AD 1827. Although not a subject of discussion here, it is worth mentioning that both areas are still inhabited today in the form of villages neighbouring the archaeological sites. The unexcavated section of ancient Thouria is to this day covered by olive groves while ancient Messene was covered by agricultural fields and vegetable gardens.

Geographical context

The Peloponnese is connected to the Greek mainland by the Isthmus of Corinth on the northeast. Its shape is defined by deeply indented coasts and jutting peninsulas (Gerstel 2013, 300). It comprises a number of different landscapes. In the centre and north-east, it is mountainous, but much of the south and west, including Messenia in the south-west, is dominated by lowland plains and hills (Katrantsiotis et al. 2016, 188; Shipley 2006, 28), while parts of its western coast are occupied by marshy plains and lagoons (Anagnostakis et al. 2002, 68). In addition, most of Messenia's rivers are seasonal in nature, while its geological structure has led to the development of a number of springs at lower altitudes (Loy and Wright 1972, 37). Messenia, like the western Peloponnese in general, is characterized by acute seismic activity, by the intense friability of its soil and by occasional catastrophic floods (Anagnostakis et al. 2002, 68).

Messenia (Figure 2.2) is surrounded by the Ionian Sea to the south and west, while it is separated from Laconia to the east by the high Taygetos mountain range and from the northwest Peloponnese by the east-west valley of the river Neda (Kennell and Luraghi 2009, 248; Zangger 1998, 1). The most prominent highlands in the interior of Messenia are Mount Lykodemos to the south and the mountain ridge of Aigaleon to the west (Kosmopoulos 2013, 399). The north-south Aigaleon ridge divides the lowlands of Messenia into the western coastal region and the fertile valley of the river Pamisos, which flows into the Messenian gulf to the south. This valley, also known as the Messenian plain, is bordered to the east by Taygetos, while a row of low hills between Taygetos and Mount Ithome, known as the Skala ridge, separates the Messenian plain into the upper and lower Pamisos valley. In antiquity, the former was known as *Stenyklaros* and the latter, the larger and more fertile of the two, as *Makaria* (Kennell and Luraghi 2009, 248; Loy and Wright 1972, 36).

Thouria and Messene are both located in the Messenian plain, one of the agriculturally richest parts of the Peloponnese. The river Pamisos, navigable and rich in fish according to Pausanias (4.34.1-2) in the 2nd century AD, flows between Messene and Thouria and, together with the river Valyras (nowadays called Mavrozoumena) near Messene and the rivers Aris[2] and Xerilos near Thouria, has contributed to the creation of fertile valleys (Shipley 2006, 28; Themelis 2010c, 13). Messene's territory included the upper and the western part of the lower Messenian plain (Shipley 2004, 563). Thouria's territory must have included a significant part of the southern Messenian plain towards the Messenian gulf, the northeastern part of which was named the Thouriate gulf in the past (Luraghi 2008, 28-9).

[2] Formerly Aslanaga (Topping 1972, 76).

Historical context and land use

Sparta conquered Messenia, starting during the late 8th c. BC/late Geometric period with the First Messenian War. The Second Messenian War followed soon after, in the early 7th c. BC/early Archaic period (Alcock et al. 2005, 153). By ca. 600 BC, and up until the founding of Messene in 369 BC, the whole of Messenia was under Spartan rule. Messenia's landscape has been described as rural during the Archaic and Classical periods (7th – early 4th c. BC) but it lacked the small farmsteads, characteristic of the rest of the Greek mainland and islands, most likely due to Spartan control over the Messenian helots, which undoubtedly affected both the local economy and the social structure (Alcock 2007, 137; Alcock et al. 1994, 142; Davis et al. 1997, 456). The helots were local populations of Laconia and Messenia that were enslaved *en masse* by the Spartans when the latter conquered their land (Luraghi 2002, 229). Helotry is better described as a form of dependence or subordination rather than chattel slavery (Alcock 2002, 185), in which the principal role of the helots was agricultural production for the benefit of the Spartans through cultivation of equal allotments of land called *kleroi* (Alcock 2002, 189; Hodkinson 1992b, 123-4). These were allegedly distributed to the Spartans by the Spartan lawgiver Lykourgos, followed by Polydoros (Hodkinson 1986, 379)[3]. It appears that helots preferred living in nucleated villages rather than being dispersed in the countryside living on the individual *kleroi* they cultivated. Possible reasons for that might have been to ensure mutual support in case of agricultural shortage and to reinforce group identity (Alcock 2002, 196; Alcock et al. 2005, 170). From the Spartans' point of view, having the helots gathered in one place may have made it easier to keep them under control and to collect the share of agricultural production owed to them (Alcock 2002, 196; 2007, 137). Due to their mutual interdependence, the Spartans and helots were most likely engaged in a sharecropping system. In contrast to having the helots give the Spartans a fixed amount of their crops, a system in which the helots would have assumed both the risks of crop failure and the profits of crop surpluses, the flexibility of sharecropping allowed both risks and profits to be shared by all parties involved and it, consequently, protected the helots from food shortage in years of crop failure. As for the Spartans, protecting the helots from starving ensured them a stable labour force on which depended not only their own food supply but also their citizenship since this obliged them to make monthly contributions of foodstuffs to their common messes (Hodkinson 1992b, 131-3; 2008, 294). How does the discussion of the sharecropping system relate to the helots' living arrangements? Spartan landowners, especially the wealthier ones, probably owned several plots of land scattered throughout Laconia and Messenia and, consequently, they cannot have personally supervised all of their landholdings. As a result, they must have left their supervision in the hands of specific helot overseers, possibly called *mnoionomoi*, whose task as local coordinators of agricultural production must have been facilitated by the nucleated character of the helots' living arrangements, a factor that likely also allowed them to operate at a broader communal level. After all, the need for helot coordination at a communal level must have been even more pressing when considering the fragmented character of the Spartans' landholdings, a fact that meant that each helot settlement must have been obliged to make simultaneous crop payments to several Spartan landlords (Hodkinson 2008, 306-15). Turning to ethnographic data from pre-mechanised Greece, when a sharecropping system was widely in effect, it was normal to have a settlement's threshing floors gathered in one place as the landowner or the state usually collected their share of the

[3] Regarding *kleroi*, Hodkinson (1986, 378-86) argues that their existence is not a historical reality but an invention of the 4th or 3rd c. BC and that scholars supporting their existence rely heavily on later and sometimes contradictory literary sources, primarily the writings of Plutarch and Polybius. Despite my belief that Hodkinson's arguments are sound, it is beyond the scope of this thesis to judge whether a distribution of equal plots of land to the Spartans is a historical event or not and, thus, I will not further analyse this complicated issue.

grain on the threshing floor. Thus, the concentration of threshing floors in one locality was a matter of convenience for the supervision of surplus extraction (Halstead 2014, 150). Finally, it is noteworthy that only five perioikic poleis are securely attested for Classical Messenia by the literary sources. Of those, Thouria is the only one that definitely lay inland (Shipley 1997, 194-5).

The process of achieving independence from Sparta began in 371 BC with the Theban victory in the battle of Leuctra. It was completed in 338 BC, after the battle of Chaeronea in Boeotia, as Philip II of Macedonia rewarded a number of Messenian poleis for their support (they remained neutral during that battle) by giving them extra territory that previously belonged to Sparta (Alcock 1998, 182; Shipley 2004, 550; 2006b, 64). A consequence of Sparta's defeat, however, was the incorporation of parts of the Peloponnese under Macedonian domination (Shipley 2018, 40-2). Moreover, a number of military events took place in the Peloponnese between the death of Alexander the Great, son of Philip II, and the Roman conquest of Greece that battered both the landscape and the people inhabiting it (cf. Shipley 2005, 216; 2006a, 29-31; 2018, 40-4). Thouria gained its independence from Spartan rule either in 369 BC with the foundation of Messene or in 338 BC with the Macedonian intervention in the Peloponnese. The more likely candidate is 369 BC, supported by both historical argument (e.g. Sparta's failure to launch a direct attack on Messene probably meant that it was not in control of the Pamisos' east bank) and archaeological evidence (e.g. Thouria's walls were built in accordance with the early 4th c. BC Theban *emplekton* technique, like those of Messene) (Luraghi 2008, 32-3).

The ancient polis of Thouria is located on the long *Ellinika* ridge, overlooking the valley of the river Pamisos from the east, with its acropolis situated on the northern part of the ridge. Along with Messene, Thouria was one of Messenia's most significant centres. The area was inhabited at least from the Early Helladic period (3rd millennium BC), as indicated by a large number of Early Helladic pottery sherds (Hope Simpson 1966, 123), and that a settlement existed there during the Mycenaean period (1600-1050 BC) is implied by the Mycenaean necropolis of chamber tombs located on the eastern slope of the southern part of the hill, at Aithaia *Ellinika* (Ladas et al. 2015, 1557-8; Bennet 2002, 26; Luraghi 2008, 27). In addition, a tholos tomb is located on the lower western slope (Bennet 2002, 26). It has been proposed that this settlement may plausibly be identified with the Mycenaean *Leuktron*, mentioned in the Linear B tablets from Nestor's Palace in Pylos (Bennet 1999, 144). According to recent research, however, the identification of *Leuktron* with Mouriatada *Elliniko* rather than Aithaia *Ellinika* seems more likely (Bennet 2002, 30). Pausanias, in his *Description of Greece* (4.31.1-2), identified the site as the Homeric *"Antheia"*, while Strabo (8.360) writing in the later 1st century BC or early 1st century AD, believed that it was Homeric *"Aipeia"* (Arapogianni 2008-9, 9). Historic Thouria is located ca. 300 m. from the Mycenaean settlement, on the western slopes of the northern part of the ridge (Hope Simpson 1966, 123).

Thouria is first mentioned by Thucydides (1.101.2) in relation to the helots' failed revolt against Sparta after a big earthquake in 465 BC. Thouria, although a perioikic polis, took part in the rebellion[4] (Luraghi 2008, 29; Shipley 2004, 566). *Perioikoi* were Lakedaimonians but not Spartans. They constituted a separate population group, inferior to and with fewer rights than the Spartans, but were considered superior to the helots (Alcock et al. 2005, 155) and their communities were self-governing (Baltrusch 2003, 35). Thouria escaped Spartan control only after the foundation of Messene a century later (Arapogianni 2008-9, 10).

[4] The only other likely perioikic polis to have taken part in the rebellion was Aithaia, the exact location of which is as of yet uncertain although it was likely located near Thouria (Shipley 2004, 558).

The city-state or *polis* of Messene is located on the foothills of Mount Ithome at an elevation of 350-400 m. above sea level in a valley defined by three hills (Shipley 2004, 563). It was supposedly founded in 369 BC by the Theban general Epaminondas and his Argive allies after their invasion of Laconia, but the earliest traces of occupation in the area of the site date to the Early Bronze Age and habitation thereafter seems to have been continuous (Alcock 1998, 179; Shipley 2004, 562; Themelis 2009/2010, 28). Traces of 9th – 8th c. BC pottery found during excavations at the Asklepieion hint to the existence of a Geometric settlement there (Themelis 2010b, 30). Messene was inhabited by newly freed helots, returning expatriate Messenians and others who wanted to join them (Shipley 2004, 563). In the early days of its foundation, it was apparently called Ithome and not Messene as an earlier settlement of that name pre-existed in the exact location of the new *polis* (Shipley 2004, 562; Themelis 2010b, 32). Ithome was founded during the 8th c. BC, if not earlier (Themelis 2000, 95).

A sort of federal arrangement was put in place soon after its foundation, with Messene as the dominant *polis* and the rest as dependent, though internally autonomous, *poleis* (Luraghi 2008, 262), while Messene itself seems to have been governed by a timocratic system, meaning that in order for someone to obtain a public office, he had to possess substantial landed property (Themelis 2016c, 542). In 191 BC, Messene was forced by Rome to join the Achaean League, even though it did not usually accept federal states as members (Luraghi 2008, 262). The Achaean League was a federal union of *poleis* in the north of the peninsula that originally campaigned against Macedonian rule (Alcock et al. 2005, 174; Shipley 2004, 562; 2005, 316). At the time of joining the League, Messene seems to have been in some way still in control of the *poleis* of the lower Pamisos valley and possibly of Kyparissia, which acted as Messene's harbour (Luraghi 2008, 262). The federal arrangement ended in 182 BC when, after a failed revolt against the Achaean League and the poisoning of its general, Philopoimen of Megalopolis, inside Messene's treasury, Messene was forced to rejoin it. According to Polybius (23.17.2), Abia, Thouria[5] and Pharai, *poleis* previously under Messene's control, now joined the Achaean League independently (Luraghi 2008, 263-4; Shipley 2004, 562). In addition, an inscribed statue base of horsemen, dated to 182/1 BC, was found in close proximity to the temple of Messana and the Bouleion in the agora of Messene. According to its long inscription (*SEG* 58, 370), which deals with a land dispute between Megalopolis and Messene, the Messenian *poleis* of Andania and Pylana had passed at the time under the control of the Achaean League. Megalopolis subsequently asked for their control along with the area surrounding them and the *poleis* of Akreiates and Bipeiates. Although Messene won both of the ensuing trials to settle the dispute, Andania and the upper part of the *Stenyklaros* valley surrounding it were not returned to Messene until after the Roman conquest of the Peloponnese and the same is true for the area of Dentheleatis as well (Themelis 2008, 211-9)[6].

After the Achaean League's defeat by the Romans in 146 BC at the battle of Corinth, which concluded the Achaean War and in which Messenia did not take part, Messene seems to have regained its independence although it is not clear whether it again became the dominant political power over the aforementioned neighbouring *poleis* such as Abia, Thouria and Pharai (Alcock et al. 2005, 174-5; Luraghi 2008, 264). These *poleis* certainly were not subordinate to Messene, however, as many of them had

[5] Thouria's independence at the time is confirmed by a very fragmentary inscription found in Olympia and dated to 181 BC (IvO 46), which mentions on one of its sides the settlement of a border dispute between Thouria and Megalopolis (Themelis 2008, 220). In addition, a 2nd or 1st c. BC inscription (*IG* V[1] 1379) found at Thouria, regulating the polis' grain supply, is cited as further support for its independence (Roebuck 1945, 153). Both inscriptions regard public matters that were taken care of by the Thourians themselves without the interference of Messene.

[6] *SEG* 58, 370 is also discussed by Arnaoutoglou (2009/2010) and by Luraghi and Magnetto (2012).

their own political structure and coinage at the time (Luraghi 2008, 264; Themelis 2001, 121). Thus, the dissolution of the League led to the renewed political fragmentation of the Peloponnese (Rizakis 2010, 1). Moreover, the year 146 BC is one possible date with which we can mark the beginning of Roman control over Greece, the Peloponnese included (Alcock et al. 2005, 175).

Although Roman presence in the Peloponnese had already been established from the 2nd c. BC, complete Roman control over Greece was established by Octavian-Augustus with the creation of the Roman province of Achaea in 27 BC, soon after winning the sea battle of Actium in 31 BC against Antony and Cleopatra, with whom most of Greece, including Messenia, had sided (Alcock 1993, 9; 1998, 184-5). Thus, administration of Greece passed from the proconsul of Macedonia to the Roman Senate (Lazenby and Hope Simpson 1972, 93). As a consequence of Messenia's support of the losing party, a number of Messenian *poleis*, Thouria included, were given to Sparta, which had sided with Augustus (Themelis 2010b, 56). Nevertheless, the Roman period was one of prosperity for Messenia and, thus, Messene. Major contributing factors to this were the fertility of the land, its proximity to Italy and the long *pax Romana*[7] (Alcock et al. 2005, 175-6; Alcock 1998, 185) as well as the halt to the political fragmentation of the Peloponnese (Rizakis 2010, 6). As regards the latter point, a new model of administration was introduced by the Romans, which focused on the promotion and demographic and territorial expansion of certain large urban centres, Messene being one of them, that acted as agents of Roman interests within their wider periphery and were granted, in return, privileges of a political and economic nature (Alcock 1993, 129-30; Rizakis 2010, 6). Furthermore, a number of Roman businessmen (*negotiatores*), amongst other Roman citizens, had already settled in Greece, including Messene, during the 2nd and 1st c. BC, thus strengthening the region's bond with Italy. They were also important landowners in the region (Alcock et al. 2005, 175-6; Alcock 1998, 185-6). According to the ephebic catalogues of the gymnasium, Messene had five tribes prior to the Roman conquest, *Aristomachis, Kleolaia, Hyllis, Kresphontis* and *Daiphontis*. In the time of Augustus, however, a sixth numerous tribe of Romans and foreigners appeared, although its members seem to have been assimilated by the older tribes by the late 1st c. AD The creation of the sixth, temporary, tribe is indicative of the number of outsiders that had settled at Messene (Themelis 2013, 143-5). The existence of a foreign population in Messene or, at the very least, the import of foreign ideas is further supported by the chance finding of a number of votive stelai depicting raised hands dated to the late Hellenistic and Roman periods. This iconographic element was characteristic of non-native cults introduced to Greece from the Hellenistic period onwards (Palagia 2011, 67-8). In addition, imports and exports of products from the Adriatic Sea increased (Themelis 2010e, 95). Like Athens, Roman Messene not only avoided reduction in size, but also entered a phase of urban improvement and rebuilding during the Augustan era (Alcock 1998, 186; Themelis 2010d, 12). Moreover, it managed to maintain the right of self-government according to its own internal laws (Themelis 2002c, 33). Messene was at the time the political and religious centre of Messenia (Themelis 2002c, 41) and can accurately be described as a thriving civic centre (Tsivikis 2012a, 62). Thus, Messene became one of the few Roman administrative centres that Augustus maintained in Greece, along with Sparta, Argos, Patrai, Corinth, Athens, Nikopolis and others, gaining metropolitan status (Rizakis 2014, 243-5). As for Thouria, as already mentioned, according to Pausanias (4.31.1-2), it was returned to Spartan control after the sea battle of Actium as Augustus' way of rewarding the latter for their support (Luraghi 2008, 37; Themelis 2001, 121).

[7] For a brief overview of the military turmoil in Messenia from the 8th c. BC until the beginning of Augustus' reign, see Lazenby and Hope Simpson (1972, 82-93) and Themelis (2010a, 30-56).

Roman taxes were paid in cash until about the 3rd c. AD onwards, when they had risen significantly and were paid in kind. A number of direct (the *tributum soli* on landholdings and *tributum capitis* on heads of population or perhaps including other assets) and indirect (e.g. sales taxes and *portoria* – customs dues) taxes were imposed on the Greeks. Additional taxes were also raised when needed (Alcock 1993, 21), including the *oktobolos eisphora* (IG V[1] 1432-1433), imposed on Messene by Roman officials in the early 1st c. AD[8]. It amounted to 100,000 denarii and both Greek and Roman inhabitants had to contribute. The reasons behind this tax are unknown (Alcock 1993, 21; Alcock et al. 2005, 175). The reforms of Emperor Constantine I in the first half of the 4th c. AD on the monetary system of the Empire managed to solidify cash payments again although payments in kind were also a staple of the current exchange system (Ostrogorsky 2002, 100-1).

In Central Greece, the Boeotia Survey Project (1978-1991) noted a great density of Classical period sites, which were identified as villages and farms, followed by a decline of dispersed rural settlement[9] by the late Hellenistic and early Roman periods. Around 400 – 600 AD, a widespread increase in sites was noted once more. Other surveys in the Peloponnese, such as the S.W. Argolid Survey Project, the Methana Survey Project, the Laconia Survey Project and the Nemea Valley Survey Project, came up with similar results of declining numbers of rural settlements during the Hellenistic and Early to Middle Roman periods and recovering rural site numbers during the subsequent period (Bintliff 2008, 22-4). Of course, the dates at which these changes occurred are not identical for each geographic region. In Messenia, for example, a takeoff in rural site numbers, delayed until the Hellenistic period was noted by the Pylos Regional Archaeological Project (hereafter PRAP) with a further increase during the Roman period (Davis et al. 1997, 456-7), while in the area of the Five Rivers Survey Project around Nichoria, again in Messenia, an increase in the number of sites was noted for the Roman period (Alcock 1993, 46). The rural sites that reappeared during the middle (2nd c. AD) but most notably during the late Roman period (3rd c. AD) in the Peloponnese were no longer dominated by suspected family-owned farms. Instead, the vast majority of them have been interpreted as elite-owned villas (Bintliff 2008, 29). Papadopoulos and Zachos have proposed, in connection to Dyme in western Achaea in the northern Peloponnese, that the reduction in site numbers and the appearance of elite villas could have been partly related to the practice of monoculture, which would have demanded less presence of farmers in the fields than polyculture, in combination with a move of the population from the countryside to urban centres (Papadopoulos and Zachos 2000, 145). In the case of the Methana survey, a connection of many of these late Roman sites to olive processing was noted due to the related pressing equipment (press-weights, press-beds, *orbes* and *mortaria* from *trapeta*) found associated with them and their proximity to both land suitable for the cultivation of wheat and vines and to marginal land as well. Based on ethnographic data, the marginal land is at an altitude too high for successful olive cultivation. Thus, it has been suggested that the late Roman farmsteads were not solely focused on agriculture but must also have practised some degree of pastoralism, for which that land would have better suited, while the olive groves must have been located on lower ground (Forbes 1995, 336; Mee et al. 1991, 225-30). In connection to the previous statement that many of the late Roman sites have been interpreted as elite-owned villas, Foxhall (1990, 109) proposes that two of the Methana Survey sites (MS 109 and MS 211) could possibly have been tenant or sharecropper-occupied farms, based on their remote locations and

[8] The inscriptions are presented and extensively analysed by Wilhelm (1914). For their dating, see Giovannini (1978, 115-22) and Migeotte (1997).

[9] A fact that Foxhall (1990, 108) interprets as evidence of nucleation, especially when combined with the expansion of various "city-sites" at the time. Foxhall does not limit this conclusion to Boeotia but applies it to other surveyed Greek areas with similar results such as Methana and the Nemea Valley (see immediately below).

the small quantities of fine-ware pottery (and the small quantities of pottery in general) found there in contrast to other contemporary possible farm sites detected at lower altitude. Despite the lack of good-quality pottery, both sites had capital equipment and masonry of excellent quality, a fact that recalls leases of that period stipulating that the landlord provided the expensive equipment (e.g. grain mills; olive and wine presses) and maintained the buildings, while the tenant brought along the more ephemeral items[10]. Of course, neither she nor Mee et al. (1991, 226-7) rule out the possibility of slave-run farms supervised by a slave bailiff. Van Andel and Runnels (1987, 115) have also noticed, beyond the presence of olive pressing equipment (*trapeta*) there, that many of the late Roman sites in the southern Argolid are located close both to land suitable for olive tree cultivation and to remote hilly terrain, though they do not connect the latter with pastoralism. In sum, the Classical and Early Hellenistic rural landscape of Greece in general was filled by numerous small farmsteads, followed by a significant drop in small rural site numbers in the Hellenistic and early Roman periods, in combination with the emergence of an increasingly wealthy elite landowning class in the countryside and possibly an increase in the growth of urban centres, and, finally, a significant recovery of smaller rural settlements in the late Roman period, around the 3rd or 4th c. AD (Alcock 1993, 48, 72 and 224).

A number of explanations have been proposed for these changes. One possible cause was an ecological crisis triggered by overexploitation of agricultural land, and thus soil erosion, in the Classical period due to the rise in population numbers (Bintliff 2008, 30). However, it is highly unlikely that soil erosion would have occurred simultaneously in different regions to the extent that the survey data on site numbers co-vary (Endfield 1995, 246). In addition, Foxhall (2003, 78) maintains that the Greek countryside was perfectly capable of supporting its population in the era discussed although she does not present any evidence to back up such an important conclusion. A second proposed reason was socioeconomic dislocation in the Late Hellenistic and Roman periods, with landownership taken over by the upper class leading to the disappearance of small family-owned farms in favour of large villas that caused the smallholders to relocate from the countryside to the towns (Bintliff 2008, 30). In many surveys, it was observed that the size of Hellenistic and especially Roman rural sites was larger than in Classical times (Alcock 1993, 59) but the possibility of some of these sites representing small nucleated settlements (e.g. villages or hamlets) rather than large, individually owned estates has also been proposed (Alcock 1993, 62-3). Moreover, since most surveyed towns either shrank in size or remained stable during the Roman period, the suggested exodus to them must have been directed to the few, large administrative settlements created by the Romans. Another possibility was the economic and political manipulation of these peripheral regions first by Hellenistic monarchs and later by Rome, causing regionally variable effects, sometimes positive (i.e. prosperity) and sometimes negative (i.e. decay) (Bintliff 2008, 30). For example, formerly exploited marginal land of low productivity, may have been abandoned in the Roman period because it represented a potential tax liability (Alcock 1993, 91). However, as each of these changes was specific to particular regions, they were also specific to particular periods (Bintliff 1997, 33). Furthermore, as noted in an earlier chapter of this thesis, emphasis was given by the Romans to the promotion of certain regional centres, while little effort was put into the development of the countryside (Rizakis 2014, 242-3). In practice, a regionally variable combination of these causal factors is perhaps the most likely solution (Bintliff 2008, 31).

It is also noteworthy that the late Hellenistic – early Roman sites identified by surveys in various parts of Greece, Messenia included, tend to be established on the most fertile soils and in less isolated areas,

[10] On the subject of equipment provided on the one hand by the landlord and on the other hand by the tenant, see Frier (1979).

indicating that agricultural activity was not abandoned at the time, even if it was perhaps less intensive than in the Classical and Early Hellenistic periods (Alcock 1993, 83). After all, a small number of rural sites of limited size established in the Peloponnese during Roman times further support this as they are usually tentatively identified as farmsteads, which constitute evidence of an intensive agricultural strategy even if this was practised by a small fraction of the population (Stewart 2010, 223-4).

Stewart (2010, 221-9) suggests that if we turn our focus from the Roman Peloponnese as a whole and we study each region individually, the decline in small rural sites is not the only trend detected. Evidence for intensification and specialisation of agriculture in a minority of sites, which were established on marginal land with soils best suited for monoculture of vines and/or olives, and perhaps increased pastoral activities, judging by a small number of inscriptions (e.g. grants of *isopoliteia* and *sympoliteia*) referring to the transport of flocks (transhumance) and to pasturage rights between regions, possibly aimed at the production of surplus for sale through a wide network of inter-regional interactions stimulated by the expanding influence of Rome. He thus argues for a higher degree of continuity in the landscape than previously thought. The changes observed could reflect shifts in patterns of landownership and, consequently, redistribution of both wealth and population evidenced by the rural villas emerging in the countryside. However, they could also be caused by changes in agricultural strategies and, as a result, in settlement patterns. Alternatively, Rome may be the causal factor behind the nucleation implied in a number of Peloponnesian field surveys by the decline in number of small rural sites. The local population could have turned inwards as a response to the shifting political balance in the Mediterranean. This may also explain why monocultures, which by nature tend to be associated with participation in a system of surplus production for exchange either on a local or on a regional level, if indeed practised, were apparently pursued only at a minority of sites.

Focussing on Messenia, during the Hellenistic period, several changes were observed in Messenia by the University of Minnesota Messenia Expedition (hereafter UMME), and later confirmed by PRAP. These were an increase in lower-lying and coastal settlements, especially along Messenia's west coast, an emphasis on activity in the area of Messene and, last but not least, a slight increase in the number of sites in general (Alcock et al. 2005, 161-2). The increase in site numbers is to be expected as, with the removal of Spartan control of the area, a portion of Messenia's exiled population returned. This at least was the narrative that suited the Theban liberators and the newly freed Messenians best. In reality, the area's population must have been composed partly of both Messenian and Laconian helots and *perioikoi*, as the helots were freed and the perioikic poleis gradually distanced themselves from Spartan domination, and partly of some influx of population from other areas of Greece (Alcock et al. 2005, 174; Luraghi 2008, 219-30). The preference for lower and coastal sites was sparked by the existence of better regulated commerce and more stable political conditions (Alcock et al. 2005, 161). The trends noted during the Hellenistic period continued in Roman and early Byzantine times (1st c. BC – 6th c. AD) (Davis et al. 1997, 457). Moreover, a significant increase in villas (*villae rusticae*), coupled with elaborate funerary monuments, is noted in the Roman period[11], possibly indicative of the ownership of large expanses of agricultural land by a few elite families. As for those who owned no land, they presumably either rented it from the elites or worked their fields as paid labourers or sharecroppers or they could have even turned to other forms of employment (Alcock et al. 2005, 193; Alcock 2007, 136). In Messene, the excavated Roman villas were built over earlier Hellenistic ones (Themelis 2002a, 100). The appearance and spread of the *villae rusticae* in the Greek landscape attests to a changed relationship

[11] Shipley (2018, 195) specifies that larger villas likely increased in number from the 1st c. BC onwards.

between town and countryside as the aim of such establishments was the production of agricultural surplus to be sold for profit in the markets of large urban centres. In return, the workshops established in these urban centres could potentially have supplied both the local population and a wider network with a variety of products such as pottery and glass vessels, metal objects, textiles, perfumes, etc. (Rizakis 2014, 254-5).

In AD 313, Emperor Constantine I allowed Christians to practice their religion openly and, in AD 330, he moved the capital of the Roman Empire from Rome to Constantinople. About half a century later, pagan worship was prohibited by Emperor Theodosius I and, thus, Christianity became the official religion of the empire (Ostrogorsky 2002, 104-6 and 114). At the same time, a period of decline, due to economic and social factors, began for Messene from the early 4th c. AD onwards as public buildings were abandoned one by one, with their definitive abandonment and collapse dating just after the great earthquake of July 21st AD 365[12]. The social and economic decay of the *polis* prevented its citizens from fully recovering from such a natural disaster (Themelis 2002c, 34; 2010d, 13). Furthermore, another catastrophic earthquake struck in AD 375[13] (Kosmopoulos 2013, 421). In addition, the population of Messene, and of the Peloponnese in general, seems to have shrunk (Lambropoulou et al. 2001, 221; Themelis 2014, 62). This decay was the result of a chain reaction caused by the decline of the Roman Empire, which began in the 2nd c. AD and got worse in the following centuries due to plague outbreaks[14], a series of barbarian raids and invasions, civil wars leading to political instability and a number of economic crises. Resisting the invaders was costly for the Empire, the income of which was largely based at the time on the taxation of its inhabitants (Tainter 1988, 11 and 188). The vast majority of the latter earned their living through agriculture (Bowman and Wilson 2009, 61; Jones 1959, 39) and, thus, needed to create enough surplus to be able to meet the taxation demands[15] of the Empire (Hopkins 1980, 101), while those who did not cultivate their own land also had to pay rent (Hopkins 1980, 104; Jones 1959, 41). Moreover, the Roman emperors debased the currency to inflate artificially the value of their annual budgets (Hopkins 1980, 123; Tainter 1988, 188). As a result, taxation increased[16] and the population was economically drained. Furthermore, as the population declined because of the outbreaks of plague and its productive capacity declined, cultivated lands were abandoned and, consequently, the Empire's income further decreased. Coming full circle, additional barbarian invasions in the late 4th and 5th centuries AD were catastrophic for the severely weakened Roman Empire (Tainter 1988, 188 and 196). Regarding the aforementioned abandonment of cultivated land, Jones (1959, 40-3) tentatively

[12] For the earthquake of AD 365 in general, see Ambraseys (2009, 151-6); Jacques and Bousquet (1984a; 1984b), Kelletat (1998); Kelly (2004); Lapelley (1984); Stiros (2001); Waldherr (1997); Avramea (2012, 82-92). Ambraseys (2009, 153) argues that this earthquake, however large, would not have caused extensive damage.

[13] According to Ambraseys (2009, 157), this earthquake did not actually occur but it simply is a duplication of the earthquake of AD 365.

[14] The most serious of these were the Antonine Plague in the second half of the 2nd c. AD during the reign of Marcus Aurelius Antoninus (Fears 2004, 65).

[15] It should be noted that the taxes imposed by the Roman Empire, according to Hopkins' (1980) theoretical calculations, were relatively low. However, the limited presence of the Roman central government in the provinces outside Italy often led to the maldistribution of the tax-load on ordinary people by the local authorities responsible for tax collection who used this as an opportunity for personal gain (Hopkins 1980, 121). Lo Cascio (2007, 624-5) argues in favour of heavier taxation as he adds local taxes, in addition to the state ones, in the equation. On the exploitation of the bulk of the population by local administrations through tax collection, especially from the 4th c. AD onwards, see the article by MacMullen (1987), which is based primarily on literary sources.

[16] According to Hopkins (1980, 123), taxation by the Roman central authorities did not actually increase but abuse by local tax collectors probably increased as it could no longer be prevented due to the weakening of the central government after the collapse of the traditional fiscal system.

attributed this to the inability of many cultivators to meet the heavy taxation demands of the central government[17] and he went on to credit over-taxation as the main cause for the reduction of the empire's population. Thus, as his article's title states, he argued that over-taxation was the leading cause for the eventual decline of the Roman Empire. In my opinion, no single factor should be credited as the sole reason for the gradual decline at the time. In contrast, a combination of the many misfortunes summarized in the current paragraph must have created a domino effect that proved to have disastrous consequences for the empire.

The Early Byzantine Peloponnese was further troubled by the Visigoth raids led by Alaric I in AD 396-7 (Anagnostakis and Poulou-Papademetriou 1997, 231-2) although, contrary to what was previously believed (cf. Gerstel 1998, 212-3), no archaeological or textual proof exists of these raids directly affecting Messene. Defeat of the Visigoths at Pholoe probably stopped them from advancing on Messene, while the plethora of Byzantine numismatic finds at Messene and the lack of destruction layers of that period in the excavated trenches suggest that the raiders did not pass through the town (Sidiropoulos 2002, 101 and 106-7). In addition, further earthquakes affected Messene in AD 522 and AD 550/5 (Avramea 2012, 91; Themelis 2002c, 43), while bubonic plague struck the Peloponnese in AD 541-4 (Gerstel 1998, 212) and at least five more times between AD 555 and 608 (Topping 1972, 64).

In the Middle Byzantine period, the traditional sea routes were threatened by the Arabs, while important changes occurred in state and religious administration. A notable change in that period was the detachment of many eastern archbishoprics, the Peloponnese included, from the Pope's jurisdiction in AD 733 and their inclusion in the jurisdiction of the Patriarchate of Constantinople (Αναγνωστάκης et al. 2002, 72-3), while the episcopacy of Messene ceased to exist at some point during that era (Αναγνωστάκης 2010, 114). Furthermore, plague troubled the Peloponnese once more in AD 747 – 8 (Topping 1972, 65). In addition, Slavs "occupied" the western portion of the peninsula during the late 6th – early 9th c. AD They did not become rulers of the region, however, and did not replace the Greek population, but apparently co-existed with the locals and were eventually assimilated by them (Gerstel 1998, 214-5). This view is supported by findings at Olympia, where a small number of 7th c. AD Slavic handmade urns were found. The Slavs seem to have adopted the Christian material culture for all other aspects of their everyday lives and the two populations were even buried in the same cemeteries (Anagnostakis et al. 2002, 75)[18].

As for Messene, it was most likely cut off at the time from areas under Byzantine control, although it seems that by the early 9th c. AD Byzantine authority in the area, and in most of the western Peloponnese in general, was restored. This is supported by the 9th – 10th c. AD Byzantine coins and lead seals found during excavations at Messene (Tsivikis 2012b, 69-71; Topping 1972, 65). It should be noted that Messene is named "*Vourkano*" or "*Voulkano*" in many written accounts from the 10th c. AD onwards, a word of possibly Slavic origin (Anagnostakis 1989, 69-79; Tsivikis 2012b, 70; Yangaki 2006, 443). Finds initially thought to have connected the settlement with a Slavic presence include the hand-made pottery vessel and bronze buckle (inv. no. 4409) from the 7th c. AD Christian tomb 31B, excavated in 1994 in the area of sanctuary Ω – Ω, as well as a couple of bronze buckles (inv. no. 3674 and 11921), found in the area of the Asklepieion and the Byzantine settlement to its east and dated to the same period as the tomb. These were in fact local Byzantine products, however, and were used in the areas

[17] Jones (1959, 41) did credit the barbarian invasions as an additional causal factor for land abandonment in regards to the frontier provinces of the empire.

[18] For the issue of Slavic invasions and settlement in the Peloponnese in general, see Avramea (2012, 135-223).

under Byzantine control, so they neither indicate nor exclude a Slavic presence (Anagnostakis and Poulou-Papademetriou 1997; Lambropoulou et al. 2001; Poulou-Papademetriou 2002; Tsivikis 2012a).

In general, the Peloponnese was a relative backwater during the Byzantine period as it was located on the margins of the Byzantine Empire. Furthermore, with the Christianization of the Peloponnese, which seems to have been a slow process that began in urban centres before moving out to rural areas (Anagnostakis 2010, 118)[19], the great Pan-Hellenic sanctuaries of the peninsula, such as Olympia and Nemea, whose continued popularity had at first delayed the spread of the new religion in the region, eventually lost their importance (Anagnostakis et al. 2002, 70-1; Gerstel 1998, 211; Tsivikis 2012b, 56).

Of course, backwater does not necessarily imply impoverishment of the Peloponnese as the construction of an important number of churches in Messenia from the 10th to the 12th c. AD is a sign that the region enjoyed relative economic stability, due to the fertility of its land (Gerstel 1998, 216-7; Topping 1972, 65). However, the growth of large estates, fiscal tyranny and the revival of piracy, factors that affected the whole Byzantine Empire at the end of the 12th c. and beginning of the 13th c. AD, eventually led to the economic decline of the Peloponnese (Topping 1972, 66).

In AD 1205, as a consequence of the Fourth Crusade, a large segment of the western Peloponnese was conquered by the Franks led by Geoffrey I of Villehardouin and William of Champlitte and a few years later most of the peninsula had succumbed. Thus, the *Principality of Achaea* or *of the Morea* was born. Methoni and Koroni, both port settlements located in the southern part of western Messenia, were at the time together with their dependent towns under Venetian rule. The ineffective Byzantine bureaucracy was replaced by the feudal system, which led to a period of relative stability for Messenia (Gerstel 1998, 219-22). Messene in the 12th and 13th c. AD, though still a mainly agricultural settlement, most likely participated in regional exchange with other Peloponnesian settlements as well as a number of towns from mainland Greece. This is suggested by the painted glazed pottery types found during excavations at Messene that were imported from various Greek production centres. Imported 13th and 14th c. AD Italian painted glazed pottery and coins found in the area of the theatre and the Arsinoe fountain house hint at the settlement's more distant commercial connections with Italy. Moreover, according to a number of inventory-type documents, the Florentine family of the Acciaiuoli owned important estates in the wider area of Messene, named Voulkano in the documents, during the 14th c. AD Those same documents hint at a prospering settlement of ca. 61 households or ca. 250 inhabitants prior to AD 1354 (Topping 1972, 68; Yangaki 2006, 435-44). Topping (1972, 68) believes that the village is both prosperous and populous in comparison to many others in Messenia because high officials such as the Acciaiuoli would not have been granted poor areas.

In a treaty of AD 1262, parts of the Frankish Morea were returned to Byzantine control under the government of the local capital of Mystra in Laconia. Then, in AD 1347-8, the Black Death reduced Messenia's population, while Turks and Catalans in the 14th c. AD and Albanians in the late 14th and 15th c. AD repeatedly invaded the Peloponnese, as a consequence of the weakening of Frankish control (Gerstel 1998, 323-4). The Albanians settled in the Peloponnese, Messenia included, often encouraged by both the Byzantines and the Venetians, who used them as mercenaries (Topping 1972, 69). By AD 1430, the Frankish Morea returned to complete Byzantine control with the exception of the area under Venetian rule, which had expanded by the early 15th c. AD as Methoni and Koroni became important

[19]Foschia (2009) and Gregory (1986) discuss this process for Greece in general. For the Peloponnese, see Sweetman (2010; 2015).

maritime trade centres. The Ottomans began conquest of the peninsula in AD 1460. The Peloponnese ceased to be under Venetian rule by AD 1500 and under Byzantine rule by AD 1540, when their last strongholds fell to the Ottomans. Shifts in demography soon followed as part of the Christian population of Messenia, and the Peloponnese in general, escaped to areas not yet under Ottoman rule to avoid recruitment into the Turkish army. Moreover, heretic Turkomans were transferred to Methoni and Koroni from Anatolia, further altering the demographic picture. In AD 1685-8, most of the Morea returned under Venetian rule, creating the *Kingdom of the Morea*. The last Byzantine fort, the fortress of Monemvasia, fell in AD 1690. As a result of the Venetian occupation, part of the Greek population returned to the severely depopulated region, but Ottoman rule was restored in AD 1715. The peninsula was finally severed from Ottoman control in AD 1827 with the Battle of Navarino (Gerstel 1998, 225-8; Topping 1972, 70-1; 1976, 92-3). Finally, in contrast to the preference of the Hellenistic – early Byzantine population for the lowlands, according to 17th c. AD documents found in Venice's archives the Ottoman estates were more common in the lowland plains, while most of the Greek population inhabited inland villages[20] (Davis and Bennet 2009, 90).

[20] The Peloponnese, or Morea as it was called at the time, was occupied by the Venetian Republic in the period AD 1688-1715 until it was reconquered by the Ottoman Empire (Davies 2004, 60). For a more detailed overview of the Venetian and Ottoman Morea, see Davies (2004) and Zarinebaf et al. (2005) with additional references.

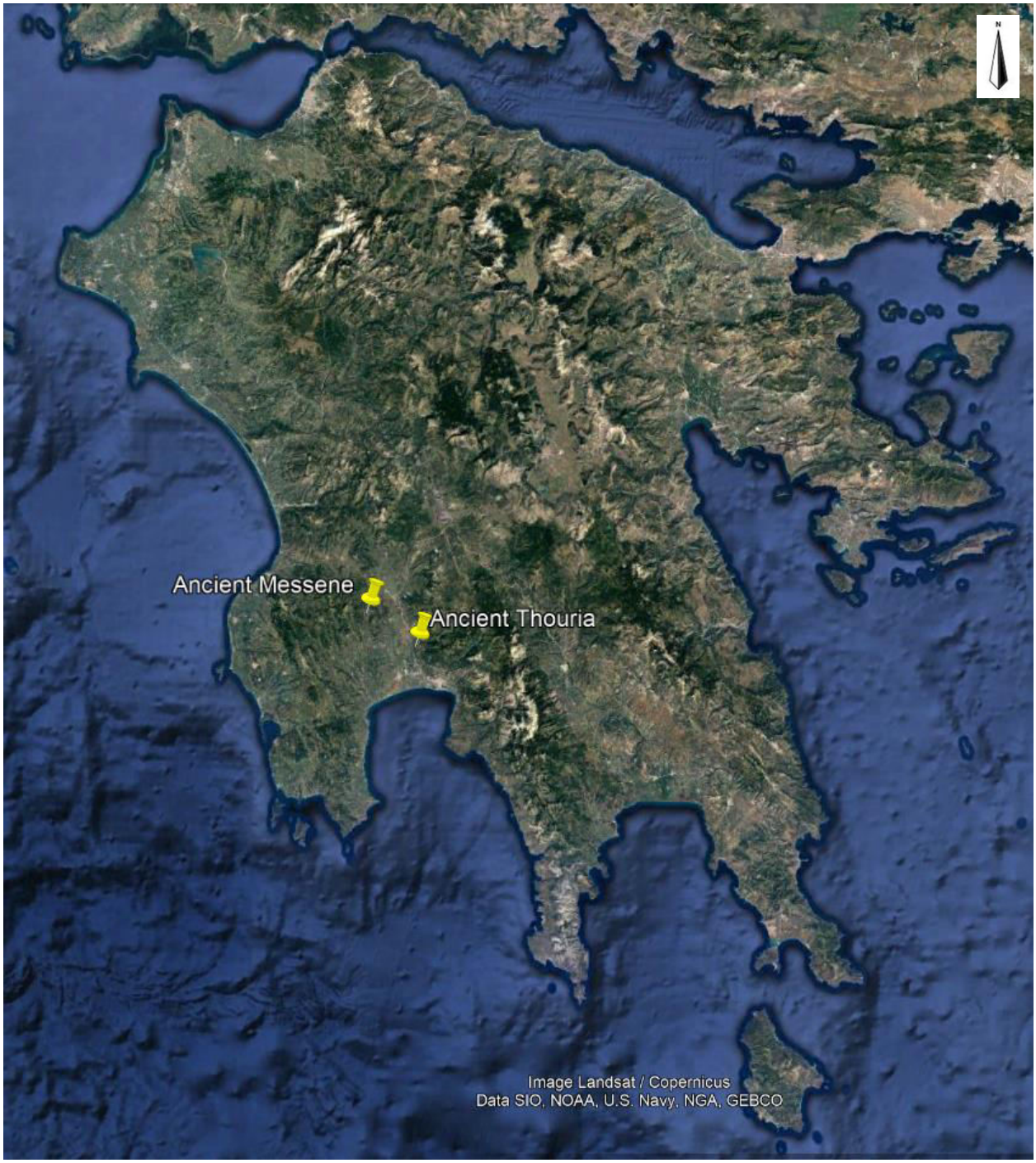


Figure 2.1: Google Earth view of the Peloponnese noting the location of ancient Messene and Thouria.

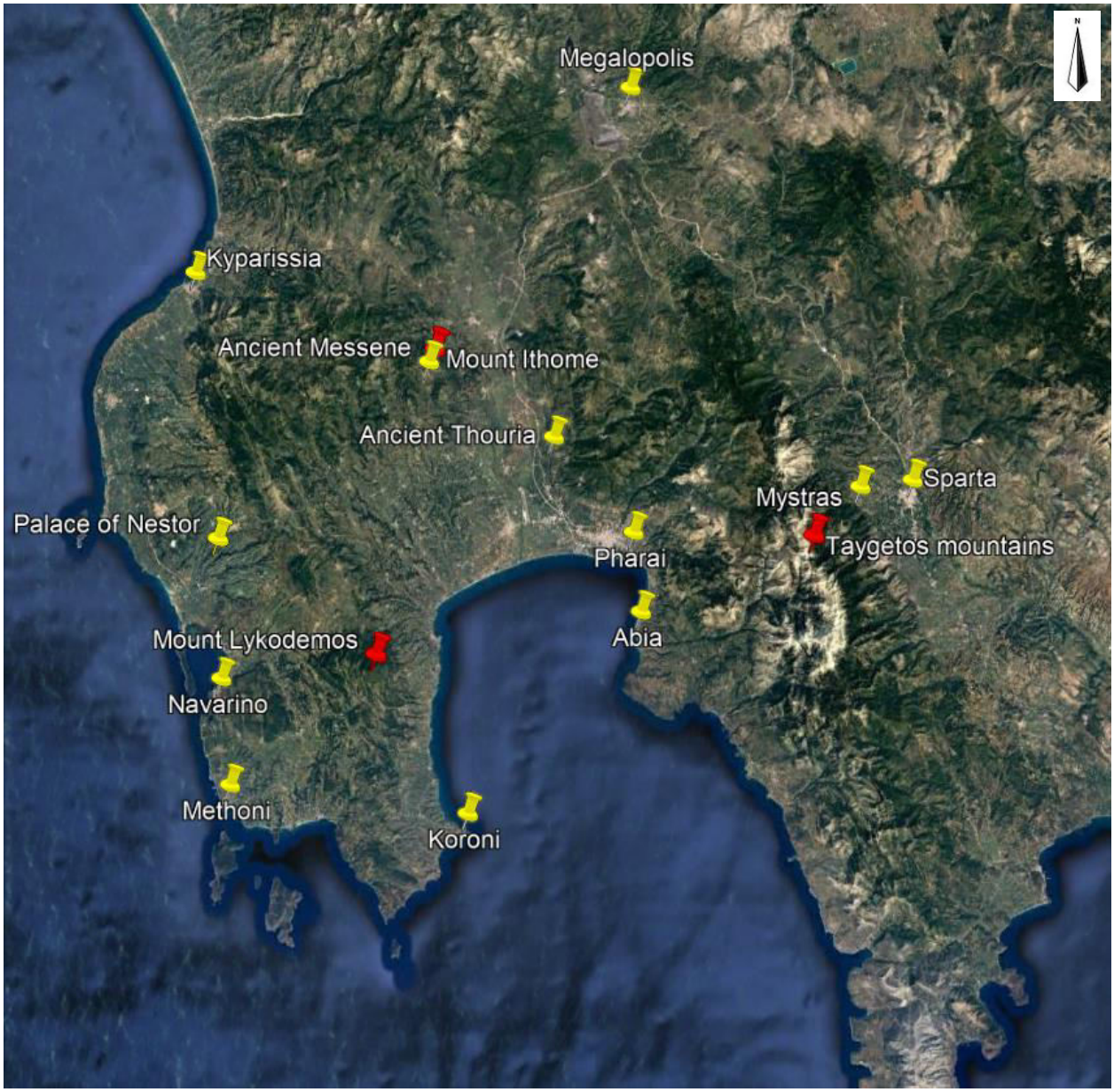


Figure 2.2: Google Earth view of Messenia and its surrounding area with the locations mentioned in the text marked.

3. The study sites

Introduction

The aim of this chapter is to take a closer look at ancient Messene and Thouria with an emphasis on the Early Byzantine phase in the case of the former as the zooarchaeological material studied originates exclusively from that time period.

Ancient Messene

Ancient Messene has a research history that spans over a century. A number of 19th c. travellers visiting the area by following the steps of Pausanias, have left us a number of drawings and descriptions of the then visible elements of the site. Milestones were the investigation of ancient Messene by the French Morea Expedition (*Expédition scientifique de Morée*, 1828-1833) for a month in 1828, led by Abel Blouet and the study of the temple of Artemis Limnatis in 1843-44 by Ph. Le Bas (Themelis 2014, 37-8).

The Archaeological Society at Athens began work at Messene in the form of systematic excavations in 1895 under the direction of Themistocles Sophoulis. The excavations were continued by George Oikonomou in 1909 and 1925 and by Anastasios Orlandos in 1957-1974. Finally, Prof. Petros Themelis was assigned the direction of the excavations in 1986, which continue to the present day in the form of a systematic programme. Nowadays, a programme for the restoration of the monuments runs parallel to the excavations. Themelis has managed to bring to light many of the monuments, both sacred and secular, that Pausanias described when he visited Messene between AD 155 and AD 160 (Themelis 2014, 38-9).

The excavations have brought to light a number of Hellenistic and Roman civic, sacred and secular structures (Figure 3.1) such as the theatre, the sanctuary of Isis and Sarapis, the Arsinoe fountain house, the agora, the temple of Messana, the *Bouleion* (Council Hall), the temple of Demeter and the Dioscouri, the building complex of the Asklepieion with the god's temple surrounded by a number of rooms of civic nature (e.g. the Ekklesiasterion, the Bouleuterion, the Hall of the Archives, etc.), the temple of Artemis Orthia, *balnea*, the Hierothysion, the horse-shoe shaped stadium, the gymnasium and the palaestra as well as a number of *intra muros* funerary monuments such as *Heroon D* and the mausoleum of the family of the Saethidae. A few Roman villas and industrial workshops were also unearthed. In addition, the temple of Artemis Limnatis and Laphria, the temple of Eileithyia and the *megaron* of the Kouretes were excavated on Mount Ithome while the temple of Zeus Ithomatas, whose cult preceded the establishment of ancient Messene, is located on the peak of this mountain. Finally, the fortification wall with its towers and the monumental Arcadian gate to the west with its adjacent Roman funerary edifices complete the picture. A thorough description of both ancient Messene and its research history is not attempted here as a number of publications have already undertaken that task (e.g. Themelis 2002b; 2014; 2019; Tsivikis 2016)[21]. As the studied faunal assemblage originates from Early Byzantine contexts, the analogous phase of the settlement is the focus of the rest of this section.

[21] The three selected references by Themelis were published as site guides and are cited here together to demonstrate how much the site has changed and how much work has been accomplished in the span of the last two decades. Tsivikis (2016) has written extensively on the research history of ancient Messene as well as the site itself, giving particular attention to the Early Byzantine phase of the settlement.

A period of decline, due to economic and social factors, began for Messene from the early 4th c. AD onwards as public buildings were abandoned one by one, with their definitive abandonment and collapse dating just after the aforementioned great earthquake of AD 365. Although the severity of the earthquake is debated by scholars, the existing social and economic decay of the polis prevented its citizens from fully recovering from such a natural disaster (Themelis 2002c, 34; 2010c, 13). A hint of this is the systematic quarrying of the theatre, which began in the late 3rd – early 4th c. AD (Themelis 2010c, 37; 2014, 62). Its aim was not just the recycling of architectural elements in new structures but also the production of lime, as attested by the limekiln excavated there (Tsivikis 2012b, 64-6) as well as a possible lime slaking pit (Themelis 2011, 105)[22]. The resulting lime was not only used in construction but, as Tsivikis (2020, 42-3) points out based on the 10th c. AD *Geoponica*, it had various agricultural applications[23]. In addition, the population of Messene, and of the Peloponnese in general, seems to have shrunk (Lambropoulou et al. 2001, 221; Themelis 2014, 62).

However, a number of archaeological finds such as coins (Sidiropoulos 2002), inscriptions (Bardani 2002) and pottery (Yangaki 2014) point to continuation of activities in various areas of ancient Messene from the late 4th c. AD onwards and a number of structures can be traced to the Byzantine era. More specifically, a settlement, inhabited exclusively during the Early Byzantine period (4th – 7th c. AD), was located in the area east of the Asklepieion. During the Early Byzantine period, a new settlement was built in the area of the fountain house, the theatre and the northern part of the agora and its inhabitation continued into the Late Byzantine era. Additional Early Byzantine household structures were identified in the area of the gymnasium while many Christian graves were located in various areas of the site. A number of non-domestic structures was also recorded. An overshot watermill for the grinding of grain was erected adjacent to the Arsinoe fountain house (Themelis 2002c, 35-41; 2017). Though earlier scholarship (Themelis 1998, 59; 2002c, 35) dated its construction to the first half of the 6th c. AD, based on a coin hoard discovered underneath its floor, Tsivikis (2020, 45), citing the same coin hoard, dates the construction of the watermill to the late 5th or early 6th c. AD while Themelis (2009, 95 n. 13) dates its period of use from the 4th c. AD to the 6th c. AD[24]. Moreover, a small 5th-7th c. AD public bath was built above the middle section of the ruins of the north portico of the agora (Themelis 2015, 89). Furthermore, three 5th – 6th c. AD basilicas have been identified. The basilica to the east of the Asklepieion known as the "Asklepieion basilica" is partly visible but has yet to be excavated (Themelis 2019, 111). Tsivikis (2016, 140-9) gives a detailed description of the visible features of the structure, the initial phase of which he (2016, 148) dates to the 5th c. AD The second basilica is located in the agora and has only partly been excavated (Themelis 2007, 48)[25]. The only completely excavated Christian sacred structure on site is the ''theatre basilica'' constructed in the mid-6th c. AD and conventionally named as such due to its proximity to the southeast of the theatre (Themelis 2016a, 93-4; Tsivikis 2018) [26]. After the partial collapse of the basilica in either the second half of the 7th c. AD or the 8th c. AD, a small church was built over the eastern part of its predecessor's south aisle and remained in use until the 11th or 12 c. AD In addition, its central aisle was turned into a yard surrounded by the aforementioned church as well as a number of rooms, some of which may have acted as workshops and others as habitation spaces

[22] For a more in depth analysis of the quarrying of the theatre and the production of lime, see Tsivikis (2016, 192-203).

[23] For the aforementioned as well as additional uses of lime in antiquity, see also Dix (1982).

[24] For the associated coin hoard, see briefly Sidiropoulos 2002, 104-5. For Messene's watermill in general, see Reinholdt (2009, 177-82).

[25] For its description, see Tsivikis (2016, 256-8).

[26] For a detailed analysis of the theatre basilica, see Tsivikis (2016, 208-55).

(Tsivikis 2016, 246-55). Finally, a number of artisanal activities were also taking place on-site as indicated by the excavation of a glass workshop[27] to the east of the Asklepieion (Themelis 2002c, 37; Triantafyllidis 2007), as well as a large concentration of bone-working waste to the north of Messana's temple in the area of the agora pointing to the existence of a bone workshop (Vasileiadou 2018)[28], while the above mentioned quarry and the building of such structures as the basilicas or the skilfully constructed graves imply the employment of specialized stonemasons (Tsivikis 2012b, 61). A rectangular tank excavated behind the mausoleum of the Saethidae bore traces of burning in and around it, indicating some as yet unidentified artisanal use before being turned into a disposal area (Themelis 1997, 93-4).

In terms of religious status, Messene is mentioned in the early 5th c. AD, as one of the seven Episcopal seats of the Peloponnese taking part in the Ecumenical Councils of Ephesus (AD 449) and Chalcedon (AD 451), and it is also listed in the late 5th/early 6th c. AD *Synecdemus* of Hierocles, as one of the 79 cities of the prefecture of Achaea, indicating that the town regained its importance even if just at a local level (Themelis 2002c, 42-3; Tsivikis 2020, 39-40).

In the previous section of this chapter, the generally reduced importance of the Peloponnese in the new order of things was mentioned. However, Messenia had several thriving port towns along its coastline at the time such as Kyparissia, Koroni and Methoni (Gerstel 1998, 211). Even though Messene seems to have been off major commercial routes as it lacked a harbour (Sanders and Whitbread 1990, 342-8), the finding of foreign coins (Sidiropoulos 2002) and imported pottery from the Aegean region and North Africa (Yangaki 2014) indicates that it was not completely cut off but still part of a wider trade network until at least the 6th c. AD. The Early and Middle (7th – 10th c. AD) Byzantine agricultural economy of Messene has been characterized as inward looking and, on a social level, an upper elite class either no longer existed or is not archaeologically visible. Messene had turned into a relatively prosperous, but now agricultural town, with the public buildings of the city centre being gradually abandoned (Tsivikis 2012b, 58; 2020, 41). Signs of ruralisation of the old city centre are not limited to the aforementioned watermill and production of lime for possibly both construction and agricultural use. The discovery of the 6th c. AD boundary inscription of the priest Ananias (*SEG* 52, 418 and *SEG* 53, 393) near the Asklepieion indicates the existence of cultivated land in the vicinity of the temple[29] (Bardani 2002, 89-90; Orlandos 1971, 118-9). Further supporting this view is Tsivikis' observation that the Christian cemeteries were located in areas where the ruins of the ancient polis were still visible and densely built. Thus, the open land may have been used for other purposes, possibly agricultural (Tsivikis 2012b, 62).

Four areas were selected for zooarchaeological study (Figure 3.2). The reasons behind that choice are explained in Chapter 4, while what follows is a brief description of them as more extensive accounts can be found in Prof. Themelis' vast bibliography as well as in the works of other researchers, most notably that of Nikos Tsivikis whose unpublished PhD thesis is an invaluable source of information about Byzantine Messene.

The first structure is the late Roman villa (XVI/9) to the east of the Asklepieion. Its most notable features are two large halls with decorated floors (Themelis 2002c, 25). Its interpretation as an urban villa is supported by the excavation of more structures belonging to this building complex (e.g. a large

[27] A 4th c. AD grave stele of a glassmaker excavated in ancient Messene (Bardani 2002, 91-2) further supports the existence of a glass workshop.

[28] As discussed in Chapter 5, finished bone objects and by-products of antler- and bone-working were identified in various areas of ancient Messene.

[29] For the possible existence of irrigation channels in the same area, see Tsivikis (2020, 49).

courtyard in the middle of the complex) with the northern room probably acting as a dining hall (Deligiannakis 2005, 392-3). Roman villas are usually characterized by the presence of baths, mosaic floors, marble decoration and statues as well as their large size (Kosmopoulos 2013, 406), criteria that XVI/9 fulfills[30]. A thick layer of destruction debris sealing both halls (Themelis 1992, 102; 1993, 59-60) indicates that the building complex was most likely destroyed during the earthquake of AD 365 as the discovery of a number of coins circulated during the reign of either the emperor Consta (AD 346–350) or Constantius II (AD 346–361) in the destruction layer act as the building's *terminus post quem* (Themelis 2002c, 25).

Immediately to the west of the theatre, and along the ancient road, is the "Theatre Quarter" (XVI/17). It is separated from the theatre by a narrow street and consists of luxury Roman villas dated to the 3rd–4th c. AD, which were built over late Hellenistic and early Roman predecessors (Themelis 2017, 12). According to two phrases ("*Παράμονος ἀναγνόστης ἐποίησε*" and "*Θεόδουλος ἐπίσκο<ι>πος ποιεῖ*") inscribed in the mosaic floors[31] of the complex, it seems that the complex operated as the residence of a bishop and as a house-church during the early Christian centuries (Themelis 2016b, 110)[32]. Based on numismatic finds, it was abandoned due to the earthquake of AD 365 (Themelis 2016a, 92). XVI/17 expands to the west outside the archaeological park and below a modern road, but the Middle Byzantine church of Saint Nicolas (still in use today) and the modern cemetery of the Mavrommati village make excavation of that section impossible at the present time (Tsivikis 2016, 160).

The cult of Isis and Sarapis must have been established at Messene in the 2nd c. BC and was probably introduced to the polis by Messenian traders. Their sanctuary (XVI/15) is located south of the theatre. A vaulted subterranean Π-shaped structure with terracotta pipes on the upper part of its walls has been excavated there. It has been interpreted as a water crypt. This type of construction is typical of Hellenistic and Roman Isis sanctuaries. Its roof collapsed in the late 4th c. AD and it was subsequently used as a rubbish pit as the sanctuary was destroyed by the earthquake of AD 365 (Themelis 2011, 105 and 109). In addition, three water tanks for the collection of rainwater and a series of rooms in association with them have also been excavated (Themelis 2017, 13). It should be noted that excavation of the sanctuary is still undergoing.

Finally, XVI/21, a Hellenistic or Roman circular Doric building underneath the east section of the apse of the ''theatre basilica'' (Themelis 2012b, 78-9), is the least explored of the four studied contexts. It was excavated in 2008-2009 but it was not completely unearthed due to its overlap with the basilica while most focus was given to its mosaic floor likely depicting one of Menander's now lost comedies (Themelis 2015, 91-2).

Ancient Thouria

In contrast to ancient Messene, ancient Thouria does not have over a century of research behind it. Other than a few descriptions of visible ruins by 19th c. travellers and topographic research in the first half of the 20th c. and again in 2003-2005 by a German archaeologist, little was known about the settlement (cf. Arapogianni 2017, 21-3 with references). Research began when in 2004-2009, the 38th Department of Prehistoric and Classical Antiquities of Messenia (at the time under the direction of Dr.

[30] For the marble statues found at XVI/9 see Themelis (2002c, 25-7).
[31] The mosaics are dated to the first half of the 4th c. AD (Tsivikis 2016, 171).
[32] Tsivikis (2016, 172-5) strengthens Themelis' interpretation of the structure as an in-home church through architectural comparison with the few other known examples.

Xeni Arapogianni) and the Italian Archaeological School at Athens (under the direction of Mr. Emanuele Greco) conducted a joint survey programme in the area of ancient Thouria, aimed at the topographical mapping of any visible remains of the polis, including its fortification walls (Arapogianni 2014a, 218).

Apart from the walls and various architectural spolia spread across the area, other visible structures were a big water tank below the acropolis, on the western side of the ridge, and the extremely well-preserved Roman baths at the site of *"Loutra"*, ca. 500 m southwest of modern Antheia. In addition, the polis's limestone quarry was discovered 1 km to the north of the settlement, at the site of "*Prionista*", along with segments of the ancient road that connected it to Thouria (Arapogianni 2014a, 215-6; Kosmopoulos 2013, 417).

In the summer of 2007, Dr. Xeni Arapogianni began excavations at the site of *"Panagitsa Aipeias"*[33] as a massive retaining wall, which would have supported a large terrace, was visible on the ground surface. Ancient architectural elements were incorporated in the walls of a nearby small 13th c. AD Christian church dedicated to Panagia/Virgin Mary (thus, the name of the site – *"Panagitsa"*), further supporting the belief that an ancient building existed in close proximity. In 2009, systematic excavations at the site began under the auspices of the Archaeological Society at Athens and the direction of Dr. Xeni Arapogianni (Arapogianni 2017, 49-53). Another retaining wall, 30 m long and of later date than the first one, was discovered. It acted as a continuation of the first wall, with a few steps in between them leading to the terrace that the walls supported. A structure (Building A) was revealed in the northern part of the terrace, with a thick layer of ash indicating that it was probably destroyed by fire. In later times, small cisterns for the collection of water were constructed around it. Building B, dated to the 4th c. BC, is located to the south of building A and in close proximity to it. Finally, building C was excavated to the south of building B. The monumental character of the three buildings led to the conclusion that the terrace acted as a public space (Arapogianni 2008-9, 13; 2012).

Excavations in subsequent years enabled, with the discovery of a votive inscription dated to the 1st c. BC – 1st c. AD and dedicated to the two deities, the identification of building C as the Doric temple of Asclepius and Hygeia (Arapogianni 2014b, 57-8). The identity of the deities worshipped there is further confirmed by the discovery of three pottery fragments bearing graffito inscriptions of the words *ACK* and *ΛΑΠΙ*, which obviously meant ΑΣΚΛΑΠΙΩ/Asclepius (Arapogianni 2017, 72). The temple was accessed by a ramp on its southern side. Its treasury[34] was also found and an inscription carved on it dated the whole structure to the late 4th – early 3rd c. BC In addition, another water cistern of later date existed in the vicinity of the temple (Arapogianni 2013, 29-31). Buildings A and B apparently comprised a single Ionic portico with either compartments or stores located at the far end. Its architectural features and the pottery found date the construction of the portico to the 3rd c. BC (Arapogianni 2017, 91) while, judging from the thick layer of ash found under its collapsed roof, the portico was destroyed by fire (Arapogianni 2017, 81). A number of Christian burials were found as well, located between the Asklepieion and the church (Arapogianni 2014b, 56; 2016b, 73-9). Furthermore, a wine press, dating to the 6th or 7th c. AD and partly built over the western side of the temple, was excavated. Spolia from the Asklepieion were used for its construction (Arapogianni 2014b, 53-4). The rectangular altar of the sanctuary was located to its south. In addition to the main altar, two smaller ones were excavated to its left and right (Arapogianni 2015a, 46-52; 2015b, 57-8). Arapogianni attributes the existence of the two

[33] It is interesting to note that the area under investigation is located outside the defensive walls of the ancient polis (Arapogianni 2017, 91).

[34] For a detailed architectural description of the temple and its treasury, see Arapogianni (2014c; 2017, 57-63).

smaller altars to the worship of more deities alongside Asclepius and Hygeia, however of lesser importance than the primary deities to whom the temple was dedicated (Arapogianni 2017, 69).

Parallel to the excavation of the Asklepieion, excavations began at *"Ellinika",* on the southern end of the ridge, where another Hellenistic, possibly outdoor, building as well as some structures of later date were discovered. In addition, an early Hellenistic precinct enclosing a few probably residential buildings was excavated northeast and in close proximity to the aforementioned buildings of later date. Finally, a number of Christian graves were also discovered in the area of the precinct (Arapogianni 2016a, 71-7; 2016b, 81-7).

The theatre of Thouria has recently been found upslope from the Asklepieion (Figure 3.3). More precisely, the theatre is located at the highest point of the western side of the hill and it overlooks the Messenian plain as it is oriented to the west (Arapogianni 2018, 48). The theatre, based on its architectural features and the small finds, is dated to the 3rd c. BC (Arapogianni 2018, 55-6). At some point after its abandonment, a two storey building of agricultural nature (as indicated by the presence of a wine press) was built over the theatre's orchestra (Arapogianni 2020a, 57-64), while a number of Christian burials were discovered in its vicinity (Arapogianni 2019, 67; 2020a, 66-7). Traces of fire indicate how the building was destroyed (Arapogianni 2020b, 76). At this point it is uncertain whether the burials are contemporary with the agricultural structure. The structure is dated to the Late Byzantine period (12th – 15th c. AD) but analysis of the finds to determine as a more precise chronology has not been completed yet (Arapogianni pers. comm.).

According to geological and archaeological research in the area of the Doric temple of the Asklepieion, Thouria was most likely abandoned sometime during the 1st c. BC – 1st c. AD due to major seismic activity that triggered extensive rock falls and thus destroyed the city (Ladas et al. 2015, 1568). The Messenian plain is one of Greece's most seismically active areas (Katrantsionis et al. 2016, 189) and rockfalls are a phenomenon noticed to this day in the area (Ladas et al. 2015, 1568). More facts that point to the abandonment of the temple at that time are the lack of mention by Pausanias, who visited Thouria in the 2nd c. AD, and the dating of the inscriptions found there, which indicate that the Asklepieion was in use from the end of the 4th c. BC until the end of the 1st c. BC (Arapogianni 2017, 91).

A number of other structures visible today or mentioned in the sources are listed below. However, faunal analysis is here limited to the Asklepieion and the agricultural structure built over the theatre orchestra. Those are the only buildings excavated by Dr. Arapogianni and consequently the only contexts from which faunal material has derived.

Thouria's defensive walls are well preserved on the northern side of the city, while small sections can also be found on the western side. In addition, the foundations of two towers can be observed along the northern part of the fortifications. Hope Simpson (1966, 123-4) dates them to 320 – 270 BC and states that they were built with isodomic ashlar masonry.

According to *IG* V[1] 1384[35] (late 2nd c. BC), the cult of Athena not only existed at Thouria (Themelis 2015, 84-5) but it was the polis's most important cult[36]. The Doric temple devoted to the goddess was located in the 19th c. AD Additionally, Pausanias (4.31.2) mentions a temple devoted to the Syrian Goddess,

[35] The inscription is published and discussed by Valmin (1929, 1-16).

[36] The goddess's importance to Thouria is further proven by her depiction on the polis' coins (Arapogianni 2017, 81).

whose cult was introduced to Thouria from the East during Hellenistic times, and mysteries were conducted in her honour. Some information about those mysteries can be read in *SEG* 11, 974, which is dated to the second half of the 1st c. BC (Arapogianni 2008-9, 11-2; Luraghi 2008, 38). The Damonon stele (*IG* V 1 213, 18-23), which was found at the temple of Athena Chalkioikos on Sparta's acropolis and dated before 431 BC, informs us that the festival *Poseidonia* in honour of Poseidon was celebrated in Thouria (Christesen 2019).

Finally, regarding the existence of other public buildings in ancient Thouria, the gymnasium must have been in close proximity to the Asklepieion as two ephebic catalogues (2nd c. BC) mentioning the names of gymnasiarchs have been found during the excavation of the temple. In addition, a 3rd c. BC inscription also mentions a gymnasiarch along with Hermes, the god to whom the protection of gymnasia was often assigned (Arapogianni 2017, 66-7).

What follows in the rest of the chapters is a thorough analysis and interpretation of the faunal assemblages of the sites.

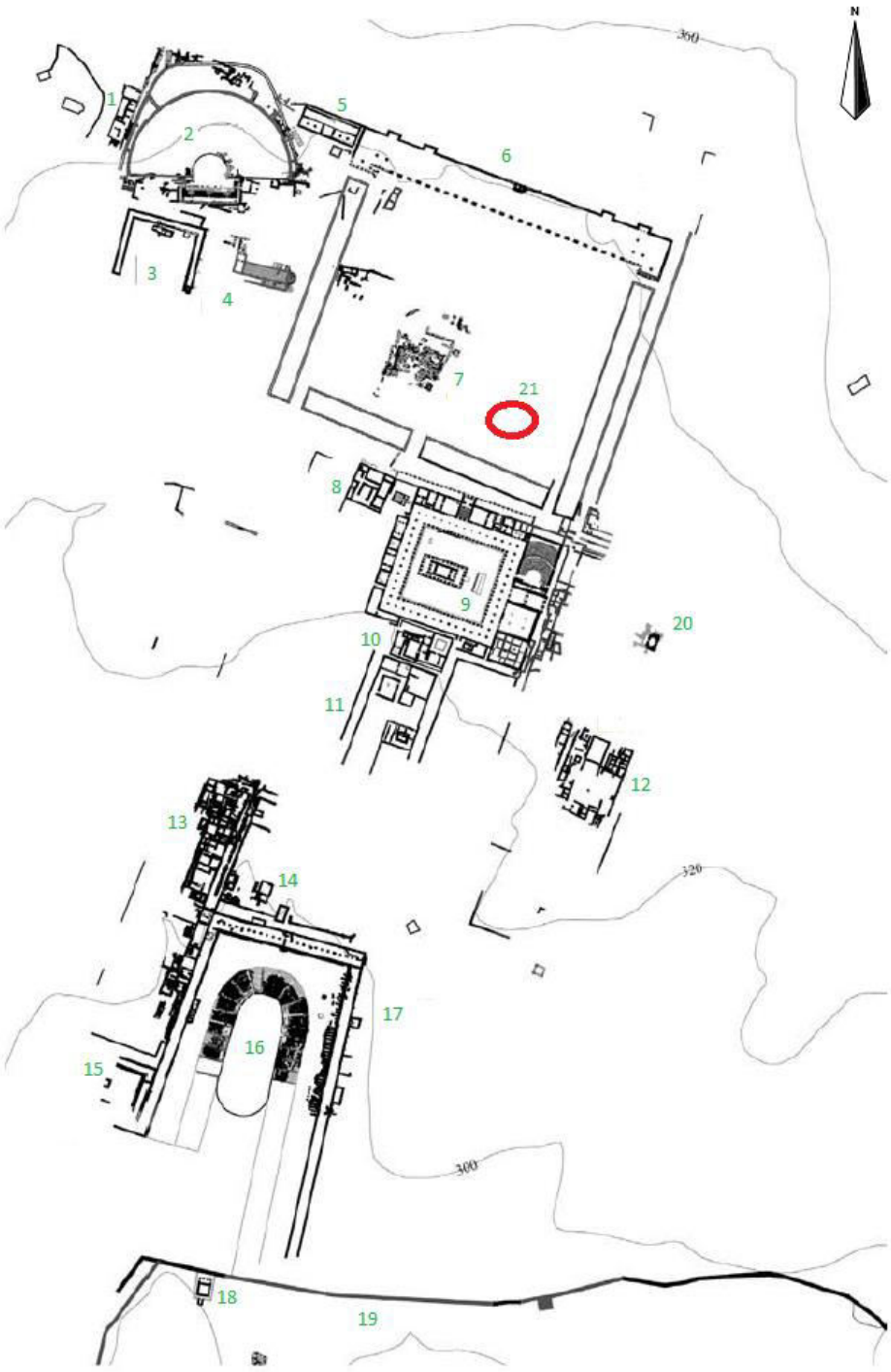


Figure 3.1: Topographic map of ancient Messene. Studied contexts are highlighted. Key: 1. "Theatre Quarter", 2. Theatre, 3. Temple of Isis/Iseion, 4. "Theatre basilica" (XVI/12) and the round structure partially below it (XVI/21), 5. Arsinoe fountain house, 6. North portico of the agora, 7. Temple of Messana and Bouleion, 8. Sanctuary of Demeter and the Dioscouri/Sanctuary Ω-Ω, 9. Asklepieion complex and remains of the early Byzantine settlement (to the east of the complex), 10. Balneum, 11. Hierothysion, 12-13. Roman villas (12=XVI/9), 14. Heroon of Aristomenes (K4), 15. Palaestra, 16. Stadium, 17. Gymnasium, 18. Mausoleum of the Saethidae family, 19. City wall, 20. "Asklepieion basilica", 21. Approximate location of the "agora basilica".

Figure 3.2: The temple of Isis (centre) and the theatre basilica (left) of ancient Messene. In the lower left corner the southern mosaic floor of the "Theatre Quarter" is visible. View from the NW (photo by the author – November 2019).

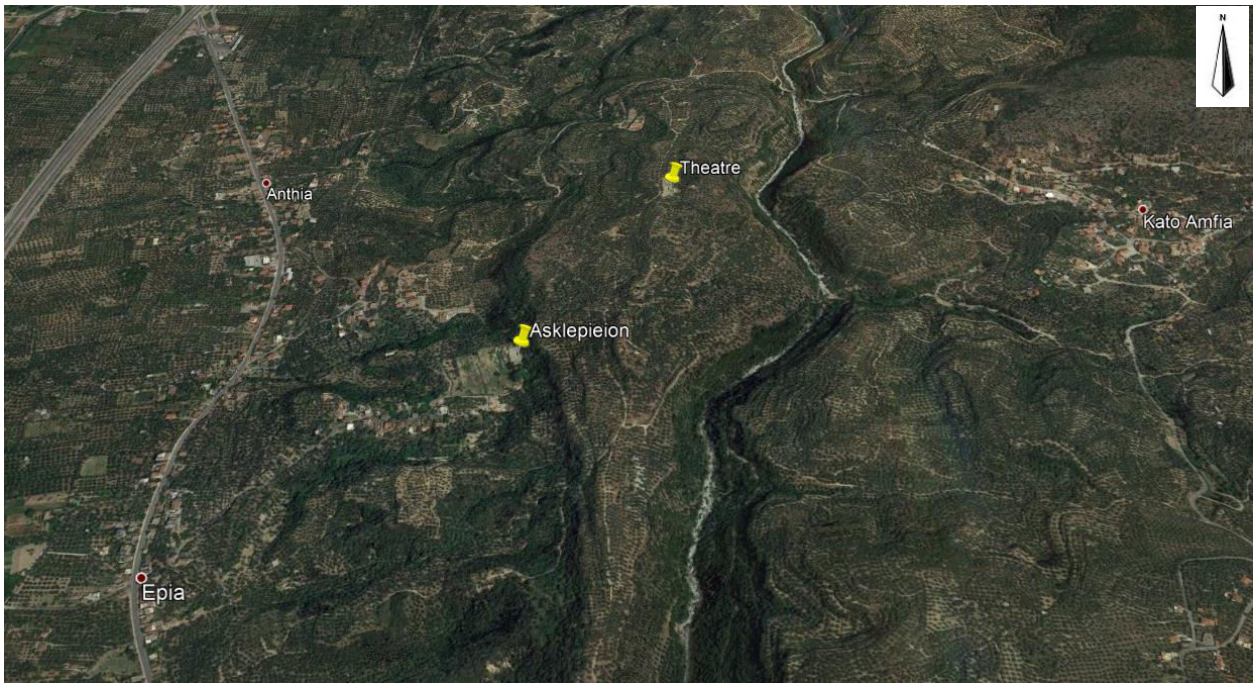


Figure 3.3: Google Earth view of the area of ancient Thouria.

4. Methodology

The faunal material from both sites was hand-collected during excavation. Although dry-sieving was carried out at ancient Thouria, no water-sieving was employed at either site. At neither site was a zooarchaeologist present during excavation of the *studied* material[37] with two minor exceptions in the case of ancient Thouria: I participated in the partial excavation of the faunal assemblage outside the temple of Asclepius in July 2015 and in the excavation of a relatively complete horse skeleton in the area of the theatre in August 2018.

When I first arrived in ancient Messene, the animal bones were stored in plastic bags by context and date of excavation. The bags were stored in plastic[38] boxes with no lid, by year of excavation rather than by context, and the boxes were (and still are) located in a metal container inside the archaeological site. Finally, a paper tag with context information was placed inside each bag. The Thouria material, which was transferred to ancient Messene for ease of study, was stored identically except that the tags were plastic. Based on the information on the tags and the condition of the bones, most bone bags were assigned to a chronological span narrow enough to be useful with some including surface finds excluded from study.

Initially, I catalogued each plastic bag of bones and then sorted them according to their area/building complex of origin. Unfortunately in the case of ancient Messene, due to the passage of time and unfavourable storage materials and conditions, five out of the 55 boxes of bones had to be omitted from future study as their labels were damaged or lost and their place of origin thus unknown. In addition, even though contexts, in the sense of the building complex the material came from, were preserved for the remaining 50 boxes, more detailed information included in the labels was in a number of cases at least partly lost[39]. Furthermore, in some cases the plastic bags had deteriorated resulting in mixing of material from different contexts.

For ancient Messene, the large size of the assemblage would have made impossible its complete study given the timeframe of my studies. However, most of the faunal material came from unstratified contexts, an unfortunate situation worsened by the aforementioned storage conditions of the excavated material. Four building complexes, for which damage to labels was minimal and the vast majority of their context information thus preserved, were selected for study. These structures are:

- The Roman villa to the east of the temple of Asclepius (XVI/9)
- The temple of Isis/Iseion (XVI/15)
- “Theatre Quarter” (XVI/17)
- The round structure below the basilica (XVI/21)

[37] The faunal assemblage of the areas studied in the case of ancient Messene comes from discontinuous excavations between 2001 and 2016. For example, even though XVI/9 was discovered and briefly excavated by Orlandos in the 1960s and subsequently excavated by Themelis in 1989-1990 (cf. Themelis 1992, 99-105; 1993, 57-62), all of the available faunal material originates from the 2002-2004 excavations (cf. Themelis 2006, 38-42). As for ancient Thouria, the temple of Asclepius was excavated in 2007-2016 and the area of the theatre in 2016-2018.
[38] A few of the Messene boxes were made of cardboard rather than plastic.
[39] Paper tags were in some cases partly or completely destroyed by mould and/or rodent activity.

XVI/9 and XVI/17 were selected because zooarchaeologists working on historical sites in Greece have tended to focus on sacred and civic contexts with little or no attention being paid to domestic ones and my intention here is to rectify that. The temple of Isis was under excavation when I first arrived on site and I thus had a rare opportunity to discuss the findings with the excavators, something that proved very helpful to my research. In addition, this seems to be one of the most secure contexts of the whole excavation, at least as regards faunal material. Moreover, its faunal assemblage has been interpreted as domestic refuse and it is thus of the same nature as the aforementioned domestic ones. As for the round structure, it was selected because of the manageable volume of faunal material it produced as it was the last building to be studied while waiting for the arrival of the ancient Thouria material. Although smaller contexts were available, XVI/21 was the most secure and it also comprised of domestic waste and thus in line with the other three contexts.

In the case of ancient Thouria, of the 27 boxes[40] of material delivered to me, only two and a half boxes from the area of the theatre (and thus the Late Byzantine farmstead) were not studied due to lack of time. Furthermore, as the excavation of the theatre area is ongoing, new faunal material comes to light with each new excavating season and thus the conclusions for the site deriving from the current study should be considered preliminary.

Any unwashed bones from the contexts selected for study[41] were washed by the author with tap water and soft toothbrushes and left to dry in a shaded area before bagging them again. The ancient Thouria bones were also individually marked with the code written on each bag label. This was not done for Early Byzantine Messene due to the objections of Prof. Themelis, the excavation director.

Then, the bones from each area and/or building complex were divided into anatomical units. Simultaneously, any fresh breaks, where possible, were grouped together and any bones which did not belong to the anatomical units studied (e.g. ribs, skulls, maxillary teeth[42]) or which did not bear any features that could enable identification, were excluded from further study. The anatomical units selected for detailed study were horncore (base and tip)/antler, mandible/loose mandibular teeth (canines, premolars and molars only), atlas, axis, cervical vertebra, thoracic vertebra, lumbar vertebra, sacrum, caudal vertebra[43], scapula (articular area and collum only), proximal half of humerus, distal half of humerus, proximal half of radius, distal half of radius, proximal half of ulna, proximal half of metacarpal, distal half of metacarpal, pelvis (acetabulum and adjacent parts), proximal half of femur, distal half of femur, proximal half of tibia, distal half of tibia, astragalus, calcaneum, navicular cuboid, proximal half of metatarsal, distal half of metatarsal, distal half of metapodial, phalanx 1, phalanx 2, phalanx 3 and tortoise carapace. Where long bones were concerned, the proximal and distal units included their respective half of the shaft. All body parts not divided into proximal and distal halves (e.g.

[40] 18 boxes came from the Hellenistic temple of Asclepius and 9 from the Late Byzantine farmstead in the area of the Hellenistic theatre. 6 of the temple boxes contained other types of archaeological material in addition to animal bones, primarily human skeletal material. Finally, 2 of the farmstead boxes just contained the skeleton of a single horse while another three also contained animal bones from test trenches from two neighbouring properties.

[41] Most of ancient Messene's bones were cleaned prior to the author's arrival on site. None of the ancient Thouria bones were cleaned beforehand.

[42] These parts of the skeleton were excluded because they pose great difficulties in both identification to taxon and quantification. However, in the case that any such specimens bore pathologies, these were described and photographed. The same is true for specimens bearing human modification other than butchery marks.

[43] In case a vertebra could be identified to species but not to a specific part of the spine, it was recorded as 'vertebra'.

astragalus, calcaneum, phalanges, etc.) are treated as "proximal" for recording purposes. It should be noted that the distal half of the "metapodial" anatomical unit contained any metapodial bone fragments that could not be identified as either metacarpal or metatarsal. In the case of pigs, only the central metapodials (metacarpals 3 and 4 and metatarsals 3 and 4) and their respective phalanges were recorded. Phalanges from the fore and hind limbs were not distinguished for any of the animal species.

The next stage in the identification process was to sort the bones by taxon. This was achieved by comparing the ancient bone fragments with the bones of a modern reference collection and with the use of a number of manuals and identification atlases[44]. Distinction between sheep and goats was based on criteria established by Payne (1985a) for deciduous teeth, by Halstead et al. (2002) for mandibles and permanent teeth, and by Boessneck (1969), Prummel and Frisch (1986) and Zeder and Lapham (2010) for horncores and limb bones (scapula, humerus, radius, ulna, metacarpal, pelvis, femur, tibia, astragalus, calcaneum, metatarsal, first phalanx, second phalanx and third phalanx)[45]. However, only a portion of each sheep/goat assemblage was possible to be identified to species (Early Byzantine Messene – 21.6%; Hellenistic Asklepieion of Thouria – 24.3%; Late Byzantine Thouria farmstead – 23.4%). It should be noted that the majority of horncores, mandibles, astragali, calcanea and, as far as the two Thouria assemblages are concerned, phalanges was speciated but only a minority of the other anatomical elements was identified to species (cf. Table 7.5). An attempt to separate red and fallow deer was based on the criteria published by Lister (1996) and biometry. However, as with sheep/goats, many specimens were impossible to identify to species and were thus excluded from any analyses. As for equids, an attempt to distinguish between horses, donkeys and their hybrids was made based on criteria established by Hanot and Bochaton (2018) and Peters (1998) for limb bones (scapula, humerus, radius, ulna, distal metacarpal, proximal femur, tibia and first phalanx)[46]. Enamel patterns based on criteria by Armitage and Chapman (1979), Churcher and Richardson (1978) and Uerpmann and Uerpmann (1994), as summarized by De Cupere (2001, 67), were used for mandibular teeth[47]. Biometry was also employed. Johnson (2015) as well as biometry were used for the distinction between dogs and red foxes. In addition, foxes have more gracile bones than the smaller dogs. Finally, wild boar bones usually bear more pronounced muscle attachments and thicker diaphysial bone walls in comparison to domestic pigs. A combination of these characteristics along with the noticeably larger size of specific recovered anatomical elements allowed to a limited extent the identification of wild boars in both assemblages.

It should be noted that due to the identification of the faunal assemblages in the field, access to reference material was limited. This factor along with a lack of experience and time were the main reasons why bird and fish bones[48] were excluded from the study.

Next, where possible, the side of the skeleton (left or right) was distinguished for all "paired" body parts except antler and horncore (which were usually too fragmentary) and phalanges.

[44] E.g. Barone (1981); France (2009; 2011), Halstead and Collins (unpublished) and Schmid (1972).

[45] An attempt to identify to species sheep/goat atlases and axes using Boessneck (1969) was unsuccessful due to the fragmentation of the relevant bones.

[46] However, unreliability of morphometrical (and biometrical) criteria for distinguishing between horses, donkeys and mules has been made evident by a number of research projects. More recently, see Granado et al. (2020).

[47] An attempt to distinguish between loose equid mandibular teeth was based on Davis (1980, 292). In reference to enamel patterns, isolated teeth could not be identified to species with confidence in most cases, a methodological issue supported by the findings of Chuang and Bonhomme (2019).

[48] The presence of fish bones was minimal (a single specimen) in the studied material of both sites, most likely due to the lack of water-sieving. Bird bones though were retrieved to some extent.

Some skeletal elements, if derived from adult animals and sufficiently well preserved, may display sexual dimorphism and, thus, allow the distinction between male and female individuals. In the case of cattle, sheep and goats, the pelvis, if fused, may provide such information, following the criteria of Grigson (1982) and of Boessneck (1969) and Prummel and Frisch (1986), respectively. Also sexually dimorphic are the canine teeth of pigs and horses, so mandibular canines and mandibular canine cavities were sexed for these species. It should be stressed, however, that male canines are bigger than female ones and so are more likely to be recovered (Payne 1985b, 229-30). Likewise, horncores are much smaller and more fragile in female cattle, goats and sheep (and perhaps even absent in the last), while antlers are absent in female red, fallow and roe deer. The strong biases against survival, recovery and recognition of female specimens thus undermines the utility of these features for establishing adult sex ratios. In addition, adult males of all the commonest domesticates tend to be larger than adult females, with bones of the forelimb especially tending to be more robust (broader relative to length) as well as absolutely larger in adult males (Boessneck et al. 1964; Higham 1969; Payne and Bull 1988). While individual *complete* long bones might be identifiable as male or female on this basis, the application of this criterion to sets of metrical data may offer insight into adult sex ratios. Castration, particularly of male domesticates, plays an important role in animal husbandry in improving docility (e.g. of male cattle used for traction), growth rate and fleece quality (Davis 2000, 374). Castration affects the shape of the pelvis (Payne 1985b, 229) and also delays epiphyseal fusion resulting in longer limb bones (e.g. Hatting 1983, 120). If complete long bones survive, therefore, individual male castrates may be identifiable, but, if fragmentation obscures long bone lengths, the presence of castrates complicates metrical distinction between males and females.

Subsequently, an attempt was made to detect articulating adjacent body parts (e.g. humerus, radius and ulna; distal tibia, astragalus and calcaneum; distal metapodials and phalanges) and matching pairs of body parts (e.g. left and right tibia from the same individual).

What followed was the recording of the identified bone fragments. The following variables were recorded for each specimen where appropriate: anatomical part, taxon, stage of epiphyseal fusion (used for ageing purposes) or absence of epiphysis, side (left/right/undetermined), fragmentation, cut marks (e.g. dismembering, filleting, skinning, etc. following Binford (1981)), sex, pathologies and other comments (e.g. details of cut mark placement). In more detail concerning fragmentation, antlers, horncores, mandibles, loose teeth, scapulae, ulnae, vertebrae, pelves, astragali, calcanea, navicular cuboids, phalanges and tortoise shells were recorded as either complete, freshly broken[49] or irrelevant while broken long bones were further classified, and thus recorded, into various types of old breaks (shaft missing, end + shaft, cylinder, shaft splinter, end splinter, end splinter + shaft splinter and end only) following the observations on bone fragmentation by dogs and humans in Binford (1978; 1981) according to which certain types of bone fragments can be associated with certain actions[50]. For example, cylinders often result from carnivore attrition while end + shaft fragments to deliberate breakage by humans for the extraction of within bone nutrients. Thus, analysis of fragmentation patterns can contribute, amongst others, to the determination of the impact of carnivore attrition on an assemblage or to the degree of exploitation for human consumption.

To complete the recording stage, selected measurements from fully fused specimens were taken following von den Driesch (1976), Payne and Bull (1988, 42) and Davis (1992) using digital callipers and a

[49] Indicating damage during and/or after excavation.
[50] On bone fragmentation and its implications, see also Pickering et al. (2003).

non-digital measuring box. Neonatal bones were recognized by their small size, lightness and rough surface texture (cf. Prummel 1987a; 1987b; 1988; 1989). Upon completion of the recording process, the collected biometric data for equid specimens unidentified to taxon were compared to other published faunal assemblages within relative geographical and chronological proximity in order to be assigned to species.

In the case of mandibles and loose mandibular teeth, tooth eruption and tooth wear stages were recorded too in order to estimate age at death. An unpublished recording system devised by Paul Halstead, Pat Collins and Glynis Jones, based on Payne (1973) for sheep and goats and Grant (1982) for cattle and pigs, was used for that purpose. According to this system, the tooth wear stage was recorded not by tooth but by cusp for greater flexibility and hence accuracy. The teeth thus recorded are the deciduous fourth premolar (dP4), the permanent fourth premolar (P4), the first molar (M1), the second molar (M2) and the third molar (M3). Observations on broken, burnt or encrusted teeth, stage of eruption, pig canines and wear of the deciduous second and third premolars (dP2 and dP3) and the permanent second and third premolars (P2 and P3) were recorded in the comments field (as Tzevelekidi 2012, 21). Mandibles of sheep and goats are assigned to tooth eruption and tooth wear stages according to Payne (1973, 299) and an adaption thereof for cattle and pigs. Mandibles originally assigned to more than one stage are proportionally assigned to individual stages, on the basis of the distribution of single-staged mandibles again following Payne (1973).

Finally, using the computer program *IBM SPSS Statistics 26*, the recorded data were quantified in both minimum numbers of anatomical units (MinAU) and maximum numbers of anatomical units (MaxAU). MinAU is used to estimate the relative abundance of different taxa, body parts and so on whereas MaxAU is used in analysis of fragmentation, butchery, gnawing, burning, etc. Both quantification units are used as MinAU tends to discount poorly preserved and heavily fragmented bones and, as a result, to underestimate their frequency, while MaxAU can lead to overrepresentation of anatomical parts, taxa, and age/sex groups due to differential fragmentation (Halstead 2011, 746-50; Tzevelekidi 2012, 24-5).

MinAU is calculated as follows. When at least two or more bone fragments might derive from the same anatomical unit of the same individual animal, only the most complete or the best preserved of the fragments contributes to MinAU. Which bone fragments were to be excluded from MinAU was decided during the recording of the material by strewing each body part first by species, then by side (left/right) and fusion stage (unfused/fusing/fused etc.) and finally by position on the bone (proximal/distal and medial/lateral). Which sections of the faunal assemblage should be strewed together was based on chronological and geographical proximity. Finally, phalanges must be divided by two before comparative assessment of anatomical representation as in the case of possible pairs (e.g. two sheep first phalanges belonging to the same foot) only one phalanx contributes in the estimation of MinAU (Halstead 2011, 749-50; Tzevelekidi 2012, 25).

Quantification in MaxAU and MinAU was preferred over the more commonly used minimum number of individuals (MNI). The latter counts the anatomical elements of each taxon and the anatomical element best represented in the assemblage equals the MNI of the species. However, MNI has a number of flaws most importantly the lack of standardisation on the treatment of fragmented bones and on the criteria (e.g. age, side, size, sex, context of provenance) used to judge whether two or more bones derive from the same individual. Consequences of the above can be an artificial inflation or depression of the MNI as well as the inability to compare MNIs among different researchers (Klein and Cruz-Uribe 1984, 26-8).

More detailed descriptions of the recording system followed in the present study can be found in Halstead (2011, 744-50) and Tzevelekidi (2012, 20-5).

The collected age data (tooth eruption and wear and epiphyseal fusion stage[51]) underpin the reconstruction of mortality profiles, essential (along with sex ratios) to understanding the management strategies followed[52]. In the case of sheep (and goats minus the wool), according to Payne (1973), three different products produce three different profiles. If dairying is the goal, then males are slaughtered in infancy with adult females making up most of the herd. In contrast, herds targeting wool would have been made up of adult, likely castrated, males as well as breeding adult females. Meat on the other hand would have required the slaughter of surplus individuals, mostly males, as juveniles or sub-adults. As Payne emphasises, the models are idealised simplifications and herds are often managed for a mixture of products.

Management of cattle also had three potential goals: meat, milk and traction or a combination thereof. Ideally, if the targeted product was meat, animals would have been slaughtered when they reached their optimum meat weight relative to the costs of rearing: judging by the accounts of elderly villagers in Greece (personal interviews in Messenia; Halstead pers. comm.) at somewhere between late in the first year and 3-4 years of age (depending on the difficulty of providing fodder/pasture). In the case of a specialised dairying economy, high infant mortality is expected, to make milk available for human consumption (e.g. Legge 1981a, 85-8; 1981b). However, other scholars (e.g. Balasse 2003; Balasse et al. 2000; McCormick 1992 for a more recent chronological period), argue that in order for the mothers to let down milk, their suckling offspring must be present. Thus calves are slaughtered when lactation ends at six to nine months after birth. Ethnographic research by Halstead and Isaakidou (2017) concluded that absence of the calf did not affect milk let-down, or could be overcome, thus affirming Legge's model. Finally, breeding females and animals destined for traction would not be killed until they reached old age; working cattle include specialised castrated male 'oxen', but also cows that combine breeding and smaller-scale draught use. Of course, as with sheep, in practice, a mix of these production goals and culling strategies may be most realistic.

Finally, the use of the words "significant(ly)" and "highly significant(ly)" in the following chapters refer to the results of statistical tests with $p < 0.05/\geq 0.01$ and $p \leq 0.01$, respectively.

[51] Epiphyseal fusion stages for postcranial elements of cattle, sheep, goat and pig are based on Silver (1969).

[52] As discussed in the next chapter, pre- and post-depositional biases and recovery methods are likely to lead to underrepresentation of the younger age groups, a fact that should always be kept in mind when trying to interpret the data.

5. Taphonomy

Introduction

A variety of taphonomic agents can contribute to the final composition and appearance of a faunal assemblage, as smaller and more fragile bones (e.g. unfused epiphyses, loose teeth, phalanges, bones of smaller species and younger individuals, etc.) have less chance of survival and, subsequently, of recovery during excavation. Taxonomic and element representation as well as age profiles are known to be prone to shaping by a site's taphonomic history (Lyman 1994; Munson and Garniewicz 2003; Payne 1972). Consequently, deciphering depositional from post-depositional alterations is essential in understanding how the studied faunal assemblages were formed. In the current chapter, I will analyse how these taphonomic agents affected the faunal assemblages of the sites under study.

Before moving on to the taphonomic analysis, it should be clarified that the Asklepieion and the farmstead of ancient Thouria will be treated as two different "sites", because their assemblages date to the Hellenistic and Late Byzantine periods respectively. In addition, the former assemblage is expected to represent remnants of ritual feasting activities and the latter domestic refuse, themes that will be explored in later chapters. Finally, the data for sheep and goats are combined in this chapter as most specimens could not be identified to species and the same is true for equids.

Recovery bias

As explained in Chapter 4, the retrieval methods of the animal bones reported here were less than ideal (lack of wet-sieving; only partial dry-sieving) and thus assemblage composition is biased, with smaller and younger animals and anatomical elements more prone to be affected (cf. Payne 1972). The aim of this section is to explore how and to what extent partial retrieval has affected the faunal assemblages.

Partial retrieval is particularly likely to have affected the representation of very small neonatal remains. In the Early Byzantine Messene and the Hellenistic Asklepieion of Thouria assemblages, the only species represented by neonatal specimens are pig and sheep/goat, while the Late Byzantine Thouria farmstead assemblage also includes neonatal dogs. The number of neonatal long bones of all species from all sites is negligible and only includes the larger elements of the skeleton, namely the scapula, pelvis and long bones and, in the case of the Late Byzantine Thouria farmstead dogs, the ulna. While differential disposal cannot be excluded, this pattern of *anatomical* representation is precisely what is expected as a result of partial recovery.

Another method of checking how recovery bias has impacted an assemblage is to examine the ratio of anatomically adjacent large and small body parts (Payne 1985b, 220). The ratios of the distal tibia to the astragalus and calcaneum and of the distal metapodials to the first, second and third phalanges are presented in Tables 5.1 – 5.3. In case of recovery bias, the astragalus, calcaneum and phalanges are expected to be underrepresented in comparison to the distal tibia and metapodial. The ratio of the proximal radius to the proximal ulna is used as a control pair since these elements are unlikely to have been separated during butchery and consequently any underrepresentation of the ulna was most likely caused by retrieval loss (or differential destruction). Since, as has already been mentioned, neonatal bones are subject to extreme retrieval bias and are unevenly represented between taxa, they were

excluded from this analysis. Dog is included only for the theatre as the other two assemblages did not produce a sufficient number of specimens for meaningful analysis.

Underrepresentation of all smaller body parts for all taxa is evident (the expected ratios are 1:1, 1:1:1 and 1:1:1:1, respectively), suggesting important retrieval losses in both the Early Byzantine Messene and ancient Thouria excavations, with second and third phalanges, the smallest of the elements included, suffering the most in terms of recovery. Cattle unsurprisingly are the least affected as their bones are larger in size than the rest of the species examined. Noteworthy is the underrepresentation of ulnae for all species but pigs in all three assemblages. Pig ulnae are larger (relative to the size of the corresponding radius) than those of sheep, goats and dogs so they have greater chances of recovery but that does not explain the underrepresentation of cattle ulnae.

In the case of the astragali, an additional possible source of bias should be taken into consideration. In antiquity and until recent times, the astragali of especially sheep and goats were used as gaming pieces and a small number of polished examples were found at all three sites including one of cattle[53]. During the excavation of the Hellenistic Asklepieion of Thouria, two glass astragali were discovered near the altars, probably deposited as dedications to the god by worshippers (Arapogianni 2017, 72). Even though the effect of this bias on the assemblages cannot be calculated, calcanea are similarly underrepresented indicating that recovery bias is the most plausible scenario. As for the possibility of differential disposal of the lower feet as a factor in the underrepresentation of phalanges, this will be explored in the next chapter. However, differential disposal cannot account for the underrepresentation of astragali and calcanea as the number of metapodials, which are anatomically located between them and the lower feet, is much higher.

All in all, it is clear that partial recovery has significantly affected the taxonomic and anatomical composition of all three assemblages. However, it should be stressed that recovery bias was not unexpected as it is very common in faunal assemblages, even those originating from systematically sieved Neolithic sites.

Finally, it is unclear whether the lack of fish bones from each site is due to recovery bias or due to dietary preferences (e.g. absence of fish in the everyday diet or consumption of primarily imported processed fish products which potentially lacked bones).

Intrusive material

A very small number of animal bones was excluded from study during the identification process as they appeared to be quite recent in date. These specimens were lighter in colour and somewhat “transparent” in comparison to the rest of the bones. A number of possible factors could have caused modern surface bones to be mingled with ancient sub-surface material during excavation or agricultural work (modern terracing is still visible in the vicinity of both ancient settlements) and/or burial by modern animals. A fragment of modern glass found in one of the theatre animal bone bags is a clear example of the sort of intrusion suspected for these bones of ‘fresh’ appearance.

Some human bones were also discovered among the animal specimens, probably derived from later Byzantine burials.

[53] Two sheep/goat astragali at Early Byzantine Messene (XVI/9); three sheep and one cattle astragali at the Hellenistic Asklepieion of Thouria; one goat astragalus at the Late Byzantine Thouria farmstead.

Early Byzantine Messene											
		MinAU	Ratio			MinAU	Ratio			MinAU	Ratio
Cattle	Rp	64	1:0.6	Pig	Rp	26	1:1	Sheep + Goat	Rp	133	1:0.1
	Up	38			Up	25			Up	15	
	Td	48	1:0.5:0.5		Td	44	1:0.3:0.3		Td	231	1:0.1:0.1
	A	26			A	11			A	13	
	C	23			C	11			C	27	
	MPd	86	1:0.7:0.3:0.2		MPd	34	1:0.2:0.1:0		MPd	168	1:0.2:0.1:0.1
	PH1	56			PH1	8			PH1	28	
	PH2	28			PH2	3			PH2	7	
	PH3	13			PH3	0			PH3	3	
Neonatal specimens excluded											

Table 5.1: Ratios of anatomically adjacent bones of the main domestic taxa – Early Byzantine Messene (MinAU).

Hellenistic Asklepieion of Thouria											
		MinAU	Ratio			MinAU	Ratio			MinAU	Ratio
Cattle	Rp	62	1:0.5	Pig	Rp	55	1:1.2	Sheep + Goat	Rp	124	1:0.1
	Up	31			Up	68			Up	13	
	Td	72	1:0.1:0.3		Td	132	1:0.1:0.1		Td	213	1:0.1:0.1
	A	7			A	4			A	8	
	C	18			C	17			C	10	
	MPd	110	1:0.3:0.2:0.1		MPd	89	1:0.1:0:0.1		MPd	363	1:0.1:0.1:0
	PH1	31			PH1	4			PH1	19	
	PH2	25			PH2	0			PH2	2	
	PH3	10			PH3	1			PH3	0	
Neonatal specimens excluded											

Table 5.2: Ratios of anatomically adjacent bones of the main domestic taxa – Hellenistic Asklepieion of Thouria (MinAU).

Late Byzantine Thouria farmstead														
		MinAU	Ratio			MinAU	Ratio			MinAU	Ratio			MinAU	Ratio
Cattle	Rp	25	1:0.4	Pig	Rp	19	1:1.3	Sheep + Goat	Rp	102	1:0.1	Dog	Rp	17	1:0.6
	Up	11			Up	25			Up	9			Up	11	
	Td	24	1:1:0.2:0.3		Td	44	1:0.1:0.2		Td	106	1:0.2:0.1		Td	23	1:0.2:0.3
	A	4			A	5			A	17			A	4	
	C	6			C	8			C	8			C	7	
	MPd	39	1:0.5:0.2:0		MPd	25	1:0.4:0.1:0.1		MPd	148	1:0.1:0.1:0.1		MPd	49	1:0.6:0.2:0.1
	PH1	20			PH1	10			PH1	19			PH1	31	
	PH2	7			PH2	2			PH2	6			PH2	9	
	PH3	0			PH3	3			PH3	2			PH3	1	
Neonatal specimens and burials excluded															

Table 5.3: Ratios of anatomically adjacent bones of the main domestic taxa – Late Byzantine Thouria farmstead (MinAU).

Post-depositional disturbance

Some animal species such as rodents and foxes live and consequently sometimes die in underground burrows. Thus, the detection of complete and articulating skeletons of said taxa in a zooarchaeological assemblage ought to be treated with caution as the animal was probably not deposited there due to human actions and is likely to be of more recent date than the rest of the assemblage (Lyman 1994, 412). No evidence of post-depositional disturbance by burrowing species was detected, however, in any of the sites.

Disturbance of the Hellenistic Asklepieion of Thouria occurred in antiquity as a 6th – 7th c. AD wine press (Arapogianni 2014b, 53) and a 13th c. AD (with additional modifications in later centuries) church were built partly on top of the sanctuary using ancient architectural building material (Arapogianni 2012, 49-50). Human burials dated to ca. 100-150 years ago and associated with the church had disturbed the upper layers of the SW corner of the sanctuary (Arapogianni 2014b, 56). Finally, a series of cisterns for the collection of water were constructed in its vicinity at some point after the abandonment of the building (Arapogianni 2012, 52-3).

As briefly discussed in Chapter 3, Christian graves were also excavated in the area of the Late Byzantine Thouria farmstead but their exact date is at present uncertain. Furthermore, at least four partial dog skeletons were encountered in 2016 inside the circular vat of a wine press and, in addition, a relatively complete horse skeleton (Figure 5.1) was uncovered in 2018. The horse was found partly buried below one of the presumed farmstead's corridors (Arapogianni 2020a, 64) thus predating its construction[54]. The body parts below said corridor (e.g. pelvis, femurs) have not been recovered. More importantly, neither of the horse's legs are aligned with its spine. In contrast, they are placed much higher over it indicating that it is not an undisturbed primary burial. As the bones are in the correct anatomical order, the legs were moved before decomposition was completed. Finally, a number of articulating elements and fragmented specimens that fit together were found in close proximity at all three sites, suggesting limited post-depositional disturbance of at least parts of the assemblages.

As for Early Byzantine Messene, according to the excavator (pers. comm.), most of the faunal remains were not found *in situ*, implying that they are secondary material unconnected to the initial use of the building structures from which they were recovered (as expected, given the high status of most of these structures).

Erosion and encrustation

Only bones with erosion considered, on visual inspection, severe enough potentially to mask other bone modifications were recorded as weathered. In addition, cause of erosion was not recorded for each individual specimen. Only general observations were made in those contexts where a particular erosive agent (e.g. roots) affected a large number of faunal remains.

Degradation of bone while buried is evident at both sites (Tables 5.4 – 5.6)[55]. Root etching (Lyman 1994, 375-7) is particularly prominent in the Late Byzantine Thouria farmstead assemblage, where olive groves still grow above most of the site, and roots have marked the bone surfaces, potentially masking human

[54] Most notably, the pelvis and the proximal half of both femurs were missing from the boxes delivered to me for study. They are potentially still located under the farmstead's corridor.
[55] Neonatal bones and loose teeth have been excluded for the same reason as above.

(e.g. cut marks) and other modifications (e.g. carnivore gnawing). In the case of Early Byzantine Messene, the entire plain was covered by trees and vegetable gardens before its expropriation by the Greek Ministry of Culture, but root etching was not prominent at the site. Figure 5.2 illustrates an example of severe, though localised, bone surface erosion, showing that erosion has affected the assemblages, but not catastrophically so. The relatively low percentages of weathering, especially cracks or exfoliation caused by sun exposure, indicate that the material was buried rather quickly after deposition. Encrustation is extremely rare with only twelve specimens in Early Byzantine Messene and eighteen in ancient Thouria (ten in the Hellenistic Asklepieion and eight in the Late Byzantine farmstead) so affected.

The incidence of surface erosion is variable, with some significant ($p \leq 0.05$ and > 0.01) or highly significant ($p \leq 0.01$) but inconsistent differences between cattle and both pigs and sheep/goats. Erosion is most strikingly low for dogs in the Late Byzantine Thouria farmstead, however, consistent with indications that much of this material was protected from weathering by relatively rapid burial as intact or partially intact carcasses and this different taphonomic pathway is further confirmed by a χ^2 analysis comparing dogs with cattle, pigs and sheep/goats and producing highly significant results ($p = 0.000$). Conversely, erosion is strikingly high for equids at Early Byzantine Messene (and also in a very small sample from the Hellenistic Asklepieion of Thouria), perhaps because these animals were more often discarded without butchery for consumption, as is argued below on the basis of the incidence of butchery and fragmentation patterns. On the other hand, equid bones are not particularly frequently eroded in the Late Byzantine Thouria farmstead. A χ^2 test comparing Early Byzantine Messene's equids with cattle, pigs and sheep/goats produced highly significant results ($p = 0.000$) with 39 of the 41 eroded equids bones coming from the early Byzantine rubbish pit in the area of the temple of Isis, the context with the highest incidence of erosion amongst the site's studied areas.

Figure 5.1: The Late Byzantine Thouria farmstead disturbed horse skeleton *in situ*. View from the north (photo by the author).

Early Byzantine Messene				
Taxa		None	Eroded	Total
Cattle	MaxAU	916	167	1083
	% within species	84.6%	15.4%	100.0%
Pig	MaxAU	580	69	649
	% within species	89.4%	10.6%	100.0%
Sheep + Goat	MaxAU	1779	194	1973
	% within species	90.2%	9.8%	100.0%
Equids	MaxAU	83	41	124
	% within species	66.9%	33.1%	100.0%
Dog	MaxAU	37	6	43
	% within species	86.0%	14.0%	100.0%
Red deer	MaxAU	22	0	22
	% within species	100.0%	0.0%	100.0%
Fallow deer	MaxAU	1	0	1
	% within species	100.0%	0.0%	100.0%
Roe deer	MaxAU	9	0	9
	% within species	100.0%	0.0%	100.0%
Wild boar	MaxAU	3	0	3
	% within species	100.0%	0.0%	100.0%
Red fox	MaxAU	2	0	2
	% within species	100.0%	0.0%	100.0%
Hare	MaxAU	20	0	20
	% within species	100.0%	0.0%	100.0%
Tortoise	MaxAU	20	0	20
	% within species	100.0%	0.0%	100.0%
Total	MaxAU	3472	477	3949
	% within species	87.9%	12.1%	100.0%
χ^2 tests				
	χ^2		p	
Cattle/Pig	7.906		0.005	
Cattle/Sheep + Goat	20.954		0.000	
Pig/Sheep + Goat	0.345		0.557	
Equids/Domesticates*	51.215		0.000	
Dog/Domesticates**	0.228		0.633	
Neonatal specimens, horncores, antlers and loose teeth excluded *Dog excluded, **Equids excluded				

Table 5.4: Incidence of erosion by taxon – Early Byzantine Messene (MaxAU).

Hellenistic Asklepieion of Thouria				
Taxa		None	Eroded	Total
Cattle	MaxAU	884	241	1125
	% within species	78.6%	21.4%	100.0%
Pig	MaxAU	1059	370	1429
	% within species	74.1%	25.9%	100.0%
Sheep + Goat	MaxAU	1778	633	2411
	% within species	73.7%	26.3%	100.0%
Equids	MaxAU	6	3	9
	% within species	66.7%	33.3%	100.0%
Dog	MaxAU	6	0	0
	% within species	100.0%	0.0%	100.0%
Red deer	MaxAU	22	22	44
	% within species	50.0%	50.0%	100.0%
Fallow deer	MaxAU	4	0	4
	% within species	100.0%	0.0%	100.0%
Wild boar	MaxAU	0	2	2
	% within species	0.0%	100.0%	100.0%
Red fox	MaxAU	18	2	20
	% within species	90.0%	10.0%	100.0%
Hare	MaxAU	9	3	12
	% within species	75.0%	25.0%	100.0%
Tortoise	MaxAU	9	2	11
	% within species	81.8%	18.2%	100.0%
Total	MaxAU	3795	1278	5073
	% within species	74.8%	25.2%	100.0%
χ^2 tests				
	χ^2		p	
Cattle/Pig	6.910		0.009	
Cattle/Sheep + Goat	9.627		0.002	
Pig/Sheep + Goat	0.061		0.805	
Equids/Domesticates*	0.328		0.567	
Dog/Domesticates**	2.005		0.157	
Neonatal specimens, horncores, antlers and loose teeth excluded *Dog excluded, **Equids excluded				

Table 5.5: Incidence of erosion by taxon – Hellenistic Asklepieion of Thouria (MaxAU).

Late Byzantine Thouria farmstead				
Taxa		None	Eroded	Total
Cattle	MaxAU	332	99	431
	% within species	77.0%	23.0%	100.0%
Pig	MaxAU	421	105	526
	% within species	80.0%	20.0%	100.0%
Sheep + Goat	MaxAU	975	220	1195
	% within species	81.6%	18.4%	100.0%
Equids	MaxAU	29	9	38
	% within species	76.3%	23.7%	100.0%
Dog	MaxAU	426	40	446
	% within species	91.4%	8.6%	100.0%
Red deer	MaxAU	61	15	76
	% within species	80.3%	19.7%	100.0%
Fallow deer	MaxAU	4	3	7
	% within species	57.1%	42.9%	100.0%
Roe deer	MaxAU	2	1	3
	% within species	66.7%	33.3%	100.0%
Wild boar	MaxAU	0	1	1
	% within species	0.0%	100.0%	100.0%
Cat	MaxAU	3	1	4
	% within species	75.0%	25.0%	100.0%
Red fox	MaxAU	2	3	5
	% within species	40.0%	60.0%	100.0%
Hare	MaxAU	4	0	4
	% within species	100.0%	0.0%	100.0%
Hedgehog	MaxAU	1	0	1
	% within species	100.0%	0.0%	100.0%
Tortoise	MaxAU	25	4	29
	% within species	86.2%	13.8%	100.0%
Total	MaxAU	2285	501	2786
	% within species	82.0%	18.0%	100.0%

χ^2 tests		
	χ^2	p
Cattle/Pig	1.278	0.258
Cattle/Sheep + Goat	4.176	0.041
Pig/Sheep + Goat	0.574	0.449
Equids/Domesticates*	0.373	0.541
Dog/Domesticates**	32.476	0.000

Neonatal specimens, horncores, antlers and loose teeth excluded
*Dog excluded, **Equids excluded

Table 5.6: Incidence of erosion by taxon – Late Byzantine Thouria farmstead (MaxAU).

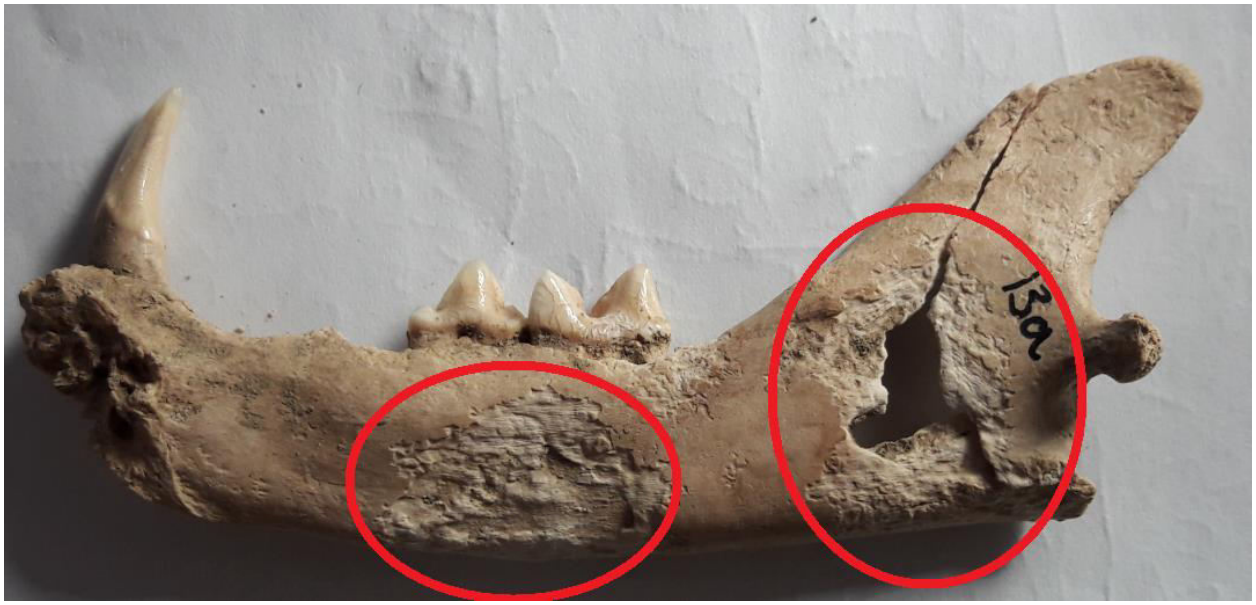


Figure 5.2: Cat mandible with plant degradation circled (Late Byzantine Thouria farmstead; photo by the author).

Gnawing and digestion

Gnawing and digestion may modify or completely destroy bones before they are buried in the ground. As can be seen in Tables 5.7 – 5.9[56], gnawing is quite common in both ancient Messene and Thouria although to a lesser degree at the Late Byzantine farmstead. Domestic dogs, present at both sites, were presumably the primary scavengers although some specimens could have been gnawed by humans (cf. Brain 1981), cats (cf. Moran and O'Connor 1992), pigs (cf. Greenfield 1988) or even ungulates (cf. Brothwell 1976; Cáceres et al. 2011). Among the main domestic taxa, based on a series of χ^2 tests, gnawing is highly significantly more frequent in pigs at all sites, closely followed by sheep/goats and is least frequent in cattle, despite the lesser probability that the more robust bones of the latter would be completely destroyed by gnawing. The high percentage of gnawed pig bones might be related to their younger age at death in comparison to other taxa making them less useful to humans for marrow extraction and thus more attractive to scavengers. This possibility is explored in Chapter 6. Gnawing is consistently scarce in dog bones, perhaps indicating that they tended to be buried rather than discarded on open surfaces at Early Byzantine Messene and in the Hellenistic Asklepieion of Thouria as well as in the Late Byzantine Thouria farmstead. In the case of equids, however, gnawing is not unusually frequent, casting doubt on the tentative suggestion – on the basis of incidence of erosion - that these animals tended to be discarded without butchery or burial.

[56] As neonatal bones can be completely destroyed by gnawing while loose teeth are unlikely to show any signs of it, they have been excluded from the tables.

Early Byzantine Messene				
Taxa		None	Gnawed*	Total
Cattle	MaxAU	905	178	1083
	% within species	83.6%	16.4%	100.0%
Pig	MaxAU	488	161	649
	% within species	75.2%	24.8%	100.0%
Sheep + Goat	MaxAU	1577	396	1973
	% within species	79.9%	20.1%	100.0%
Equids	MaxAU	101	23	124
	% within species	81.5%	18.5%	100.0%
Dog	MaxAU	38	5	43
	% within species	88.4%	11.6%	100.0%
Red deer	MaxAU	17	5	22
	% within species	77.3%	22.7%	100.0%
Fallow deer	MaxAU	1	0	1
	% within species	100.0%	0.0%	100.0%
Roe deer	MaxAU	8	1	9
	% within species	88.9%	11.1%	100.0%
Wild boar	MaxAU	1	2	3
	% within species	33.3%	66.7%	100.0%
Red fox	MaxAU	2	0	2
	% within species	100.0%	0.0%	100.0%
Hare	MaxAU	19	1	20
	% within species	95.0%	5.0%	100.0%
Tortoise	MaxAU	18	2	20
	% within species	90.0%	10.0%	100.0%
Total	MaxAU	3175	774	3949
	% within species	80.4%	19.6%	100.0%

χ^2 tests		
	χ^2	p
Cattle/Pig	18.067	0.000
Cattle/Sheep + Goat	6.057	0.014
Pig/Sheep + Goat	6.548	0.010

* Including ingested bones
Neonatal specimens, horncores, antlers and loose teeth excluded

Table 5.7: Incidence of gnawing by taxon – Early Byzantine Messene (MaxAU).

Hellenistic Asklepieion of Thouria				
Taxa		None	Gnawed*	Total
Cattle	MaxAU	986	139	1125
	% within species	87.6%	12.4%	100.0%
Pig	MaxAU	1061	368	1429
	% within species	74.2%	25.8%	100.0%
Sheep + Goat	MaxAU	1955	456	2411
	% within species	81.1%	18.9%	100.0%
Equids	MaxAU	7	2	9
	% within species	77.8%	22.2%	100.0%
Dog	MaxAU	6	0	6
	% within species	100.0%	0.0%	100.0%
Red deer	MaxAU	36	8	44
	% within species	81.8%	18.2%	100.0%
Fallow deer	MaxAU	2	2	4
	% within species	50.0%	50.0%	100.0%
Wild boar	MaxAU	2	0	2
	% within species	100.0%	0.0%	100.0%
Red fox	MaxAU	19	1	20
	% within species	95.0%	5.0%	100.0%
Hare	MaxAU	12	0	12
	% within species	100.0%	0.0%	100.0%
Tortoise	MaxAU	11	0	11
	% within species	100.0%	0.0%	100.0%
Total	MaxAU	4097	976	5073
	% within species	80.8%	19.2%	100.0%

χ^2 tests		
	χ^2	p
Cattle/Pig	71.003	0.000
Cattle/Sheep + Goat	23.570	0.000
Pig/Sheep + Goat	24.899	0.000

* Including ingested bones
Neonatal specimens, horncores, antlers and loose teeth excluded

Table 5.8: Incidence of gnawing by taxon – Hellenistic Asklepieion of Thouria (MaxAU).

Late Byzantine Thouria farmstead				
Taxa		None	Gnawed*	Total
Cattle	MaxAU	400	31	431
	% within species	92.8%	7.2%	100.0%
Pig	MaxAU	454	72	526
	% within species	86.3%	13.7%	100.0%
Sheep + Goat	MaxAU	1051	144	1195
	% within species	87.9%	12.1%	100.0%
Equids	MaxAU	37	1	38
	% within species	97.4%	2.6%	100.0%
Dog	MaxAU	459	7	466
	% within species	98.5%	1.5%	100.0%
Red deer	MaxAU	73	3	76
	% within species	96.1%	3.9%	100.0%
Fallow deer	MaxAU	7	0	7
	% within species	100.0%	0.0%	100.0%
Roe deer	MaxAU	3	0	3
	% within species	100.0%	0.0%	100.0%
Wild boar	MaxAU	1	0	1
	% within species	100.0%	0.0%	100.0%
Cat	MaxAU	4	0	4
	% within species	100.0%	0.0%	100.0%
Red fox	MaxAU	5	0	5
	% within species	100.0%	0.0%	100.0%
Hare	MaxAU	3	1	4
	% within species	75.0%	25.0%	100.0%
Hedgehog	MaxAU	1	0	1
	% within species	100.0%	0.0%	100.0%
Tortoise	MaxAU	29	0	29
	% within species	100.0%	0.0%	100.0%
Total	MaxAU	2527	259	2786
	% within species	90.7%	9.3%	100.0%

χ^2 tests		
	χ^2	p
Cattle/Pig	10.407	0.001
Cattle/Sheep + Goat	7.782	0.005
Pig/Sheep + Goat	0.893	0.345

* Including ingested bones
Neonatal specimens, horncores, antlers and loose teeth excluded

Table 5.9: Incidence of gnawing by taxon – Late Byzantine Thouria farmstead (MaxAU).

Gnawing may also have selectively destroyed the more vulnerable (e.g. late fusing) body parts. Figures 5.4 – 5.12[57] present the relative abundance of anatomical units for the main domestic taxa in MinAU. The anatomical units are arranged in descending order of susceptibility to destruction by carnivore attrition as observed by Brain (1981, 23 fig. 18a) on modern goat bones chewed by both dogs and humans in a southern African village (Figure 5.3). A number of observations can be made, but with caution given retrieval and identification biases, the fact that Brain's observations are anatomically more relevant to sheep/goats than other domesticates, and that long bones units with surviving shaft but missing epiphysis are treated as present here, but as absent by Brain (1981, 19).

At first glance at least, none of the histograms resemble Brain's, but that is to some degree due to the methodological differences and taphonomic biases just mentioned. For example, proximal humeri are unexpectedly well represented in Figures 5.4 – 5.12, but of a total of 642 specimens (MinAU, combining all species and all three assemblages) of proximal humerus diaphysis, only nine (1.4%) preserve the proximal epiphysis (fused or unfused), a figure closely compatible with Brain's model. Also, cattle bones are larger and more robust than those of sheep and goats and thus less prone to total destruction by gnawing, so this species might be expected to diverge from Brain's model – as is in fact the case. Furthermore, some anatomical elements (highlighted in the Figures) are likely to be underrepresented for reasons of partial recovery and so cannot be taken as evidence for destruction by gnawing. In addition, all types of vertebrae for all species may be underestimated due to the difficulty of identifying them to taxon. A number of factors thus played some role in shaping these histograms, not least the protocols adopted in recording particular anatomical parts as present, but it is apparent that, in all three assemblages, body parts poorly represented in Brain's modern goat data (and for the most part meat-rich) are here relatively abundant – a point discussed below in analysing the evidence for carcass processing.

Another measure of the severity of the effects of gnawing is the ratio of early to late fusing epiphyses of humerus, radius and tibia (Table 5.10). Distal humerus and proximal radius fuse early, distal tibia fuses moderately early and proximal humerus, distal radius and proximal tibia fuse late. The latter group is thus expected to be more vulnerable to carnivore attrition. Early fusing elements in most cases outnumber the late fusing ones, but the ratios are in most cases relatively balanced, again suggesting fairly modest impact of gnawing on anatomical representation.

Gnawing may destroy bones completely, particularly so in the case of more fragile immature specimens, and this may counter-intuitively also lead to underrepresentation of gnawing marks (Halstead 2011, 762). Gnawing is also more likely to obscure the state of epiphyseal fusion in unfused than fused specimens. Tables 5.11 – 5.13 explore the relationship between gnawing and age for the three commonest taxa, through the comparison of unfused (+fusing) with fused specimens. Neonatal specimens are excluded from the tables due to their vulnerability to recovery biases. The frequency of gnawing does not differ significantly between unfused and fused bones for all three common domestic taxa at Early Byzantine Messene or at the Late Byzantine Thouria farmstead. A highly significant difference is found in the Hellenistic Asklepieion of Thouria but only for cattle and sheep/goats (with gnawing more frequent in fused and unfused specimens, respectively). There is thus no evidence that scavenger attrition has significantly and consistently altered age profiles in any of the three assemblages.

[57] Neonatal bones and loose teeth have been excluded from the histograms.

Turning to the fragmentation patterns of long bones (Table 5.14), destruction of epiphyses by gnawing commonly creates shaft 'cylinders'. Cylinders of cattle long bones are rare in all three assemblages, implying that dogs may have had limited access to cattle bones, at least in a form that could be reduced to a cylinder[58]. More specifically, the low percentage of complete bones in combination with the high percentage of shaft splinters hints at fragmentation of cattle long bones by deliberate human activities (e.g. marrow extraction), which would have subsequently led to the low number of cylinders. Pigs and sheep/goats exhibit fairly similar percentages of cylinders at each site, suggesting once more that dogs had more or less equal access to the bones of pigs and sheep/goats, although it should be noted that not all cylinders recorded bore tooth marks.[59] Complete bones of pig and sheep/goats are rare, while diaphysis fragments are dominant and cylinders are closely followed by diaphyses with at least part of the epiphysis. This pattern is evident in all three assemblages. Again carcass processing must have been the primary factor in the creation of these fragmentation patterns with gnawing being less important. It is worth noting that pigs have a higher percentage of complete bones than sheep/goats in all three assemblages. Given the younger age at which pigs were slaughtered, their bones had a higher probability of being discarded intact rather than fragmented for marrow extraction highlighting the influence of age on exploitation of bones for marrow.

To sum up, the impact of carnivore attrition is modest at the three sites under investigation suggesting a relatively quick burial of most of the bones. Even though pig bones exhibit the highest percentage of gnawing, sheep/goats are not far behind, suggesting equal access of scavengers to these species. Cattle are unsurprisingly the least affected species, possibly because scavengers gained access to them only after removal of their marrow had made them less attractive. It is difficult to imagine that recovery biases and destruction by gnawing have not caused underrepresentation particularly of unfused specimens, but there is no evidence that these effects were severe. Although gnawing definitely contributed to some degree to the formation of the assemblages, the patterns of anatomical representation and fragmentation suggest that other factors, most likely carcass processing procedures, played a more vital role.

Finally, a single digested bone was identified in Early Byzantine Messene and five in ancient Thouria (two from the Hellenistic Asklepieion of Thouria and three from the Late Byzantine farmstead), confirming that scavengers such as dogs roamed all three sites, while sixteen bones from Early Byzantine Messene and seven from ancient Thouria (six from the Hellenistic Asklepieion[60] and one from the Late Byzantine farmstead) indicate the same for rodents.

[58] The possibility that a number of cattle bones were kept as raw material for craft activities is another factor that should be taken into consideration. Sheep, goats and especially pigs were usually slaughtered at a younger age than cattle and thus their bones were softer and less suitable as raw material.

[59] 45% of the Early Byzantine Messene cylinders, 44% of the Hellenistic Asklepieion of Thouria cylinders and 31% of the Late Byzantine Thouria farmstead cylinders had traces of gnawing.

[60] Another two bones could potentially have been gnawed by rodents but determination was uncertain.

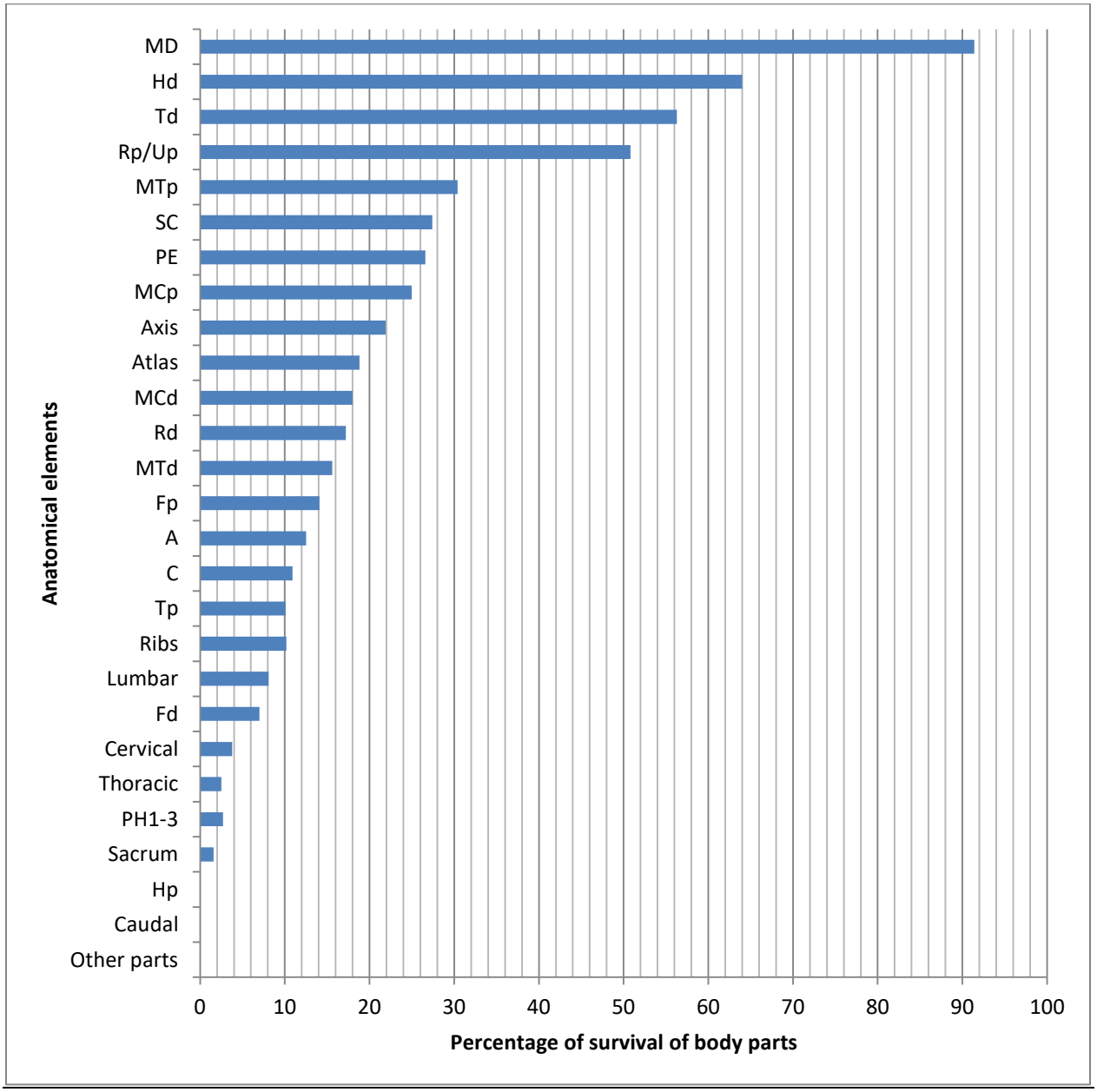


Figure 5.3: Anatomical representation of modern goat bones subject to attrition in descending order of frequency (based on Brain 1981, 23 fig. 18a).

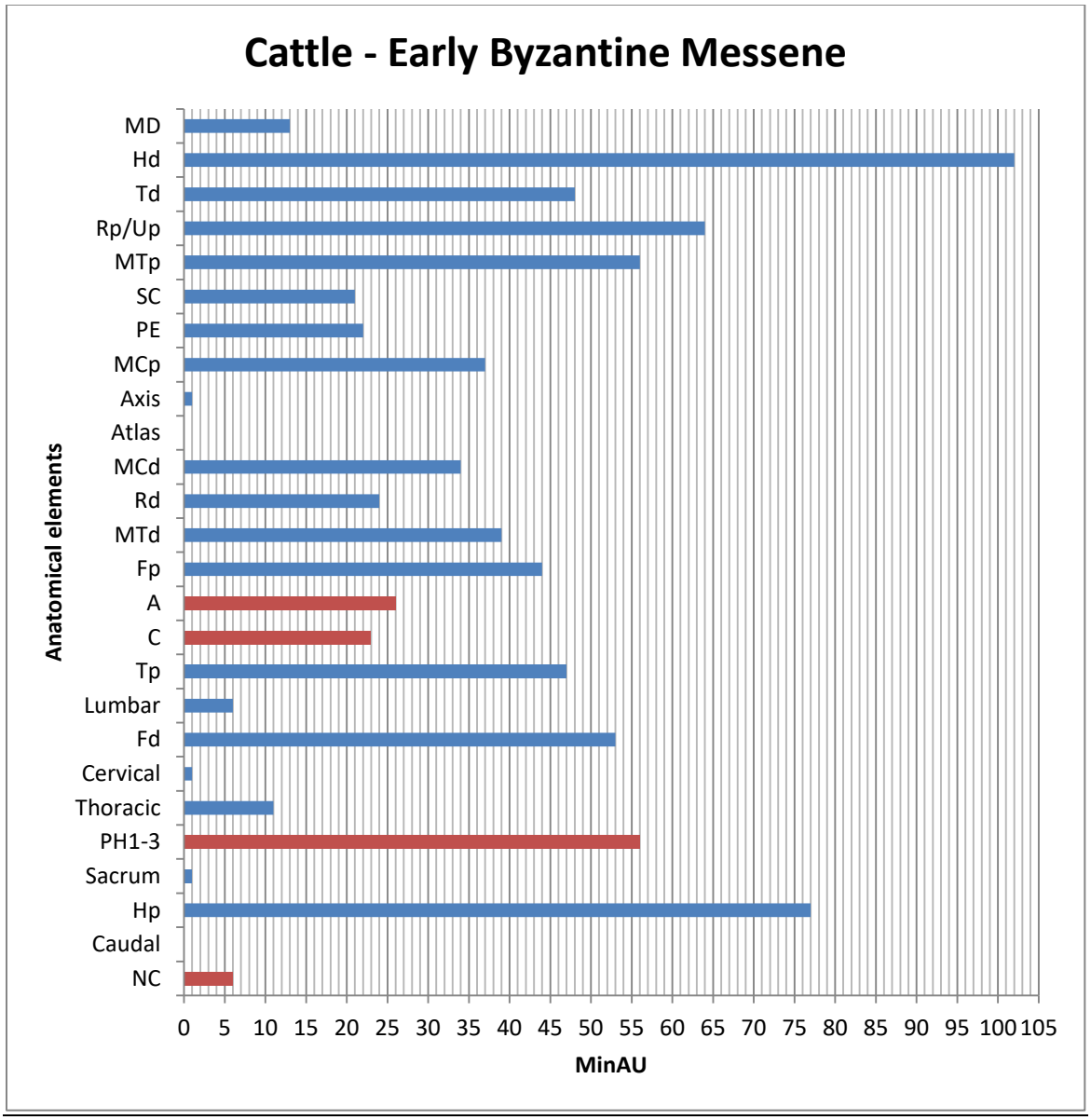


Figure 5.4: Anatomical representation of cattle ordered as by Brain (MinAU – Early Byzantine Messene). Anatomical elements vulnerable to retrieval loss are highlighted in red.

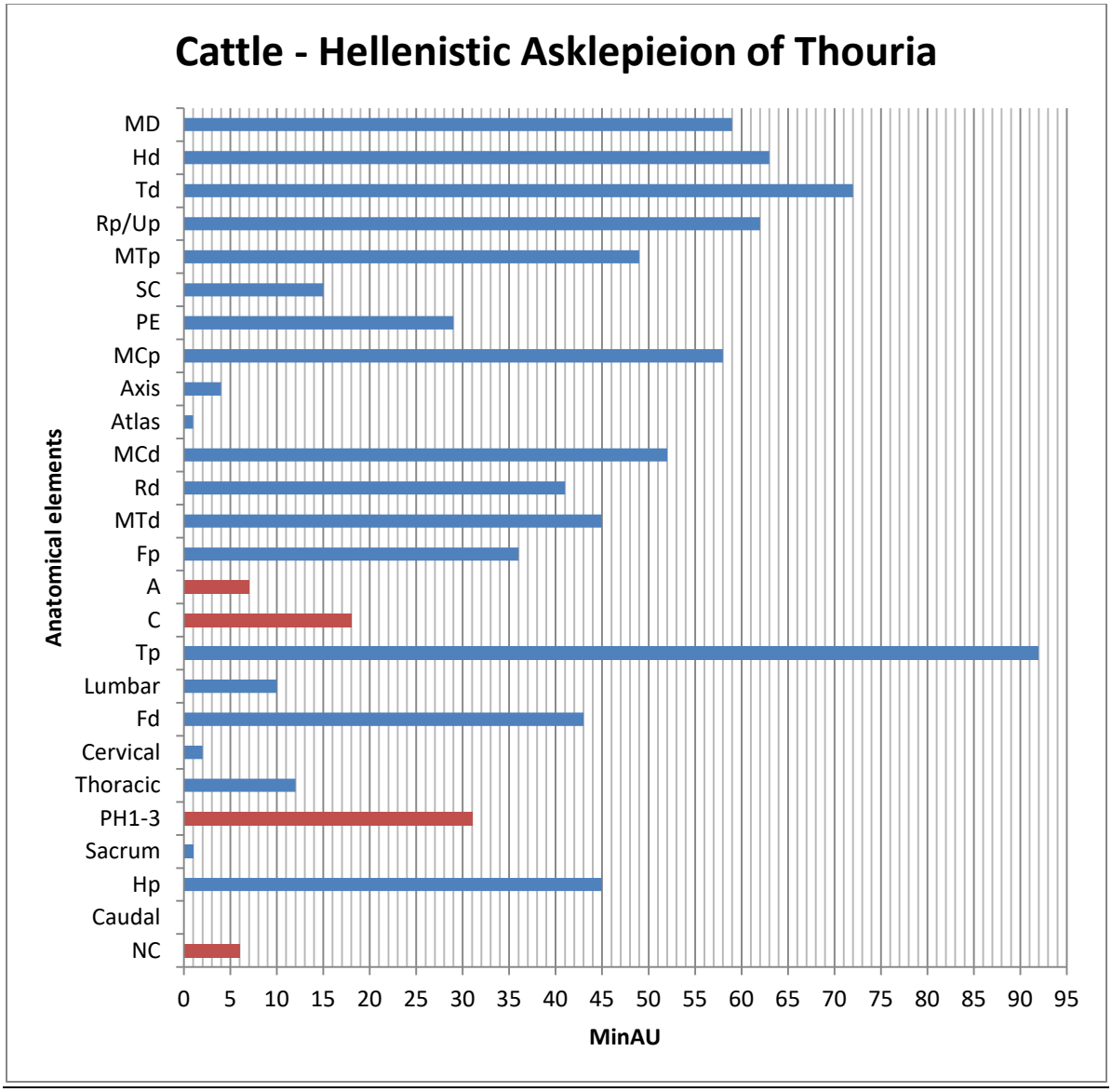


Figure 5.5: Anatomical representation of cattle ordered as by Brain (MinAU – Hellenistic Asklepieion of Thouria). Anatomical elements vulnerable to retrieval loss are highlighted in red.

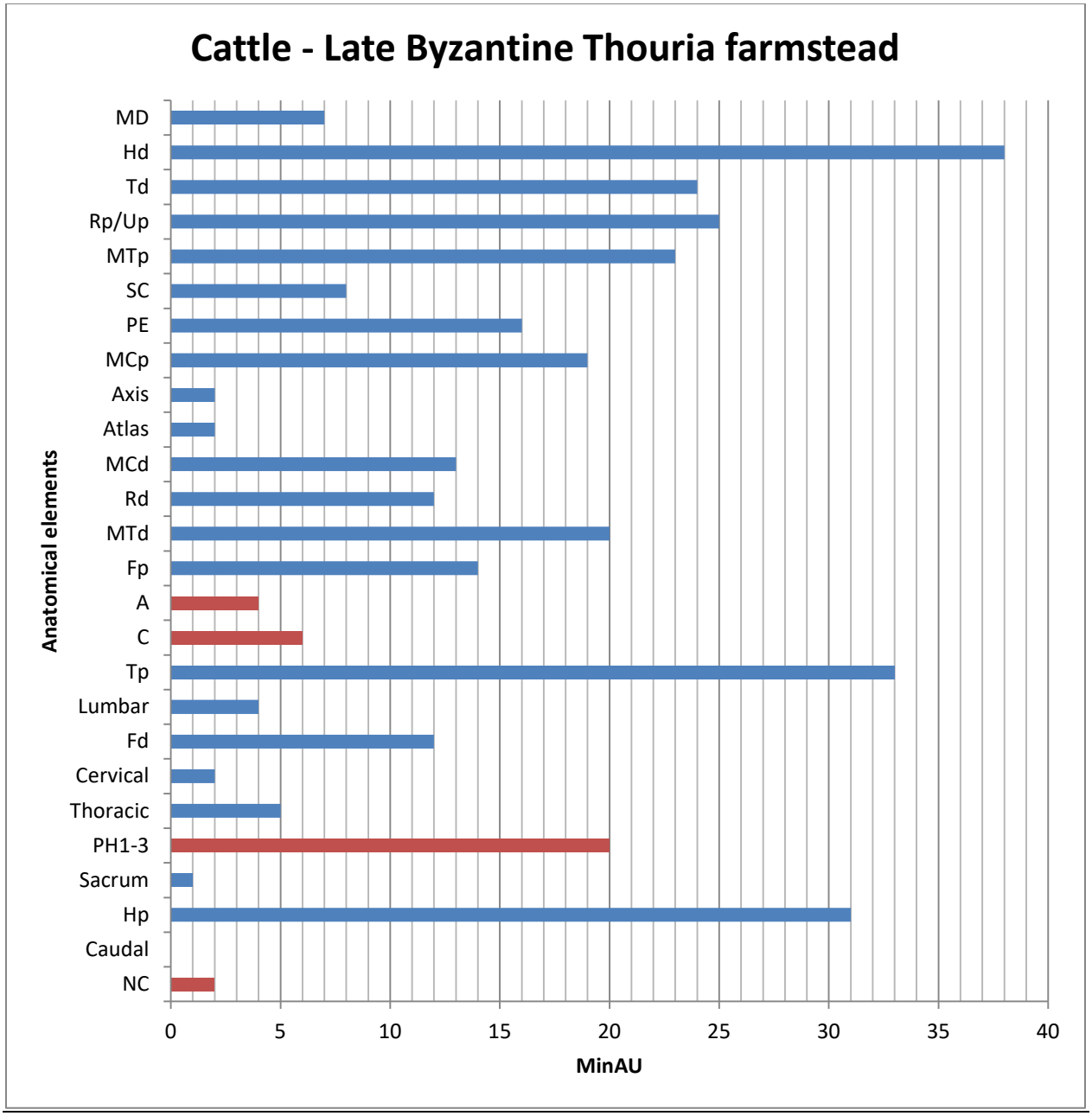


Figure 5.6: Anatomical representation of cattle ordered as by Brain (MinAU – Late Byzantine Thouria farmstead). Anatomical elements vulnerable to retrieval loss are highlighted in red.

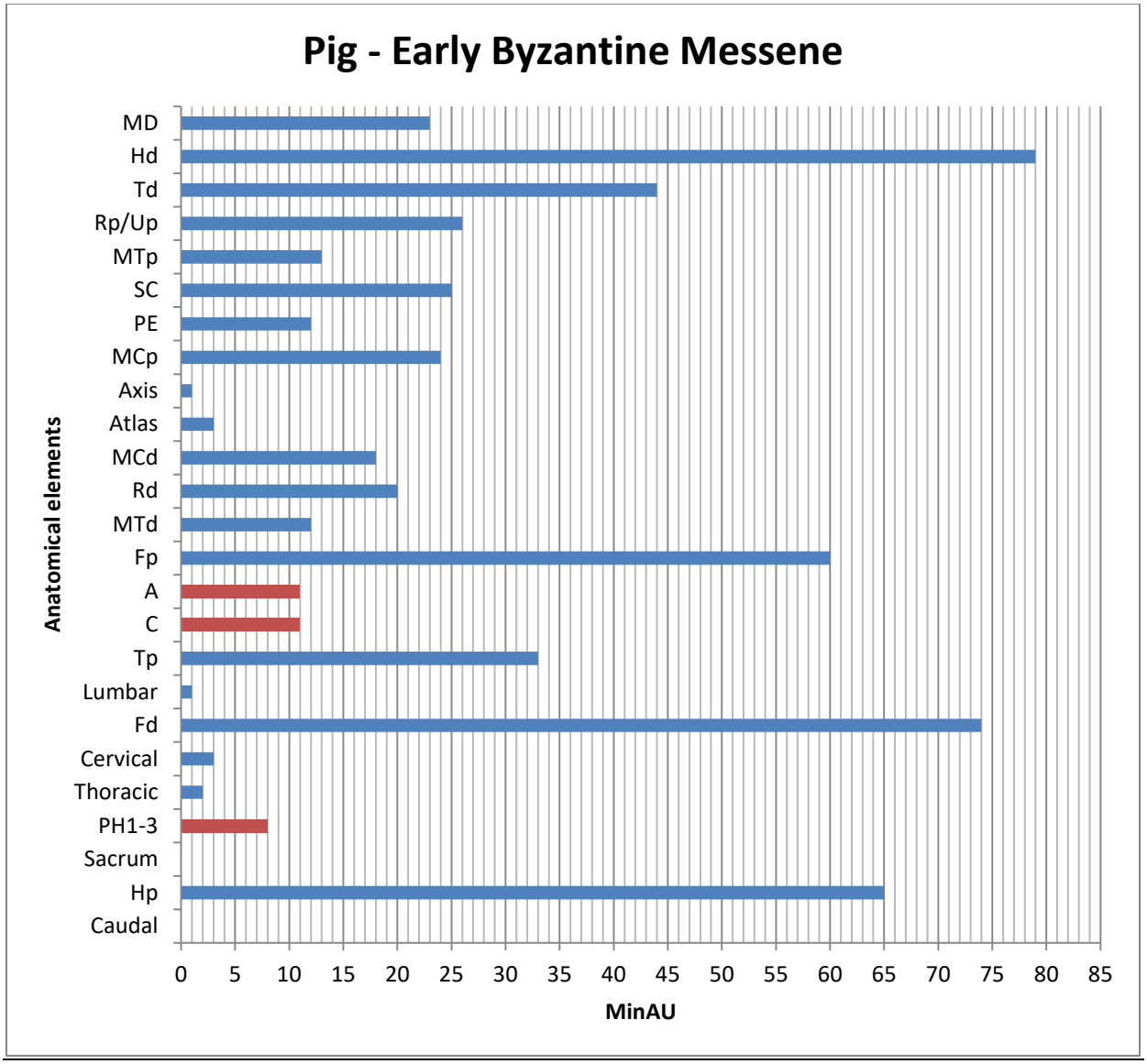


Figure 5.7: Anatomical representation of pigs ordered as by Brain (MinAU – Early Byzantine Messene). Anatomical elements vulnerable to retrieval loss are highlighted in red.

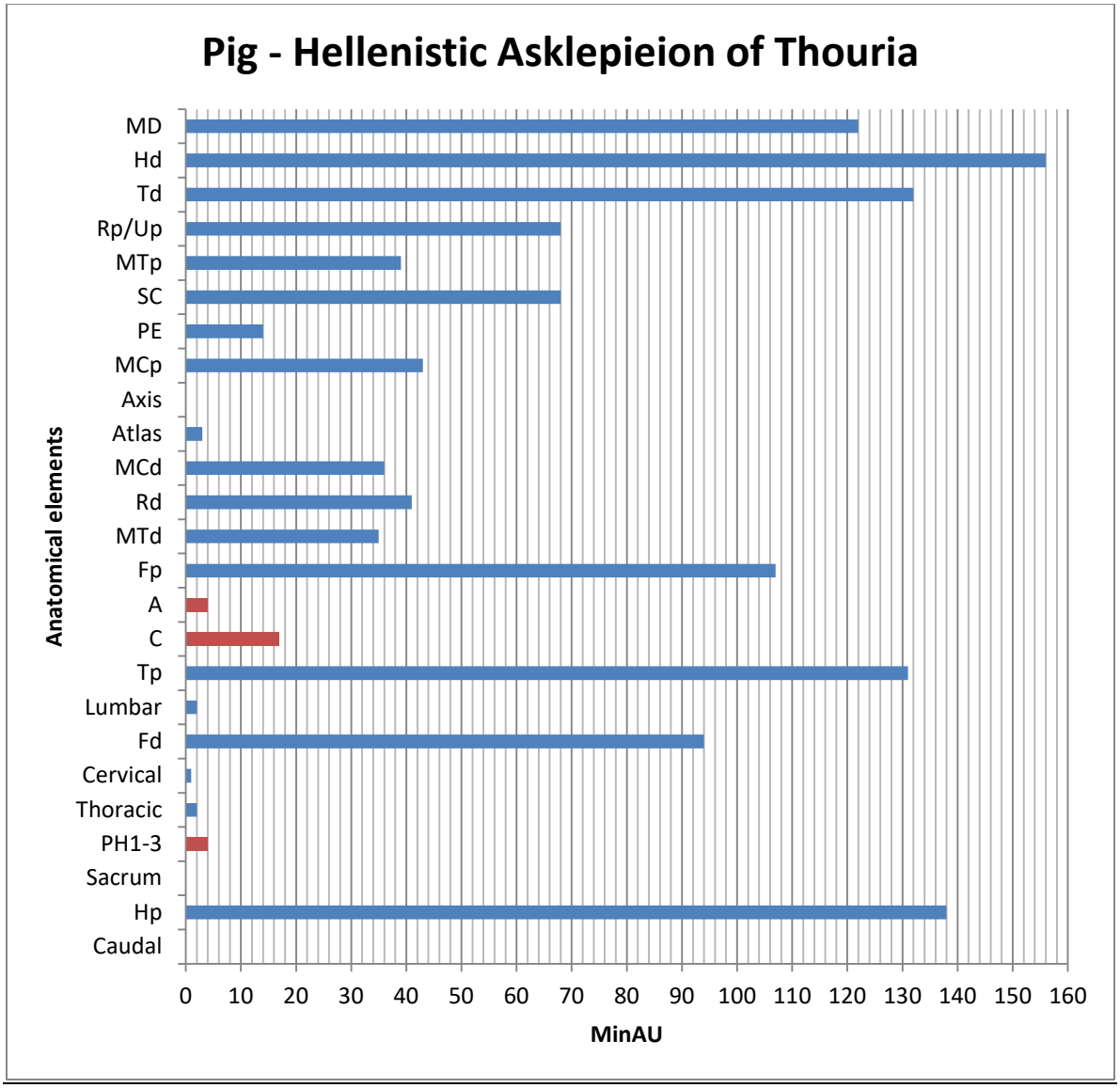


Figure 5.8: Anatomical representation of pigs ordered as by Brain (MinAU – Hellenistic Asklepieion of Thouria). Anatomical elements vulnerable to retrieval loss are highlighted in red.

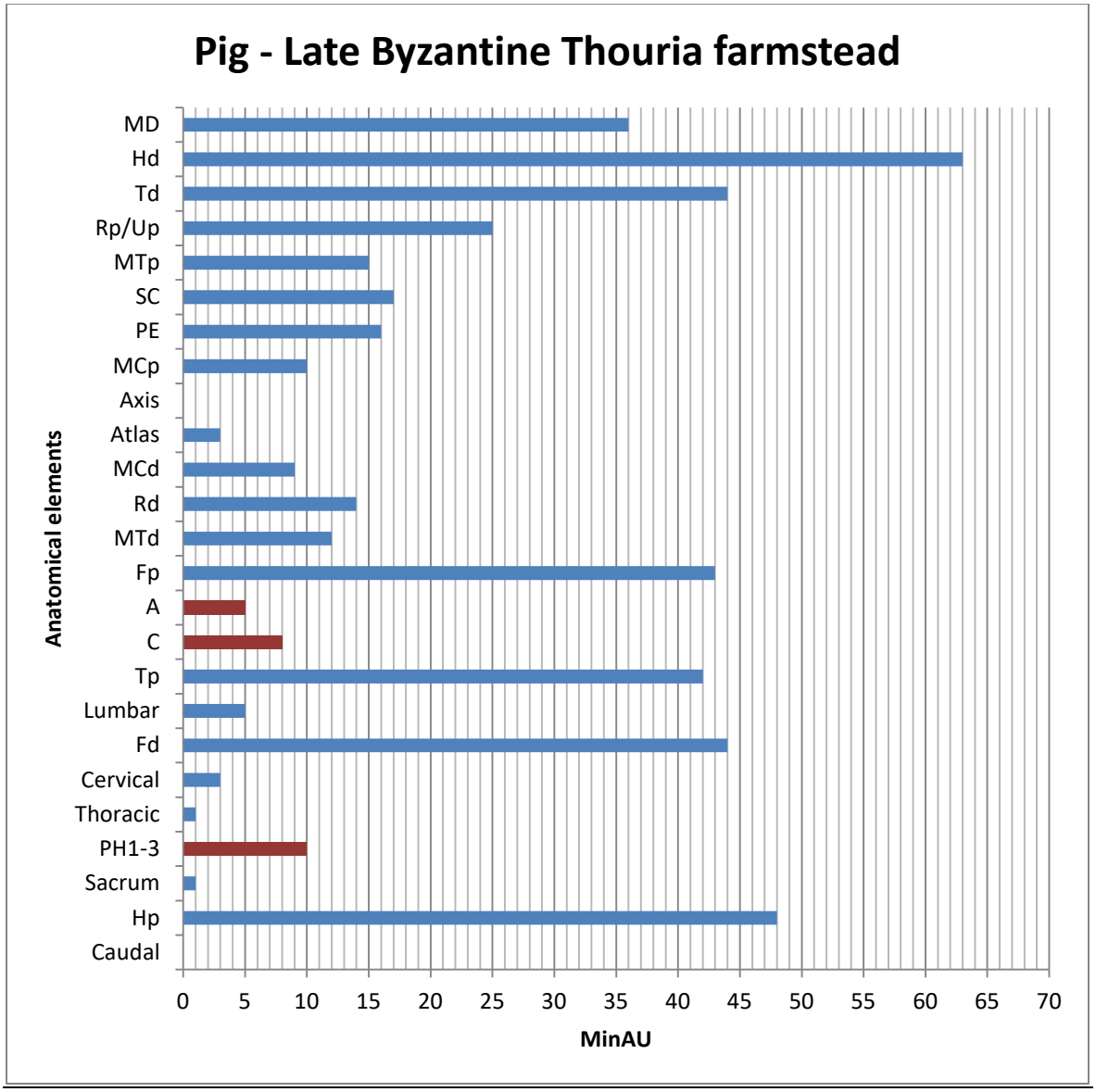


Figure 5.9: Anatomical representation of pigs ordered as by Brain (MinAU – Late Byzantine Thouria farmstead). Anatomical elements vulnerable to retrieval loss are highlighted in red.

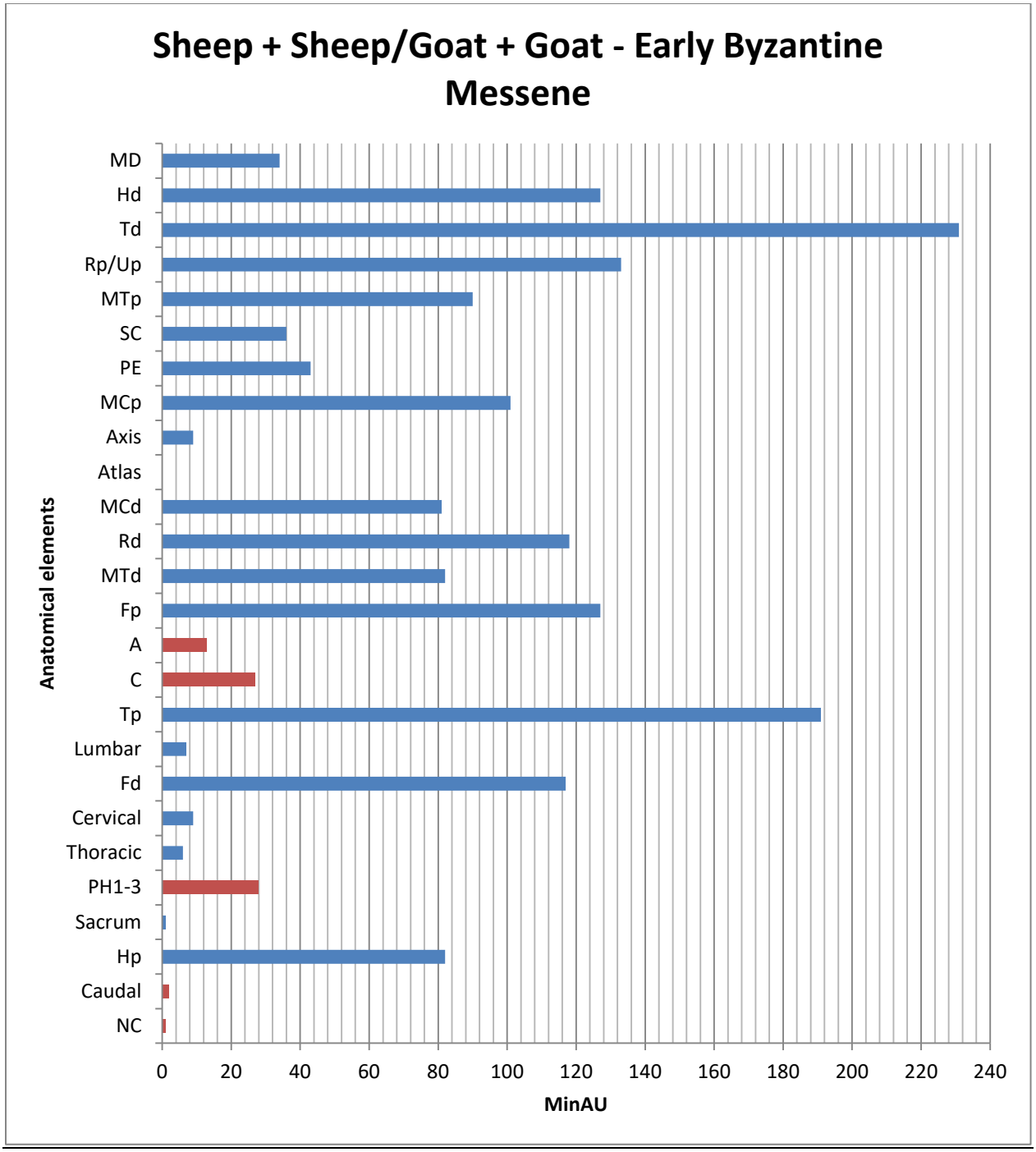


Figure 5.10: Anatomical representation of sheep/goats ordered as by Brain (MinAU – Early Byzantine Messene). Anatomical elements vulnerable to retrieval loss are highlighted in red.

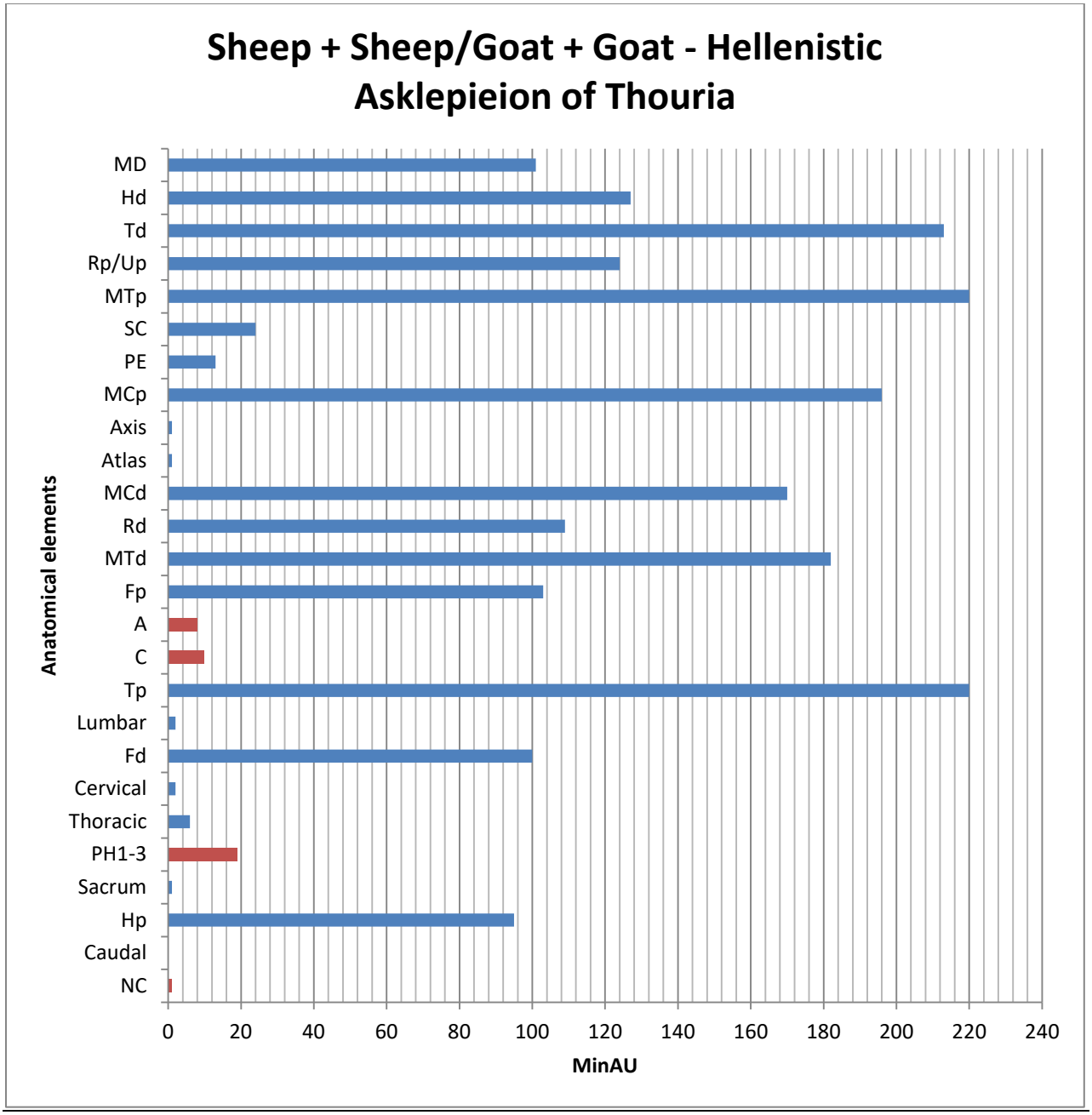


Figure 5.11: Anatomical representation of sheep/goats ordered as by Brain (MinAU – Hellenistic Asklepieion of Thouria). Anatomical elements vulnerable to retrieval loss are highlighted in red.

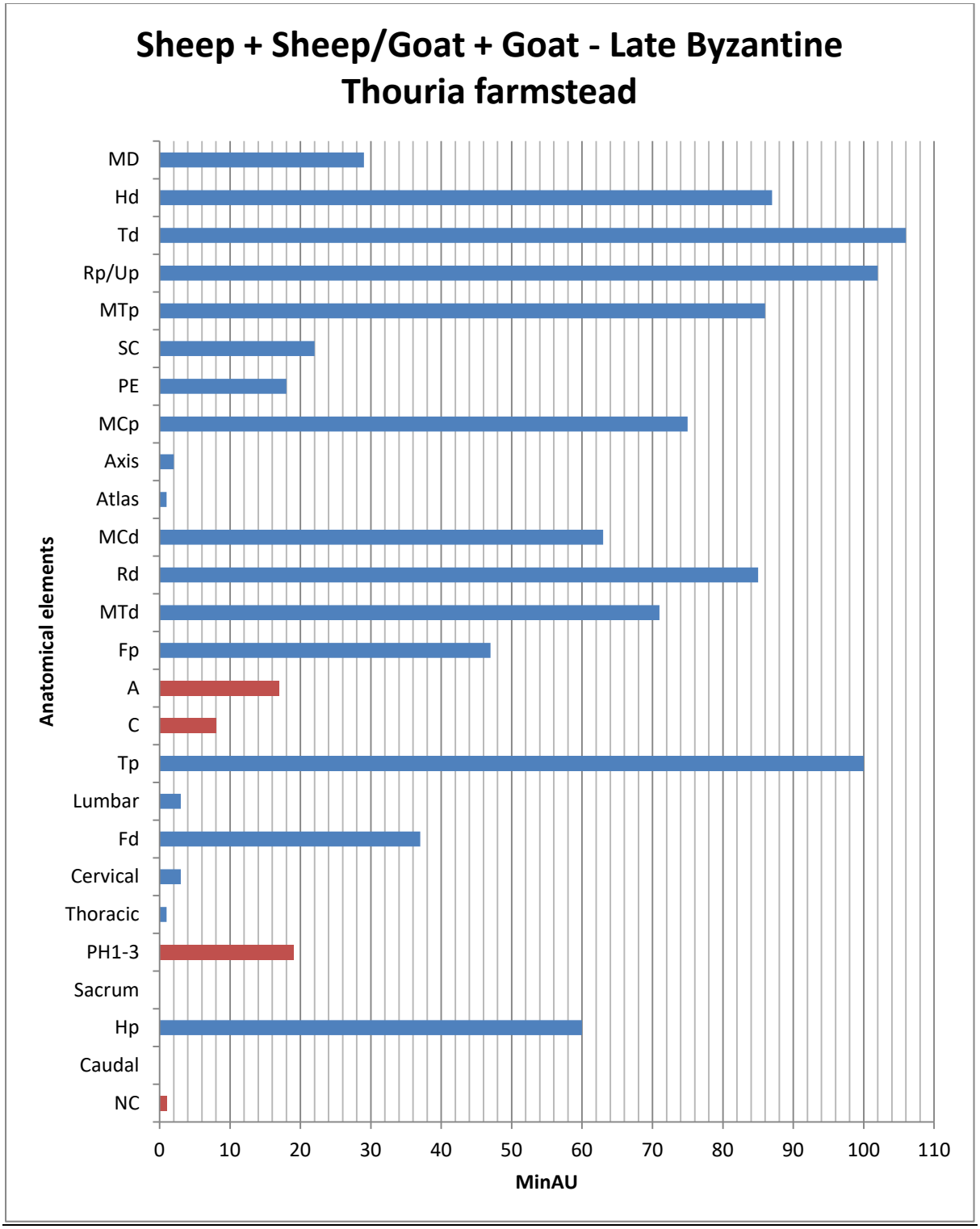


Figure 5.12: Anatomical representation of sheep/goats ordered as by Brain (MinAU – Late Byzantine Thouria farmstead). Anatomical elements vulnerable to retrieval loss are highlighted in red.

	Early Byzantine Messene			Hellenistic Asklepieion of Thouria			Late Byzantine Thouria farmstead		
	Hp	**Hd**	**Ratio**	**Hp**	**Hd**	**Ratio**	**Hp**	**Hd**	**Ratio**
Cattle	77	102	0.8:1	45	63	0.7:1	31	38	0.8:1
Pig	65	79	0.8:1	138	156	0.9:1	48	63	0.8:1
Sheep + Goat	83	126	0.7:1	95	127	0.7:1	60	87	0.7:1
	Rp	**Rd**	**Ratio**	**Rp**	**Rd**	**Ratio**	**Rp**	**Rd**	**Ratio**
Cattle	64	24	1:0.4	62	41	1:0.7	25	12	1:0.5
Pig	26	20	1:0.8	55	41	1:0.7	19	14	1:0.7
Sheep + Goat	133	118	1:0.9	124	109	1:0.9	102	85	1:0.8
	Tp	**Td**	**Ratio**	**Tp**	**Td**	**Ratio**	**Tp**	**Td**	**Ratio**
Cattle	47	48	0.9:1	92	72	1:0.8	33	24	1:0.7
Pig	33	44	0.8:1	131	132	0.9:1	42	44	0.9:1
Sheep + Goat	191	231	0.8:1	220	213	1:0.9	100	106	0.9:1
Neonatal specimens excluded									

Table 5.10: Ratio of proximal humerus (Hp) to distal humerus (Hd), proximal radius (Rp) to distal radius (Rd) and proximal tibia (Tp) to distal tibia (Td) for the main domesticates (MinAU).

Early Byzantine Messene					
			Unfused*	Fused	Total
Cattle	None	MaxAU	226	523	749
		%	86.3%	81.5%	82.9%
	Gnawed**	MaxAU	36	119	155
		%	13.7%	18.5%	17.1%
	Total	MaxAU	262	642	915
		%	100.0%	100.0%	100.0%
	χ^2 test	$\chi^2 = 3.012$, p = 0.083			
			Unfused*	Fused	Total
Pig	None	MaxAU	71	378	449
		%	80.7%	73.4%	74.5%
	Gnawed**	MaxAU	17	137	154
		%	19.3%	26.6%	25.5%
	Total	MaxAU	88	515	603
		%	100.0%	100.0%	100.0%
	χ^2 test	$\chi^2 = 2.097$, p = 0.148			
			Unfused*	Fused	Total
Sheep + Goat	None	MaxAU	265	1098	1363
		%	79.1%	78.8%	78.9%
	Gnawed**	MaxAU	70	295	365
		%	20.9%	21.2%	21.1%
	Total	MaxAU	335	1393	1728
		%	100.0%	100.0%	100.0%
	χ^2 test	$\chi^2 = 0.013$, p = 0.910			

* Including unfused epiphyses, unfused diaphyses, fusing specimens, and specimens identified as immature.
** Including ingested specimens.
Neonatal specimens, horncores and loose teeth excluded

Table 5.11: Incidence of gnawing in relation to age (unfused vs. fused – MaxAU) for the three main domestic taxa – Early Byzantine Messene.

Hellenistic Asklepieion of Thouria					
			Unfused*	Fused	Total
Cattle	None	MaxAU	197	617	814
		%	92.1%	84.8%	86.4%
	Gnawed**	MaxAU	17	111	128
		%	7.9%	15.2%	13.6%
	Total	MaxAU	214	728	942
		%	100.0%	100.0%	100.0%
	χ^2 test	$\chi^2 = 7.513$, p = 0.006			
			Unfused*	Fused	Total
Pig	None	MaxAU	131	865	996
		%	72.4%	74.1%	73.8%
	Gnawed**	MaxAU	50	303	353
		%	27.6%	25.9%	26.2%
	Total	MaxAU	181	1168	1349
		%	100.0%	100.0%	100.0%
	χ^2 test	$\chi^2 = 0.230$, p = 0.632			
			Unfused*	Fused	Total
Sheep + Goat	None	MaxAU	252	1406	1658
		%	72.0%	80.8%	79.3%
	Gnawed**	MaxAU	98	335	433
		%	28.0%	19.2%	20.7%
	Total	MaxAU	350	1741	2091
		%	100.0%	100.0%	100.0%
	χ^2 test	$\chi^2 = 13.614$, p = 0.000			
* Including unfused epiphyses, unfused diaphyses, fusing specimens, and specimens identified as immature. ** Including ingested specimens. Neonatal specimens, horncores and loose teeth excluded					

Table 5.12: Incidence of gnawing in relation to age (unfused vs. fused – MaxAU) for the three main domestic taxa – Hellenistic Asklepieion of Thouria.

Late Byzantine Thouria farmstead					
			Unfused*	Fused	Total
Cattle	None	MaxAU	83	255	338
		%	96.5%	90.1%	91.6%
	Gnawed**	MaxAU	3	28	31
		%	3.5%	9.9%	8.4%
	Total	MaxAU	86	283	369
		%	100.0%	100.0%	100.0%
	χ^2 test	χ^2 = 3.517, p = 0.061			
			Unfused*	Fused	Total
Pig	None	MaxAU	53	385	438
		%	93.0%	85.7%	86.6%
	Gnawed**	MaxAU	4	64	68
		%	7.0%	14.3%	13.4%
	Total	MaxAU	57	449	506
		%	100.0%	100.0%	100.0%
	χ^2 test	χ^2 = 2.277, p = 0.131			
			Unfused*	Fused	Total
Sheep + Goat	None	MaxAU	167	785	952
		%	87.0%	87.6%	87.5%
	Gnawed**	MaxAU	25	111	136
		%	13.0%	12.4%	12.5%
	Total	MaxAU	192	896	1088
		%	100.0%	100.0%	100.0%
	χ^2 test	χ^2 = 0.058, p = 0.810			

* Including unfused epiphyses, unfused diaphyses, fusing specimens, and specimens identified as immature.
** Including ingested specimens.
Neonatal specimens, horncores and loose teeth excluded

Table 5.13: Incidence of gnawing in relation to age (unfused vs. fused – MaxAU) for the three main domestic taxa – Late Byzantine Thouria farmstead.

Early Byzantine Messene						
Taxa		Complete	Frags. with end*	Shaft splinter	Cylinder	Total
Cattle	MaxAU	47	164	463	28	702
	% within species	6.7%	23.4%	66.0%	4.0%	100.0%
Pig	MaxAU	44	89	232	108	473
	% within species	9.3%	18.8%	49.0%	22.8%	100.0%
Sheep + Goat	MaxAU	42	302	864	364	1572
	% within species	2.7%	19.2%	55.0%	23.2%	100.0%
Total	MaxAU	133	555	1559	500	2747
	% within species	4.8%	20.2%	56.8%	18.2%	100.0%
χ^2 test	$\chi^2 = 165.376$, p = 0.000					
Hellenistic Asklepieion of Thouria						
Taxa		Complete	Frags. with end*	Shaft splinter	Cylinder	Total
Cattle	MaxAU	27	147	459	51	684
	% within species	3.9%	21.5%	67.1%	7.5%	100.0%
Pig	MaxAU	58	146	442	212	858
	% within species	6.8%	17.0%	51.5%	24.7%	100.0%
Sheep + Goat	MaxAU	57	287	1049	438	1831
	% within species	3.1%	15.7%	57.3%	23.9%	100.0%
Total	MaxAU	142	580	1950	701	3373
	% within species	4.2%	17.2%	57.8%	20.8%	100.0%
χ^2 test	$\chi^2 = 118.099$, p = 0.000					
Late Byzantine Thouria farmstead						
Taxa		Complete	Frags. with end*	Shaft splinter	Cylinder	Total
Cattle	MaxAU	7	50	175	19	251
	% within species	2.8%	19.9%	69.7%	7.6%	100.0%
Pig	MaxAU	16	66	144	94	320
	% within species	5.3%	21.9%	43.7%	29.1%	100.0%
Sheep + Goat	MaxAU	28	158	470	269	925
	% within species	3.0%	17.1%	50.8%	29.1%	100.0%
Total	MaxAU	51	274	789	382	1496
	% within species	3.4%	18.3%	52.7%	25.5%	100.0%
χ^2 test	$\chi^2 = 61.249$, p = 0.000					
*Includes some shaft missing, end + shaft, end splinter + shaft splinter, end only, end splinter Neonatal specimens and loose epiphyses excluded						

Table 5.14: Breakdown of old break types for the long bones of the three main domestic taxa (MaxAU).

Burning

Tables 5.15 – 5.17[61] present in MaxAU the numbers and percentages of burnt specimens for all taxa present at each site. The number of burnt specimens at ancient Thouria is extremely small and limited to the main domesticates, a point discussed below in relation to possible sacrificial and feasting activity at the Hellenistic Asklepieion of Thouria. In Early Byzantine Messene, 18.1% of specimens bear traces of burning and, in contrast to ancient Thouria, these are spread across a wider variety of species although the vast majority of the burnt specimens still belong to cattle, pigs and sheep/goats. How and why bones were burnt will be considered in the next chapter, but at this stage two points can be made. First, calcined bones were extremely rare in all assemblages. Secondly, the proportion of bones that were both gnawed and burned varies sharply between the three assemblages: one of 713 (0.1%) burnt specimens at Early Byzantine Messene, 19 of 244 (7.8%) in the Thouria Asklepieion and 6 of 39 (15.4%) in the Late Byzantine Thouria farmstead. By contrast, the overall incidence of gnawing in the three assemblages is very different: 19.6%, 19.2% and 9.3%, respectively. Thus burning apparently occupied a different place in the discard pathway at the three sites. Burnt bones were most frequent (18.1%) at Early Byzantine Messene, but almost never gnawed, perhaps indicating that burning before discard made bones unattractive to scavengers. Bone was least frequently burnt (1.4% overall) at the Late Byzantine Thouria farmstead, but here burnt bones were more likely to be gnawed than unburnt, perhaps implying that burning took place after gnawing in the context of refuse disposal. The Hellenistic Asklepieion of Thouria assemblage occupies an intermediate position in this respect between Early Byzantine Messene and the Late Byzantine Thouria farmstead.

Fragmentation

Excavation, unfavourable storage conditions and transportation of the material are often damaging procedures for many types of archaeological material, animal bone included. Consequently, a number of specimens presented non-mendable fresh fractures (Early Byzantine Messene 14.7%; Hellenistic Asklepieion of Thouria 21.6%; Late Byzantine Thouria farmstead 20.3%). Most of these must have been inflicted during excavation with the smaller pieces lost due to partial recovery. If much of the damage had been caused during storage and transportation, most of the broken pieces would have been found in the bone bags allowing mending of the affected specimens. Fragmentation was also caused by ancient human action (e.g. butchery) or to a lesser degree carnivore attrition prior to deposition (briefly discussed above). A more detailed analysis of fragmentation patterns is presented in the next chapter. It is interesting to note here, however, that in the case of the Hellenistic Asklepieion of Thouria, according to the excavator (Arapogianni 2014, 55-6) the animal bones discarded there had been gathered outside the building and compacted in order to take up less space. This action further contributed to the high degree of fragmentation of the assemblage.

[61] Neonatal bones and loose teeth have been excluded for the same reason as above.

Early Byzantine Messene				
Taxa		Not burnt	Burnt	Total
Cattle	MaxAU	928	155	1083
	% within species	85.7%	14.3%	100.0%
Pig	MaxAU	500	149	649
	% within species	77.0%	23.0%	100.0%
Sheep + Goat	MaxAU	1592	381	1973
	% within species	80.7%	19.3%	100.0%
Equids	MaxAU	112	12	124
	% within species	90.3%	9.7%	100.0%
Dog	MaxAU	38	5	43
	% within species	88.4%	11.6%	100.0%
Red deer	MaxAU	17	5	22
	% within species	77.3%	22.7%	100.0%
Fallow deer	MaxAU	1	0	1
	% within species	100.0%	0.0%	100.0%
Roe deer	MaxAU	8	1	9
	% within species	88.9%	11.1%	100.0%
Wild boar	MaxAU	1	2	3
	% within species	33.3%	66.7%	100.0%
Red fox	MaxAU	2	0	2
	% within species	100.0%	0.0%	100.0%
Hare	MaxAU	19	1	20
	% within species	95.0%	5.0%	100.0%
Tortoise	MaxAU	18	2	20
	% within species	90.0%	10.0%	100.0%
Total	MaxAU	3236	713	3949
	% within species	81.9%	18.1%	100.0%
χ^2 tests				
	χ^2		p	
Cattle/Pig	20.964		0.000	
Cattle/Sheep + Goat	12.079		0.001	
Pig/Sheep + Goat	4.029		0.045	
Neonatal bones, horncores, antlers and loose teeth excluded				

Table 5.15: Incidence of burnt specimens by taxon – Early Byzantine Messene (MaxAU).

Hellenistic Asklepieion of Thouria				
Taxa		Not burnt	Burnt	Total
Cattle	MaxAU	1011	114	1125
	% within species	89.9%	10.1%	100.0%
Pig	MaxAU	1377	52	1429
	% within species	96.4%	3.6%	100.0%
Sheep + Goat	MaxAU	2333	78	2411
	% within species	96.8%	3.2%	100.0%
Equids	MaxAU	9	0	9
	% within species	100.0%	0.0%	100.0%
Dog	MaxAU	6	0	6
	% within species	100.0%	0.0%	100.0%
Red deer	MaxAU	44	0	44
	% within species	100.0%	0.0%	100.0%
Fallow deer	MaxAU	4	0	4
	% within species	100.0%	0.0%	100.0%
Wild boar	MaxAU	2	0	2
	% within species	100.0%	0.0%	100.0%
Red fox	MaxAU	20	0	20
	% within species	100.0%	0.0%	100.0%
Hare	MaxAU	12	0	12
	% within species	100.0%	0.0%	100.0%
Tortoise	MaxAU	11	0	11
	% within species	100.0%	0.0%	100.0%
Total	MaxAU	4829	244	5073
	% within species	95.2%	4.8%	100.0%
χ^2 tests				
	χ^2		p	
Cattle/Pig	43.686		0.000	
Cattle/Sheep + Goat	71.082		0.000	
Pig/Sheep + Goat	0.447		0.504	
Neonatal bones, horncores, antlers and loose teeth excluded				

Table 5.16: Incidence of burnt specimens by taxon – Hellenistic Asklepieion of Thouria (MaxAU).

Late Byzantine Thouria farmstead				
Taxa		Not burnt	Burnt	Total
Cattle	MaxAU	425	6	431
	% within species	98.6%	1.4%	100.0%
Pig	MaxAU	520	6	526
	% within species	98.9%	1.1%	100.0%
Sheep + Goat	MaxAU	1168	27	1195
	% within species	97.7%	2.3%	100.0%
Equids	MaxAU	38	0	38
	% within species	100.0%	0.0%	100.0%
Dog	MaxAU	466	0	466
	% within species	100.0%	0.0%	100.0%
Red deer	MaxAU	76	0	76
	% within species	100.0%	0.0%	100.0%
Fallow deer	MaxAU	7	0	7
	% within species	100.0%	0.0%	100.0%
Roe deer	MaxAU	3	0	3
	% within species	100.0%	0.00%	100.0%
Wild boar	MaxAU	1	0	1
	% within species	100.0%	0.0%	100.0%
Cat	MaxAU	4	0	4
	% within species	100.0%	0.0%	100.00%
Red fox	MaxAU	5	0	5
	% within species	100.0%	0.0%	100.0%
Hare	MaxAU	4	0	4
	% within species	100.0%	0.0%	100.0%
Hedgehog	MaxAU	1	0	1
	% within species	100.0%	0.0%	100.0%
Tortoise	MaxAU	29	0	29
	% within species	100.0%	0.0%	100.0%
Total	MaxAU	2747	39	2786
	% within species	98.6%	1.4%	100.0%
χ^2 tests				
	χ^2		p	
Cattle/Pig	0.121		0.728	
Cattle/Sheep + Goat	1.198		0.274	
Pig/Sheep + Goat	2.431		0.119	
Neonatal bones, horncores, antlers and loose teeth excluded				

Table 5.17: Incidence of burnt specimens by taxon – Late Byzantine Thouria farmstead (MaxAU).

Conclusions

Taking a combination of gnawing, burning and erosion and comparing the affected versus the unaffected specimens, pre- and post-depositional taphonomic agents seem to have affected 29.4% of the Early Byzantine Messene assemblage, 43.7% of the Hellenistic Asklepieion of Thouria assemblage and 24.4% of the Late Byzantine Thouria farmstead assemblage. Most of the damage is attributable to carnivore attrition and erosion, but in the case of the Late Byzantine Thouria farmstead root etching is also very prominent. Encrustation, attrition by rodents and (with the exception of Early Byzantine Messene) burning occurred in only modest frequencies. From the above analysis, it seems that neither erosion nor gnawing had a decisive impact on the studied material (at least for the post-neonatal age groups) and carcass processing procedures must largely be responsible for fragmentation patterns and anatomical representation within each bone assemblage.

A more significant factor was recovery bias during excavation as smaller body parts are heavily underrepresented, especially for the smaller taxa. Partial retrieval thus played a major role in the taxonomic and anatomical profiles of the assemblages, a factor that must be taken into consideration in subsequent analysis and interpretation of the assemblages.

6. Carcass processing and patterns of consumption

Introduction

As indicated by the depositional patterns analysed in the previous chapter, most of the bones forming the three assemblages under study were discarded by humans after some form of carcass processing, the sequence of which is explored in the current chapter through the anatomical representation (in MinAU) of post-neonatal elements, the butchery stages for each taxon as represented by various types of cut marks, the anthropogenic bone fragmentation patterns and the use of bone as raw material for artefacts.

The commonest domestic mammals (cattle, pig, sheep and goat) are analysed in detail, while the less common taxa are discussed to the degree that the limited available data allow. It should be stressed that the Early Byzantine Messene and the Late Byzantine Thouria farmstead assemblages are considered to represent domestic refuse and the Hellenistic Asklepieion of Thouria assemblage remnants of ritual feasting activities. Potential differences between these two types of context in the treatment of carcasses will be a major focus of this chapter.

Anatomical element representation

The anatomical element representation in MinAU of post-neonatal specimens of cattle, pigs and sheep/goats is displayed for each assemblage in Figures 6.1 – 6.9. The anatomical elements on the bar charts are divided into five anatomical zones: head, fore-limb, vertebral column, hind-limb, ankle and feet. Numbers of phalanges 1 – 3 have been divided by two (as no distinction between fore- and hind-limb was made) to be directly comparable with other body parts.

Although all anatomical elements are present, the underrepresentation of smaller elements (astragali, calcanea, navicular cuboids, phalanges, caudal vertebrae and, in the case of cattle and sheep/goats, ulnae too) is evident in all three assemblages and especially in pigs and sheep/goats, consistent with the recovery bias identified in the previous chapter. The underrepresentation of vertebrae can be attributed at least partly to difficulty of identification. As a consequence, long bones are generally the best represented elements, in some cases accompanied by the mandible and to a lesser and varying degree the less robust scapula and pelvis.

Beginning with cattle (Figures 6.1 – 6.3), meat-rich fore- and hind-limbs are the most abundant in all three assemblages, although which specific anatomical units are most prevalent differs between sites. For example, the humerus is best represented in Early Byzantine Messene and, with tibia, in the Late Byzantine Thouria farmstead, but tibiae are most abundant in the Hellenistic Asklepieion of Thouria, where mandibles are also much better represented than in the other two assemblages. The meat-poor metapodials are also well represented at all three sites, suggesting that cattle were either slaughtered and butchered on-site and most of the underrepresented phalanges subsequently lost during excavation or that carcass dressing was performed off-site where phalanges were removed and discarded. The latter interpretation could also account for the underrepresentation of mandibles at Early Byzantine

Messene and the Late Byzantine Thouria farmstead[62]. In addition, the distal tibia is underrepresented relative to the less robust proximal tibia in both Thouria assemblages, for which a possible explanation might be carcass dressing to the tibia mid-shaft, but the high percentages of metapodials (which would have been discarded with the distal tibia) indicates that this must not have been the norm.

Turning to pigs (Figures 6.4 – 6.6), the meat-rich humerus, femur and tibia are the best represented anatomical zones in all three assemblages. The metapodials are less well represented than for the other common taxa, probably as a result of poorer preservation and lower identifiability (absence of the distinctive features marking the prenatal fusion of metapodials 3 and 4 in the ruminants). Mandibles are better represented in the two Thouria assemblages than at Early Byzantine Messene.

For sheep/goats (Figures 6.7 – 6.9), the tibia is best represented in all three assemblages, together with or followed by the metapodials, humerus and radius, femur (Early Byzantine Messene and Hellenistic Asklepieion of Thouria) and mandible (Hellenistic Asklepieion of Thouria). Carcasses must have been dressed at the level of the phalanges but, due to recovery bias, it is unclear whether this took place on- or off-site. Of course, in the latter case, recovery bias is not the sole reason for their underrepresentation. The underrepresentation of the mandible at Early Byzantine Messene and the Late Byzantine Thouria farmstead mimics the pattern detected for cattle.

The Hellenistic Asklepieion of Thouria assemblage comes from a sacred context. According to the primary ancient Greek Olympian sacrificial ritual, the *thysia*, the victim's femur, sacrum and tail were burnt on the altar as an offering to the gods while the worshippers consumed its meat (Ekroth 2009). In the case of the Hellenistic Asklepieion of Thouria, due to recovery and identification biases, the lack of sacra and caudal vertebrae cannot be attributed securely to the *thysia* ritual nor can the ritual be excluded as a possible contributing factor. Femurs are not underrepresented for either species, even though femur shaft splinters are often difficult to identify to species in comparison to other long bones. The lack of heavily burnt bones at the Hellenistic Asklepieion of Thouria points to the interpretation of the assemblage as dining refuse rather than the god's portion, which could have been discarded somewhere else. Since not all animals consumed at a sanctuary were necessarily sacrificed, the presence of some femurs in the assemblage is not unusual. However, the abundance of femurs relative to other long bones is unusual for a sacred context interpreted as dining debris (cf. Ekroth 2017a; 2017b; MacKinnon 2018b).

For pigs specifically, an important suggestion first made by Meuli (1946, 214 n. 1), and later supported by Ekroth (2009, 143-4), is that they were sacrificed in a different manner than sheep, goats and cattle (meaning not in the *thysia* manner). Meuli supported his theory with the description of the pig sacrifice by Eumaios in Homer's *Odyssey* (19.419-38) and Ekroth by pointing out the lack of pig femurs, sacra and caudal vertebrae in many altar deposits interpreted as the remains of the god's portion burnt on the altar even though pig bones were found in the sanctuaries' dining refuse. To confirm this theory, however, more zooarchaeological evidence from relevant contexts is essential. Returning to the Hellenistic Asklepieion of Thouria assemblage, pig femurs are better represented than those of other domesticates, consistent with Meuli and Ekroth's views.

[62] Horncores are also underrepresented in all three assemblages but this may be at least partly due to their poor preservation (for sheep and cattle) in the archaeological record.

To sum up, anatomical element representation points to on-site slaughter and processing of cattle, sheep/goats and pigs at the Hellenistic Asklepieion of Thouria while off-site slaughter of the animals is a possibility at the other two sites based on the underrepresentation of mandibles. The underrepresentation of phalanges is also relevant here, but difficult to interpret due to recovery bias. The Late Byzantine Thouria farmstead pigs are a likely exception to the above as their mandibles are not underrepresented. The nature of the Hellenistic Asklepieion of Thouria assemblage as ritual dining refuse rather than the god's portion burnt on the altar is supported by the relative abundance of femurs relative to other long bones, given the survival and identification biases to which the former are subject, in combination with the scarcity of heavily burnt specimens.

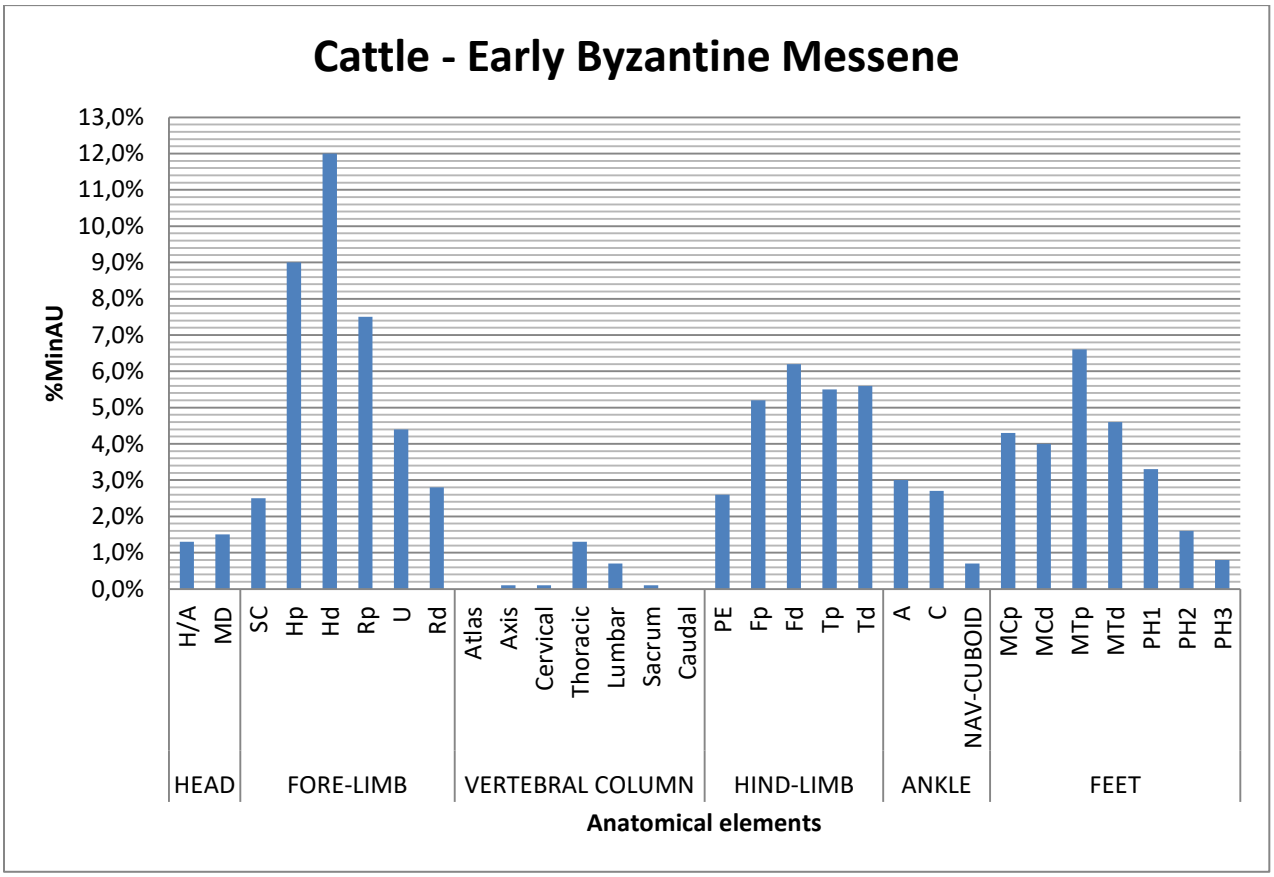


Figure 6.1: Anatomical element representation of post-neonatal cattle – Early Byzantine Messene (MinAU; loose teeth excluded; numbers of phalanges divided by 2).

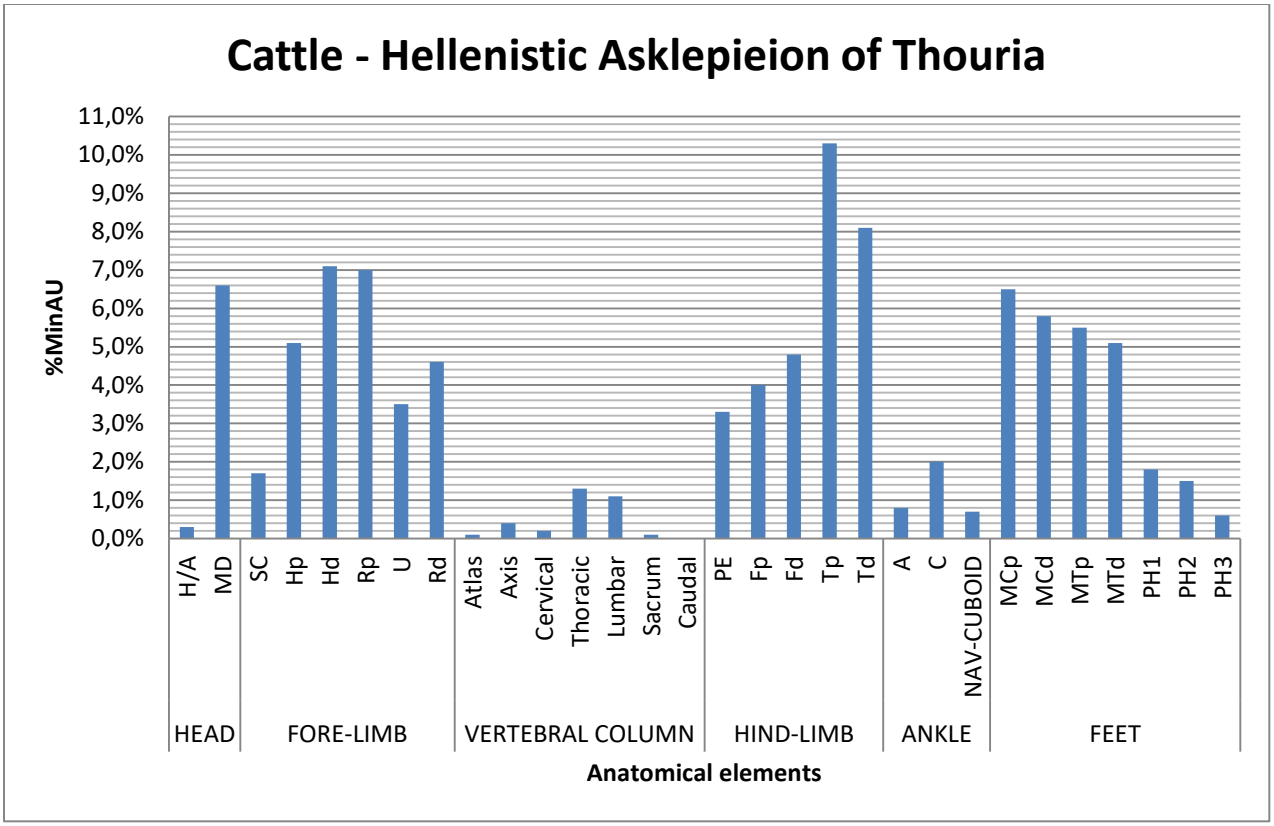


Figure 6.2: Anatomical element representation of post-neonatal cattle – Hellenistic Asklepieion of Thouria (MinAU; loose teeth excluded; numbers of phalanges divided by 2).

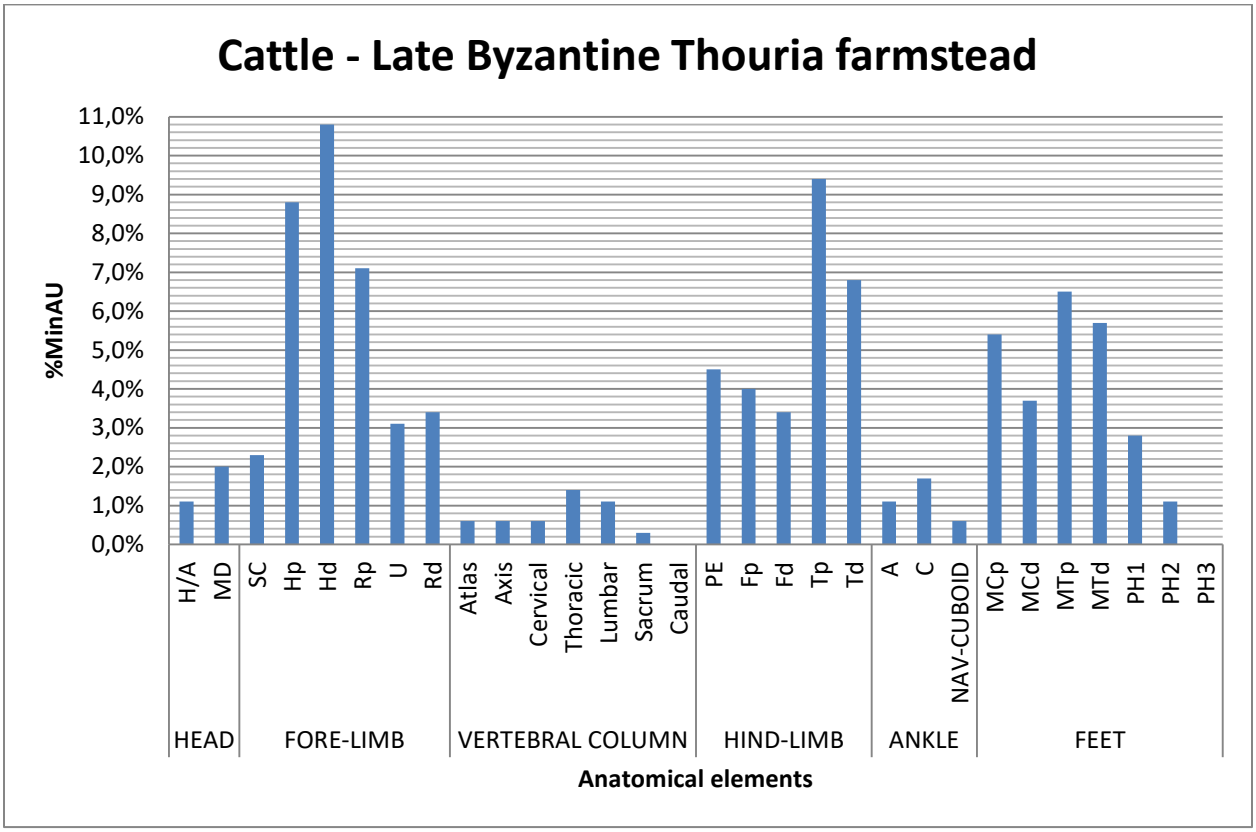


Figure 6.3: Anatomical element representation of post-neonatal cattle – Late Byzantine Thouria farmstead (MinAU; loose teeth excluded; numbers of phalanges divided by 2).

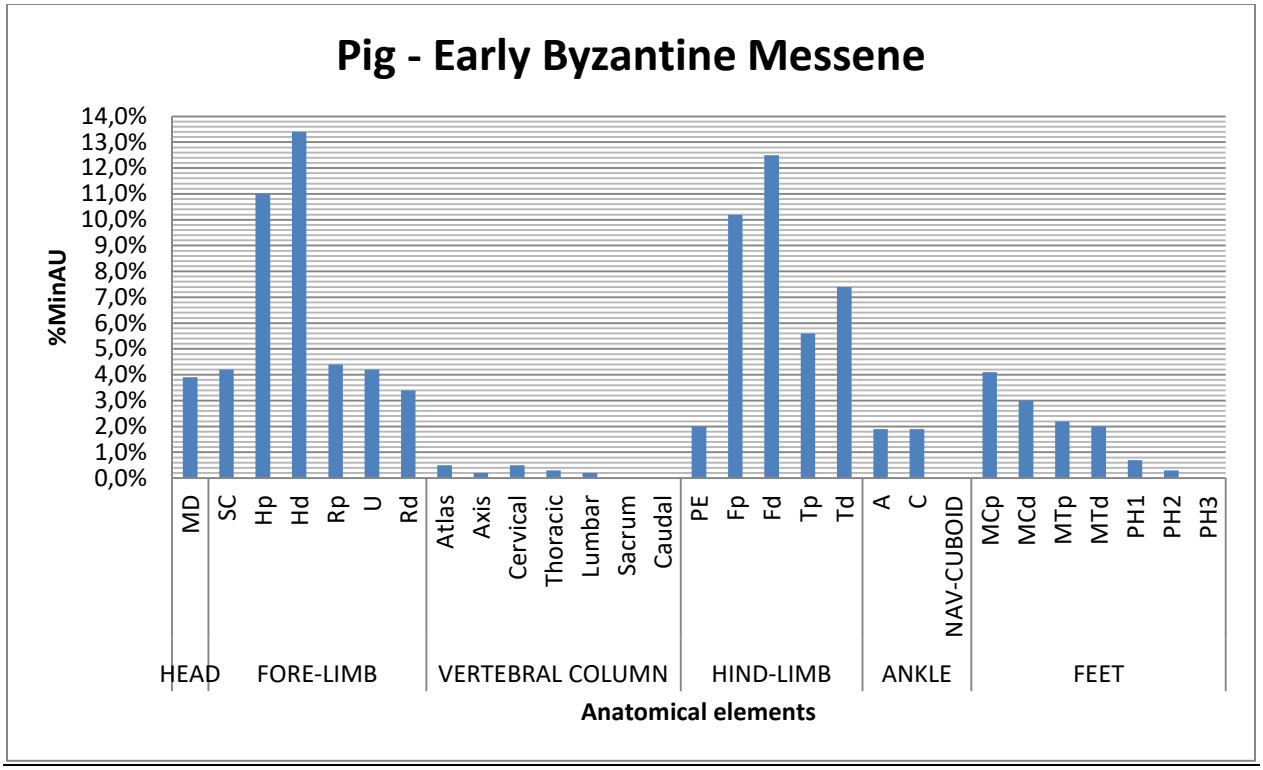


Figure 6.4: Anatomical element representation of post-neonatal pig – Early Byzantine Messene (MinAU; loose teeth excluded; numbers of phalanges divided by 2).

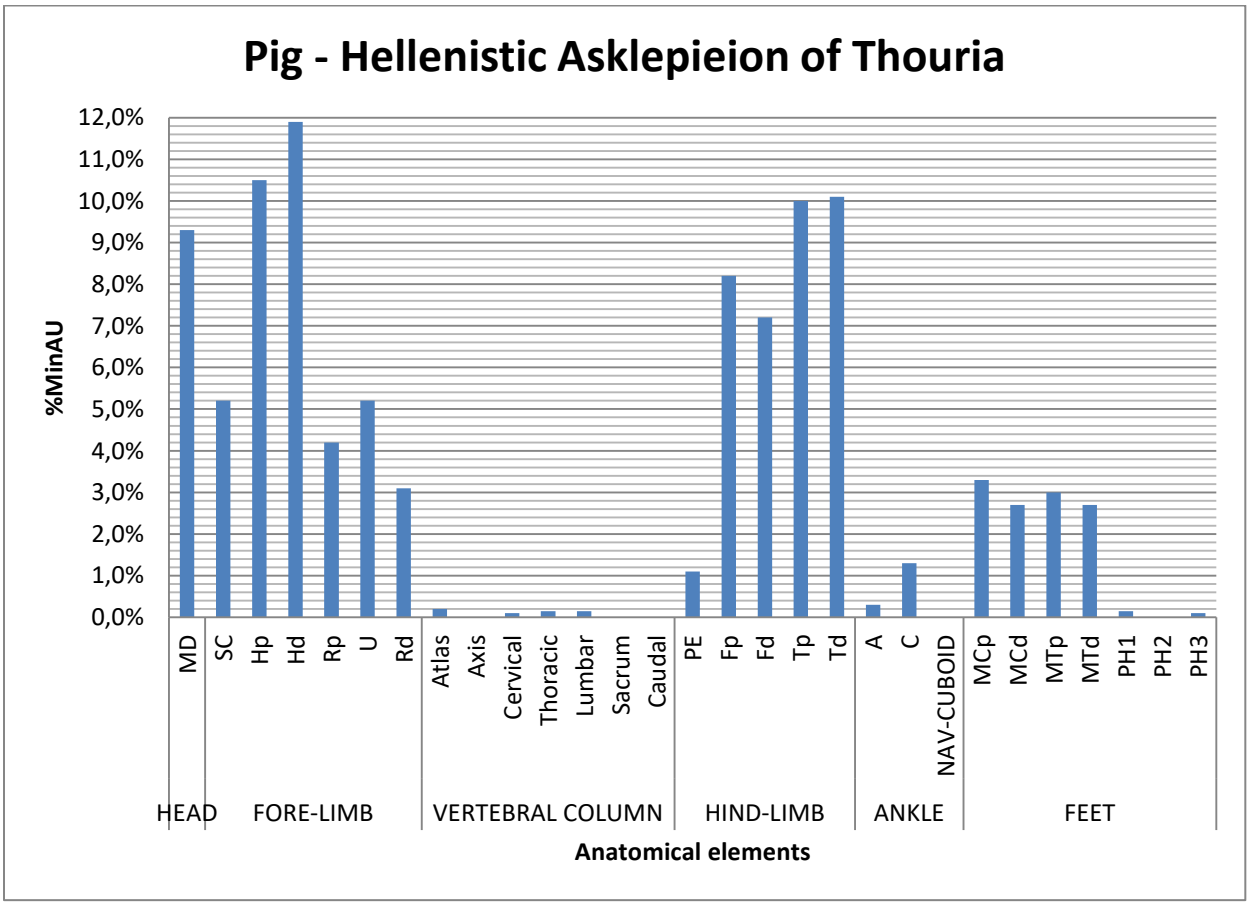


Figure 6.5: Anatomical element representation of post-neonatal pig – Hellenistic Asklepieion of Thouria (MinAU; loose teeth excluded; numbers of phalanges divided by 2).

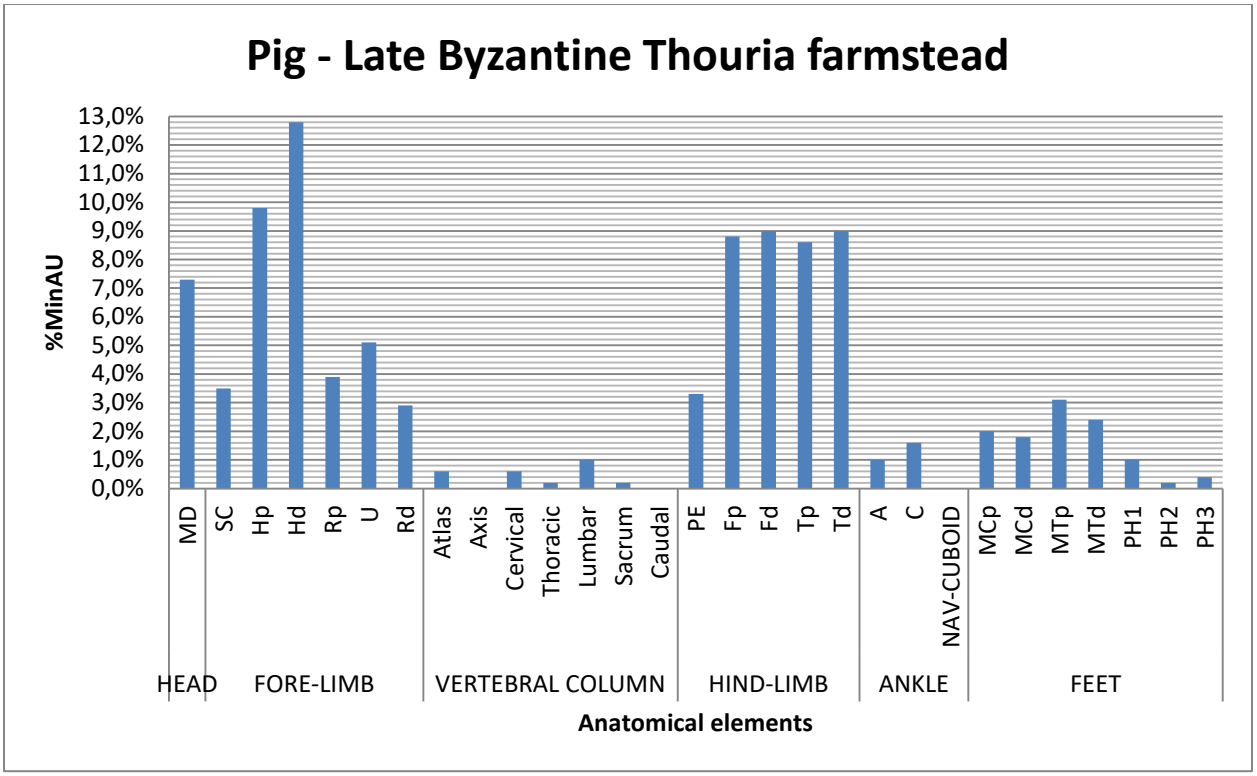


Figure 6.6: Anatomical element representation of post-neonatal pig – Late Byzantine Thouria farmstead (MinAU; loose teeth excluded; numbers of phalanges divided by 2).

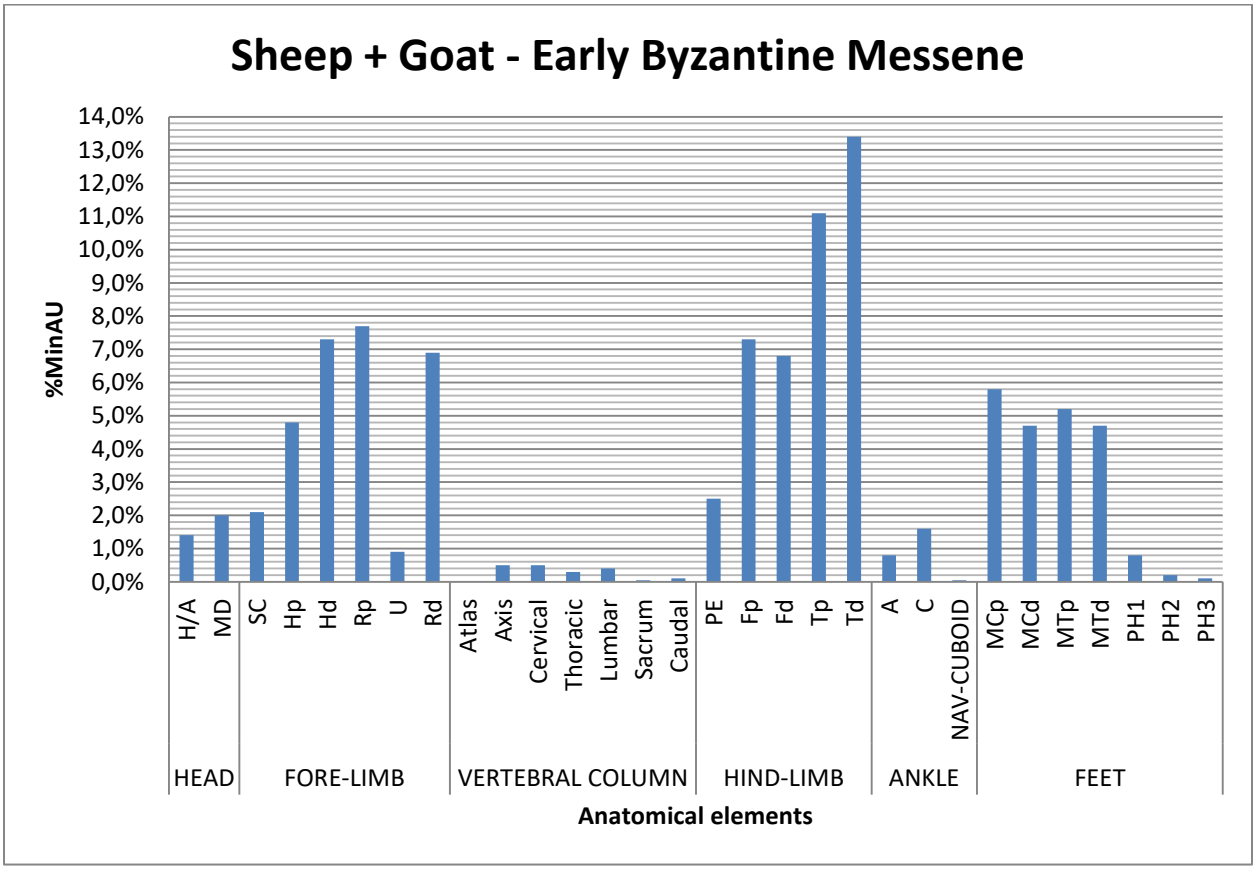


Figure 6.7: Anatomical element representation of post-neonatal sheep/goat – Early Byzantine Messene (MinAU; loose teeth excluded; numbers of phalanges divided by 2).

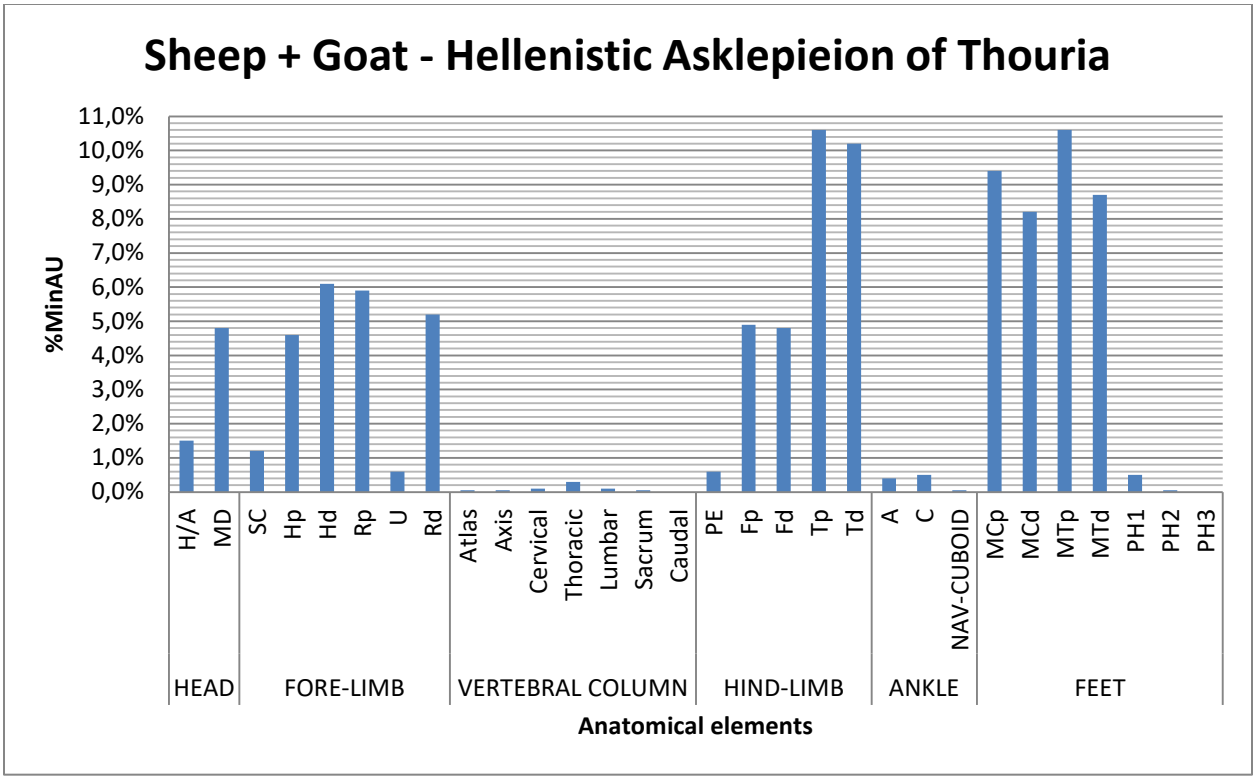


Figure 6.8: Anatomical element representation of post-neonatal sheep/goat – Hellenistic Asklepieion of Thouria (MinAU; loose teeth excluded; numbers of phalanges divided by 2).

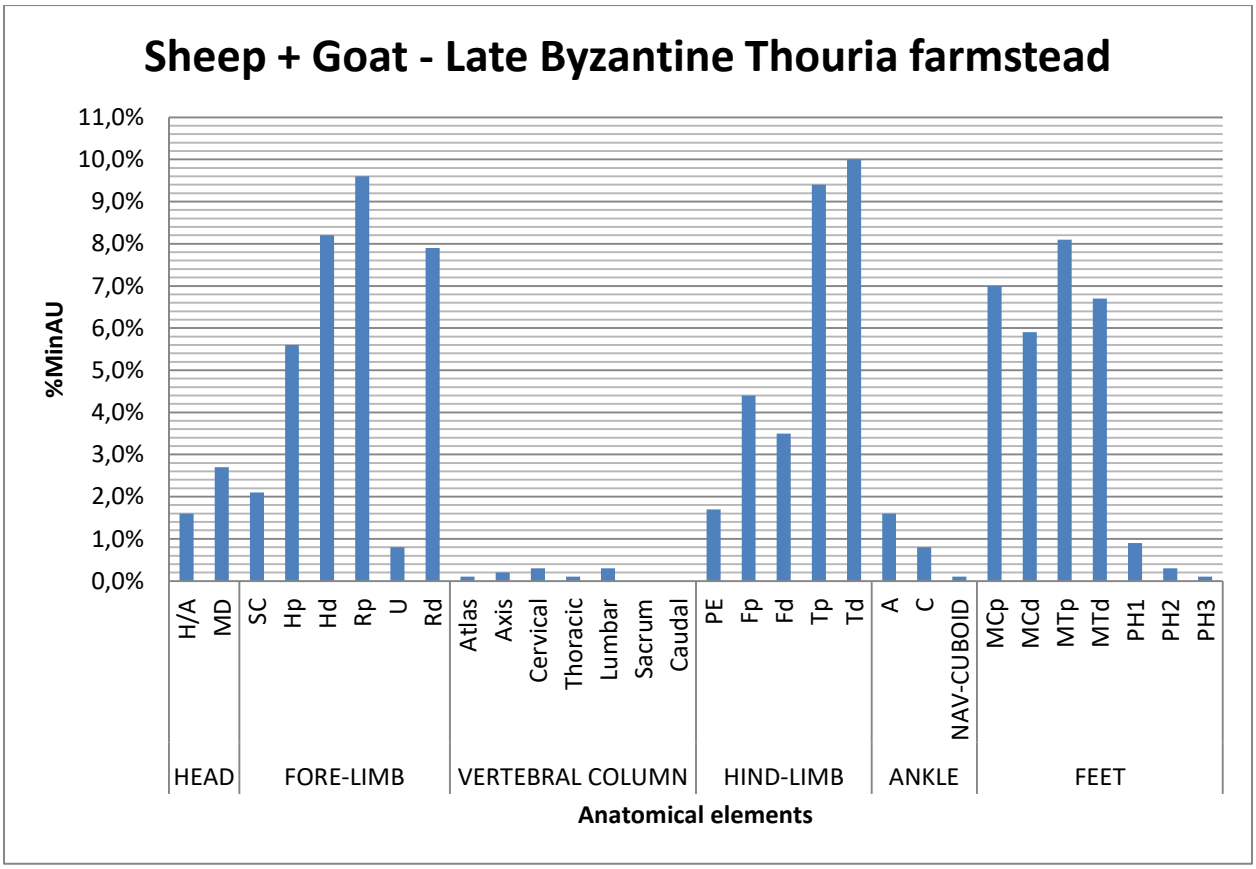


Figure 6.9: Anatomical element representation of post-neonatal sheep/goat – Late Byzantine Thouria farmstead (MinAU; loose teeth excluded; numbers of phalanges divided by 2).

Butchery practices

Cut-marks inflicted on animal bones during butchery are the most direct line of evidence for how carcasses were treated after slaughter. In the following section, an analysis of the carcass processing sequence is attempted by analysis of butchery marks recorded in the studied assemblages.

Frequency of cut-marks

As concluded in the previous chapter, the impact of taphonomic agents that could potentially obscure cut-marks (e.g. erosion, encrustation, gnawing) is modest in all three assemblages. Nonetheless, as gnawing primarily destroys the epiphyses of bones around which dismembering cut-marks occur, an underrepresentation of these marks should be anticipated. Similarly, anthropogenic pre-depositional fragmentation of long bones, which is likely to have created many long bone shaft splinters unidentifiable to species or/and body part, has probably reduced the number of filleting marks as these are inflicted on bone shafts. In addition, many chopped vertebrae were impossible to identify to species as many diagnostic characteristics were removed by chopping.

When including all taxa present (MaxAU; loose teeth excluded), 18.2% of the Early Byzantine Messene (Table 6.1) post-neonatal assemblage bears traces of butchery while just two neonatal sheep/goat bones bear cut-marks. In the case of the Hellenistic Asklepieion of Thouria (Table 6.2) and the Late Byzantine Thouria farmstead (Table 6.3) post-neonatal specimens, 13.1% and 15.3% respectively bear traces of butchery. The Late Byzantine Thouria farmstead assemblage also includes a neonatal pig bone and a neonatal sheep/goat bone with cut-marks. Most of the butchery traces in all three assemblages are found on the three main domesticates (cattle, pig and sheep/goat). Other taxa in Early Byzantine Messene on which butchery traces were observed are dog, horse, donkey, red deer, roe deer and wild boar. In the Hellenistic Asklepieion of Thouria, butchery traces were also located on specimens of horse, red deer, fallow deer, roe deer and red fox. Finally, butchery traces were also observed on dog, mule, donkey, red deer, fallow deer, red fox and hedgehog in the Late Byzantine Thouria farmstead assemblage. The hedgehog, represented by a single mandible, might be intrusive as it has a lighter colour than the rest of the specimens included, but skinning marks make clear that it too was a product of human action.

The number of specimens with cut-marks on all the aforementioned species, the three main domestic taxa excluded, is very low (less than 10) in all three assemblages, unsurprisingly given their generally small sample sizes. The only exception is red deer from the Late Byzantine Thouria farmstead, for which butchered specimens are significantly more frequent than the four main domesticates ($\chi^2 = 9.643$, $p = 0.002$).

Cattle bear significantly higher frequencies of butchered specimens than the other common domesticates in all three sites, consistent with their larger body size (which, other things being equal, would require more intensive butchery for ‘pot-sizing’, etc.) and also with the fact that, somewhat unusually, their bones are not more fragmented than those of at least sheep and goats (below). In the Early Byzantine Messene and Late Byzantine Thouria farmstead assemblages, pigs and sheep/goats display similar frequencies of butchered specimens, but pigs display a very significantly higher frequency of butchered specimens than sheep/goats in the Hellenistic Asklepieion of Thouria assemblage. Table 6.4 displays the frequencies of butchered and not butchered post-neonatal specimens for sheep and goats in MaxAU. The two species have comparable frequencies of butchery marks in Early Byzantine

Messene and the Late Byzantine Thouria farmstead, but cut-marks are significantly more frequent in goats than sheep at the Hellenistic Asklepieion of Thouria. Given that sheep, goats and perhaps pigs are of similar body size, comparable frequencies of cut-marks in Early Byzantine Messene and the Late Byzantine Thouria farmstead are unsurprising, but deviation from this pattern at the Hellenistic Asklepieion of Thouria indicates more intensive butchery of pig and goat than sheep carcasses. The reasons for this are unclear but it may be relevant that goats, based on literary and epigraphic evidence, were forbidden as sacrificial victims in some Asklepieia. According to Pausanias (2.26.9; 10.32.12), goats were forbidden as sacrificial victims at the temple of Asclepius at Epidaurus in Argolis and at Tithorea in Phocis (Kavvadias 2003, 201), a fact that Stafford (2008, 214) proposes may allude to the myth of newborn Asclepius having been suckled by a goat.

Tables 6.5 – 6.7 display the distribution of cut-marks per anatomical element for the three main domesticates. The wide distribution of cut-marks on cattle fore- and hind-limbs in all three assemblages suggests intensive butchery of the carcass, which must have been divided into small parcels of meat. Moreover, cut-marks on the first and second phalanges suggest that skinning took place low on the feet, implying recovery of as much of the hide as possible. Intensive butchery of the meaty parts of the carcass also seems to have been practised on sheep/goat and pig carcasses. Small parcels match the scenario of cooking most meat by boiling as the portions could fit inside the cooking pots, a hypothesis further corroborated in the two Thouria assemblages by the low percentage of burnt specimens (4.8% – Hellenistic Asklepieion of Thouria; 1.4% – Late Byzantine Thouria farmstead) as discussed in Chapter 5. A possible example of pot-sized parcels of meat, ideal for boiling, may be found in the sanctuary of Poseidon and Amphitrite on Tenos. The long bones of sheep, goats and pigs (3^{rd} – 2^{nd} c. BC) were divided into three sections (Leguilloux 1999, 442-3) and as Ekroth (2008b, 270) observed, their size correlates with that of the cooking pots found at the same sanctuary (Étienne et al. 1986).

Types of butchery marks

Chop marks are the dominant type of butchery trace in the Hellenistic Asklepieion of Thouria, while knife marks are most common in both Early Byzantine Messene and the Late Byzantine Thouria farmstead (Tables 6.8 – 6.10). The number of worked specimens is minimal even when including the small number of worked bones that were impossible to identify to species and/or anatomical element. Looking at each taxon, sheep/goats have the highest percentage of knife marks in all three assemblages while cattle and pigs have similar percentages in the two Thouria assemblages. At Early Byzantine Messene, pigs have the lowest frequency of knife traces. As for chop marks, cattle have the highest percentage in Early Byzantine Messene and sheep/goats in the Late Byzantine Thouria farmstead while pigs have the lowest percentage at both sites. As for the Hellenistic Asklepieion of Thouria, cattle and pigs have almost identical percentages of chop marks followed by sheep/goats.

The high incidence of chop marks at the Hellenistic Asklepieion of Thouria and knife marks at the other two sites is probably related to the different nature of the assemblages, the former being a sacred context and the latter two composed of domestic refuse. One would expect a more standardised butchery procedure to be followed at sanctuaries, which necessitated specialized butchers handling the more efficient cleavers. During the Classical and Hellenistic periods, the slaughter and butchering of the sacrificial victims was usually performed by the *mageiros*, a butcher, meat seller and cook employed by the sanctuaries even though it is not clear whether the employment of a *mageiros* was actually standard practice (Tsoukala 2009, 5-6). This subject will be further discussed in Chapter 8.

Early Byzantine Messene																
		Cattle	Pig	Sheep + Goat	Horse	Donkey	Equid	Dog	Red deer	Fallow deer	Roe deer	Wild boar	Red fox	Hare	Tortoise	Total
Not butchered	MaxAU	808	556	1681	23	4	89	42	17	1	7	1	2	20	20	3271
	% within species	73.7%	85.7%	83.6%	88.5%	80.0%	95.7%	97.7%	77.3%	100.0%	70.0%	33.3%	100.0%	100.0%	100.0%	81.8%
Butchered	MaxAU	288	95	330	3	1	4	1	5	0	3	2	0	0	0	730
	% within species	26.3%	14.3%	16.4%	11.5%	20.0%	4.3%	2.3%	22.7%	0.0%	30.0%	66.7%	0.0%	0.0%	0.0%	18.2%
Total	MaxAU	1096	650	2011	26	5	93	43	22	1	10	3	2	20	20	4001
	% within species	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
χ^2 test	χ^2 = 91.572, p = 0.000															
Neonatal specimens and loose teeth excluded																

Table 6.1: Frequencies of not butchered and butchered specimens – Early Byzantine Messene (MaxAU).

Hellenistic Asklepieion of Thouria															
		Cattle	Pig	Sheep + Goat	Horse	Donkey	Equid	Dog	Red deer	Fallow deer	Wild boar	Red fox	Hare	Tortoise	Total
Not butchered	MaxAU	905	1202	2270	0	2	4	6	36	3	1	19	12	11	4471
	% within species	79.5%	84.0%	92.0%	0.0%	100.0%	80.0%	100.0%	81.8%	75.0%	50.0%	95.0%	100.0%	100.0%	86.9%
Butchered	MaxAU	234	222	197	2	0	1	0	8	1	1	1	0	0	672
	% within species	20.5%	16.0%	8.0%	100.0%	0.0%	20.0%	0.0%	18.2%	25.0%	100.0%	5.0%	0.0%	0.0%	13.1%
Total	MaxAU	1139	1430	2467	2	2	5	6	44	4	2	20	12	11	5143
	% within species	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
χ^2 test	χ^2 = 113.999, p = 0.000														
Neonatal specimens and loose teeth excluded															

Table 6.2: Frequencies of not butchered and butchered specimens – Hellenistic Asklepieion of Thouria (MaxAU).

Late Byzantine Thouria farmstead																			
		Cattle	Pig	Sheep + Goat	Horse	Mule	Donkey	Equid	Dog	Red deer	Fallow deer	Roe deer	Wild boar	Cat	Red fox	Hare	Hedgehog	Tortoise	Total
Not butchered	MaxAU	338	425	1007	115	1	7	20	546	69	4	3	1	4	4	4	0	29	2579
	% within species	76.3%	80.8%	82.7%	100.0%	25.0%	100.0%	69.0%	99.8%	67.6%	57.1%	100.0%	100.0%	100.0%	80.0%	100.0%	0.0%	100.0%	84.7%
Butchered	MaxAU	105	101	211	0	3	0	9	1	33	3	0	0	0	1	0	1	0	466
	% within species	23.7%	19.2%	17.3%	0.0%	75.0%	0.0%	31.0%	0.2%	32.4%	42.9%	0.0%	0.0%	0.0%	20.0%	0.0%	100.0%	0.0%	15.3%
Total	MaxAU	443	526	1218	115	4	7	29	547	102	7	3	1	4	5	4	1	29	3045
	% within species	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
χ^2 test	$\chi^2 = 7.125$, p = 0.028																		
Neonatal specimens and loose teeth excluded																			

Table 6.3: Frequencies of not butchered and butchered specimens – Late Byzantine Thouria farmstead (MaxAU).

Classification of butchery marks in terms of stage of carcass processing, depending on their position on the skeleton, is based on Binford (1981, 96-142). The range of recorded butchery traces indicates that the entire sequence of carcass processing took place on-site in all three cases as skinning, dismembering and filleting traces have been recorded in all the assemblages (Tables 6.11 – 6.14) although, as suggested previously in the current chapter, skinning may have been primarily practised off-site at Early Byzantine Messene and the Late Byzantine Thouria farmstead. In addition, a small number of sawn and worked specimens were recorded. Sawing must be related solely to modification of bones and antlers to be used as raw material as will be shown later in this chapter. What follows is an examination of the traces of each stage of the carcass processing sequence for the three main domesticates.

Early Byzantine Messene				
		Sheep	Goat	Total
Not butchered	MaxAU	164	153	317
	% within species	80.0%	81.4%	80.7%
Butchered	MaxAU	41	35	76
	% within species	20.0%	18.6%	19.3%
Total	MaxAU	205	188	393
	% within species	100.0%	100.0%	100.0%
χ^2 test	$\chi^2 = 0.008$, p = 0.928			
Hellenistic Asklepieion of Thouria				
		Sheep	Goat	Total
Not butchered	MaxAU	248	179	427
	% within species	93.2%	84.4%	89.3%
Butchered	MaxAU	18	33	51
	% within species	6.8%	15.6%	10.7%
Total	MaxAU	266	212	478
	% within species	100.0%	100.0%	100.0%
χ^2 test	$\chi^2 = 9.122$, p = 0.003			
Late Byzantine Thouria farms				
		Sheep	Goat	Total
Not butchered	MaxAU	93	80	173
	% within species	73.2%	73.4%	73.3%
Butchered	MaxAU	34	29	63
	% within species	26.8%	26.6%	26.7%
Total	MaxAU	127	109	236
	% within species	100.0%	100.0%	100.0%
χ^2 test	$\chi^2 = 0.000$, p = 0.994			
Neonatal specimens and loose teeth excluded				

Table 6.4: Frequencies of not butchered and butchered specimens for sheep and goats per site (MaxAU).

Early Byzantine Messene						
Anatomical elements	Cattle		Pig		Sheep + Goat	
	MaxAU	%	MaxAU	%	MaxAU	%
H/A	1	7.7%	-	-	3	7.9%
MD	16	66.7%	5	18.5%	3	7.7%
SC	8	32.0%	8	32.0%	16	41.0%
Hp	30	34.1%	14	20.0%	20	22.2%
Hd	41	34.2%	18	21.2%	38	27.7%
Rp	19	26.0%	6	21.4%	32	21.9%
U	10	23.3%	7	28.0%	6	40.0%
Rd	6	16.7%	3	15.0%	24	18.1%
MCp	14	29.8%	1	4.0%	11	8.8%
MCd	12	26.1%	2	10.5%	7	7.5%
Atlas	-	-	1	33.3%	-	-
Axis	0	0.0%	0	0.0%	1	11.1%
Cervical	0	0.0%	0	0.0%	1	11.1%
Thoracic	1	9.1%	0	0.0%	0	0.0%
Lumbar	3	50.0%	0	0.0%	2	28.6%
Sacrum	0	0.0%	-	-	0	0.0%
Caudal	-	-	-	-	0	0.0%
PE	10	41.7%	3	25.0%	13	28.9%
Fp	8	14.0%	7	9.7%	18	11.6%
Fd	13	19.4%	7	8.2%	16	11.3%
Tp	11	17.7%	3	8.1%	33	15.2%
Td	13	22.0%	5	11.4%	38	14.2%
A	7	26.9%	1	9.1%	3	23.1%
C	5	21.7%	1	9.1%	1	3.7%
NC	2	33.3%	-	-	0	0.0%
MTp	15	22.1%	0	0.0%	21	20.0%
MTd	12	24.0%	1	8.3%	15	16.7%
PH1	22	37.3%	0	0.0%	6	21.4%
PH2	5	17.2%	0	0.0%	0	0.0%
PH3	0	0.0%	-	-	0	0.0%
MPp	-	-	0	0.0%	1	25.0%
MPd	4	22.2%	0	0.0%	1	14.3%
Total butchered	288	26.3%	93	14.3%	330	16.4%
Neonatal specimens and loose teeth excluded						

Table 6.5: Distribution of cut-marks per anatomical element for the three main domesticates – Early Byzantine Messene (MaxAU; % is calculated out of the total MaxAU of each anatomical element).

Hellenistic Asklepieion of Thouria						
Anatomical elements	Cattle		Pig		Sheep + Goat	
	MaxAU	%	MaxAU	%	MaxAU	%
H/A	0	0.0%	-	-	4	7.1%
MD	20	26.3%	14	9.9%	6	5.1%
SC	11	73.3%	41	58.6%	8	32.0%
Hp	14	26.4%	32	22.1%	20	19.8%
Hd	22	29.3%	34	20.6%	29	21.2%
Rp	12	15.2%	4	5.4%	13	9.1%
U	4	10.3%	11	15.7%	3	21.4%
Rd	10	20.8%	3	4.7%	10	8.6%
MCp	8	11.9%	4	9.3%	12	5.1%
MCd	12	19.4%	4	10.8%	6	3.0%
Atlas	0	0.0%	2	66.7%	0	0.0%
Axis	1	25.0%	-	-	0	0.0%
Cervical	0	0.0%	0	0.0%	1	50.0%
Thoracic	5	41.7%	0	0.0%	2	3.3%
Lumbar	7	70.0%	0	0.0%	1	50.0%
Sacrum	1	100.0%	-	-	0	0.0%
Caudal	-	-	-	-	-	-
Vertebra	1	50.0%	-	-	0	0.0%
PE	20	58.8%	7	50.0%	4	30.8%
Fp	4	8.5%	13	11.4%	17	14.3%
Fd	6	10.7%	12	11.5%	17	15.7%
Tp	21	19.3%	13	9.6%	11	4.2%
Td	18	20.0%	16	11.0%	14	5.3%
A	2	28.6%	0	0.0%	5	62.5%
C	3	15.0%	1	5.9%	0	0.0%
NC	1	16.7%	-	-	0	0.0%
MTp	9	17.0%	6	15.4%	9	3.6%
MTd	16	28.1%	6	16.7%	4	2.0%
PH1	3	9.1%	2	50.0%	1	5.3%
PH2	1	4.0%	-	-	0	0.0%
PH3	1	10.0%	0	0.0%	-	-
MPp	0	0.0%	3	16.7%	0	0.0%
MPd	1	4.5%	1	5.3%	0	0.0%
Total butchered	234	20.5%	229	15.9%	197	8.0%
Neonatal specimens and loose teeth excluded						

Table 6.6: Distribution of cut-marks per anatomical element for the three main domesticates – Hellenistic Asklepieion of Thouria (MaxAU; % is calculated out of the total MaxAU of each anatomical element).

Late Byzantine Thouria farmstead						
Anatomical elements	Cattle		Pig		Sheep + Goat	
	MaxAU	%	MaxAU	%	MaxAU	%
H/A	1	8.3%	-	-	3	13.0%
MD	1	12.5%	7	17.9%	5	12.8%
SC	2	22.2%	8	47.1%	14	63.6%
Hp	9	27.3%	11	22.9%	9	14.1%
Hd	12	26.7%	17	25.4%	23	25.6%
Rp	6	18.8%	4	21.1%	19	17.0%
U	3	25.0%	5	19.2%	3	33.3%
Rd	3	18.8%	3	21.4%	15	16.7%
MCp	1	4.8%	0	0.0%	8	9.4%
MCd	2	11.8%	0	0.0%	6	9.2%
Atlas	2	66.7%	0	0.0%	0	0.0%
Axis	2	100.0%	-	-	1	50.0%
Cervical	0	0.0%	0	0.0%	0	0.0%
Thoracic	0	0.0%	0	0.0%	0	0.0%
Lumbar	1	25.0%	2	40.0%	0	0.0%
Sacrum	0	0.0%	1	100.0%	-	-
Caudal	-	-	-	-	-	-
PE	8	47.1%	5	29.4%	8	44.4%
Fp	4	28.6%	10	22.2%	11	22.4%
Fd	6	50.0%	11	23.9%	10	27.0%
Tp	9	23.1%	5	11.4%	18	15.9%
Td	8	25.8%	8	17.0%	17	14.2%
A	1	25.0%	1	20.0%	5	29.4%
C	1	16.7%	0	0.0%	0	0.0%
NC	0	0.0%	-	-	1	100.0%
MTp	7	21.9%	2	13.3%	19	82.6%
MTd	8	29.6%	1	8.3%	11	13.9%
PH1	6	28.6%	0	0.0%	1	5.3%
PH2	1	14.3%	0	0.0%	0	0.0%
PH3	-	-	0	0.0%	0	0.0%
MPp	0	0.0%	0	0.0%	0	0.0%
MPd	1	16.7%	0	0.0%	1	4.5%
Total butchered	105	23.7%	101	19.2%	208	17.3%
Neonatal specimens and loose teeth excluded						

Table 6.7: Distribution of cut-marks per anatomical element for the three main domesticates – Late Byzantine Thouria farmstead (MaxAU; % is calculated out of the total MaxAU of each anatomical element).

Early Byzantine Messene					
		Cattle	Pig	Sheep + Goat	Total
None	MaxAU	808	556	1681	3045
	%	73.7%	85.4%	83.6%	81.1%
Chop	MaxAU	96	34	77	207
	%	8.8%	5.2%	3.8%	5.5%
Knife	MaxAU	177	53	240	470
	%	16.1%	8.5%	11.9%	12.5%
Chop + Knife	MaxAU	6	4	6	16
	%	0.5%	0.6%	0.3%	0.4%
Worked	MaxAU	7	1	5	13
	%	0.6%	0.2%	0.2%	0.3%
Worked + Butchered	MaxAU	2	1	2	5
	%	0.2%	0.2%	0.1%	0.1%
Total	MaxAU	1096	649	2011	3756
	%	100.0%	100.0%	100.0%	100.0%
χ^2 tests	Cattle/Pig		$\chi^2 = 34.528$, p = 0.000		
	Cattle/Sheep + Goat		$\chi^2 = 51.451$, p = 0.000		
	Pig/Sheep + Goat		$\chi^2 = 9.544$, p= 0.089		
Neonatal specimens and loose teeth excluded					

Table 6.8: Frequencies of types of butchery traces for the three main domesticates – Early Byzantine Messene (MaxAU).

Hellenistic Asklepieion of Thouria					
		Cattle	Pig	Sheep + Goat	Total
None	MaxAU	905	1202	2270	4377
	%	79.5%	84.1%	92.0%	86.9%
Chop	MaxAU	130	127	94	351
	%	11.4%	8.9%	3.8%	7.0%
Knife	MaxAU	67	64	81	212
	%	5.9%	4.5%	3.3%	4.2%
Chop + Knife	MaxAU	33	34	17	84
	%	2.9%	2.4%	0.7%	1.7%
Worked	MaxAU	4	0	5	9
	%	0.4%	0.0%	0.2%	0.2%
Worked + Butchered	MaxAU	0	4	0	4
	%	0.0%	0.3%	0.0%	0.1%
Total	MaxAU	1139	1429	2467	5035
	%	100.0%	100.0%	100.0%	100.0%
χ^2 tests	Cattle/Pig		$\chi^2 = 16.968$, p = 0.005		
	Cattle/Sheep + Goat		$\chi^2 = 123.829$, p = 0.000		
	Pig/Sheep + Goat		$\chi^2 = 77.714$, p= 0.000		
Neonatal specimens and loose teeth excluded					

Table 6.9: Frequencies of types of butchery traces for the three main domesticates – Hellenistic Asklepieion of Thouria (MaxAU).

Late Byzantine Thouria farmstead					
		Cattle	Pig	Sheep + Goat	Total
None	MaxAU	338	425	1007	1170
	%	76.3%	80.8%	82.7%	80.9%
Chop	MaxAU	32	23	58	113
	%	7.2%	4.4%	4.8%	5.2%
Knife	MaxAU	56	60	126	242
	%	12.6%	11.4%	10.3%	11.1%
Chop + Knife	MaxAU	14	18	26	58
	%	3.2%	3.4%	2.1%	2.7%
Worked	MaxAU	3	0	1	4
	%	0.7%	0.0%	0.1%	0.2%
Worked + Butchered	MaxAU	0	0	0	0
	%	0.0%	0.0%	0.0%	0.0%
Total	MaxAU	443	526	1218	2187
	%	100.0%	100.0%	100.0%	100.0%
χ^2 tests	Cattle/Pig		$\chi^2 = 10.487$, p = 0.033		
	Cattle/Sheep + Goat		$\chi^2 = 16.017$, p = 0.003		
	Pig/Sheep + Goat		$\chi^2 = 2.898$, p= 0.575		
Neonatal specimens and loose teeth excluded					

Table 6.10: Frequencies of types of butchery traces for the three main domesticates – Late Byzantine Thouria farmstead (MaxAU).

Skinning										
		Early Byzantine Messene			Hellenistic Asklepieion of Thouria			Late Byzantine Thouria farmstead		
		Cattle	Pig	Sheep + Goat	Cattle	Pig	Sheep + Goat	Cattle	Pig	Sheep + Goat
Not skinned	MaxAU	1041	645	1986	1115	1427	2443	433	526	1188
	% within species	95.0%	99.3%	98.8%	97.9%	99.9%	99.0%	97.7%	100.0%	97.5%
Skinned	MaxAU	55	4	25	24	2	24	10	0	30
	% within species	5.0%	0.7%	1.2%	2.1%	0.1%	1.0%	2.3%	0.0%	2.5%
Total	MaxAU	1096	649	2011	1139	1429	2467	443	526	1218
	% within species	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
χ^2 tests		χ^2 = 51.724, p = 0.000			χ^2 = 18.988, p = 0.000			χ^2 = 14.690, p = 0.001		
Dismembering										
		Early Byzantine Messene			Hellenistic Asklepieion of Thouria			Late Byzantine Thouria farmstead		
		Cattle	Pig	Sheep + Goat	Cattle	Pig	Sheep + Goat	Cattle	Pig	Sheep + Goat
Not dismembered	MaxAU	1030	631	1944	1077	1361	2421	401	492	1144
	% within species	94.0%	97.2%	96.7%	94.6%	95.2%	98.1%	90.5%	93.5%	93.9%
Dismembered	MaxAU	66	18	67	62	68	46	42	34	74
	% within species	6.0%	2.8%	3.3%	5.4%	4.8%	1.9%	9.5%	6.5%	6.1%
Total	MaxAU	1096	649	2011	1139	1429	2467	443	526	1218
	% within species	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
χ^2 tests		χ^2 = 14.760, p = 0.001			χ^2 = 33.425, p = 0.000			χ^2 = 4.833, p = 0.089		
Filleting										
		Early Byzantine Messene			Hellenistic Asklepieion of Thouria			Late Byzantine Thouria farmstead		
		Cattle	Pig	Sheep + Goat	Cattle	Pig	Sheep + Goat	Cattle	Pig	Sheep + Goat
Not filleted	MaxAU	1002	613	1842	1052	1319	2390	396	453	1116
	% within species	91.4%	94.5%	91.6%	92.4%	92.3%	96.9%	89.4%	86.1%	91.6%
Filleted	MaxAU	94	36	169	87	110	77	47	73	102
	% within species	8.6%	5.5%	8.4%	7.6%	7.7%	3.1%	10.6%	13.9%	8.4%
Total	MaxAU	1096	649	2011	1139	1429	2467	443	526	1218
	% within species	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
χ^2 tests		χ^2 = 6.372, p = 0.041			χ^2 = 50.629, p = 0.000			χ^2 = 11.897, p = 0.003		
Neonatal specimens and loose teeth excluded										

Table 6.11: Frequencies of types of butchery traces by stage of carcass processing for the main domesticates per site (MaxAU).

Skinning

Skinning is most often the first step in the carcass processing sequence and its traces occur on the non-meat bearing extremities of the carcass, specifically horncore bases, mandibles[63], metapodials and phalanges (Table 6.12). In general, the evidence for skinning is small but this might be partly due to the occurrence of its traces on a much smaller number of skeletal elements than other types of cuts in combination with the recovery bias affecting at least the phalanges and the possibility of off-site discard of the lower extremities and heads (including mandibles). The latter possibility is supported for Early Byzantine Messene and the Late Byzantine Thouria farmstead by the underrepresentation of mandibles for all main domesticates apart from the theatre pigs.

Cattle have by far the greatest frequency of skinning marks at Early Byzantine Messene, perhaps due to the relatively large number of cattle first phalanges found (56 MaxAU, of which 17 – 30.4% – bore skinning traces, amounting to 30.9% of all skinning marks – Table 6.12). Skinning traces are as frequent for sheep/goats as for cattle, however, at the Hellenistic Asklepieion of Thouria and Late Byzantine Thouria farmstead, despite the inevitable loss of phalanges of the smaller taxon to recovery bias. In the Late Byzantine Thouria farmstead assemblage, most skinning marks for sheep/goat occur on the metatarsal, in contrast to their anatomically wider distribution in the other two assemblages. The frequency of skinning marks on Early Byzantine Messene cattle first phalanges confirms the previous conclusion that cattle carcasses at Early Byzantine Messene were likely dressed to the level of the phalanges and skinning marks on a few second and third cattle phalanges in all three assemblages suggest that this may have been a general pattern. Whether cattle were skinned at a lower level of the extremities, representing more intensive exploitation of their carcasses, than other taxa is uncertain given that phalanges are largely lost for pigs and sheep/goats, but at least some sheep/goat from the theatre were skinned higher up the foot (at the metatarsal). In the case of pig, evidence for skinning is lacking at the Late Byzantine Thouria farmstead, rare in the Hellenistic Asklepieion of Thouria and relatively sparse at Early Byzantine Messene. In addition to the scarcity of pig foot bones (probably due to recovery bias), this may indicate that, as in the recent past (cf. Halstead and Isaakidou 2011, 168), pigs were often shaved rather than skinned.

A few skinning marks were also observed on rarer taxa: on a couple of red deer specimens in all three assemblages; on a horse distal metatarsal at Early Byzantine Messene; on a fallow deer distal metatarsal at the Hellenistic Asklepieion of Thouria; and on a fallow deer proximal metatarsal and a hedgehog mandible at the Late Byzantine Thouria farmstead. Since equids were likely rarely consumed, skinning could have potentially resulted from an effort to retrieve the metatarsal as raw material for artisanal activities or more likely to obtain the hide (or both). Burford (1993, 106) cites Diogenis Laertius 8.60 (3rd c. AD), who in turns quotes from Sicilian Empedocles (5th c. BC), on the use of bags made of donkey skin to catch winds harming crops!

Dismembering

Dismembering is the next stage in the carcass processing procedure involving cuts around articular ends to separate body parts. Table 6.13 presents the recorded dismembering cuts for the three main

[63] The numbers of skinned mandibles are probably deflated as, due to a combination of fragmentation and recording protocol, the parts of the bone on which such marks occur are likely not to have been included in the collected data.

domesticates by combining the MaxAU of adjacent anatomical elements to achieve a composite picture of dismemberment traces around each articulation. Before looking at each species individually, the low number of cuts on the spine should be addressed. It is likely that the low numbers reflect the separation of the spine at wide intervals. Furthermore, general lack of axial chopping of the vertebrae indicates lack of separation of the trunk in two halves prior to further processing of the carcass. As for the general underrepresentation of traces on the mandible, the same biases as for skinning apply.

Beginning with cattle, it appears, as far as sample size and element representation allow, that dismemberment most often took place at the level of the elbow (Hd/Rp/U), the ankle (Td/A/C/NC/MTp) and the beginning of the lower foot (MPd/PH1) in all three assemblages with the shoulder (SC/Hp) being of secondary importance. The hip (PE/Fp) seems to be of secondary importance in the Thouria assemblages but the sample size is too small for any safe conclusions to be reached. For pigs, with the exception of the Hellenistic Asklepieion of Thouria, the sample size is even smaller than for cattle but a very noticeable trend in all three assemblages is the high frequency of cuts at the level of the shoulder and elbow. The extent of dismemberment at the level of the ankle and beginning of the lower foot cannot be accurately calculated as both joints are the most affected by recovery bias at all three sites. Off-site discard cannot be excluded as another possible factor for their underrepresentation. Finally, dismemberment of sheep/goats was primarily concentrated at the shoulder, elbow, ankle and beginning of the lower foot with some variation between sites especially at the latter two joints, which could have been affected by the same factors as for pigs. The wrist (Rd/MCp) and hip seem to be of secondary importance. In general, all species examined seem to have been intensively dismembered with such cuts being distributed on most articulations of the carcass.

Dismemberment at each major joint best fits a pattern of intensive carcass exploitation. Thus, the general underrepresentation of the hip, for example, is at first glance surprising. However, as commented earlier in the chapter, the underrepresentation of cut-marks at specific joints might be an artefact of variable representation of the various anatomical elements. A general tendency for the pelvis to be underrepresented has been noted above and this, combined with the rarity of femur proximal epiphyses, may have contributed to the limited evidence for dismembering of the hip (Table 6.13).

Turning to other taxa, a horse ulna, a wild boar scapula and a red deer distal metacarpal and proximal femur bore dismembering cuts at Early Byzantine Messene. At the Hellenistic Asklepieion of Thouria, dismembering cuts were identified on a wild boar distal humerus. Finally, the Late Byzantine Thouria farmstead displayed the greatest variety of dismembered specimens with a dog scapula, a mule ulna, three equid bones, nine red deer elements and a fallow deer distal tibia. As with skinning, cut-marks on equid bones could have been inflicted in retrieving raw material for bone working.

In conclusion, a more or less similar fashion of dismemberment seems to have been in effect at all three sites for all main domestic species. This conclusion is further supported by the fact that, although one might expect cattle to show the highest frequencies of dismembering marks given their large size, this is not the case as cattle and sheep/goats have similar numbers of dismembering marks at Early Byzantine Messene while the same is true for cattle and pigs in both Thouria assemblages. Furthermore, intensive sectioning of the carcass is evident for other species at least where sample size is large enough for analysis, suggesting that a broadly similar approach to dismembering may have been common to all species and assemblages.

Filleting

The final stage of the carcass processing procedure was filleting of the meat, meaning its removal from the bone. For the three main domesticates (Table 6.14), filleting cuts are more often encountered in all three assemblages than skinning and dismembering. This is unsurprising as filleting was performed on a larger area of the skeleton, primarily the diaphyses of long bones and to a lesser degree the mandible, scapula and pelvis. One filleting mark was also identified on a cattle lumbar vertebra transverse process in the Hellenistic Asklepieion of Thouria. Among the long bones, filleting is almost completely absent on the non-meaty metapodials of cattle and sheep/goats and absent on those of pigs. Though sample size is in some cases small (Early Byzantine Messene pigs; Late Byzantine Thouria farmstead cattle), it is evident that all meat bearing parts of the carcass of all three species were exploited at all three sites. While some anatomical elements bear a low number of filleting traces, this may well be an artefact of uneven anatomical element representation. Taking pigs as an example, their radii exhibit the lowest number of filleting marks among the species' long bones in all studied assemblages, but this body part is relatively poorly represented (Figures 6.4 – 6.6). The same holds for pig tibiae at Early Byzantine Messene, which exhibit as few filleting marks as the radii. Conversely, pig humeri, their most frequent long bone at all three sites, bear the most filleting marks. Exceptions to this pattern exist (e.g. the Hellenistic Asklepieion of Thouria cattle tibiae are the most frequent long bone but their humeri have the most filleting marks) but it should be kept in mind that Figures 6.1 – 6.9 include specimens represented only by epiphyses on which filleting marks would not be inflicted.

For the rarer species, filleting marks were identified on a dog pelvis and wild boar distal tibia at Early Byzantine Messene; on an equid scapula, a red deer distal femur and distal tibia, and a red fox distal tibia at the Hellenistic Asklepieion of Thouria; and on a mule radius, two scapulae and a proximal and a distal radius of equid, a red deer radius and femur, a fallow deer distal tibia and a red fox distal tibia in the Late Byzantine Thouria farmstead assemblage. The equid bones, especially the radii, might once more have been destined for artisanal activities.

Bones and antlers as raw material

Finally, before moving on to discussing fragmentation patterns, a small number of worked bone objects and possible by-products of bone- and antler-working were identified within the three assemblages. In the case of Early Byzantine Messene, a number of worked bone specimens and by-products of bone-working were removed from the rest of the faunal assemblage prior to the beginning of my research (Prof. Themelis, pers. comm.) and were inaccessible to me. A preliminary study of these objects appears in Vasileiadou (2012; 2018).

The most common bone artefacts recorded were polished astragali: one cattle, one pig and three sheep/goat[64] examples at Early Byzantine Messene; one cattle, one sheep/goat and three sheep examples at the Hellenistic Asklepieion of Thouria; and one goat examples at the Late Byzantine Thouria farmstead. As discussed in Chapter 5, astragali, especially those of sheep and goats, were often used as gaming pieces and divination instruments. The discovery of two glass astragali at the Hellenistic Asklepieion of Thouria (Arapogianni 2017, 72) indicates that they were also used as votive offerings at

[64] One of them was also pierced proximally in anterior-posterior direction, likely to be worn as a pendant (Fig. 6.10).

temples with glass ones being a more expensive alternative[65]. The various uses of astragali are discussed in detail by Russell (2012, 133-7)[66].

Two small unidentified bone fragments, belonging to large-sized taxa judging from their thickness, were found in the Hellenistic Asklepieion of Thouria assemblage. One was sawn longitudinally and irregularly on three of its sides and the other in its entire periphery giving it a somewhat rounded shape. They are both most likely waste of artisanal activities. In addition, a small roundish bone fragment, probably broken off a larger object, was retrieved amongst the burnt soil north of Altar C'. The Hellenistic Asklepieion of Thouria assemblage also contained fragments of two cattle tibiae possibly used as working surfaces judging from the rows of punctures likely caused by some type of toothed tool (Halstead and Isaakidou, pers. comm.). An unidentified bone fragment from Early Byzantine Messene and a cattle radius[67] and four unidentified long bone fragments from the Late Byzantine Thouria farmstead bear such marks as well (Figs. 6.11a and 6.11b)[68]. What is particularly interesting about the Late Byzantine Thouria farmstead radius and other fragments, which belong to diaphyses, is that their outer surface was flattened before use. Bone fragments with similar modifications have been identified in a number of European and North African countries including France (Brios et al. 1995; Rodet-Belarbi et al. 2002), Hungary (Gál 2010), Italy (Grassi 2016), Morocco (Benco et al. 2002), Romania (Beldiman et al. 2011), Serbia (Vuković-Bogdanović and Bogdanović 2016), Spain (Moreno-García et al. 2007) and have been interpreted as bone anvils, polishing or scraping tools, decorative objects, amulets or even counting aids (cf. Grassi 2016, 133 and Moreno-García et al. 2007, 170-1 for further bibliography). Ethnographic research (e.g. Anderson et al. 2014; Nadal and Roure 2004) make the interpretation of such specimens as bone anvils the most plausible one.

Furthermore, a small diaphysis fragment of cattle humerus, with one of its sides smoothed forming a U-shaped tip, was located in one of the rooms of the Roman villa at Early Byzantine Messene, the same context that yielded one of the aforementioned polished astragali. Another modified cattle first phalanx was found at the Late Byzantine Thouria farmstead. Its distal epiphysis was removed with the area of the cut polished and a round hole was created right above it (Fig. 6.12); the specimen could conceivably have served as a loom weight. A similarly modified fragment (possibly a broken bead) of an unidentified bone was also found on site (Fig. 6.13). Also belonging to the Late Byzantine Thouria farmstead assemblage and found broken in two pieces is the unidentified bone object in Fig. 6.14. Its entire surface was worked in order to create a roundish shape, possibly representing an unfinished nail or hair pin.

A sawn roe deer antler was found at Early Byzantine Messene and sixteen red deer ones at the Late Byzantine Thouria farmstead. In addition, sawn-off long bone epiphyses (e.g. radii, metapodials) of cattle were occasionally encountered at Early Byzantine Messene both within and outside the studied

[65] In connection to Asclepius specifically, of particular interest is *IG* IV^2 1, 121, VIII from the Asklepieion of Epidaurus (c. 350-300 BC) in which the boy Euphanes promises ten astragali to the god if he heals him (Edelstein and Edelstein 1998, 223). This inscription further confirms the dedicatory properties of knucklebones.

[66] Meier's (2013) suggestion of the use of astragali as ceramic burnishers is another alternative.

[67] The radius diaphysis was retrieved in two pieces. Traces on its posterior side show that the ulna was chopped off while the rows of punctures are encountered on its anterior side. In addition, two of the unidentified shaft fragments came from the same context as the radius and they may thus all be pieces of the same bone.

[68] To the above, can be added a cattle mandible retrieved from the area of Early Byzantine Messene's theatre (included in Fig. 6.10a).

contexts (Fig. 6.15)[69], while a sawn-off equid distal metapodium was identified in the assemblage from the early Byzantine rubbish pit in the vicinity of the temple of Isis. Those elements most likely represent by-products of antler- and bone-working. The rarity and placement of sawing marks allow us to conclude that saws were most often utilised in bone working and extremely rarely (if ever) in butchery. Another conclusion that can be drawn is that cattle long bones were the primary source of raw material for bone-working at all three sites, most likely due to their robustness and greater accessibility in comparison to other large-sized mammals (e.g. equids, red deer).

Finally, a number of tortoise carapace fragments were recovered in all three sites. The lack of traces of human modification makes it impossible to determine whether their presence on-site indicates manufacture of sound-boxes for stringed musical instruments such as lyres (Georgiou 2007, 34-61) or their use as bowls. However, tortoises roam the sites even to this day and thus their occurrence is likely unrelated to artisanal activities.

[69] Cf. Vasileiadou (2012; 2018). In addition, the label of an unstudied bone bag from the area of the basilica described its contents as possible waste of an artisanal workshop (cf. Themelis 2004, 79-81).

Skinning marks - MaxAU				
Early Byzantine Messene				
Anatomical elements	Cattle	Pig	Sheep + Goat	Total
H/A	1	0	2	3
MD	2	0	0	2
MCp	7	1	4	12
MCd	9	2	3	14
MTp	8	0	5	13
MTd	7	1	6	14
PH1	17	0	5	22
PH2	2	0	0	2
MPd	2	0	0	2
Total	55	4	25	84
Hellenistic Asklepieion of Thouria				
Anatomical elements	Cattle	Pig	Sheep + Goat	Total
H/A	0	0	4	4
MD	7	0	0	7
MCp	5	0	7	12
MCd	5	0	5	10
MTp	1	0	4	5
MTd	2	0	4	6
PH1	2	0	0	2
PH2	1	0	0	1
PH3	1	0	0	1
MPp	0	2	0	2
Total	24	2	24	50
Late Byzantine Thouria farmstead				
Anatomical elements	Cattle	Pig	Sheep + Goat	Total
H/A	1	0	3	4
MD	0	0	1	1
MCp	1	0	3	4
MCd	0	0	1	1
MTp	2	0	13	15
MTd	2	0	7	9
PH1	3	0	1	4
PH2	1	0	0	1
MPd	0	0	1	1
Total	10	0	30	40
Neonatal specimens and loose teeth excluded				

Table 6.12: Distribution of skinning marks per anatomical element for the three main domesticates (MaxAU).

Dismembering marks - MaxAU				
Early Byzantine Messene				
Anatomical elements	Cattle	Pig	Sheep + Goat	Total
MD	1	0	0	1
SC/Hp	8	5	7	20
Hd/Rp/U	20	9	17	46
Rd/MCp	2	0	4	6
PE/Fp	2	1	8	11
Fd	0	0	1	1
Td/A/C/NC/MTp	13	2	18	33
MPd/PH1	14	0	10	24
PH2	4	0	0	4
Atlas	0	1	0	1
Axis	0	0	1	1
Thoracic	1	0	0	1
Lumbar	1	0	1	2
Total	66	18	67	151
Hellenistic Asklepieion of Thouria				
Anatomical elements	Cattle	Pig	Sheep + Goat	Total
MD	6	4	1	11
SC/Hp	7	26	10	43
Hd/Rp/U	14	15	18	47
Rd/MCp	6	4	7	17
PE	6	3	1	10
Fd/Tp	1	0	1	2
Td/A/C/NC/MTp	10	6	7	23
MPd/PH1	9	9	1	19
Atlas	0	1	0	1
Lumbar	3	0	0	3
Total	62	68	46	176
Late Byzantine Thouria farmstead				
Anatomical elements	Cattle	Pig	Sheep + Goat	Total
MD	0	2	1	3
SC/Hp	4	9	14	27
Hd/Rp/U	8	12	15	35
Rd/MCp	0	0	6	6
PE	5	3	6	14
Fd/Tp	0	1	4	5
Td/A/C/NC/MTp	8	3	18	29
MPd/PH1	11	1	7	19
PH2	1	0	0	1
Atlas	2	0	0	2

Axis	2	0	1	3
Lumbar	1	2	0	3
Sacrum	0	1	0	1
Total	42	34	72	148
Neonatal specimens and loose teeth excluded				

Table 6.13: Distribution of dismembering marks per anatomical element for the three main domesticates (MaxAU).

Filleting marks - MaxAU				
Early Byzantine Messene				
Anatomical elements	Cattle	Pig	Sheep + Goat	Total
MD	4	3	2	9
SC	1	2	5	8
Hp/Hd	40	13	44	97
Rp/U/Rd	17	5	34	56
PE	2	1	3	6
Fp/Fd	8	7	25	40
Tp/Td	20	5	45	70
MPp/MPd	2	0	11	13
Total	94	36	169	299
Hellenistic Asklepieion of Thouria				
Anatomical elements	Cattle	Pig	Sheep + Goat	Total
MD	7	7	5	19
SC	3	21	2	26
Hp/Hd	29	37	15	81
Rp/U/Rd	10	5	12	27
Lumbar	1	0	0	1
PE	5	2	1	8
Fp/Fd	9	17	25	51
Tp/Td	19	21	14	54
MPp/MPd	4	0	3	7
Total	87	110	77	274
Late Byzantine Thouria farmstead				
Anatomical elements	Cattle	Pig	Sheep + Goat	Total
MD	1	5	3	9
SC	2	4	6	12
Hp/Hd	15	22	21	58
Rp/U/Rd	3	6	24	33
PE	7	2	5	14
Fp/Fd	6	21	20	47
Tp/Td	13	13	23	49
MPp/MPd	0	0	0	0
Total	47	73	102	222
Neonatal specimens and loose teeth excluded				

Table 6.14: Distribution of filleting marks per body part for the three main domesticates (MaxAU).

Figure 6.10: Sheep or goat pierced and polished right astragalus from Early Byzantine Messene.

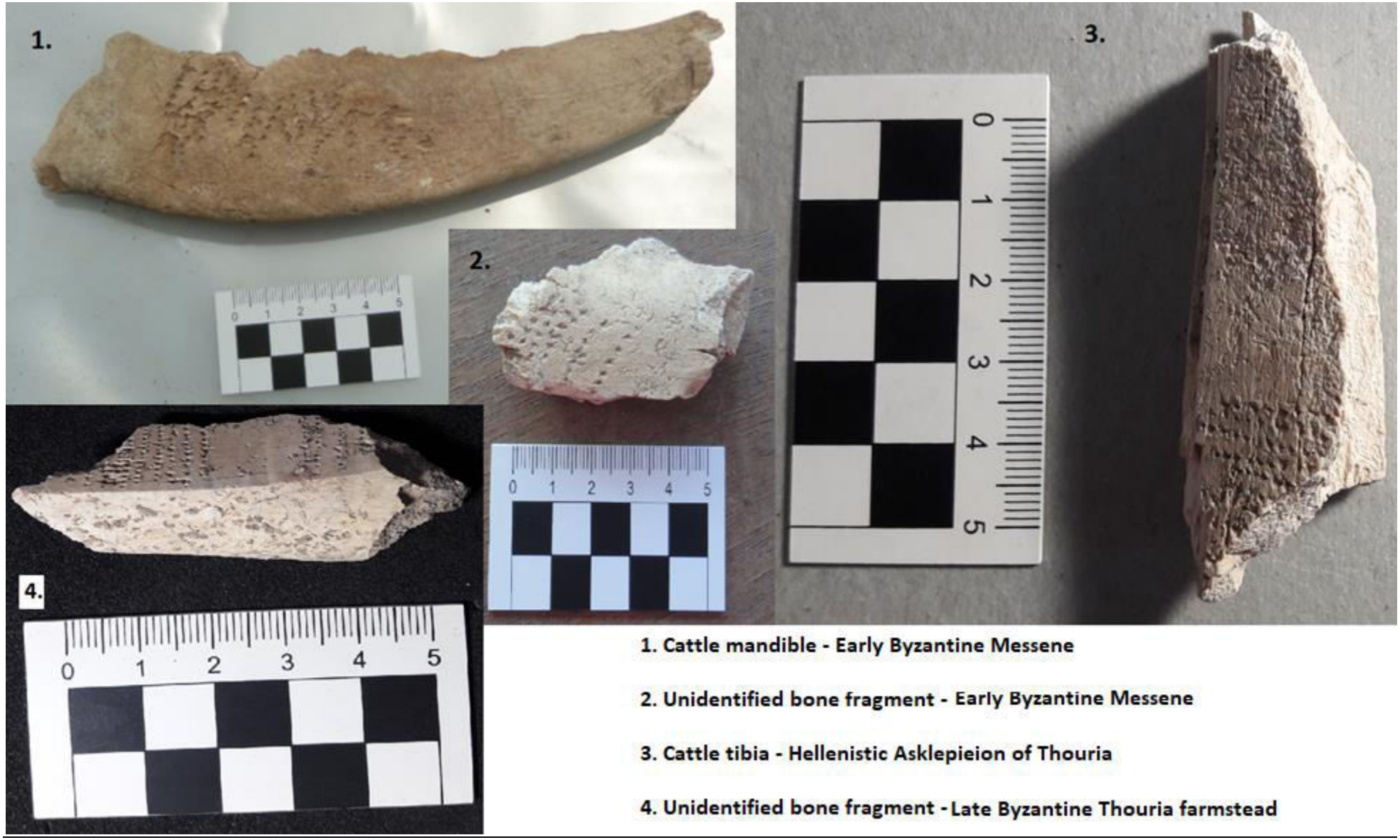


Figure 6.11a: Bone fragments from Messene and Thouria with marks indicating their use as working surfaces.

Figure 6.11b: Close-up of one of the Late Byzantine Thouria farmstead shaft fragments bearing a flattened surface with marks indicating its use as a working surface.

Figure 6.12: Modified cattle first phalanx – Late Byzantine Thouria farmstead.

Figure 6.13: Modified bone fragment – Late Byzantine Thouria farmstead.

Figure 6.14: Fragmented bone object – Late Byzantine Thouria farmstead.

Figure 6.15: Sawn-off cattle long bone epiphyses – Early Byzantine Messene.

Fragmentation patterns

Within-bone nutrients (bone marrow and fat) were potential food sources that may have been exploited at Messene and Thouria and it was concluded in Chapter 5 that attrition by canid scavengers was of lesser importance than deliberate human action in the creation of the fragmentation patterns recorded. In order to explore this behaviour further, an analysis of fragmentation patterns of post-neonatal long bones[70], based on Binford's (1978; 1981, 148-63) observations, will be undertaken.

Pig has the lowest percentage of old breaks, and significantly fewer than sheep/goat, at all three sites (Table 6.15). As already suggested in Chapter 5, the younger slaughter age for pigs, and consequently lower value of their marrow, may have discouraged deliberate anthropogenic breakage. Although the larger bones of (older) cattle contained more marrow than those of (younger) sheep/goats, and so should have attracted more deliberate anthropogenic breakage, the two taxa surprisingly exhibit almost identical levels of fragmentation in both Thouria assemblages and sheep/goat bones are highly significantly more fragmented at Early Byzantine Messene. A number of cattle long bones must have been kept whole as raw material for artisanal activities although it is doubtful that it would have been high enough to affect anatomical representation. Interestingly, while sheep and goats exhibit almost identical levels of breakage at Early Byzantine Messene, sheep are more fragmented in the two Thouria assemblages and significantly so in the Late Byzantine Thouria farmstead (Table 6.16).

To explore whether partial recovery has deflated the number of "old breaks" for pigs and sheep/goats, Table 6.17 compares numbers of post-neonatal complete long bones and those with old breaks that include parts of both articulation and diaphysis ("end + shaft"[71]). The category "end + shaft" includes broken specimens retaining at least one whole epiphysis as these are less likely to be affected by retrieval loss than diaphysis and epiphysis splinters. Looking at the frequencies of fragment types, the same patterns as in Table 6.15 arise. Early Byzantine Messene's sheep/goats are highly significantly more fragmented and so are the Hellenistic Asklepieion of Thouria pigs suggesting deliberate anthropogenic fragmentation rather than the outcome of partial retrieval. The results for the Late Byzantine Thouria farmstead assemblage do not differ significantly between taxa, although in this case sample size is smaller. A comparison between sheep and goats (Table 6.18) produced significant results only in the theatre assemblage, which might indicate a preference for the marrow of sheep over that of goats at the site.

Table 6.19 explores fragmentation patterns in relation to age groups ("unfused + fusing" versus "fused" specimens – MinAU) for each taxon. Despite the greater fragility of younger specimens, frequency of fragmentation is higher in the "fused" age group for all taxa in all three assemblages and the results are in most cases highly significant, indicating purposeful selection of older specimens for breakage, presumably because they offered more and better marrow. No attempt was made to compare sheep to goats as samples are too limited.

Another piece of evidence for marrow extraction from long bones is a number of transverse chop marks observed on long bone diaphyses. These chops could potentially have fulfilled a dual purpose, both sectioning the carcass to pot-sized pieces in preparation for cooking and exposing the marrow cavity

[70] More specifically, the term "long bones" in this section refers to humerus (Hp, Hd), radius (Rp, Rd), femur (Fp, Fd), tibia (Tp, Td) and metapodials (MCp, MCd, MTp, MTd, MPp, MPd), but excluding loose epiphyses.
[71] The category also includes specimens recorded as "some shaft missing" and "shaft splinter + end splinter".

before or after cooking the meat. This pattern was also observed, as already mentioned, in the faunal assemblage from the sanctuary of Poseidon and Amphitrite on Tenos (Leguilloux 1999, 442-3).

Finally, two pierced cattle first phalanges (one pierced twice, one thrice) were identified in the round structure below Early Byzantine Messene's basilica. Although open to interpretation, the holes may have facilitated marrow extraction.

Early Byzantine Messene								
	Cattle		Pig		Sheep + Goat		Total	
	MaxAU	%	MaxAU	%	MaxAU	%	MaxAU	%
Complete	47	6.7%	44	9.3%	42	2.7%	133	4.8%
Old break	655	93.3%	429	90.7%	1530	97.3%	2614	95.2%
Total	702	100.0%	473	100.0%	1572	100.0%	2747	100.0%
χ^2 tests	Cattle/Pig			$\chi^2 = 2.688$, p = 0.101				
	Cattle/Sheep + Goat			$\chi^2 = 20.889$, p = 0.000				
	Pig/Sheep + Goat			$\chi^2 = 39.680$, p = 0.000				
Hellenistic Asklepieion of Thouria								
	Cattle		Pig		Sheep + Goat		Total	
	MaxAU	%	MaxAU	%	MaxAU	%	MaxAU	%
Complete	27	3.9%	58	6.7%	57	3.1%	142	4.2%
Old break	657	96.1%	802	93.3%	1774	96.9%	3233	95.8%
Total	684	100.0%	860	100.0%	1831	100.0%	3375	100.0%
χ^2 tests	Cattle/Pig			$\chi^2 = 5.780$, p = 0.016				
	Cattle/Sheep + Goat			$\chi^2 = 1.074$, p = 0.300				
	Pig/Sheep + Goat			$\chi^2 = 18.980$, p = 0.000				
Late Byzantine Thouria farmstead								
	Cattle		Pig		Sheep + Goat		Total	
	MaxAU	%	MaxAU	%	MaxAU	%	MaxAU	%
Complete	7	2.8%	16	5.0%	28	3.0%	51	3.4%
Old break	244	97.2%	304	95.0%	897	97.0%	1445	96.6%
Total	251	100.0%	320	100.0%	925	100.0%	1496	100.0%
χ^2 tests	Cattle/Pig			$\chi^2 = 1.779$, p = 0.182				
	Cattle/Sheep + Goat			$\chi^2 = 0.039$, p = 0.844				
	Pig/Sheep + Goat			$\chi^2 = 2.715$, p = 0.099				
Long bones only; Neonatal specimens, loose epiphyses and fresh breaks excluded								

Table 6.15: Frequency of complete and fragmented long bones for the three main domesticates (MaxAU).

Early Byzantine Messene						
	Sheep		Goat		Total	
	MaxAU	%	MaxAU	%	MaxAU	%
Complete	14	11.1%	13	11.4%	27	11.3%
Old break	112	88.9%	101	88.6%	213	88.7%
Total	126	100.0%	114	100.0%	240	100.0%
χ^2 test	$\chi^2 = 0.005$, p = 0.943					
Hellenistic Asklepieion of Thouria						
	Sheep		Goat		Total	
	MaxAU	%	MaxAU	%	MaxAU	%
Complete	28	15.6%	27	25.0%	55	19.2%
Old break	151	84.4%	81	75.0%	232	80.8%
Total	179	100.0%	108	100.0%	287	100.0%
χ^2 test	$\chi^2 = 3.807$, p = 0.051					
Late Byzantine Thouria farmstead						
	Sheep		Goat		Total	
	MaxAU	%	MaxAU	%	MaxAU	%
Complete	6	7.7%	12	20.0%	18	13.0%
Old break	72	92.3%	48	80.0%	120	87.0%
Total	78	100.0%	60	100.0%	138	100.0%
χ^2 test	$\chi^2 = 4.529$, p = 0.033					
Long bones only; Neonatal specimens, loose epiphyses and fresh breaks excluded						

Table 6.16: Frequency of complete and fragmented long bones for sheep and goats (MaxAU).

Early Byzantine Messene								
	Cattle		Pig		Sheep + Goat		Total	
	MaxAU	%	MaxAU	%	MaxAU	%	MaxAU	%
Complete	47	25.8%	44	34.6%	42	12.6%	133	20.7%
End + shaft	135	74.2%	83	65.4%	292	87.4%	510	79.3%
Total	182	100.0%	127	100.0%	334	100.0%	643	100.0%
χ^2 tests	Cattle/Pig		$\chi^2 = 2.802$, p = 0.094					
	Cattle/Sheep + Goat		$\chi^2 = 14.489$, p = 0.000					
	Pig/Sheep + Goat		$\chi^2 = 29.536$, p = 0.000					
Hellenistic Asklepieion of Thouria								
	Cattle		Pig		Sheep + Goat		Total	
	MaxAU	%	MaxAU	%	MaxAU	%	MaxAU	%
Complete	27	17.3%	58	28.7%	57	16.8%	142	20.3%
End + shaft	129	82.7%	144	71.3%	283	83.2%	556	79.7%
Total	156	100.0%	202	100.0%	340	100.0%	698	100.0%
χ^2 tests	Cattle/Pig		$\chi^2 = 6.324$, p = 0.012					
	Cattle/Sheep + Goat		$\chi^2 = 0.022$, p = 0.881					
	Pig/Sheep + Goat		$\chi^2 = 10.822$, p = 0.001					
Late Byzantine Thouria farmstead								
	Cattle		Pig		Sheep + Goat		Total	
	MaxAU	%	MaxAU	%	MaxAU	%	MaxAU	%
Complete	7	14.6%	16	19.8%	28	15.6%	51	16.5%
End + shaft	41	85.4%	65	80.2%	152	84.4%	258	83.5%
Total	48	100.0%	81	100.0%	180	100.0%	309	100.0%
χ^2 tests	Cattle/Pig		$\chi^2 = 0.550$, p = 0.458					
	Cattle/Sheep + Goat		$\chi^2 = 0.028$, p = 0.868					
	Pig/Sheep + Goat		$\chi^2 = 0.702$, p = 0.402					
Long bones only; Neonatal specimens, loose epiphyses and fresh breaks excluded								

Table 6.17: Frequency of complete bones and long bone ends for the three main domesticates (MaxAU).

Early Byzantine Messene						
	Sheep		Goat		Total	
	MaxAU	%	MaxAU	%	MaxAU	%
Complete	14	12.6%	13	15.1%	27	13.7%
End + shaft	97	87.4%	73	84.9%	170	86.3%
Total	111	100.0%	86	100.0%	197	100.0%
χ^2 test	$\chi^2 = 0.257$, p = 0.612					
Hellenistic Asklepieion of Thouria						
	Sheep		Goat		Total	
	MaxAU	%	MaxAU	%	MaxAU	%
Complete	28	22.0%	27	31.4%	55	25.8%
End + shaft	99	78.0%	59	68.6%	158	74.2%
Total	127	100.0%	86	100.0%	213	100.0%
χ^2 test	$\chi^2 = 2.339$, p = 0.126					
Late Byzantine Thouria farmstead						
	Sheep		Goat		Total	
	MaxAU	%	MaxAU	%	MaxAU	%
Complete	6	8.8%	12	28.6%	18	16.4%
End + shaft	62	91.2%	30	71.4%	92	83.6%
Total	68	100.0%	42	100.0%	110	100.0%
χ^2 test	$\chi^2 = 7.398$, p = 0.007					
Long bones only; Neonatal specimens, loose epiphyses and fresh breaks excluded						

Table 6.18: Frequency of complete bones and long bone ends for sheep and goats (MaxAU).

Early Byzantine Messene												
	Cattle				Pig				Sheep + Goat			
	Unfused + Fusing		Fused		Unfused + Fusing		Fused		Unfused + Fusing		Fused	
	MinAU	%	MinAU	%	MinAU	%	MinAU	%	MinAU	%	MinAU	%
Complete	28	18.5%	15	3.5%	20	32.8%	22	5.9%	21	8.8%	21	1.9%
Old break	123	81.5%	410	96.5%	41	67.2%	351	94.1%	217	91.2%	1099	98.1%
Total	151	100.0%	425	100.0%	61	100.0%	373	100.0%	238	100.0%	1120	100.0%
χ^2 tests	$\chi^2 = 36.355$, p = 0.000				$\chi^2 = 43.365$, p = 0.000				$\chi^2 = 31.621$, p = 0.000			
Hellenistic Asklepieion of Thouria												
	Cattle				Pig				Sheep + Goat			
	Unfused + Fusing		Fused		Unfused + Fusing		Fused		Unfused + Fusing		Fused	
	MinAU	%	MinAU	%	MinAU	%	MinAU	%	MinAU	%	MinAU	%
Complete	11	9.6%	11	2.5%	21	22.6%	23	3.2%	16	6.4%	30	2.3%
Old break	103	90.4%	432	97.5%	72	77.4%	686	96.8%	233	93.6%	1288	97.7%
Total	114	100.0%	443	100.0%	93	100.0%	709	100.0%	249	100.0%	1318	100.0%
χ^2 tests	$\chi^2 = 12.273$, p = 0.000				$\chi^2 = 59.285$, p = 0.000				$\chi^2 = 12.656$, p = 0.000			
Late Byzantine Thouria farmstead												
	Cattle				Pig				Sheep + Goat			
	Unfused + Fusing		Fused		Unfused + Fusing		Fused		Unfused + Fusing		Fused	
	MinAU	%	MinAU	%	MinAU	%	MinAU	%	MinAU	%	MinAU	%
Complete	4	10.8%	3	1.8%	6	18.8%	8	2.9%	7	5.5%	18	2.5%
Old break	33	89.2%	168	98.2%	26	81.2%	268	97.1%	120	94.5%	692	97.5%
Total	37	100.0%	171	100.0%	32	100.0%	276	100.0%	127	100.0%	710	100.0%
χ^2 tests	$\chi^2 = 7.672$, p = 0.006				$\chi^2 = 16.606$, p = 0.000				$\chi^2 = 3.294$, p = 0.070			
Long bones only; Neonatal specimens, loose epiphyses and fresh breaks excluded												

Table 6.19: Frequency of complete and fragmented long bones by fusion stage for the three main domesticates (MinAU).

Conclusions

As indicated by both anatomical element representation and butchery marks, it is clear that slaughter and the entire sequence of carcass processing took place on-site for all main domestic taxa at the Hellenistic Asklepieion of Thouria. Underrepresentation of mandibles (and phalanges) at Early Byzantine Messene and the Late Byzantine Thouria farmstead may suggest off-site slaughter and skinning of the animals or at least off-site discard of those body parts. The Late Byzantine Thouria farmstead pig mandibles are not underrepresented and this species may, thus, have been slaughtered on-site. In general, cattle and sheep/goats were most likely skinned at the level of the phalanges although some individuals were dressed higher up the foot as indicated by skinning marks on some metapodial fragments. Pigs generally lack skinning traces possibly indicating that they were often shaved rather than skinned.

Distribution of butchery marks on the skeleton indicates that cattle, pigs and sheep/goats were intensively butchered at all three sites to divide the carcasses into small parcels of meat. This, combined with the low incidence of burnt bones, suggests boiling as the preferred cooking method. In addition, butchery traces hint at a similar and equally intensive fashion of dismemberment and filleting of all three main domestic taxa at all three sites with, as mentioned already, intensive sectioning of the carcass noted in all cases that supplied a sample large enough for such a conclusion to be extracted. Furthermore, the fragmentation patterns indicate deliberate fragmentation of the long bones of older individuals for the extraction of within-bone nutrients.

At the Hellenistic Asklepieion of Thouria, however, it seems that sheep were not as intensively butchered as pigs and goats. The reason for this is unknown, but may be clarified if publication of the sacred law from the Hellenistic Asklepieion of Thouria, currently under study, confirms that goats and pigs were, as elsewhere, considered less suitable for sacrifice than sheep.

Chop marks are more common in the Hellenistic Asklepieion of Thouria assemblage while knife marks are more common in the other two assemblages. This pattern may have resulted from the varying nature of the assemblages, the first being a sacred context employing specialized butchers handling cleavers for speed and efficiency while the Late Byzantine Thouria farmstead is a domestic one in which people were using knives as they were not under the pressure of having to handle large quantities of meat in such a short time. Early Byzantine Messene is somewhere in the middle, as it is very likely that at least some of the meat was distributed through specialised butchery shops while the rest of it came from domestic contexts.

Finally, evidence of antler- and bone-working was also detected in all three assemblages by either finished artefacts or their by-products.

7. Mortality patterns and husbandry management strategies

Introduction

The aim of this chapter is to explore the management strategies of the main domestic taxa through analysis of species composition and age profiles, morphological sex data, biometry[72] and observed pathological conditions. As in previous chapters, data for sheep and goats will be combined when necessary, especially in constructing age profiles based on postcranial fusion data as most anatomical elements of younger individuals are difficult to attribute to species.

Species composition

The taxonomic composition of each assemblage may obviously be affected by a number of pre- and post-depositional biases. Of the main domestic taxa examined in Chapter 5, pigs, sheep, goats and also dogs must be underrepresented to some extent relative to cattle in all the assemblages due to the recovery bias affecting the smaller anatomical elements. The effect of taphonomic agents such as gnawing, erosion and burning is rather limited, but the same small- and medium-sized taxa also proved most vulnerable to these. Tables 7.1 and 7.3 assess taxonomic representation, based on all post-neonatal anatomical elements except horncores/antlers as these are absent in some taxa as well as specific age and sex groups, while Tables 7.2 and 7.4 also exclude additional small anatomical elements (loose teeth, ulnae, astragali, calcanea, navicular cuboids, phalanges and caudal vertebrae) to minimise the effect of recovery loss. The horse burial and the (at least) four dogs discarded in the wine press at the Late Byzantine Thouria farmstead are excluded from the tables so as not to distort the percentages of the various taxa. Furthermore, the former predates the structure as it was partly buried below one of its corridors (Arapogianni 2020, 64). Tables 7.3 and 7.4 include only the four main domestic taxa in order to avoid skewing the taxonomic representation of said taxa by the presence of other species of lesser importance to the economy of the studied sites. Sheep/goat bones are proportionally reassigned to sheep and goats in all four tables. However, Table 7.5 displays the MinAU and percentage of each anatomical element attributed to each of the three “taxa”.

Comparing Table 7.1 with Table 7.2 and Table 7.3 with Table 7.4, it is obvious that the effect of recovery bias on species composition is minor in all three assemblages. The four commonest species are fairly evenly represented and together overwhelmingly dominate each assemblage (Table 7.1: 93.6% – Early Byzantine Messene, 97.6% – Hellenistic Asklepieion of Thouria, 77.2% – Late Byzantine Thouria farmstead). The lower combined percentage of the four species in the Late Byzantine Thouria farmstead assemblage is caused by the high representation of dogs at 16.9%, in comparison to 1.3% at the other two sites combined. Otherwise, the most noteworthy differences between sites are the higher occurrence of pigs in the Hellenistic Asklepieion of Thouria and the lower occurrence of cattle at the

[72] Only measurements from fused non-pathological anatomical elements are considered here. In addition, I have included here only those standard measurements for which there are enough specimens to allow intra- and/or inter-site comparisons.

Late Byzantine Thouria farmstead[73]. Equids are modestly represented at ca. 3% in Early Byzantine Messene and ca. 2% in the Late Byzantine Thouria farmstead, likely used for transport and as beasts of burden. Their rarity in the Hellenistic Asklepieion of Thouria is unsurprising given the latter's sacred nature. The same might be argued for the rarity of dogs in the Hellenistic Asklepieion of Thouria, although, as one of the sacred animals of Asclepius, they were present at his temples elsewhere[74]. Cat bones were only identified at the Late Byzantine Thouria farmstead and in negligible numbers. Wild taxa make up ca. 2% of the Early Byzantine Messene and Hellenistic Asklepieion of Thouria assemblages and ca. 4% at the Late Byzantine Thouria farmstead, with red deer making up over half of this category. Finally, a wider selection of taxa is found at the Late Byzantine Thouria farmstead. Other than the differences highlighted above, the species representation between sites is quite similar.

Pigs are the primary taxon consumed at the Hellenistic Asklepieion of Thouria, a result otherwise unparalleled in sanctuaries unless these were connected to the cult of Demeter (cf. Bookidis et al. 1999 – Corinth; Crabtree 1990 – Cyrene; Forstenpointner 2001 – Ephesus; Jarman 1973 – Knossos; Nobis 1997 – Messene; pigs are also well represented, but less so than sheep/goats, at Mytiline – Ruscillo 2013). Most of the relevant faunal reports do not make a distinction, however, between sheep and goats. Had that been the case with the Hellenistic Asklepieion of Thouria, then sheep/goats would have been the dominant taxon, consistent both with other published sacred faunal assemblages and with the pattern exhibited at Early Byzantine Messene and the Late Byzantine Thouria farmstead. Interestingly, a late 4th/early 3rd c. BC[75] refuse pit connected to the altar of Asclepius at Messene (Themelis 1993, 70) contained 216 identifiable bones of domestic taxa, 41% of which belonging to cattle, 44% to pigs and 15% to sheep/goats (Nobis 1994, 299). However, the sample size is rather small to be considered reliably representative of the cult activity taking place there.

An issue arising with pigs is the separation of their bones from those of wild boar[76]. In addition to the more pronounced muscle attachments and thicker diaphyseal bone walls of the latter, biometry can also be useful as wild boars tend to be larger than domestic pigs. Unfortunately, only two specimens morphologically identified as wild boar, a scapula from Early Byzantine Messene and a distal humerus from the Hellenistic Asklepieion of Thouria, have provided biometric data and thus any biometric attempts to separate the two taxa were hindered. As distinction between the two taxa based solely on morphological or size criteria is difficult, not least given possible interbreeding between the two populations (as occurs today in Greece – Halstead and Isaakidou 2011), only the most extreme specimens were recorded as wild boar, half of them being male loose mandibular canines (Figure 7.1). These specimens attributed to wild boar barely constitute 0.1% of each assemblage, so any possible misidentifications will not have altered significantly the species composition of either site.

[73] That is evident in all four tables.

[74] For example, according to the 4th c. BC inscription *IG* IV^2, 1 122 XXVI (Edelstein and Edelstein 1998, T. 423) from the Asklepieion of Epidaurus, a boy was healed of a growth on his neck by having it licked by one of the sanctuary's sacred dogs. The association of dogs with the god is attributed to two variations of his birthing myth. According to Pausanias 2.26.3-5 (Edelstein and Edelstein 1998, T. 7), he was suckled by a goat and guarded by a dog, while according to Apollodorus of Athens *FGrH* 244F138 (Edelstein and Edelstein 1998, T. 5), Asclepius was suckled by a dog.

[75] Nobis (1994, 297) dates the context to the 3rd/2nd c. BC

[76] On the reliability of the various methods used by researchers, see Rowley-Conwy et al. (2012).

Another pair of species that can present difficulties in morphological separation is the dog and the red fox. Unfortunately, the biometrical sample of the latter is meagre for all three studied assemblages. However, the handful collected red fox biometrical information does show that they are smaller in size than most of their dog counterparts (Figure 7.2).

Finally, as mentioned in Chapter 4, a number of equid specimens were identified to species solely on biometric grounds. At Early Byzantine Messene, seventeen specimens[77] were identified as horse and five as donkey. At the Hellenistic Asklepieion of Thouria, a single metacarpal was biometrically assigned to donkey. At the Late Byzantine Thouria farmstead, a nearly complete radius and its ulna[78] (Figure 7.4) as well as a second phalanx were identified as possible mule (Figure 7.3a) and three specimens as donkey. The determination to species was made by comparing my equid biometric data to that for morphologically speciated specimens from both my sites and other sites, geographically and chronologically as close as possible[79] to Messene and Thouria given the limited availability of relevant publications including equid biometric data. Only specimens with extreme measurements were identified to species (e.g. the Early Byzantine Messene horse and the Late Byzantine Thouria farmstead possible donkey astragali in Figure 7.3b), to minimize the risk of misidentification due to overlapping biometric ranges between taxa. As a prime example of species determination through the combination of morphology and biometry, Figure 7.4 shows the distal epiphysis of the aforementioned Late Byzantine Thouria farmstead mule radius. Based on morphological criteria, the specimen was initially identified as donkey/mule. It was then identified as mule by biometric comparison of its distal epiphysis (Figure 7.5) with securely identified specimens from my studied assemblages as well as with those from Roman – Early Byzantine (1st – 7th c. AD) Sagalassos in southwestern Turkey (De Cupere 2001, 68).

What follows next is a detailed analysis of the management of the four main domesticates, namely cattle, pigs, sheep and goats.

[77] Three calcanea were actually identified as horse because they articulated with astragali assigned to horse through biometry.

[78] Unfortunately the radius and ulna were damaged during excavation. As a consequence, the ulna and both epiphyses were broken off the radius diaphysis. The proximal epiphysis of the radius was further broken in at least two pieces and its lateral half was never recovered.

[79] Sites used: ancient Messene, Messenia (Nobis 1994; 2001); Hellenistic New Halos, Thessaly (Prummel 2003); Roman – Early Byzantine Sagalassos, SW Turkey (De Cupere 2001).

Figure 7.1: Male wild boar mandibular canines from Early Byzantine Messene (left) and the Hellenistic Asklepieion of Thouria (right). All the fragments of the latter belong to the same specimen.

Taxa	Early Byzantine Messene		Hellenistic Asklepieion of Thouria		Late Byzantine Thouria farmstead	
	MinAU	%	MinAU	%	MinAU	%
Cattle	947	26.5%	982	20.7%	397	14.7%
Pig	644	18.0%	1471	30.9%	545	20.2%
Sheep	938	26.3%	1204	25.3%	661	24.5%
Goat	812	22.8%	984	20.7%	481	17.8%
Horse	23	0.6%	2	0.1%	3	0.1%
Mule	-	-	-	-	4	0.1%
Donkey	5	0.1%	2	0.1%	7	0.3%
Equid	91	2.5%	15	0.3%	38	1.4%
Dog	42	1.2%	7	0.1%	457	16.9%
Red deer	23	0.6%	42	0.9%	70	2.6%
Fallow deer	1	0.1%	3	0.1%	7	0.3%
Roe deer	9	0.3%	-	-	3	0.1%
Wild boar	4	0.1%	6	0.1%	2	0.1%
Cat	-	-	-	-	4	0.1%
Red fox	2	0.1%	20	0.4%	4	0.1%
Hare	20	0.6%	12	0.3%	4	0.1%
Hedgehog	-	-	-	-	1	0.1%
Tortoise	8	0.2%	3	0.1%	9	0.3%
Total	3569	100.0%	4753	100.0%	2697	100.0%

Neonatal specimens, horncores/antlers and burials excluded
Sheep/goats proportionately assigned to sheep and goats
A number of equid specimens were identified to species solely by biometric comparison with specimens from other published assemblages

Table 7.1: Taxonomic composition of the three studied assemblages (MinAU).

Taxa	Early Byzantine Messene		Hellenistic Asklepieion of Thouria		Late Byzantine Thouria farmstead	
	MinAU	%	MinAU	%	MinAU	%
Cattle	714	23.3%	814	19.4%	319	13.9%
Pig	545	17.8%	1257	29.9%	455	19.8%
Sheep	893	29.1%	1211	28.9%	599	26.1%
Goat	739	24.1%	827	19.7%	427	18.6%
Horse	13	0.4%	2	0.1%	1	0.1%
Mule	-	-	-	-	2	0.1%
Donkey	1	0.1%	2	0.1%	3	0.1%
Equid	71	2.3%	4	0.1%	19	0.8%
Dog	38	1.2%	6	0.1%	383	16.7%
Red deer	13	0.4%	34	0.8%	55	2.4%
Fallow deer	-	-	2	0.1%	7	0.3%
Roe deer	8	0.3%	-	-	3	0.1%
Wild boar	3	0.1%	2	0.1%	-	-
Cat	-	-	-	-	4	0.2%
Red fox	2	0.1%	20	0.5%	4	0.2%
Hare	17	0.6%	12	0.3%	3	0.1%
Hedgehog	-	-	-	-	1	0.1%
Tortoise	8	0.3%	3	0.1%	9	0.4%
Total	3065	100.0%	4196	100.0%	2292	100.0%

Neonatal specimens, loose teeth, horncores/antlers, ulnae, astragali, calcanea, navicular cuboids, phalanges, caudal vertebrae and burials excluded
Sheep/goats proportionately assigned to sheep and goats
A number of equid specimens were identified to species solely by biometric comparison with specimens from other published assemblages

Table 7.2: Taxonomic composition of the three studied assemblages – excluding anatomical elements vulnerable to recovery bias (MinAU).

	Early Byzantine Messene		Hellenistic Asklepieion of Thouria		Late Byzantine Thouria farmstead	
Taxa	MinAU	%	MinAU	%	MinAU	%
Cattle	947	28.3%	982	21.2%	397	19.0%
Pig	644	19.3%	1471	31.7%	546	26.2%
Sheep	938	28.1%	1204	25.9%	661	31.7%
Goat	812	24.3%	984	21.2%	481	23.1%
Total	3341	100.0%	4641	100.0%	2085	100.0%
Neonatal specimens, horncores/antlers and burials excluded Sheep/goats proportionately assigned to sheep and goats						

Table 7.3: Taxonomic composition of the four main domestic taxa of the three studied assemblages (MinAU).

	Early Byzantine Messene		Hellenistic Asklepieion of Thouria		Late Byzantine Thouria farmstead	
Taxa	MinAU	%	MinAU	%	MinAU	%
Cattle	714	24.7%	814	19.8%	319	17.8%
Pig	545	18.8%	1257	30.6%	453	25.2%
Sheep	893	30.9%	1211	29.5%	599	33.3%
Goat	739	25.6%	827	20.1%	427	23.7%
Total	2891	100.0%	4109	100.0%	1798	100.0%
Neonatal specimens, loose teeth, horncores/antlers, ulnae, astragali, calcanea, navicular cuboids, phalanges, caudal vertebrae and burials excluded Sheep/goats proportionately assigned to sheep and goats						

Table 7.4: Taxonomic composition of the four main domestic taxa of the three studied assemblages – excluding anatomical elements vulnerable to recovery bias (MinAU).

Anatomical element		Early Byzantine Messene				Hellenistic Asklepieion of Thouria				Late Byzantine Thouria farmstead			
		Sheep/Goat	Sheep	Goat	Total	Sheep/Goat	Sheep	Goat	Total	Sheep/Goat	Sheep	Goat	Total
Horncore	MinAU	2	6	17	25	9	2	21	32	7	4	6	17
	%	8.0%	24.0%	68.0%	100.0%	28.1%	6.3%	65.6%	100.0%	41.2%	23.5%	35.3%	100.0%
MD	MinAU	19	13	24	56	39	56	101	196	22	46	15	83
	%	33.9%	23.2%	42.9%	100.0%	19.9%	28.6%	51.5%	100.0%	26.5%	55.4%	18.1%	100.0%
SC	MinAU	17	14	5	36	17	5	2	24	10	7	5	22
	%	47.2%	38.9%	13.9%	100.0%	70.8%	20.8%	8.3%	100.0%	45.5%	31.8%	22.7%	100.0%
Hp	MinAU	69	6	8	83	86	2	7	95	49	3	8	60
	%	83.1%	7.2%	9.6%	100.0%	90.5%	2.1%	7.4%	100.0%	81.7%	5.0%	13.3%	100.0%
Hd	MinAU	84	21	21	126	109	3	15	127	69	7	11	87
	%	66.7%	16.7%	16.7%	100.0%	85.8%	2.4%	11.8%	100.0%	79.3%	8.0%	12.6%	100.0%
Rp	MinAU	113	10	10	133	113	4	7	124	94	5	3	102
	%	85.0%	7.5%	7.5%	100.0%	91.1%	3.2%	5.6%	100.0%	92.2%	4.9%	2.9%	100.0%
U	MinAU	10	4	1	15	7	3	3	13	6	3	0	9
	%	66.7%	26.7%	6.7%	100.0%	53.8%	23.1%	23.1%	100.0%	66.7%	33.3%	0.0%	100.0%
Rd	MinAU	105	7	6	118	106	0	3	109	78	4	3	85
	%	89.0%	5.9%	5.1%	100.0%	97.2%	0.0%	2.8%	100.0%	91.8%	4.7%	3.5%	100.0%
MCp	MinAU	62	20	19	101	133	41	22	196	57	8	10	75
	%	61.4%	19.8%	18.8%	100.0%	67.9%	20.9%	11.2%	100.0%	76.0%	10.7%	13.3%	100.0%
MCd	MinAU	54	14	13	81	119	30	21	170	53	3	7	63
	%	66.7%	17.3%	16.0%	100.0%	70.0%	17.6%	12.4%	100.0%	84.1%	4.8%	11.1%	100.0%
Atlas	MinAU	-	-	-	-	1	0	0	1	1	0	0	1
	%	-	-	-	-	100.0%	0.0%	0.0%	100.0%	100.0%	0.0%	0.0%	100.0%
Axis	MinAU	9	0	0	9	1	0	0	1	2	0	0	2
	%	100.0%	0.0%	0.0%	100.0%	100.0%	0.0%	0.0%	100.0%	100.0%	0.0%	0.0%	100.0%
Cervical	MinAU	9	0	0	9	2	0	0	2	3	0	0	3
	%	100.0%	0.0%	0.0%	100.0%	100.0%	0.0%	0.0%	100.0%	100.00%	0.00%	0.00%	100.00%
Thoracic	MinAU	6	0	0	6	6	0	0	6	1	0	0	1
	%	100.0%	0.0%	0.0%	100.0%	100.0%	0.0%	0.0%	100.0%	100.0%	0.0%	0.0%	100.0%

Lumbar	MinAU	7	0	0	7	2	0	0	2	3	0	0	3
	%	100.0%	0.0%	0.0%	100.0%	100.0%	0.0%	0.0%	100.0%	100.0%	0.0%	0.0%	100.0%
Sacrum	MinAU	1	0	0	1	1	0	0	1	-	-	-	-
	%	100.0%	0.0%	0.0%	100.0%	100.0%	0.0%	0.0%	100.0%	-	-	-	-
Caudal	MinAU	2	0	0	2	-	-	-	-	-	-	-	-
	%	100.0%	0.0%	0.0%	100.0%	-	-	-	-	-	-	-	-
PE	MinAU	30	10	3	43	12	0	1	13	14	3	1	18
	%	69.8%	23.3%	7.0%	100.0%	92.3%	0.0%	7.7%	100.0%	77.8%	16.7%	5.6%	100.0%
Fp	MinAU	124	3	0	127	103	0	0	103	47	0	0	47
	%	97.6%	2.4%	0.0%	100.0%	100.0%	0.0%	0.0%	100.0%	100.0%	0.0%	0.0%	100.0%
Fd	MinAU	113	3	1	117	100	0	0	100	37	0	0	37
	%	96.6%	2.6%	0.9%	100.0%	100.0%	0.0%	0.0%	100.0%	100.0%	0.0%	0.0%	100.0%
Tp	MinAU	183	7	1	191	219	1	0	220	98	2	0	100
	%	95.8%	3.7%	0.5%	100.0%	99.5%	0.5%	0.0%	100.0%	98.0%	2.0%	0.0%	100.0%
Td	MinAU	191	31	9	231	180	26	7	213	81	21	4	106
	%	82.7%	13.4%	3.9%	100.0%	84.5%	12.2%	3.3%	100.0%	76.4%	19.8%	3.8%	100.0%
A	MinAU	6	6	1	13	3	5	0	8	3	7	7	17
	%	46.2%	46.2%	7.7%	100.0%	37.5%	62.5%	0.0%	100.0%	17.6%	41.2%	41.2%	100.0%
C	MinAU	10	7	10	27	7	2	1	10	3	4	1	8
	%	37.0%	25.9%	37.0%	100.0%	70.0%	20.0%	10.0%	100.0%	37.5%	50.0%	12.5%	100.0%
NC	MinAU	1	0	0	1	1	0	0	1	1	0	0	1
	%	100.0%	0.0%	0.0%	100.0%	100.0%	0.0%	0.0%	100.0%	100.0%	0.0%	0.0%	100.0%
MTp	MinAU	68	9	13	90	149	54	17	220	62	16	8	86
	%	75.6%	10.0%	14.4%	100.0%	67.7%	24.5%	7.7%	100.0%	72.1%	18.6%	9.3%	100.0%
MTd	MinAU	63	4	15	82	122	45	15	182	52	11	8	71
	%	76.8%	4.9%	18.3%	100.0%	67.0%	24.7%	8.2%	100.0%	73.2%	15.5%	11.3%	100.0%
MPp	MinAU	2	0	0	2	16	0	0	16	14	0	0	14
	%	100.0%	0.0%	0.0%	100.0%	100.0%	0.0%	0.0%	100.0%	100.0%	0.0%	0.0%	100.0%
MPd	MinAU	5	0	0	5	11	0	0	11	14	0	0	14
	%	100.0%	0.0%	0.0%	100.0%	100.0%	0.0%	0.0%	100.0%	100.0%	0.0%	0.0%	100.0%

PH1	MinAU	18	3	7	28	2	8	9	19	6	1	12	19
	%	64.3%	10.7%	25.0%	100.0%	10.5%	42.1%	47.4%	100.0%	31.6%	5.3%	63.2%	100.0%
PH2	MinAU	7	0	0	7	2	0	0	2	1	0	5	6
	%	100.0%	0.0%	0.0%	100.0%	100.0%	0.0%	0.0%	100.0%	16.7%	0.0%	83.3%	100.0%
PH3	MinAU	2	1	0	3	-	-	-	-	0	0	2	2
	%	66.7%	33.3%	0.0%	100.0%	-	-	-	-	0.0%	0.0%	100.0%	100.0%
Total	MinAU	1392	199	184	1775	1678	287	252	2217	888	155	116	1159
	%	78.4%	11.2%	10.4%	100.0%	75.7%	12.9%	11.4%	100.0%	76.6%	13.4%	10.0%	100.0%
Neonatal specimens excluded; Loose teeth included in 'MD'													

Table 7.5: Sheep/goat, sheep and goat anatomical element distribution (MinAU).

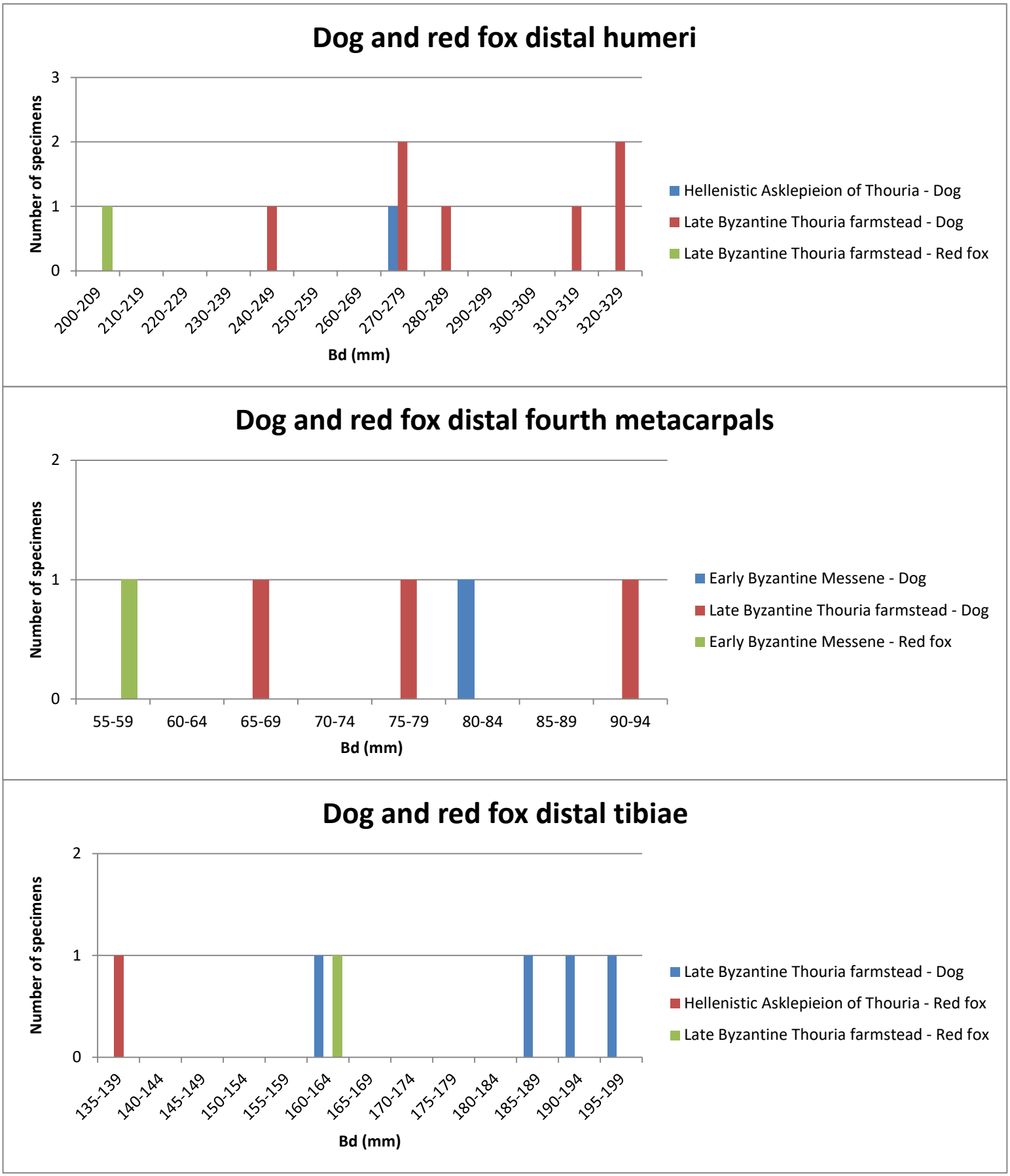


Figure 7.2: Comparison of the distribution of distal breadth (Bd) of the three studied sites for dog and red fox fused distal humeri, fourth metacarpals and tibiae.

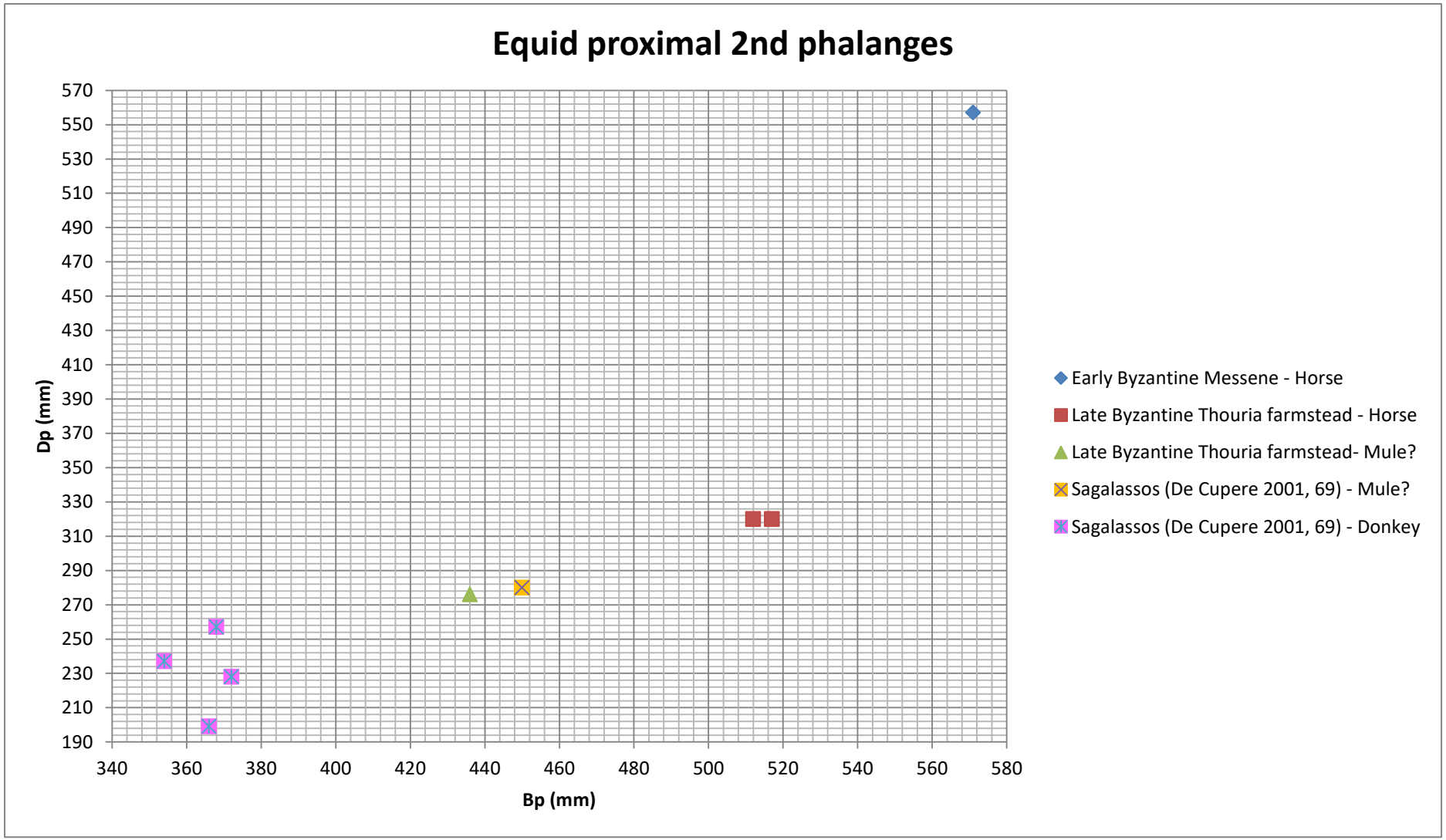


Figure 7.3a: Comparison of the greatest breadth of the proximal epiphysis (Bp) versus the greatest depth of the proximal epiphysis (Dp) of the equid 2nd phalanges of the studied sites and Roman – Early Byzantine Sagalassos. The two horse specimens from the Late Byzantine Thouria farmstead belong to the same individual, the skeleton of which was found relatively complete.

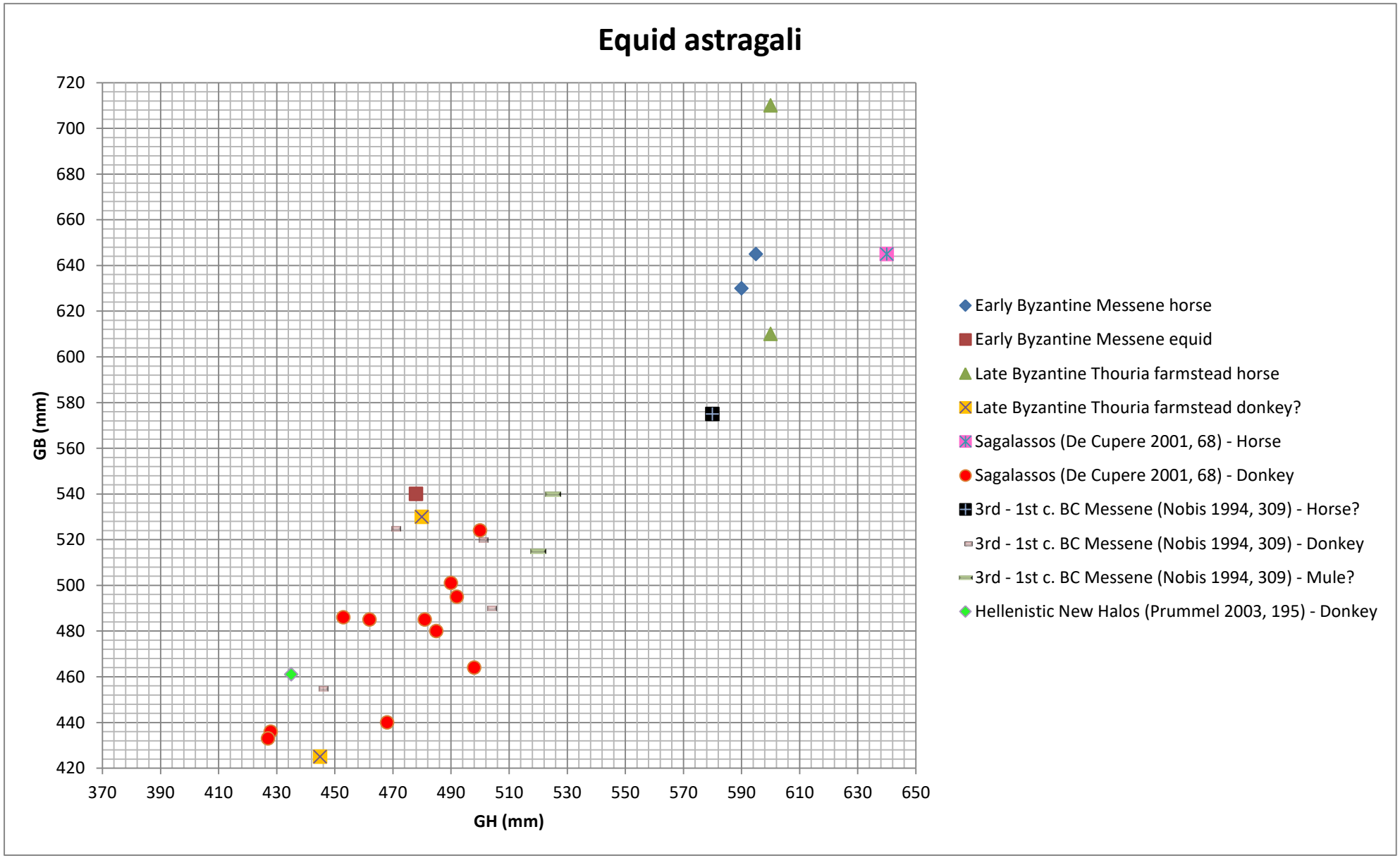


Figure 7.3b: Comparison of the greatest height (GH) versus the greatest breadth (GB) of the equid astragali of the studied sites and a number of other contemporary assemblages. The two horse astragali from the Late Byzantine Thouria farmstead belong to the same individual, the skeleton of which was found relatively complete.

Figure 7.4: Left distal radius epiphysis of the Late Byzantine Thouria farmstead mule (photo by the author). The arrow points to the sulcus characteristic of both donkeys and mules (Peters 1998).

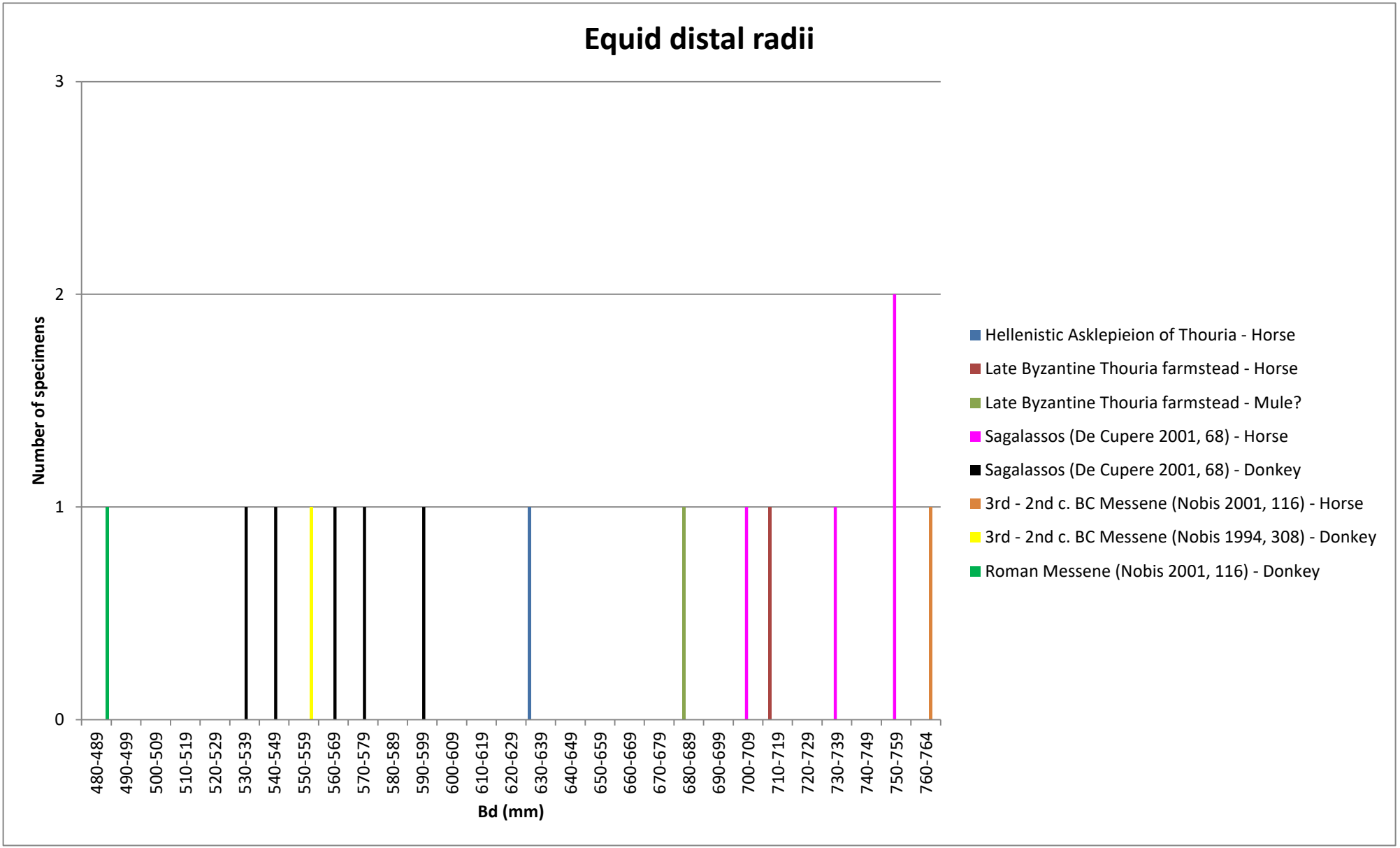


Figure 7.5: Comparison of the distribution of the greatest breadth of the distal epiphysis (Bd) of equid radii from my studied sites and Roman – Early Byzantine Sagalassos. The horse specimen from the Late Byzantine Thouria farmstead belongs to the buried individual, the skeleton of which was found relatively complete.

Cattle

No neonatal cattle specimens were identified in any of the three assemblages. The existence of neonatal specimens of smaller taxa (pigs, sheep/goats and dogs) makes recovery bias an unlikely cause for their complete absence in cattle. Off-site slaughter and/or discard could be contributing factors but more likely cattle were not normally culled at such a young age because they were too valuable, while calves are also less vulnerable to infant mortality than lambs and kids (which are much smaller) and, especially, piglets (which are born relatively 'prematurely'). In the case of the Hellenistic Asklepieion of Thouria, therefore, sacrifice of newborn calves seems improbable, consistent with Rosivach's (1994, 91) observation that calves (in contrast to lambs, kids and piglets) are not mentioned in the surviving Classical Attic sacrificial calendars.

Management of cattle had three potential goals: meat, milk and traction or a combination of thereof. To determine which products were targeted at the sites under study, mortality profiles are constructed based on epiphyseal fusion of postcranial elements and on eruption and wear of mandibular cheek teeth. Various methodological and theoretical complexities are discussed in detail in Chapter 4 and thus only data analysis is explored in this section.

Table 7.6 presents the epiphyseal fusion evidence for post-neonatal postcranial elements in MinAU, which suggests that most individuals survived well past their first year of life at all three sites. The relatively high percentage of deaths before 7-10 months at the Late Byzantine Thouria farmstead might, in isolation, be considered an artefact of small sample size, but epiphyseal fusion data for pigs and sheep/goats similarly suggest a high percentage of early deaths at the Late Byzantine Thouria farmstead. Thereafter, most cattle ostensibly died as adults at Early Byzantine Messene, with younger mortality at the Hellenistic Asklepieion of Thouria and especially theatre site. It must be recalled, however, that unfused elements, and thus young deaths, must be underrepresented to at least some degree due to recovery and survival bias.

Table 7.7 and Figure 7.6 display the mortality profiles for cattle per site based on mandibular cheek tooth eruption and wear stages (MinAU). The sample size is even smaller than that for epiphyseal fusion, for Early Byzantine Messene especially, and results must be treated with caution, not least since few mandibles were complete and most data come from incomplete specimens and loose teeth[80]. As with the epiphyseal fusion data, however, the picture that emerges is of mainly adult deaths at Early Byzantine Messene and of younger mortality at the Hellenistic Asklepieion of Thouria and especially theatre.

Mortality profiles for cattle, based on epiphyseal fusion and tooth eruption and wear, indicate that the species was primarily exploited for meat rather than milk at the two Thouria sites as most deaths occur from the time animals reach what might be considered an optimum meat weight, in their fourth year at the Hellenistic Asklepieion of Thouria and from the second year onwards at the theatre. It is hotly disputed (Chapter 4) whether, to maximise milk yield for human use, calves should be slaughtered within a few weeks of birth or at 6-9 months of age (at the end of the lactation period). In either case,

[80] 24.1% (Early Byzantine Messene), 34.7% (Hellenistic Asklepieion of Thouria) and 42.9% (Late Byzantine Thouria farmstead) of the cattle mandibles and loose teeth were initially assigned to a single eruption and wear stage. On the basis of these precisely aged specimens, the rest were then proportionally assigned to a single stage as per Payne (1973).

however, evidence for first-year cattle deaths is scarce for all three of the assemblages under discussion, effectively precluding intensive dairying. Individuals surviving beyond 4 years old were most likely used as breeding stock and/or draught animals, the latter supported by traction-related pathologies detected on a number of specimens and discussed later in this section. At Early Byzantine Messene, the survival of most individuals past their fourth year of life indicates a greater emphasis on retention of adults, probably for traction as well as breeding stock. At the Hellenistic Asklepieion of Thouria, mortality suggests an emphasis on meat production but, given the sacred nature of the site, the data almost certainly do not represent an actual breeding population but rather animals selected for sacrifice and ritual feasting, whether bought by the state from breeders for use as sacrificial victims or donated by individual citizens. The Thouria theatre site, although identified as a Late Byzantine farmstead, also exhibits young mortality perhaps more suggestive of consumption than production, but it was commonplace in the Greek countryside before the widespread availability of refrigerators for cattle, and especially adult cattle, to be sold to urban butchers because they were too large to be consumed fresh or preserved in small village communities. Finally, manure would have been another by-product of cattle herding and the same is true for other domesticates as well[81].

Table 7.8 presents the frequencies of fused sexed pelves of cattle[82] from the three studied assemblages. Even though the sample is small, most of the sexed specimens belong to females, hinting at a preference for slaughtering them at an older age than males, a pattern compatible with both the use of cows for traction and breeding and the utilisation of young bulls (most likely castrated) for meat as only a few bulls (and not necessarily full adults) were needed for breeding. Of four cattle horncores, two (one male and one possible male) were identified to sex at the Late Byzantine Thouria farmstead, but horncore survivability is biased towards the more robust males and this very small sample sheds no useful light on slaughter patterns.

Even though not set in stone, there was a preference in ancient Greek religion to match the sex of the sacrificial victim to that of the recipient god (Ekroth 2014, 333-4)[83]. Epigraphic evidence offers some insight. Even though not applicable to every Asklepieion, the sacred law from the Asklepieion of Epidaurus (*IG* IV^2 1, 41, 1-4/*LSCG* 60, 18-21 – ca. 400 BC) specifies the sacrificing of bulls to the god and the other gods that share his temple and of a cow to the goddesses that share his temple. An inscription from Cos regarding public sacrifices to Asclepius also specifies a bull (*IG* II^2 974, 16 – 138-7 BC). Asclepius shared his temple in Thouria with his daughter Hygeia and she could have been the actual recipient of at least some of the cows identified on-site while male victims may have been sacrificed too young to be registered in the available sex-ratio data. In addition, one should keep in mind that uncastrated bulls

[81] A number of ancient Greek and Roman writers (e.g. Theophrastus, *De Causis Plantarum* and *Historia Plantarum*; Xenophon, *Oeconomicus*; Cato, *De Agricultura*; Columella, *Res Rustica*; Varro, *De Re Rustica*) mention the utilisation of manure. The use of manure is also mentioned in ancient Greek land leases such as *IG* II^2 2493 from the *deme* of Rhamnous in Attica and *IG* XII, 7 62 from Arcesine on Amorgos and sacred laws such as *IG* II^2 1126/*LSCG* 78 from the sanctuary of Apollo in Delphi in Phocis and *IG* V^2 3/*LSCG* 67 from the temple of Athena Alea in Tegea in Arcadia. Notably, in the latter, the manure produced by the animals grazing the land owned by the temple was actually sold. On manure, without exhausting the subject, see Alcock et al. 1994; Burford 1993, 122-4; Chandezon 2003; Forbes 2013; Halstead 2018; Isager and Skydsgaard 1992.

[82] Cattle pelves fuse at around 7-10 months of age (Silver 1969, 286). Cattle metacarpals, their distal half especially, also display sexual dimorphism but no specimens could be assigned to sex in any of the studied assemblages.

[83] Parker (2011, 134 n. 41) notes that in far more than 50% of the surviving cases, the sex of the victim matched that of the god.

were both very expensive[84] and rare in the herds as in a meat oriented economy castrated males[85] were the norm (Ekroth 2014, 334). Consequently, large numbers of bulls would have been more readily affordable for the state for public sacrifices rather than for private individuals as a thank-you offering to the god for healing them.

The biometric data set for cattle is quite small as a consequence of the fragmentation of their bones[86], and the Late Byzantine Thouria farmstead assemblage has produced by far the fewest metrical data for this species. Despite the small size of the available sample, in order to explore sex ratios, the biometric data of the sexually dimorphic fore-limb bones of cattle are analysed. Figures 7.7a and 7.7b plot a selection of measurements from the anatomical elements available. Specimens located to the far left or far right of the graphs probably represent female and male individuals respectively, with any oxen (i.e. castrated males) likely grouped along with the males, but the larger samples tend to exhibit more or less continuous distributions and of course the three sites may have supported different breeds or populations of different build. Sex and size of livestock are, after all, interlinked and often difficult if not impossible to separate (Davis et al. 2012, 1445). The detection of changes in size is even more challenging when only a single chronological phase is available for each assemblage as is the case here. Nonetheless, at the Hellenistic Asklepieion of Thouria, large specimens predominate in most cases (distal humerus, proximal radius and proximal and distal metacarpal), suggesting slaughter mainly of males. Interestingly, the same pattern is also visible in the proximal and distal metatarsal and the single specimen of distal tibia does not contradict the pattern (Figure 7.7c). Conversely, the data for metacarpal and metatarsal from Early Byzantine Messene are dominated by smaller specimens, suggesting that most adults consumed on site were female. For the Late Byzantine Thouria farmstead, biometric data are extremely scarce and no sexual selection is evident.

Finally, astragali reach adult size early in life and their biometric data are thus not very age dependent (Albarella and Payne 2005, 597; Payne and Bull 1988, 32), but are also not very sexually dimorphic (Higham 1969, 65 table 1). Figure 7.7d, which plots the greatest lateral length (GLl) against the greatest medial length (GLm) of the cattle astragali, displays the robustness of this anatomical part. If the more robust specimens in the upper right corner were attributed to males (entire or castrated) and the less robust specimens in the lower left corner to females, two astragali from Early Byzantine Messene would represent males and two others, along with all of those from the Hellenistic Asklepieion of Thouria, would represent females. This outcome, however, would contradict the previous argument that males dominate the Hellenistic Asklepieion of Thouria and may be dismissed given the low level of sexual dimorphism exhibited by cattle astragali.

A number of studies focussing on central and western Europe have shown that cattle (and also sheep and horses) of larger size than in previous periods appeared alongside the smaller-sized, native breeds during the Roman period and then disappeared with the end of Roman rule (e.g. Albarella et al. 2008; Audoin-Rouzeau 1995; Bökönyi 1974; Groot 2017; Luff 1982; MacKinnon 2010; MacKinnon 2015; Peters

[84] On the prices of sacrificial victims, see van Straten (1995, 175-86).

[85] Conversely, according to Aristotle (*Historia Animalium* 632a), bulls were preferably castrated when they were one year old. Castration at an older age was also possible although the animals would be inferior to the ones castrated early.

[86] The first and second phalanges, which tend to survive complete, have provided rich biometrical data. However, they have been excluded from biometric analysis as no distinction between fore- and hind-foot specimens was attempted.

1998, 47-59; Rizzetto et al. 2017; Trentacoste et al. 2021; Valenzuela-Lamas and Albarella 2017). Several of these studies demonstrate size increase in terms of withers height (cf. Boessneck 1956), but this was not estimated here as only four complete cattle long bones (sex unknown) were retrieved, a metacarpal from the Hellenistic Asklepieion of Thouria and a radius, metacarpal and metatarsal from the Late Byzantine Thouria farmstead. Using literary evidence and zooarchaeological studies from pre-Roman sites with contacts with Greece, Kron (2002, 65-9) maintains that cattle (and sheep) size improvements were actually initiated by the ancient Greeks and continued by the Romans. Unfortunately, zooarchaeological data from Greece itself are sparse while most of the Greek literary evidence survives through references in later Roman writers. Epirus cattle were described as larger than most. The earliest written references to them are by Aristotle (*Historia Animalium* 3.21) and his contemporary Theopompus (whose work survives in Athenaeus – *Deipnosophistae* 11.468d; F284)[87]. Thus the breed may have existed at least from the 4th c. BC, most likely from earlier still, and it may at some point have been introduced to the Peloponnese, but on present evidence this possibility must remain speculative. In addition, the gap between the Hellenistic and Early Byzantine periods in our assemblages makes the detection of possible Roman improvements and subsequent disappearance in Messenia impossible to detect based on zooarchaeological evidence alone.

Another source of evidence for the use of cattle as draught animals is a number of pathological deformations indicative of osteoarthritis and possibly related to traction (cf. Baker and Brothwell 1980, 107-34; Bartosiewicz et al. 1997). At Early Byzantine Messene, a metacarpal and four first and three second phalanges had lipping on their proximal epiphysis, while one of the second phalanges also had a deep vertical groove in the middle of its distal articulation. Moreover, one first phalanx had exostosis on its distal articular surface and a third phalanx also had lipping. Additionally, a distal metatarsal had reversed asymmetry, eburnation and grooving on its medial condyle, which was also extended, and osteophytes around the perimeter of its metaphysis[88]. Finally, a pelvis fragment of unknown sex bore signs of eburnation.

The Hellenistic Asklepieion of Thouria assemblage produced a metatarsal with osteophytes along the edge of the diaphysis, six first phalanges with lipping on their proximal epiphysis and one first phalanx with exostosis on its distal epiphysis (Figure 7.8). Of the aforementioned six first phalanges, three also had exostoses on their distal epiphysis, one had a tiny exostosis on its distal diaphysis and another bore a thick extension on part of its distal epiphysis. Moreover, lipping was recorded on the proximal epiphysis of seven second phalanges while another second phalanx had lipping on its proximal epiphysis and exostosis on its diaphysis. A ninth second phalanx had extreme lipping on its proximal epiphysis in addition to a disfigured medial side and exostoses on both the medial and lateral sides of its diaphysis. A final second phalanx had a small exostosis on its medial distal epiphysis and two lumps on its diaphysis.

The Late Byzantine Thouria farmstead assemblage included two first phalanges with slight lipping on their proximal and osteophytes on their distal epiphysis. Another first phalanx had slight lipping on its proximal epiphysis, while a fourth specimen just had osteophytes on its distal epiphysis.

[87] A number of Roman writers also make reference to the large size of the Epirus cattle (e.g. Aelian – *De Natura Animalium* 12.11; Pliny the Elder – *Naturalis Historia* 8.176) while others write of their superiority in comparison to other breeds (e.g. Varro – *De Re Rustica* 2.5.10)

[88] The same bone also had a lump (ca. 1.5x1.5 cm) of low height on the distal medial half of its posterior diaphysis (just next to the foramen nutricium).

In addition to the above, a number of pathologies unrelated to traction were also detected. At Early Byzantine Messene, a distal femur presented a bony growth in the area of the tuberosity, a proximal metacarpal had a lumpy posterior surface, a proximal metatarsal had a barely noticeable lump on its proximal anterior diaphysis while another proximal metatarsal had signs of bone inflammation causing thickening of its diaphysis. At the Hellenistic Asklepieion of Thouria, a mandible had indentations on its ventral and lateral sides while another had a socket from which a tooth's root was possibly protruding, two lumbar vertebrae had a tilted spinous process and a rib fragment and a metatarsal were swollen. At the Late Byzantine Thouria farmstead, a mandible had inflammation on its buccal side near the third premolar while a pelvis had inflammation on its ischium.

Although other factors such as age, sex, environment and inherited traits (Bartosiewicz et al. 1997, 62-72) may have caused the formation of the aforementioned traction-related pathologies, contemporary literary and iconographic evidence confirms the use of cattle as draught animals in Hellenistic – Byzantine Greece and make their absence from Messene and Thouria highly improbable. It is also unlikely to be fortuitous that pathological specimens in cattle are dominated by those typical of traction stress, whereas pathological specimens in sheep, goat and pigs are anatomically much more diverse. The use of equids for traction is also well documented in written sources but their presence is modest at Messene and Thouria while the number of specimens with osteoarthritic symptoms is limited to a horse[89] first phalanx with lipping from Early Byzantine Messene.

In summary, mortality profiles based on epiphyseal fusion and mandibular cheek tooth eruption and wear point to a concentration at the Hellenistic Asklepieion of Thouria and theatre on consumption of young cattle, slaughtered at the optimum age for meat production, whereas at Early Byzantine Messene most cattle were kept into adulthood, probably as both breeding and draught animals. The latter suggestion is supported by the identification of traction-related pathologies on a number of bones from all three sites, but especially Early Byzantine Messene. Although sex data are limited, the available sample again points to the retention of adult cows for traction and breeding, especially at Early Byzantine Messene, and the slaughter of young bulls for meat, especially at the Hellenistic Asklepieion of Thouria. The dominance of young bulls at the Hellenistic Asklepieion of Thouria suggests the selective slaughter of excess bulls, not needed for reproduction, as sacrificial victims, but also matches the sex of the worshipped divinity, the male Asclepius, further complementing the surviving epigraphic evidence mentioned earlier in this chapter. No castrates were identified within the three assemblages and, although that hardly precludes their existence (for traction, they were easier to control than bulls and stronger than cows), the available evidence for adult sex ratio is compatible with cows being of greater importance as draught animals. According to ethnographic evidence from pre-modern small-scale farmers across the Mediterranean, although cows were less powerful draught animals than oxen and horses, they were cheaper to maintain and so generally favoured by small-scale arable farmers (Halstead 2014, 56).

[89] The phalanx was identified to species solely through biometric comparison with specimens from other published assemblages.

Early Byzantine Messene						
	Unfused*		Fused		Indeterminate	Total
Fusion stages	MinAU	%	MinAU	%	MinAU	MinAU
7-10 months	0	0.0%	20	100.0%	23	43
18 months	6	4.4%	131	95.6%	113	250
24-36 months	11	23.4%	36	76.6%	87	134
36-48 months	17	47.2%	19	52.8%	270	306
Hellenistic Asklepieion of Thouria						
	Unfused*		Fused		Indeterminate	Total
Fusion stages	MinAU	%	MinAU	%	MinAU	MinAU
7-10 months	2	7.4%	25	92.6%	17	44
18 months	12	12.9%	81	87.1%	88	181
24-36 months	29	42.6%	39	57.4%	114	182
36-48 months	35	71.4%	14	28.6%	257	306
Late Byzantine Thouria farmstead						
	Unfused*		Fused		Indeterminate	Total
Fusion stages	MinAU	%	MinAU	%	MinAU	MinAU
7-10 months	4	26.7%	11	73.3%	9	24
18 months	9	20.5%	35	79.5%	46	90
24-36 months	15	46.9%	17	53.1%	31	63
36-48 months	21	80.8%	5	19.2%	93	119
Neonatal specimens excluded * Includes unfused epiphyses, unfused diaphyses, fusing specimens and specimens recorded as “young”						

Table 7.6: Postcranial epiphyseal fusion evidence for post-neonatal cattle mortality per site (MinAU). Fusion stages follow Silver (1969), with 7-10 months including fusion of SC and PE; 18 months including fusion of Hd, Rp, PH1p and PH2p; 24-36 months including fusion of Td and MPd; 36-48 months including fusion of Hp, Rd, Up, Fp, Fd, Tp and C.

STAGE	Definition	Suggested age	Early Byzantine Messene		Hellenistic Asklepieion of Thouria		Late Byzantine Thouria farmstead	
			MinAU	%	MinAU	%	MinAU	%
1	dP4 unworn	0-1 months	0	0.0%	0	0.0%	0	0.0%
2	dP4 worn, M1 unworn	1-8 months	0	0.0%	0	0.0%	0	0.0%
3	M1 worn, M2 unworn	8-18 months	0	0.0%	7	7.2%	0	0.0%
4	M2 worn, M3 unworn	18-30 months	0	0.0%	7	7.2%	3	8.6%
5	M3 worn, M3.3 unworn	30-36 months	6	11.1%	11	11.2%	9	25.7%
6	M3.3 worn, P4 unworn	36-40 months	0	0.0%	0	0.0%	11	31.4%
7	P4 worn, M3 Grant stage g-k	40-50 months	4	7.4%	56	57.1%	8	22.9%
8	M3 ≥ Grant stage l	>50 months	44	81.5%	17	17.3%	4	11.4%
		Total	54	100.0%	98	100.0%	35	100.0%
Multi-staged mandibles proportionally assigned to single stages following Payne (1973)								

Table 7.7: Frequencies of cattle mandibles per eruption and wear stage from the three studied assemblages (MinAU).

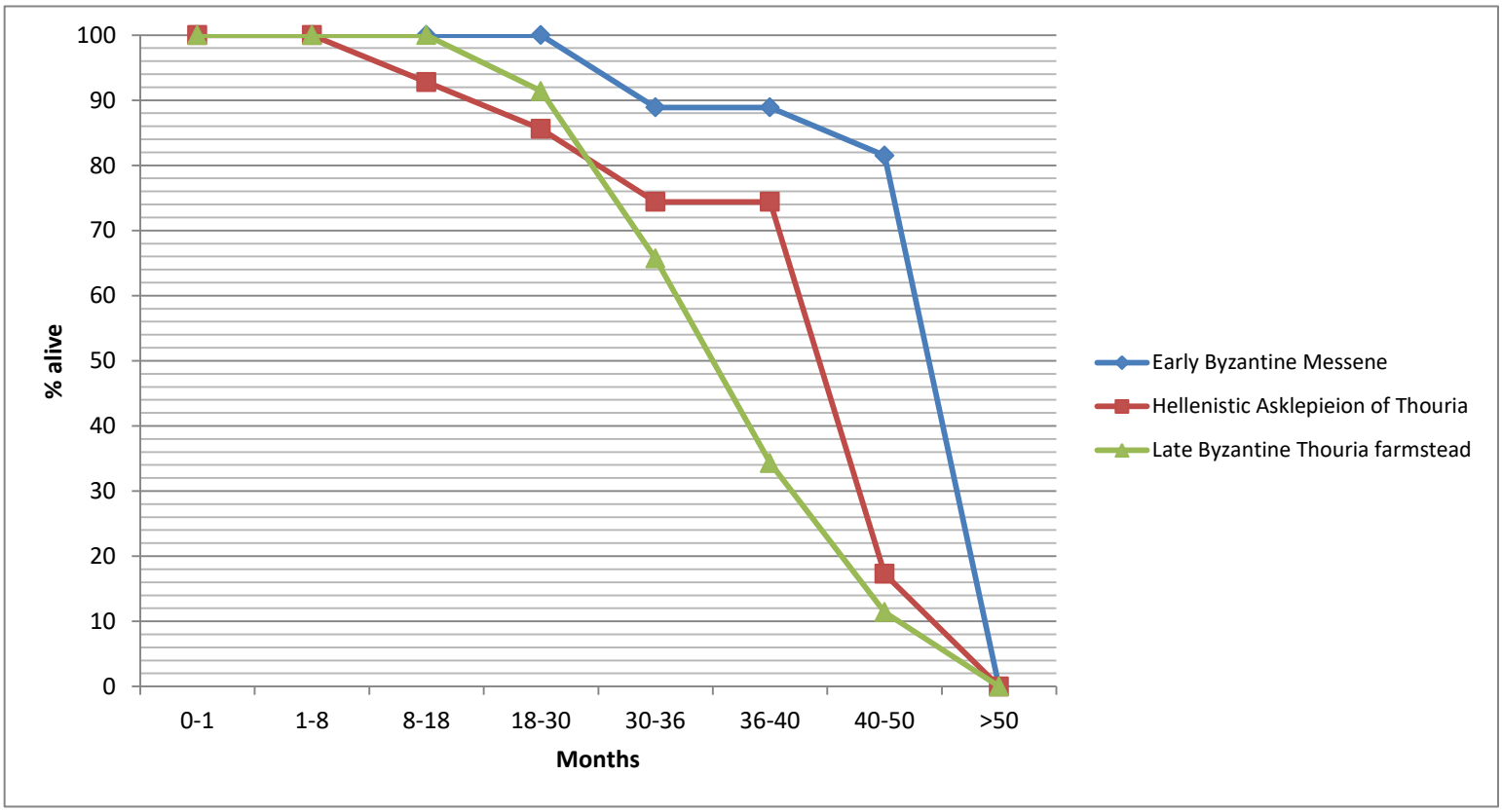


Figure 7.6: Comparison of cattle cumulative age curves in the three studied assemblages based on mandibular cheek tooth eruption and wear (MinAU).

Sex	Early Byzantine Messene		Hellenistic Asklepieion of Thouria		Late Byzantine Thouria farmstead	
	MinAU	%	MinAU	%	MinAU	%
Indeterminate	17	-	15	-	9	-
Female	5	100.0%	10	71.4%	4	57.1%
Male	0	0.0%	3	21.4%	3	42.9%
Possible female	0	0.0%	0	0.0%	0	0.0%
Possible male	0	0.0%	1	7.2%	0	0.0%
Neonatal specimens excluded						

Table 7.8: Frequencies of cattle fused sexed pelves from the three studied assemblages (MinAU). %s calculated excluding indeterminate specimens.

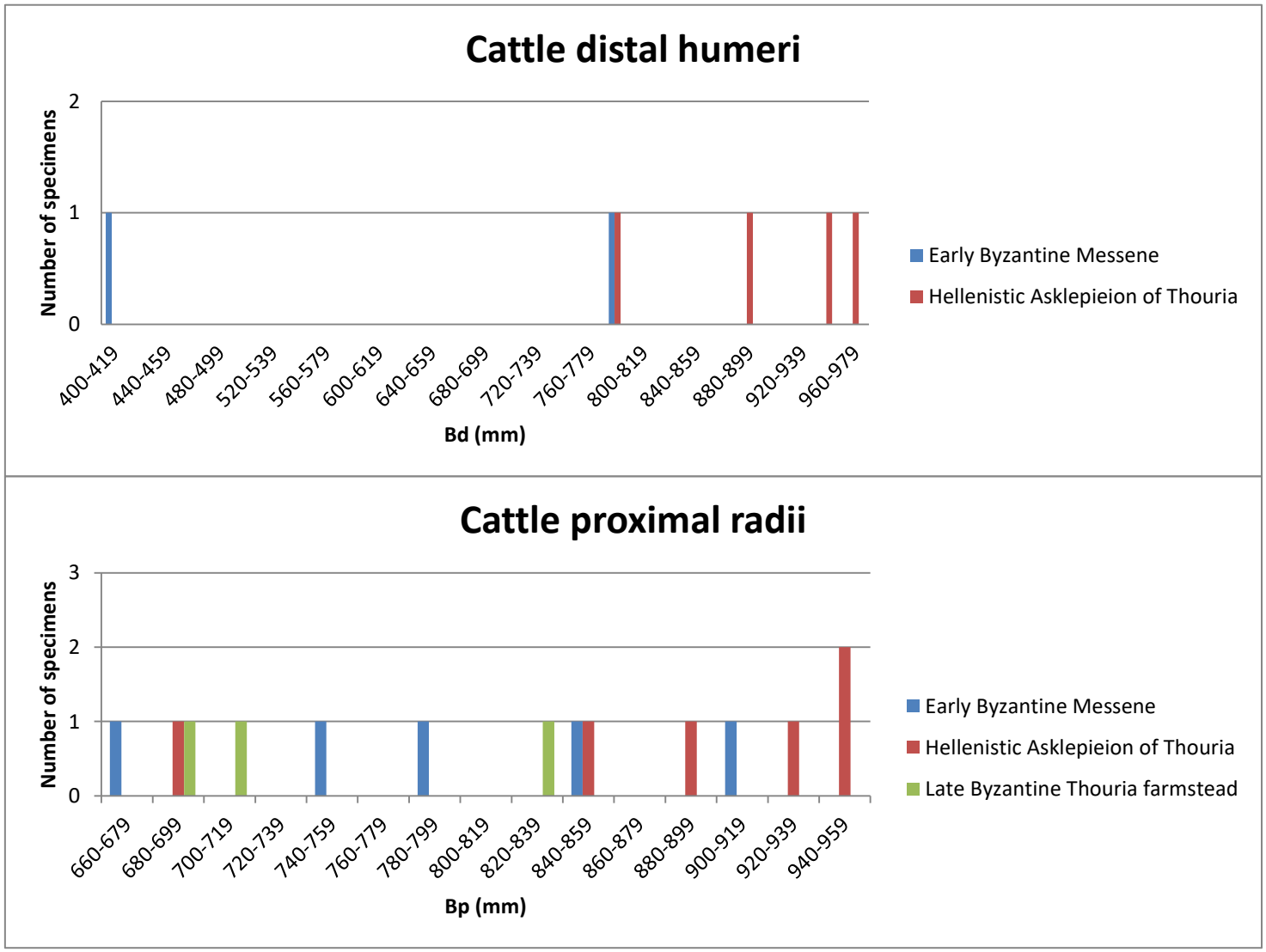


Figure 7.7a: Comparison of the distribution of selected measurements of the three studied sites for cattle fused distal humeri and proximal radii.

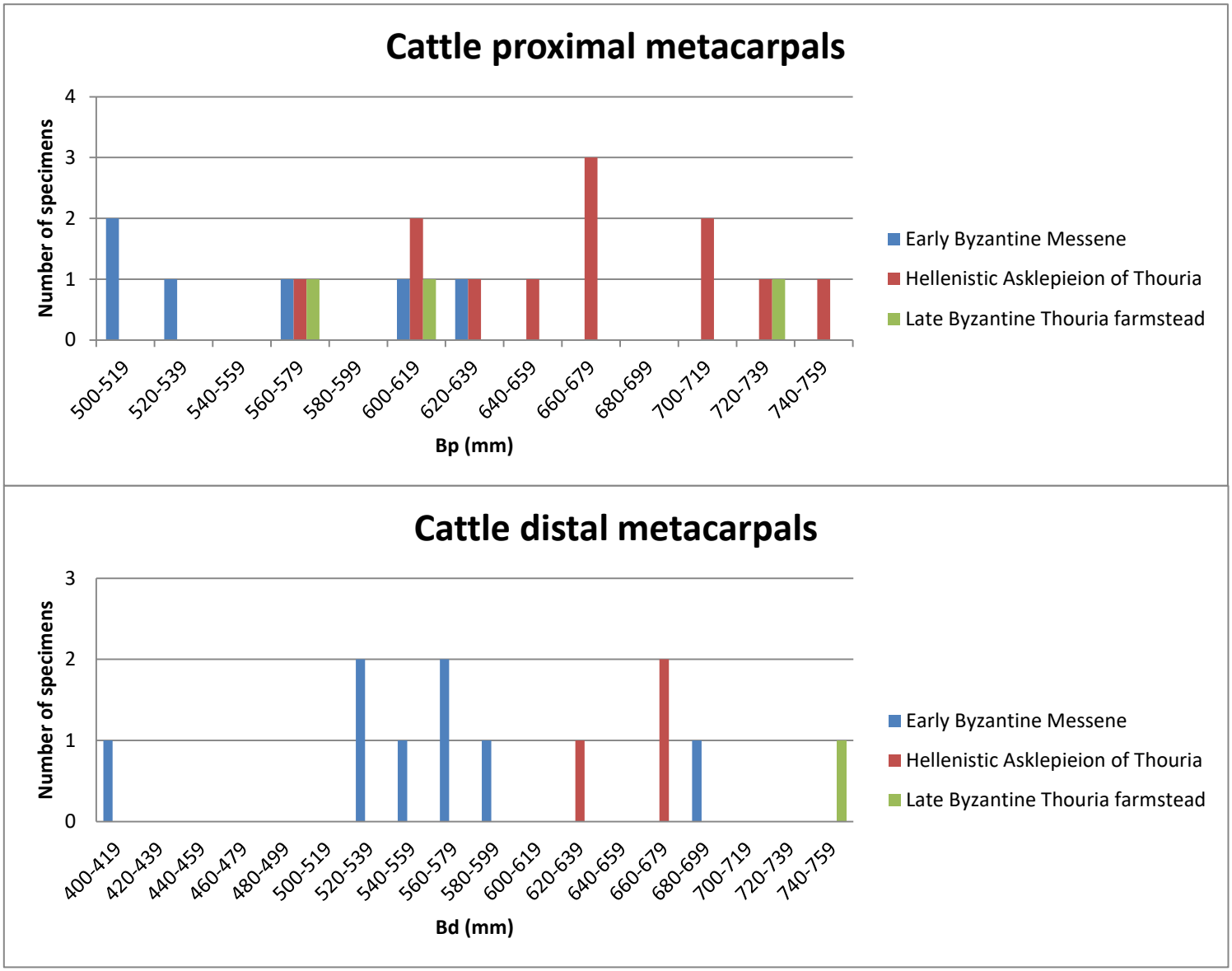
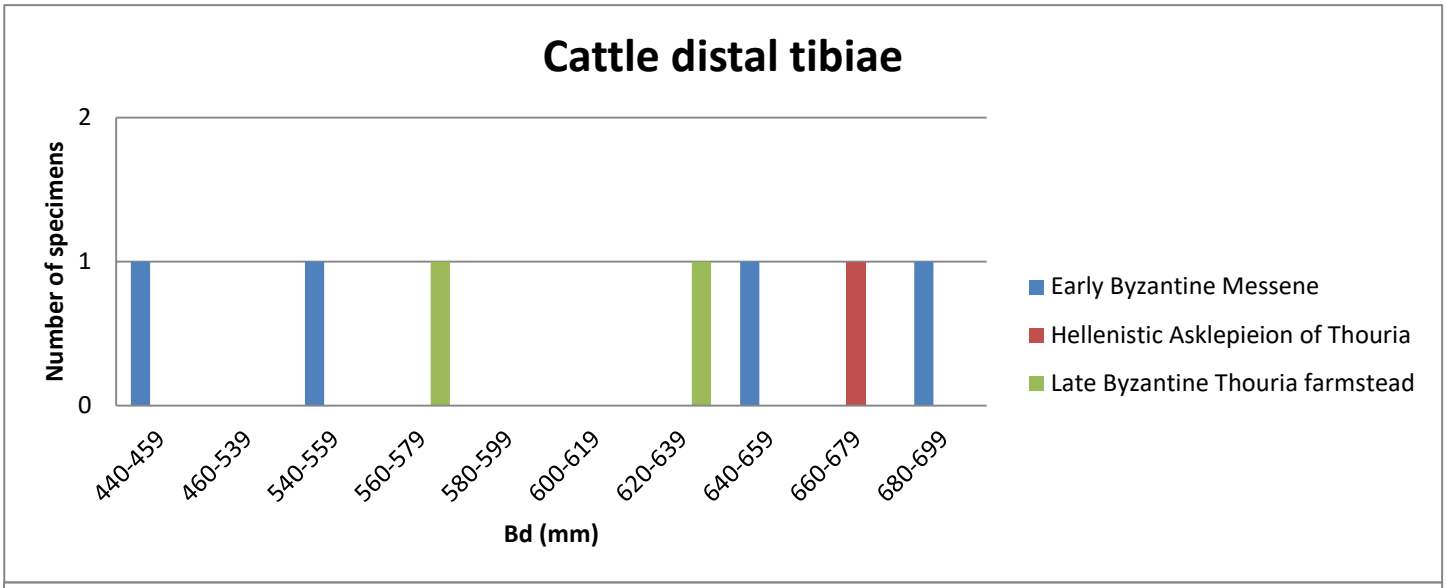
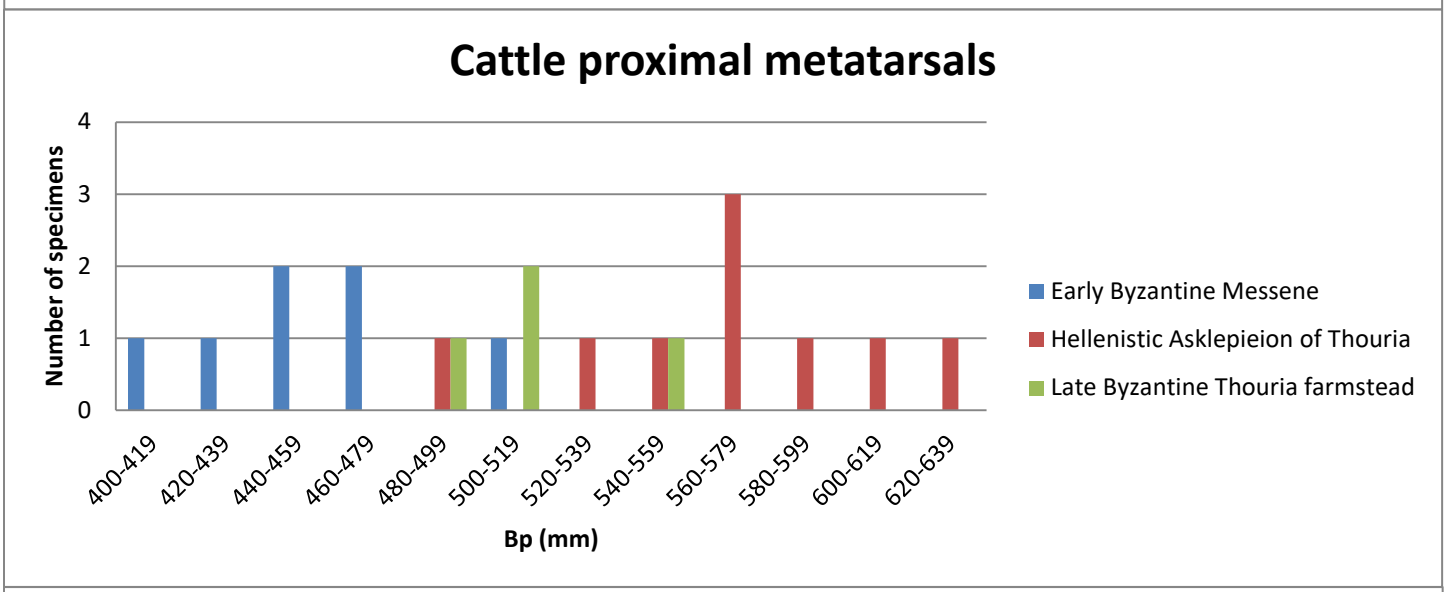


Figure 7.7b: Comparison of the distribution of selected measurements of the three studied sites for cattle fused proximal and distal metacarpals.





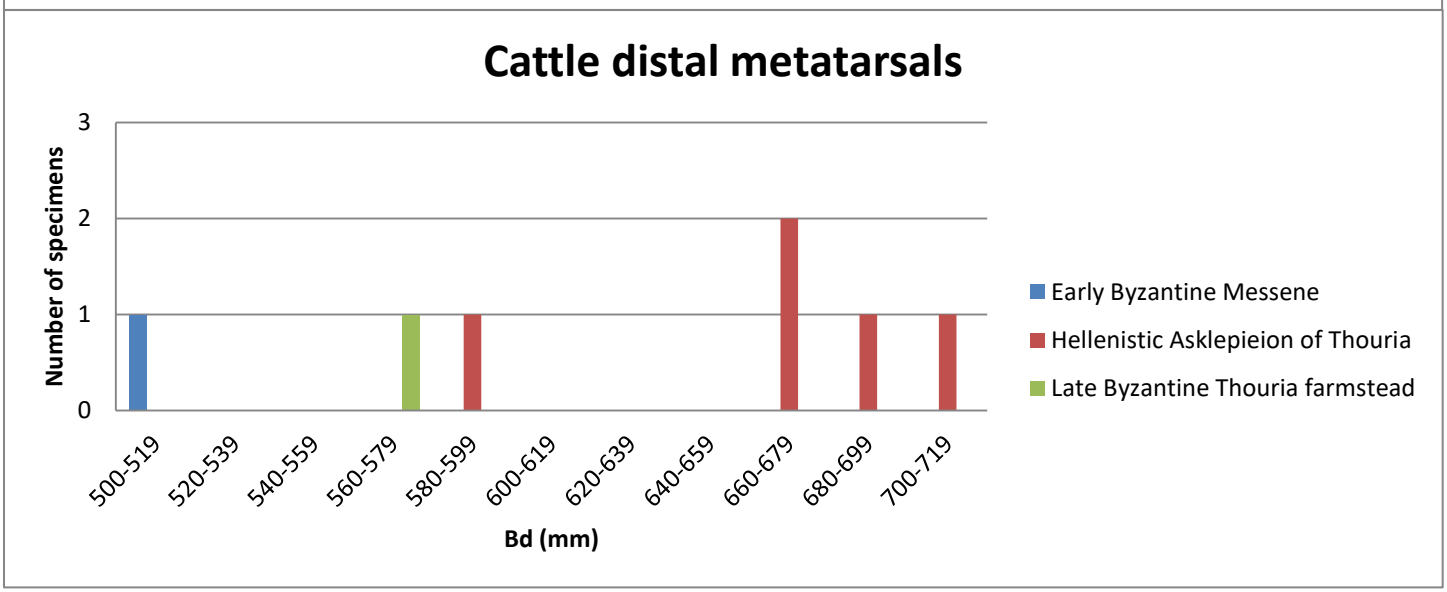


Figure 7.7c: Comparison of the distribution of selected measurements of the three studied sites for cattle fused distal tibiae and proximal and distal metatarsals.

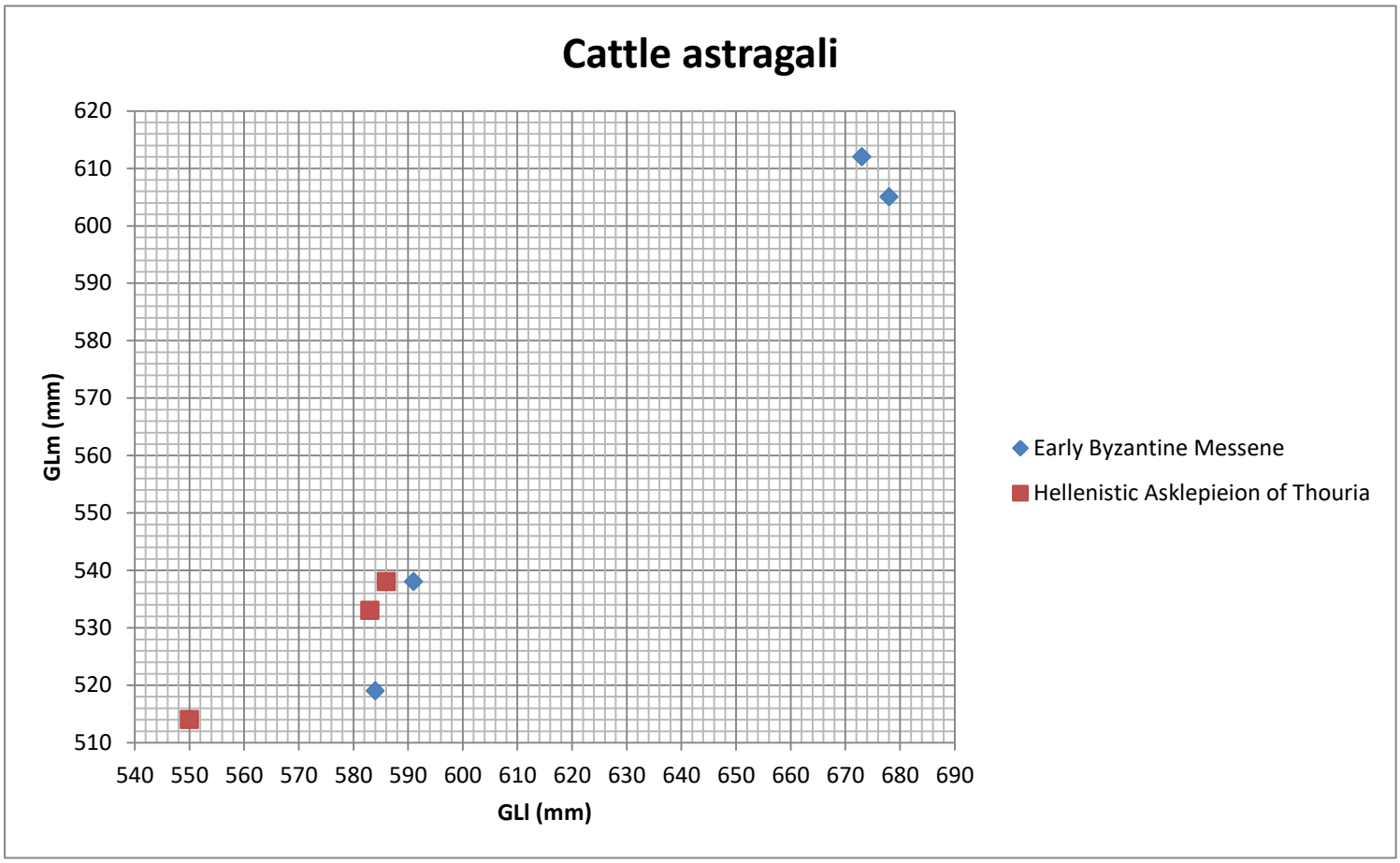


Figure 7.7d: Comparison of the greatest lateral length (GLl) versus the greatest medial length (GLm) of the cattle astragali of the studied sites.

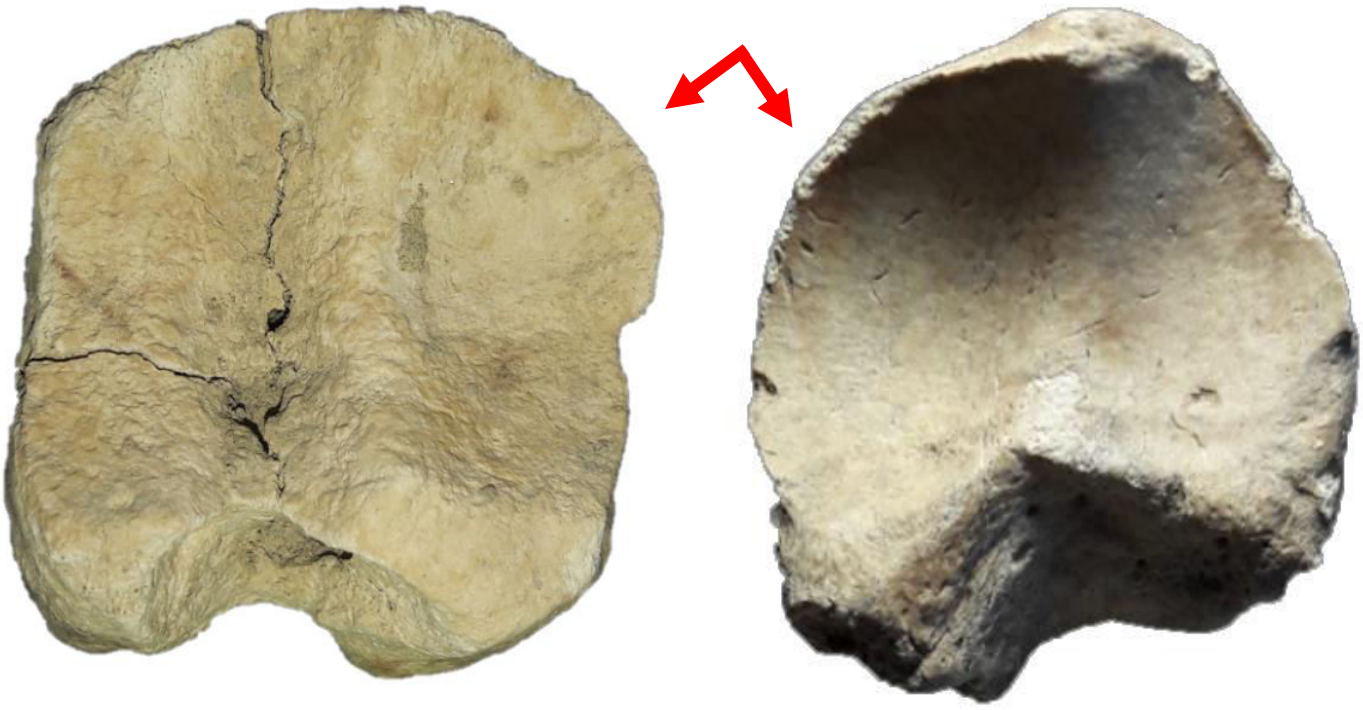


Figure 7.8: Cattle proximal first (left) and second (right) phalanx with lipping (Hellenistic Asklepieion of Thouria).

Pigs

Rearing of pigs inevitably targeted just meat production as the species does not offer any secondary products. A small percentage of neonatal specimens was identified in all three assemblages (Table 7.9). Pigs give birth to much larger litters of significantly less developed young than cattle, sheep and goats and are thus subject to higher natural infant mortality. Thus, the presence of neonatal individuals on-site can potentially be attributed to natural deaths around birth. However, a neonatal humerus from the Late Byzantine Thouria farmstead assemblage bore chop marks indicating that at least some neonatal individuals were indeed consumed. Ideally, it would have been more advantageous to delay consumption of all piglets until they approached adult body weight, but poorer households, perhaps representing the majority of the human population, cannot have been able to raise the whole litter and so must have slaughtered or sold surplus offspring (cf. Halstead and Isaakidou 2011 for ethnographic evidence of the latter). Of course, the level of consumption of very young piglets must have been distorted by recovery bias. Moreover, butchery is less likely to leave detectable traces on neonatal bones, further complicating the identification of consumed individuals. The corpus of Greek sacred laws, however, indicates that piglets were indeed sacrificed and bones of foetal and newborn piglets (and lambs) have been found in some Greek sanctuaries, apparently confirming the written accounts (Ekroth 2014, 334). For instance, Forstenpointner et al. (2005, 88) report newborn piglets at the Artemision of Ephesus. In addition, Vila (2000, 199) identified foetal or neonatal piglets at the temple of Athena Alea at Tegea and (2000, 201) found infant or neonate femurs from either piglets or lambs at the temple at Asea. Finally, a sacrificial pit at the sanctuary of Demeter and Kore on the acropolis of Mytilene on the island of Lesbos was filled with calcined foetal and perinatal pig bones (Ruscillo 2013, 187-8).

Turning to the postcranial epiphyseal fusion evidence for post-neonatal pig mortality (Table 7.10)[90], it seems that, for all three assemblages, about half of the pigs were culled in their first year and half by their third or fourth year, while those surviving past this age were very few. According to mandibular cheek tooth eruption and wear (Table 7.11 and Figure 7.9)[91], at all three sites about half of the pigs were slaughtered by some stage in their second year and half by the end of their third year. In contrast with the epiphyseal fusion data, dental evidence suggests that few pigs were slaughtered in their first year except at the Late Byzantine Thouria farmstead. A possible explanation for this discrepancy between the two lines of evidence is that epiphyseal fusion may have been delayed by early castration of male piglets, a practice ethnographically documented across the Mediterranean (cf. Albarella et al. 2007, 299; Hadjikoumis 2012, 357; Halstead and Isaakidou 2011).

The sex distribution of mandibular canines and alveoli is presented in Table 7.12. A predominance of males is evident in all three assemblages. Most of the sexed specimens (74.8% – MaxAU)[92] come from loose canines and the known recovery bias in favour of the larger males makes the resulting sex ratio unreliable. When loose canines are excluded (Table 7.13), the data sample for Early Byzantine Messene and the Late Byzantine Thouria farmstead is negligible at four and five sexed mandibles respectively. The

[90] The numbers are most definitely underestimated due to recovery loss of loose epiphyses and smaller anatomical elements.

[91] 30.3% (Early Byzantine Messene), 29.3% (Hellenistic Asklepieion of Thouria) and 25.8% (Late Byzantine Thouria farmstead) of specimens were initially assigned to a single eruption and wear stage. The rest were proportionally assigned to a single stage following Payne (1973).

[92] When all three assemblages are combined, 36 mandibles and 107 loose canines (MaxAU) where assigned to sex.

Hellenistic Asklepieion of Thouria assemblage provided 27 sexed mandibles, two thirds of which were male or possible male. Females are more underrepresented in the Hellenistic Asklepieion of Thouria than in the two 'secular' assemblages, perhaps hinting at a preference to sacrifice male individuals to the male Asclepius, a possibility also detected with cattle.

As with cattle, the fore-limbs of pigs are the most sexually dimorphic post-cranial elements in terms of biometry and their hind-limbs only moderately so (Payne and Bull 1988, 30). However, as already established for all three assemblages, a large proportion of the pig bones identified was comprised of unfused specimens. Consequently, the biometric data set for pigs is quite restricted and, as is evident in Figures 7.10a and 7.10b, both fore- and hind-limb body parts exhibit a range of sizes between small (possible female?) and large (possible male?) but with no consistent indication of either a preference towards one sex at any site or a difference in body size between sites.

All three sites exhibit the overwhelmingly young mortality typical of pigs, because of their large litter size and lack of secondary products, with little if any evidence for elderly breeding sows. A large corpus of cult-related epigraphical evidence from all over the ancient Greek world reveals that young piglets were sacrificed as preliminary victims before larger public sacrifices and as cheap victims by individuals who could not afford more expensive ones, but at the Hellenistic Asklepieion of Thouria evidence for newborn piglets is scarcer than in the other two assemblages studied here and dental evidence suggests that older piglets were overwhelmingly killed in the second rather than first half of their first year. First-year piglets, that in a secular context could have been slaughtered for consumption of fresh meat by individual households, are best represented at the Late Byzantine Thouria farmstead, while the meat of older individuals may have been destined for sausages or other types of preserved pork. Furthermore, the urban character of Early Byzantine Messene may have provided the option of larger carcasses being sold through commercial butchers, although the butchery evidence reviewed above (Chapter 6) offers no indication of this.

A small number of pathological specimens was identified in each assemblage. At Early Byzantine Messene a proximal tibia diaphysis bore a bony growth, a mandible was slightly swollen on its lingual side just below its third molar and another mandible presented alveolar bone recession at the roots of the second molar again on the lingual side. At the Hellenistic Asklepieion of Thouria, a fourth metacarpal was swollen on the junction between the diaphysis and distal epiphysis, a metatarsal had a thin projection on the posterior side of the distal epiphysis, a metapodium had slight pitting and a small raised area on the surface of the diaphysis, two deciduous second premolars had swollen roots, and a mandible had a raised and pitted bony projection posterior of its third premolar. A first phalanx from the Late Byzantine Thouria farmstead had lipping.

Finally, seventeen pig teeth from the Hellenistic Asklepieion of Thouria and thirteen teeth from the Late Byzantine Thouria farmstead exhibited enamel hypoplasia, in most cases in the form of thin lines or shallow depressions but on a single tooth from the Hellenistic Asklepieion of Thouria and two teeth from the Late Byzantine Thouria farmstead in the form of rows of pits, as a response to some kind of physiological stress (e.g. birth; weaning; food availability and quality; disease) during the period of development of the affected tooth's crown (cf. Goodman and Rose 1990 for detailed description of the condition; Dobney and Ervynck 2000, Dobney et al. 2002 and Ervynck and Dobney 1999 for pigs

specifically). As the sample size is small and the recording of the position of the enamel hypoplasia on each tooth is not consistent, no safe conclusions can be drawn.

To sum up, despite some detailed discrepancies between postcranial epiphyseal fusion and dental data, both lines of evidence indicate overwhelmingly young or young-adult mortality for pigs at all three sites, again with substantially heavier first-year mortality at the Late Byzantine Thouria farmstead. Although epigraphic evidence from other sanctuary sites documents use of very young piglets as 'cheap' sacrificial victims, those represented at the Hellenistic Asklepieion of Thouria were killed mainly in the second half of their first year or later and would have represented far more than 'token' offerings. This observation is consistent with the previous suggestion, based on anatomical representation and traces of burning, that the Hellenistic Asklepieion of Thouria assemblage represents the remains of ritual dining rather than sacrifices *per se*. Although the evidence for sex ratio comes primarily from loose canines, and so is heavily influenced by recovery bias in favour of males, the dominance of males is particularly marked at the Hellenistic Asklepieion of Thouria and so may well also reflect the association of the sex of the sacrificial victims with that of the worshipped god. Finally, the sparse biometric data and few specimens with traces of enamel hypoplasia and other pathological conditions shed no useful light on patterns of husbandry or consumption of pigs at the three sites under study.

Early Byzantine Messene			
	Neonatal	Post-neonatal	Total
MinAU	13	644	657
%	2.0%	98.0%	100.0%
Hellenistic Asklepieion of Thouria			
	Neonatal	Post-neonatal	Total
MinAU	10	1470	1480
%	0.7%	99.3%	100.0%
Late Byzantine Thouria farmstead			
	Neonatal	Post-neonatal	Total
MinAU	19	545	564
%	3.4%	96.6%	100.0%

Table 7.9: Frequencies of pig neonatal vs. post-neonatal individuals from the three studied assemblages (MinAU).

Early Byzantine Messene						
	Unfused*		Fused		Indeterminate	Total
Fusion stages	MinAU	%	MinAU	%	MinAU	MinAU
12 months	27	47.4%	30	52.6%	89	146
24-30 months	32	64.0%	18	36.0%	47	97
36-42 months	25	96.2%	1	3.8%	252	278
Hellenistic Asklepieion of Thouria						
	Unfused*		Fused		Indeterminate	Total
Fusion stages	MinAU	%	MinAU	%	MinAU	MinAU
12 months	50	50.5%	49	49.5%	194	293
24-30 months	78	66.7%	39	33.3%	125	242
36-42 months	125	97.7%	3	2.3%	451	579
Late Byzantine Thouria farmstead						
	Unfused*		Fused		Indeterminate	Total
Fusion stages	MinAU	%	MinAU	%	MinAU	MinAU
12 months	31	67.4%	15	32.6%	71	117
24-30 months	34	77.3%	10	22.7%	43	87
36-42 months	76	98.7%	1	1.3%	139	216
Neonatal specimens excluded * Includes unfused epiphyses, unfused diaphyses, fusing specimens and specimens recorded as “young”						

Table 7.10: Postcranial epiphyseal fusion evidence for post-neonatal pig mortality per site (MinAU). Fusion stages follow Silver (1969), with 12 months including fusion of SC, Hd, Rp, PE and PH2p; 24-30 months including fusion of Td, C, MPd and PH1p; 36-42 months including fusion of Hp, Rd, Up, Fp, Fd and Tp.

STAGE	Definition	Suggested age	Early Byzantine Messene		Hellenistic Asklepieion of Thouria		Late Byzantine Thouria farmstead	
			MinAU	%	MinAU	%	MinAU	%
1	dP4 unworn	0-2 months	0	0.0%	0	0.0%	0	0.0%
2	dP4 worn, M1 unworn	2-6 months	3	9.1%	3	1.8%	11	16.7%
3	M1 worn, M2 unworn	6-12 months	0	0.0%	27	16.5%	15	22.7%
4	M2 worn, M3 unworn	12-24 months	17	51.5%	78	47.6%	33	50.0%
5	M3 worn, M3.3 unworn	24-30 months	6	18.2%	20	12.2%	6	9.1%
6	M3.3 worn, P4 unworn	30-40 months	7	21.2%	35	21.3%	1	1.5%
7	P4 worn	>40 months	0	0.0%	1	0.6%	0	0.0%
		Total	33	100.0%	164	100.0%	66	100.0%
Multi-staged mandibles proportionally assigned to single stages following Payne (1973)								

Table 7.11: Frequencies of pig mandibles per eruption and wear stage from the three studied assemblages (MinAU).

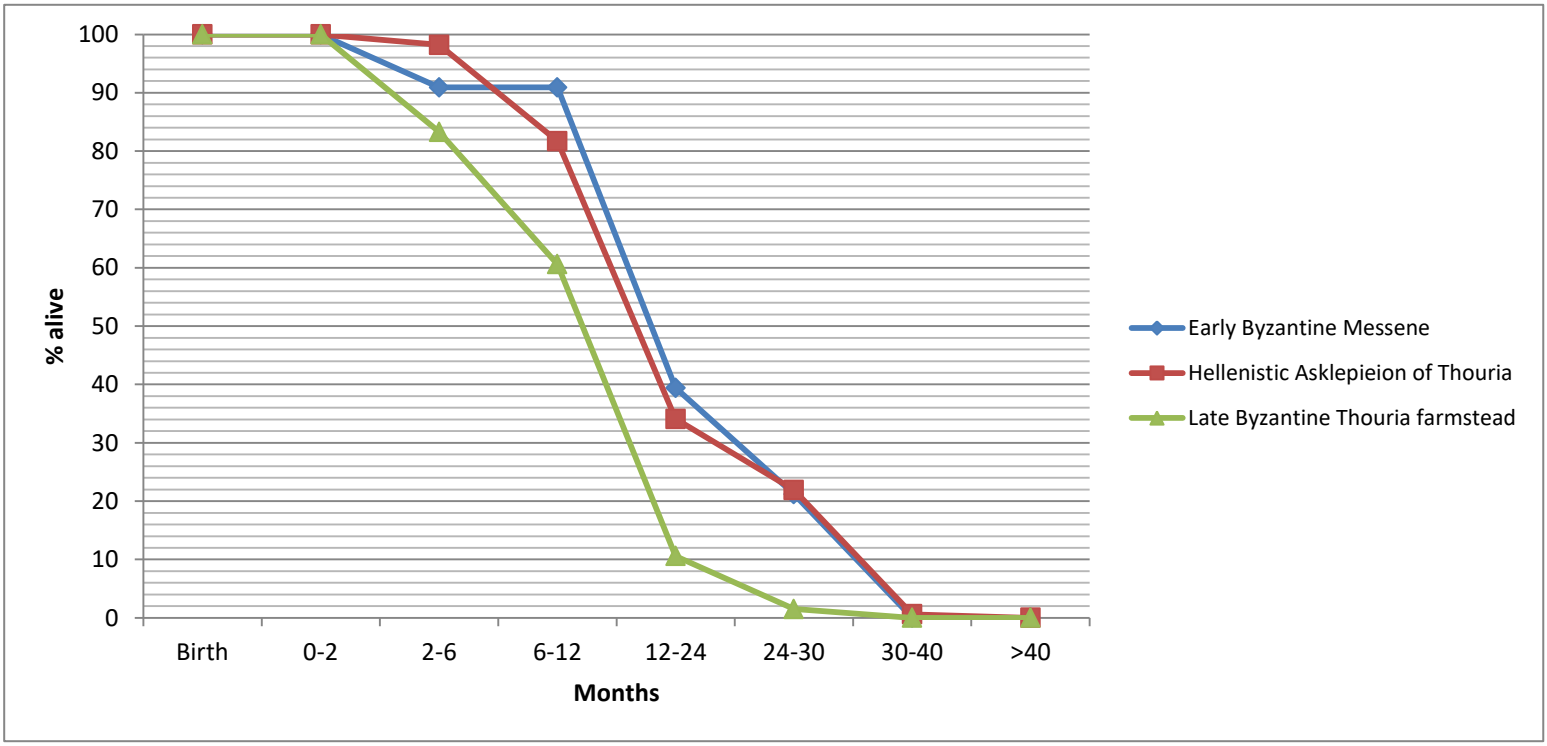


Figure 7.9: Comparison of cumulative age curves in the three studied assemblages based on mandibular cheek tooth eruption and wear (MinAU).

Sex	Early Byzantine Messene		Hellenistic Asklepieion of Thouria		Late Byzantine Thouria farmstead	
	MinAU	%	MinAU	%	MinAU	%
Indeterminate	34	-	144	-	59	-
Female	9	30.0%	14	14.4%	4	25.0%
Male	17	56.7%	67	69.1%	7	43.8%
Possible female	2	6.7%	5	5.2%	3	18.8%
Possible male	2	6.7%	11	11.3%	2	12.5%
Neonatal specimens excluded Loose canines and alveoli combined						

Table 7.12: Frequencies of pig sexed mandibular canines and alveoli from the three studied assemblages (MinAU). %s calculated excluding indeterminate specimens.

Sex	Early Byzantine Messene		Hellenistic Asklepieion of Thouria		Late Byzantine Thouria farmstead	
	MinAU	%	MinAU	%	MinAU	%
Indeterminate	19	-	95	-	31	-
Female	1	25.0%	4	14.8%	0	0.0%
Male	0	0.0%	10	37.0%	0	0.0%
Possible female	1	25.0%	5	18.5%	3	60.0%
Possible male	2	50.0%	8	29.7%	2	40.0%
Neonatal specimens and loose canines excluded						

Table 7.13: Frequencies of pig sexed mandibular alveoli from the three studied assemblages (MinAU). %s calculated excluding indeterminate specimens.

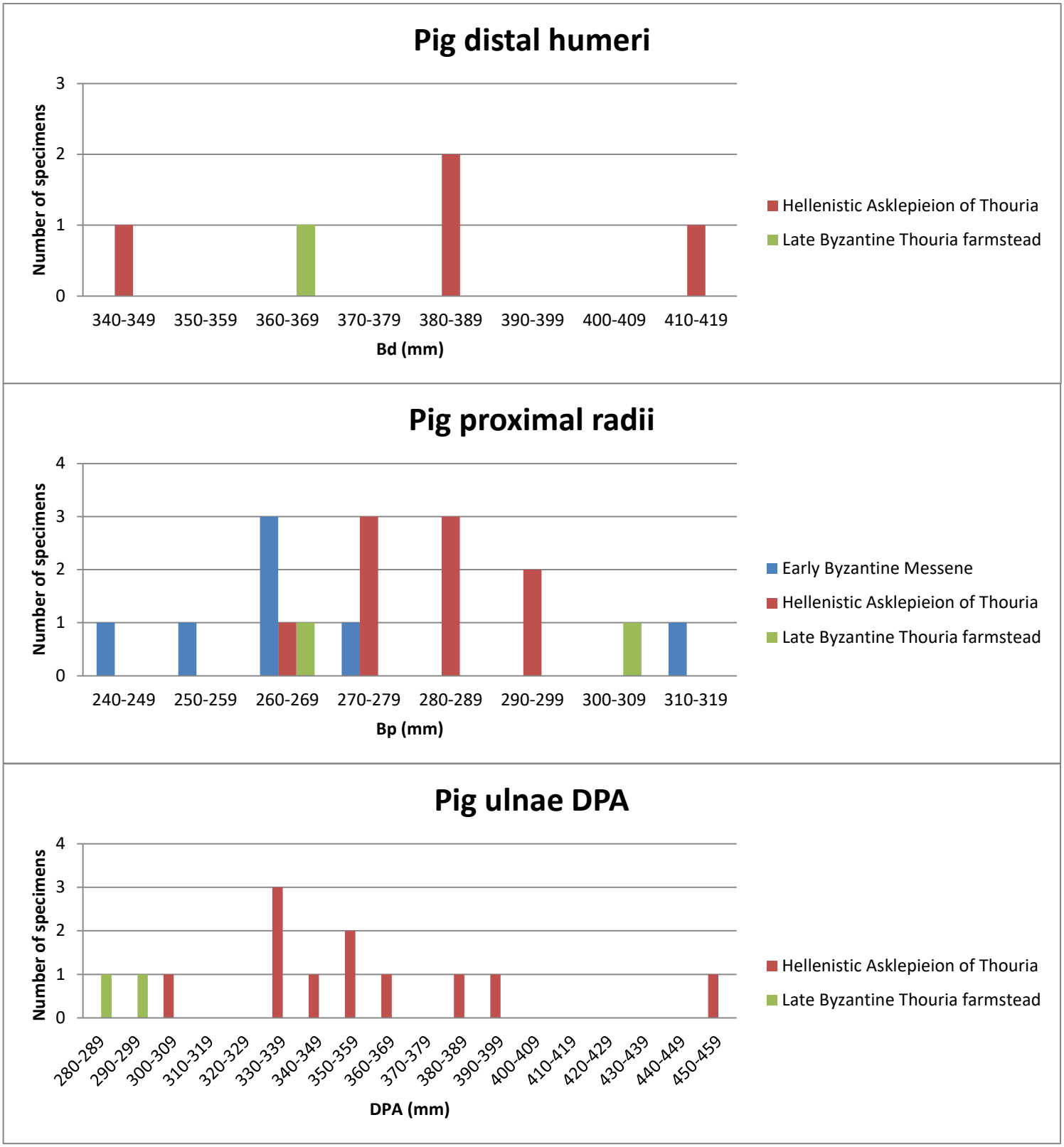


Figure 7.10a: Comparison of the distribution of selected measurements of the three studied sites for pig fused distal humeri, proximal radii and ulnae.

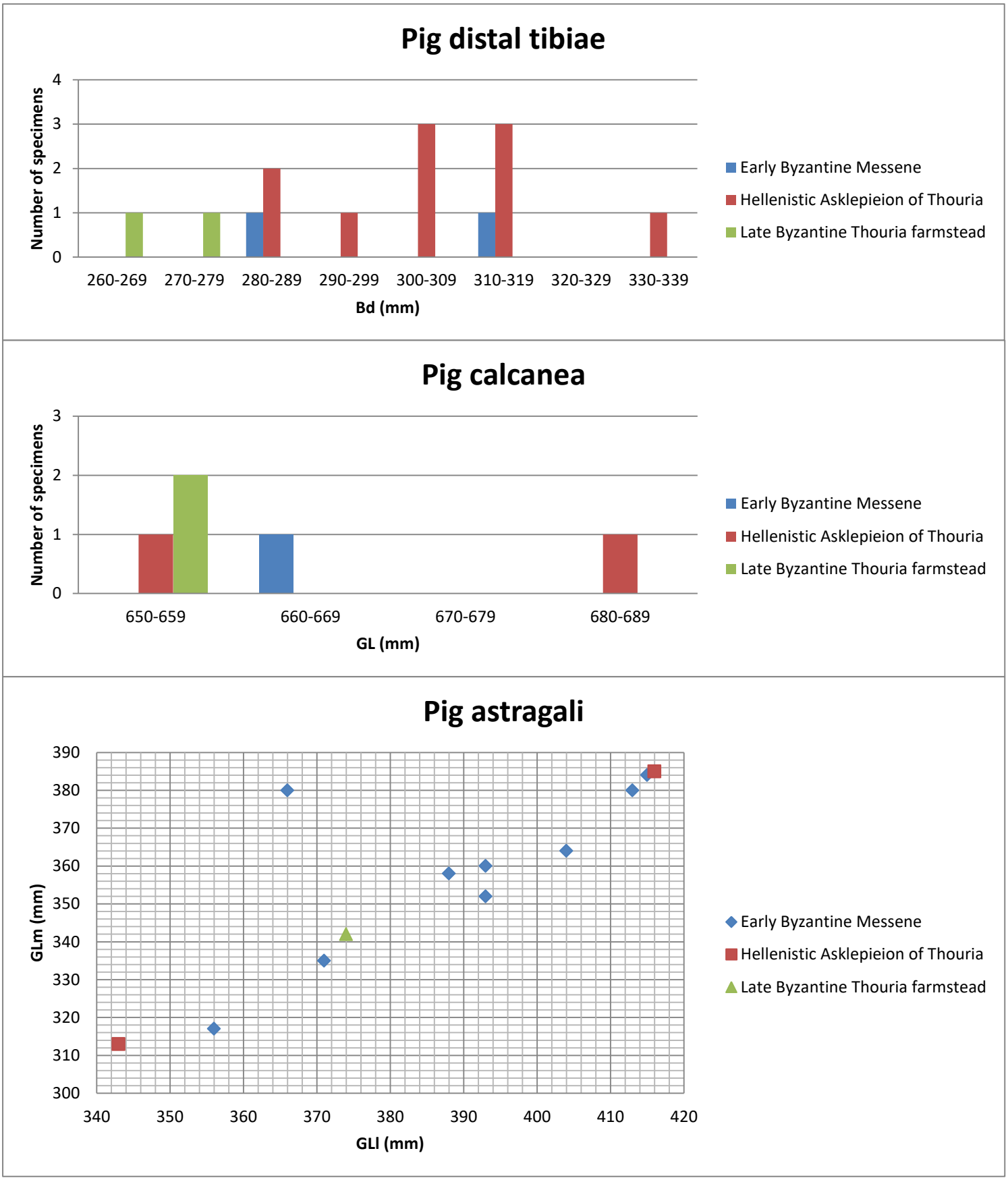


Figure 7.10b: Comparison of the distribution of selected measurements of the three studied sites for pig distal tibiae, calcanea and astragali.

Sheep and goats

Just like cattle, sheep and goats were also potentially multipurpose species used for meat, milk and fibre (sheep – wool; goats – hair). Neonatal bones were found in all three assemblages (Table 7.14) but were not identified specifically to either sheep or goat. Although neonatal specimens are likely underestimated due to recovery bias, their presence indicates that at least some sheep/goats were reared in the immediate vicinity of the sites and they were at least occasionally consumed, as a neonatal distal tibia from Early Byzantine Messene and a neonatal scapula from the Late Byzantine Thouria farmstead bear filleting marks.

Table 7.15 presents the postcranial epiphyseal fusion evidence for post-neonatal sheep/goat mortality per assemblage, combining the two taxa as unfused specimens cannot usually be identified to species. Mortality is implied of roughly 20% (Early Byzantine Messene and Hellenistic Asklepieion of Thouria) or 30% (Late Byzantine Thouria farmstead) within the first year of life, of roughly 20% (Early Byzantine Messene and Late Byzantine Thouria farmstead) or 30% (Hellenistic Asklepieion of Thouria) in the second or early third year, and of a further roughly 30% by the late third-early fourth year; those apparently surviving to full adulthood (fourth year and beyond) were a modest 30% at Early Byzantine Messene and only around 15% at the Hellenistic Asklepieion of Thouria and Late Byzantine Thouria farmstead.

Turning to mandibular cheek tooth eruption and wear, the data for each taxon are presented both for sheep+goat+sheep/goat combined (Table 7.16a and Figure 7.11), for ease of comparison with the epiphyseal fusion evidence, and for sheep and goat separately (Table 7.16b-c and Figures 7.12 – 7.13), to enable exploration of management of each species independently. Looking at the dental evidence first for combined sheep/goat mortality, the evidence is very similar across assemblages (Figure 7.11): deaths within the first year of age are much lower (ca. 4-8%) at all three sites than implied by the epiphyseal fusion data (20-30%); and, thereafter, the mortality rate is higher through the second (third at the Hellenistic Asklepieion of Thouria) to fifth or sixth year at all three sites, peaking in the third year at Early Byzantine Messene and in the fifth to sixth year at the two Thouria sites. The principal divergence between the dental and epiphyseal evidence is the much higher proportion of first-year deaths in the latter dataset which may be due, as already suggested for the similar contradiction in pigs, to delayed epiphyseal fusion as a result of castration of males not required for breeding. Alternatively, it might be argued that first-year deaths (of sheep/goats and pigs) are underrepresented because the heads of young animals were discarded elsewhere during slaughter and initial carcass dressing off-site, but in practice separate disposal of bone from carcass dressing (heads and feet) and from consumption (meat-rich body parts) is more usual with large (e.g. adult) than small (e.g. young) animals. It is also unlikely that excavation at all three sites should have fortuitously missed the areas where young heads were discarded and particularly so in the case of the Hellenistic Asklepieion of Thouria where there were strong liturgical reasons for on-site slaughter of any sacrificial victims – a practice also supported by the evidence of anatomical representation (Chapter 5).

A very small number of sheep/goat pelves was attributed to sex (Table 7.17) at each studied site[93]. Females are more common than males at Early Byzantine Messene and the Late Byzantine Thouria

[93] The low sex identification rate is in large measure related to the small number of sheep/goat pelves recorded.

farmstead while the opposite is true for the Hellenistic Asklepieion of Thouria; no castrates were identified. The numbers involved are small, however, especially at the Hellenistic Asklepieion of Thouria, and about half of the sexed pelves were not identified to species, preventing evaluation of sex ratio independently for sheep and goats. What can be safely concluded is that individuals of both sexes survived their first year of life, while the ostensibly higher proportion of males at the Hellenistic Asklepieion of Thouria is at least consistent with the expectation that sacrificial victims would match the gender of the principal divinity.

Figures 7.14 – 7.15 compare the dentition-based mortality curves for sheep and goats from the three assemblages with Payne's (1973) models for husbandry geared to exploitation of milk, meat and wool. The Early Byzantine Messene sheep curve broadly matches Payne's 'wool' model, with modest juvenile mortality and slaughter mainly of mature adults. The sheep curves for the two Thouria sites and the goat curves from all three sites exhibit even lower juvenile and higher adult mortality, which at face value should imply even greater specialisation in fibre production. With such specialisation, an even adult sex ratio is expected, as *castrated* males produce more and better wool/hair, but the sparse available data for the two species combined suggest a predominance of adult females at Early Byzantine Messene and the Late Byzantine Thouria farmstead. On the other hand, these *deadstock* curves may offer a selective and thus misleading picture of the management of local livestock.

Most obviously, the Hellenistic Asklepieion of Thouria assemblage represents animals selected for sacrifice or associated dining, whether chosen on grounds of suitability for the deity or of availability/cost. The few mature adult sheep were culled as they neared the end of their productive lives as breeding/milking females or wool-/hair-bearing castrated males – unfortunately the scarce data for adult sex ratio are insufficient to choose securely between these two alternatives. Jameson (1988, 102-3) interprets the sheep and goats earmarked for sacrifice in the sacrificial calendar from 4th c. BC Erchia as animals surplus to the requirements or carrying capacity of local herds. The majority of sheep and all the goats culled at the Hellenistic Asklepieion of Thouria were adults but not mature ones. Even though the targeted product of the herds from which those animals were removed may have been fibre or dairy, the animals directed to the temple were selected at a prime age. Whether purchased by the state or donated by individuals, these animals would have been more 'costly' than animals culled at the end of their productive lives. A likely motive for such behaviour is the display of status. If ambassadors from other settlements attended large sacrificial events, it was an opportunity for the state to display its wealth by using prime animals. In the case of individual citizens, it could have been an opportunity to display their wealth and status to their fellow citizens.

The goats from all three sites exhibit very similar mortality profiles, with few first- and second-year deaths, in common with sheep, but thereafter more rapid kill-off in their third and fourth years, suggesting that the main aim was consumption of large carcasses or at any rate that any demand for goat milk and/or hair was balanced against the demand for meat. This contrasts with sheep mortality which suggests that the demand for wool (or conceivably milk) overrode that for meat, at least in the case of Early Byzantine Messene. The close similarity of the three goat mortality profiles is at first sight unexpected, given the apparently contrasting nature of *urban* Early Byzantine Messene, the Hellenistic Asklepieion of Thouria *sanctuary* and the Late Byzantine Thouria *farmstead*. The concentration on young adults at the Hellenistic Asklepieion of Thouria is consistent with selective slaughter for consumption in a publicly visible context. The almost identical profile from Early Byzantine Messene, however, raises the

possibility that goats in this region were generally raised for adult meat (and perhaps hair/milk), such that essentially similar ages were consumed at urban Early Byzantine Messene and the Hellenistic Asklepieion of Thouria.

Intriguingly, at the Late Byzantine Thouria farmstead, younger goats, sheep and pigs were slaughtered in slightly larger numbers than at the other two sites. One possible reason for this is that younger and thus smaller carcasses were preferred for domestic consumption, whereas older and thus larger carcasses were directed to urban butchers to be shared among larger groups of consumers. Alternatively, the Late Byzantine Thouria farmstead may have been a consumption rather than production site, with its elite inhabitants consuming the young animals of dependent herders or farmers. The relative scarcity of cattle (especially adults) at the Late Byzantine Thouria farmstead site perhaps favours the first alternative.

A number of fused anatomical elements provided biometric information for both sheep (Figures 7.16a-c) and goats (Figures 7.17a-d)[94]. As with the previous species, many of the bones produced a meagre number of measurements with the Hellenistic Asklepieion of Thouria being absent from many of the sheep forelimb graphs and from that for the goat astragali. The sparse data do not allow the determination of sex ratios or size differences between sites for either taxon with the possible exception of some of the sheep astragali (Figure 7.16c) of the Late Byzantine Thouria farmstead, which seem to belong to more robust individuals than those from the other two sites. However, whether they belong to rams or to a larger breed cannot be determined based on the sparse available data.

Only two sheep complete metatarsals from the Hellenistic Asklepieion of Thouria were retrieved and thus no withers height was estimated.

The following pathological traces were noted. At Early Byzantine Messene, among sheep/goat specimens, a femur had slight swelling on the medial side of its mid diaphysis, a first phalanx had a bone growth on its distal epiphysis, a second permanent molar had linear enamel hypoplasia and a mandible was slightly swollen on its lateral side just below the first permanent molar. Among specimens identified as sheep, a distal humerus had penning elbow, a proximal metacarpal bore small osteophytes along the lateral and medial edges of the posterior aspect of its diaphysis, a horncore had a depression at its base, and the second and third permanent molars of a mandible had abnormal roots. Turning to goats, a first phalanx had an osteophyte on its distal epiphysis, a horncore had a depression halfway up its lateral side, three third permanent molars had abnormal roots and a mandible was slightly swollen on its lateral side below the second permanent molar.

At the Hellenistic Asklepieion of Thouria, the following sheep/goat specimens were diagnosed as pathological. A femur had some swelling in the middle of the anterior side of the diaphysis with tiny holes on the surface of the swollen part of the bone, a third permanent molar had enamel hypoplasia in the form of depressions on the buccal and lingual sides of all three cusps and a third permanent molar had enamel hypoplasia (row of pits) low on the buccal side of the second and third cusps. The first cusp of the latter was too broken for any observations to be made. Among sheep, a metacarpal had two bumps on the medial half of the posterior side of its diaphysis, another metacarpal had a small bone growth on its medial proximal side, the first permanent molar of a mandible had fallen out and the bone

[94] Biometric data from specimens not identified to taxon have been excluded from the current analysis.

around it was swollen and a first permanent molar had disfigured roots. As for goats, a humerus had an exostosis on the lateral side of its distal epiphysis and a first permanent molar had abnormal roots.

Finally, the Late Byzantine Thouria farmstead assemblages had a limited number of pathological specimens. More specifically, a goat second phalanx had lipping on its proximal epiphysis, a sheep horncore had two depressions at mid-height and another sheep horncore had a depression at its base. In sum, the recorded pathologies are few and varied in nature in all three assemblages and they consequently do not offer any insight into the management of either species. As in the case of pigs, however, their diversity of form and placement serves to highlight the dominance in cattle remains of skeletal abnormalities consistent with traction stress.

In conclusion, sheep were reared for their wool at Early Byzantine Messene and the animals consumed at the Hellenistic Asklepieion of Thouria and possibly also at the Late Byzantine Thouria farmstead site may have been removed selectively from similar flocks. A preference for slaughter of young adult sheep (with a small percentage of mature ones) and goats at the Hellenistic Asklepieion of Thouria reflects the selection of prime victims possibly because they were more suited to honour the god and a means of display of wealth and status for the state and elite donors. The true purpose of herding sheep and goats at ancient Thouria will only be revealed when contemporary assemblages emerge from currently unexcavated domestic contexts. The culling of young goats, sheep and pigs in relatively large numbers at the Late Byzantine Thouria farmstead may reflect the export of larger carcasses to an urban market, but may alternatively indicate that the suspected farmstead should be interpreted as an elite estate where livestock of prime age exacted from dependent farmers were consumed. The rarity of older adult deaths among goats at all three sites suggests a lesser role for secondary products of this species than of sheep. Unfortunately, the meagre sample of both sexed pelves and relevant biometric data prevents fuller interpretation of the mortality profiles using data on adult sex ratios. Size differentiation between sites, based on biometric data, was also undetectable. Finally, a small number of pathological specimens was recorded for both taxa but without any clear patterns that might shed light on animal management practices.

Early Byzantine Messene			
	Neonatal	Older	Total
MinAU	23	1775	1798
%	1.3%	98.7%	100.0%
Hellenistic Asklepieion of Thouria			
	Neonatal	Older	Total
MinAU	2	2218	2220
%	0.1%	99.9%	100.0%
Late Byzantine Thouria farmstead			
	Neonatal	Older	Total
MinAU	3	1157	1160
%	0.3%	99.7%	100.0%

Table 7.14: Frequencies of sheep/goat neonatal vs. older individuals from the three studied assemblages (MinAU).

Early Byzantine Messene						
	Unfused*		Fused		Indeterminate	Total
Fusion stages	MinAU	%	MinAU	%	MinAU	MinAU
6-10 months	25	20.0%	100	80.0%	213	338
13-16 months	8	26.7%	22	73.3%	5	35
18-28 months	32	37.2%	54	62.8%	313	399
30-42 months	57	69.5%	25	30.5%	596	678
Hellenistic Asklepieion of Thouria						
	Unfused*		Fused		Indeterminate	Total
Fusion stages	MinAU	%	MinAU	%	MinAU	MinAU
6-10 months	13	19.1%	55	80.9%	220	288
13-16 months	2	10.0%	18	90.0%	1	21
18-28 months	51	49.5%	52	50.5%	473	576
30-42 months	39	83.0%	8	17.0%	603	650
Late Byzantine Thouria farmstead						
	Unfused*		Fused		Indeterminate	Total
Fusion stages	MinAU	%	MinAU	%	MinAU	MinAU
6-10 months	26	33.3%	52	66.7%	151	229
13-16 months	4	20.0%	16	80.0%	5	25
18-28 months	39	54.9%	32	45.1%	183	254
30-42 months	62	87.3%	9	12.7%	275	346
Neonatal specimens excluded * Includes unfused epiphyses, unfused diaphyses, fusing specimens and specimens recorded as “young”						

Table 7.15: Postcranial epiphyseal fusion evidence for post-neonatal sheep/goat mortality per site (MinAU). Fusion stages follow Silver (1969), with 6-10 months including fusion of SC, Hd, Rp and PE; 13-16 months including fusion of PH1p and PH2p; 18-28 months including fusion of Td and MPd; 30-42 months including fusion of Hp, Rd, Up, Fp, Fd and Tp. Specimens attributed to species have been combined in the table.

SHEEP + SHEEP/GOAT + GOAT								
			Early Byzantine Messene		Hellenistic Asklepieion of Thouria		Late Byzantine Thouria farmstead	
STAGE	Definition	Suggested age	MinAU	%	MinAU	%	MinAU	%
1	dP4 unworn	0-2 months	1	1.5%	0	0.0%	0	0.0%
2	dP4 worn, M1 unworn	2-6 months	1	1.5%	0	0.0%	1	1.2%
3	M1 worn, M2 unworn	6-12 months	1	1.5%	8	4.0%	6	7.1%
4	M2 worn, M3 unworn	12-24 months	12	18.8%	16	8.0%	14	16.7%
5	M3 worn, M3.3 unworn	24-36 months	24	37.5%	30	15.0%	15	17.9%
6	M3.3 worn, M3<11G	36-48 months	12	18.8%	58	29.0%	18	21.4%
7	M3=11G, M2=9A	48-72 months	9	14.1%	76	38.0%	30	35.7%
8	M3=11G, M2>9A	72-96 months	4	6.3%	11	5.5%	0	0.0%
9	M3>11G	96-120 months	0	0.0%	1	0.5%	0	0.0%
		Total	64	100.0%	200	100.0%	84	100.0%
SHEEP								
			Early Byzantine Messene		Hellenistic Asklepieion of Thouria		Late Byzantine Thouria farmstead	
STAGE	Definition	Suggested age	MinAU	%	MinAU	%	MinAU	%
1	dP4 unworn	0-2 months	1	6.3%	0	0.0%	0	0.0%
2	dP4 worn, M1 unworn	2-6 months	2	12.5%	0	0.0%	0	0.0%
3	M1 worn, M2 unworn	6-12 months	1	6.3%	2	3.7%	7	15.2%
4	M2 worn, M3 unworn	12-24 months	0	0.0%	4	7.4%	7	15.2%
5	M3 worn, M3.3 unworn	24-36 months	3	18.7%	5	9.3%	1	2.2%
6	M3.3 worn, M3<11G	36-48 months	0	0.0%	6	11.1%	11	23.9%
7	M3=11G, M2=9A	48-72 months	6	37.5%	29	53.7%	20	43.5%
8	M3=11G, M2>9A	72-96 months	3	18.7%	8	14.8%	0	0.0%
9	M3>11G	96-120 months	0	0.0%	0	0.0%	0	0.0%
		Total	16	100.0%	54	100.0%	46	100.0%
GOATS								
			Early Byzantine Messene		Hellenistic Asklepieion of Thouria		Late Byzantine Thouria farmstead	
STAGE	Definition	Suggested age	MinAU	%	MinAU	%	MinAU	%
1	dP4 unworn	0-2 months	0	0.0%	0	0.0%	0	0.0%
2	dP4 worn, M1 unworn	2-6 months	0	0.0%	0	0.0%	0	0.0%
3	M1 worn, M2 unworn	6-12 months	0	0.0%	3	2.9%	0	0.0%
4	M2 worn, M3 unworn	12-24 months	4	16.0%	6	5.8%	1	6.7%
5	M3 worn, M3.3 unworn	24-36 months	7	28.0%	31	30.1%	3	20.0%
6	M3.3 worn, M3<11G	36-48 months	10	40.0%	44	42.7%	9	60.0%
7	M3=11G, M2=9A	48-72 months	4	16.0%	19	18.5%	2	13.3%
8	M3=11G, M2>9A	72-96 months	0	0.0%	0	0.0%	0	0.0%
9	M3>11G	96-120 months	0	0.0%	0	0.0%	0	0.0%

	Total	25	100.0%	103	100.0%	15	100.0%
Multi-staged mandibles proportionally assigned to single stages following Payne (1973); Wear codes 9A and 11G after Payne (1987)							

Table 7.16: Frequencies of sheep and goat mandibles per wear stage from the three studied assemblages (MinAU). 20.3% (Early Byzantine Messene), 36% (Hellenistic Asklepieion of Thouria) and 28.6% (Late Byzantine Thouria farmstead) of the sheep/goat mandibles and loose teeth were originally assigned to a single eruption and wear stage while the rest were proportionally assigned to a single stage as per Payne (1973).

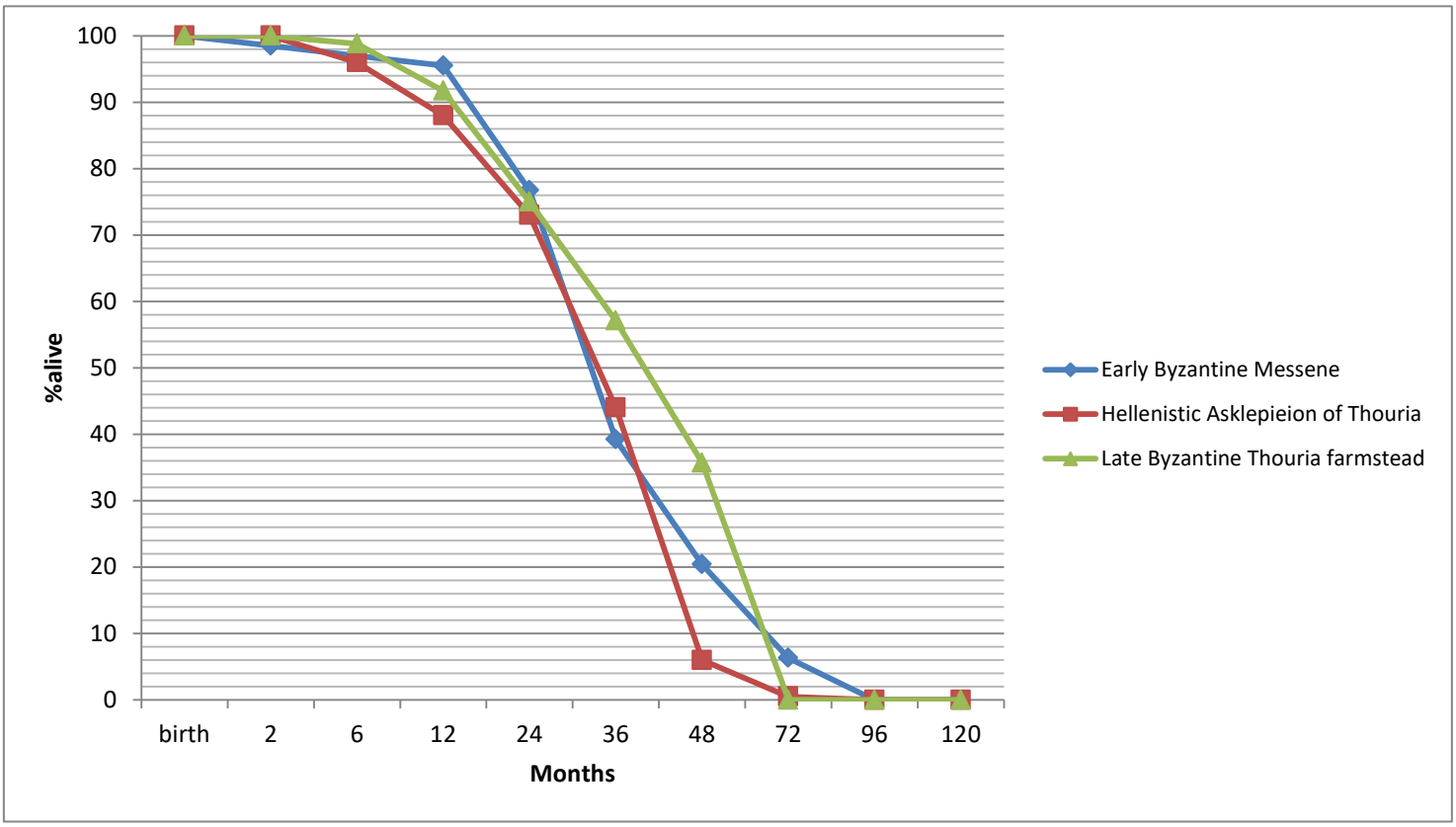


Figure 7.11: Comparison of sheep/goat cumulative age curves in the three studied assemblages based on mandibular cheek tooth eruption and wear (MinAU). Specimens attributed to species have been combined in the chart.

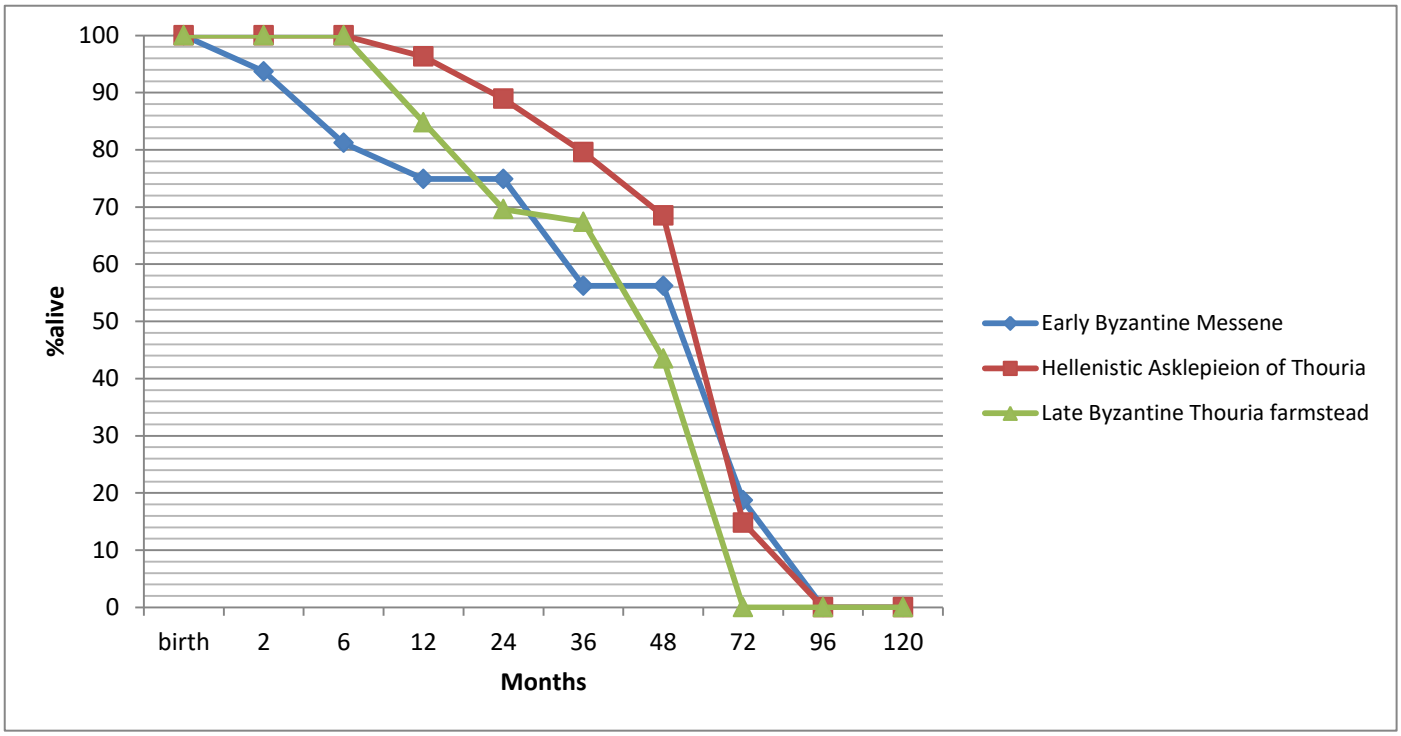


Figure 7.12: Comparison of sheep cumulative age curves in the three studied assemblages based on mandibular cheek tooth eruption and wear (MinAU).

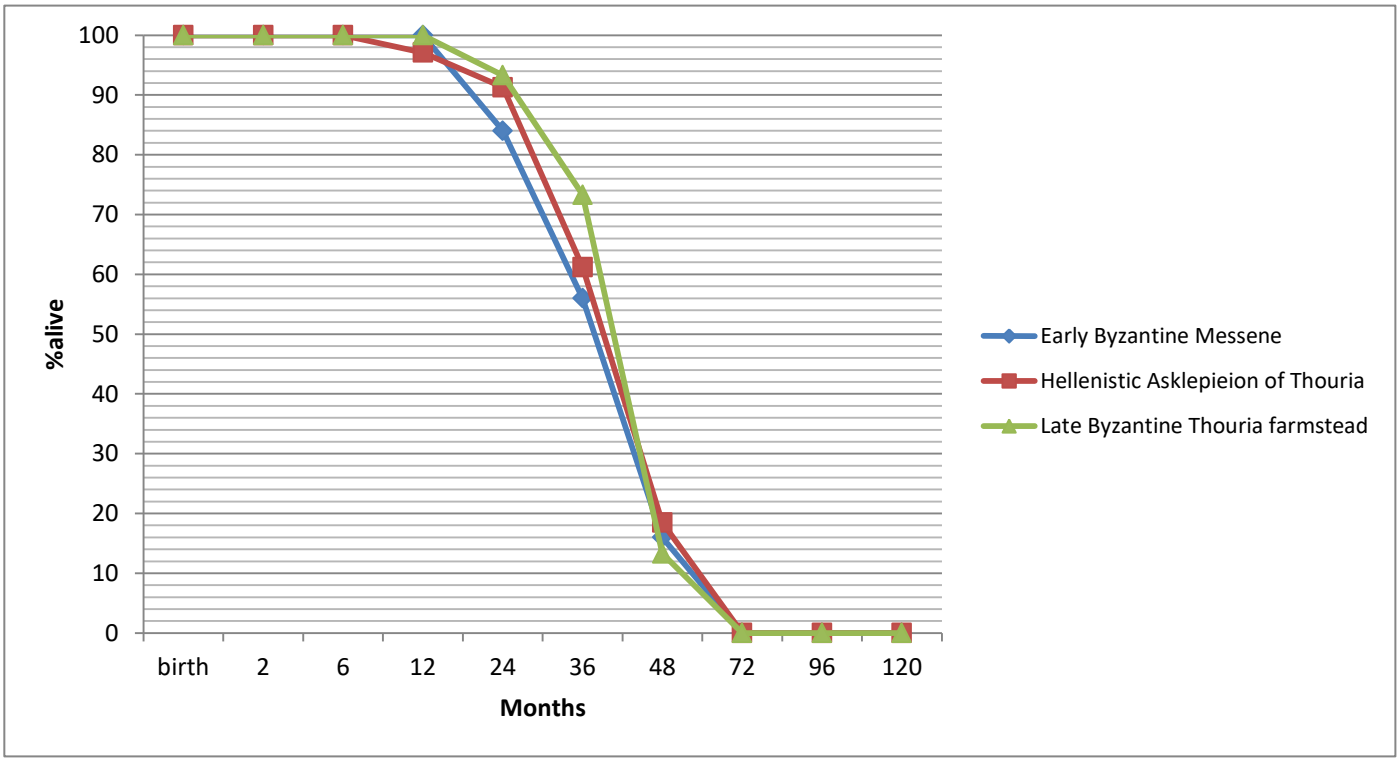


Figure 7.13: Comparison of goat cumulative age curves in the three studied assemblages based on mandibular cheek tooth eruption and wear (MinAU).

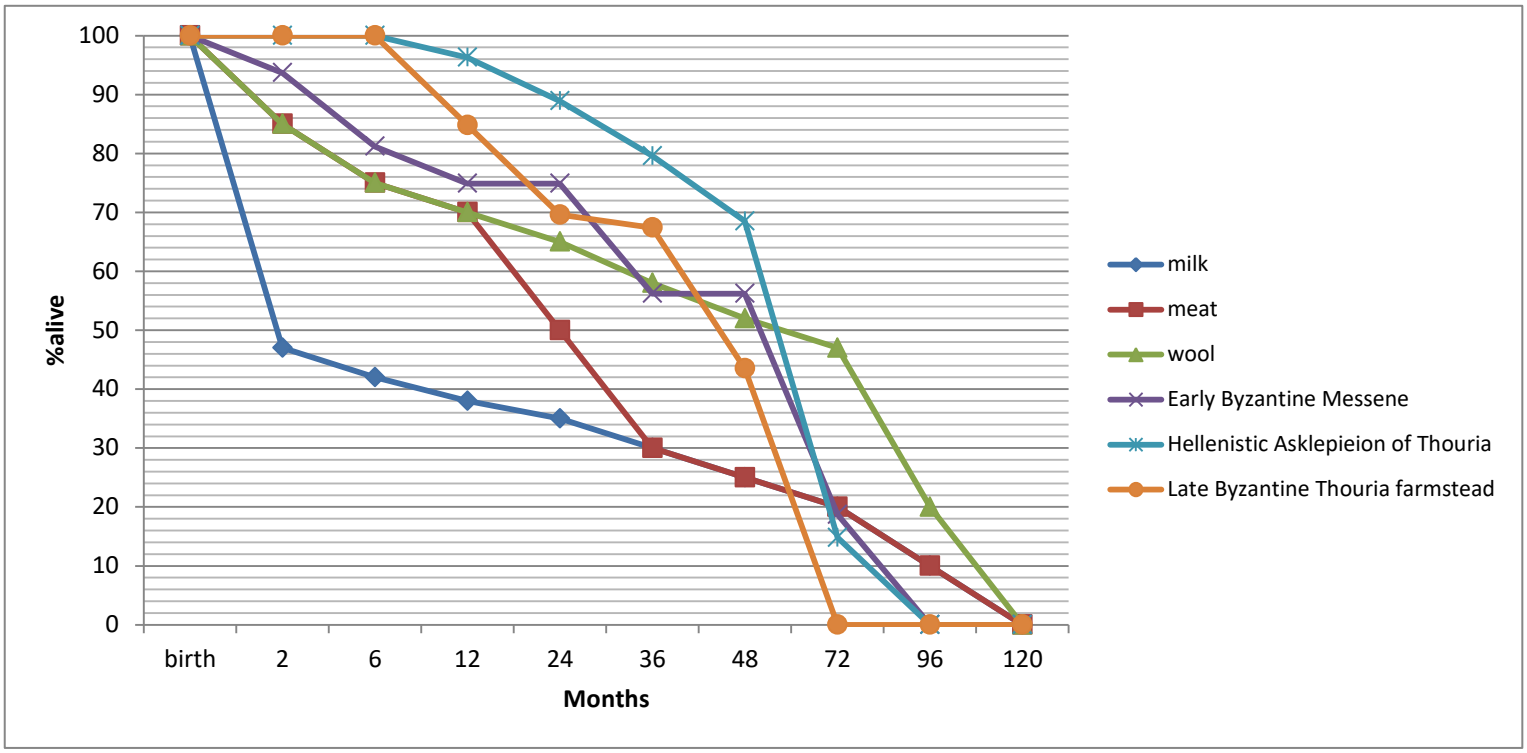


Figure 7.14: Comparison of the sheep cumulative age curves from the studied sites versus Payne's model based on mandibular cheek tooth eruption and wear (MinAU).

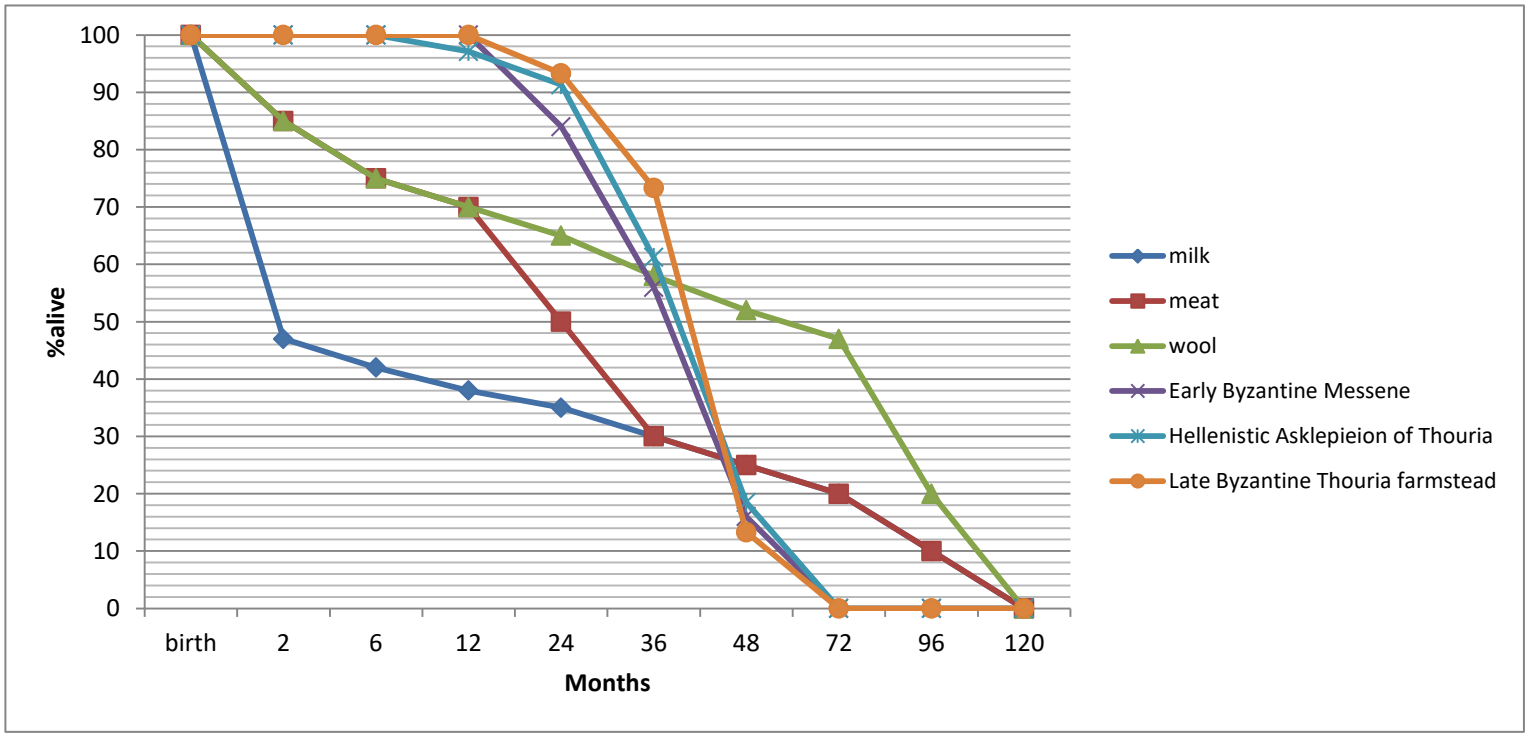


Figure 7.15: Comparison of the goat cumulative age curves from the studied sites versus Payne's model based on mandibular cheek tooth eruption and wear (MinAU).

Early Byzantine Messene						
	Sheep		Sheep/Goat		Goat	
Sex	MinAU	%	MinAU	%	MinAU	%
Indeterminate	2	-	24	-	0	-
Female	4	50.0%	3	50.0%	2	66.7%
Male	4	50.0%	1	16.7%	1	33.3%
Possible female	0	0.0%	2	33.3%	0	0.0%
Possible male	0	0.0%	0	0.0%	0	0.0%
Hellenistic Asklepieion of Thouria						
	Sheep		Sheep/Goat		Goat	
Sex	MinAU	%	MinAU	%	MinAU	%
Indeterminate	0	-	8	-	0	-
Female	0	0.0%	1	25.0%	0	0.0%
Male	0	0.0%	3	75.0%	1	100.0%
Possible female	0	0.0%	0	0.0%	0	0.0%
Possible male	0	0.0%	0	0.0%	0	0.0%
Late Byzantine Thouria farmstead						
	Sheep		Sheep/Goat		Goat	
Sex	MinAU	%	MinAU	%	MinAU	%
Indeterminate	0	-	6	-	0	-
Female	2	66.7%	7	87.5%	1	100.0%
Male	1	33.3%	1	12.5%	0	0.0%
Possible female	0	0.0%	0	0.0%	0	0.0%
Possible male	0	0.0%	0	0.0%	0	0.0%
Neonatal specimens excluded						

Table 7.17: Frequencies of sheep/goat fused sexed pelves from the three studied assemblages (MinAU). %s calculated excluding indeterminate specimens.

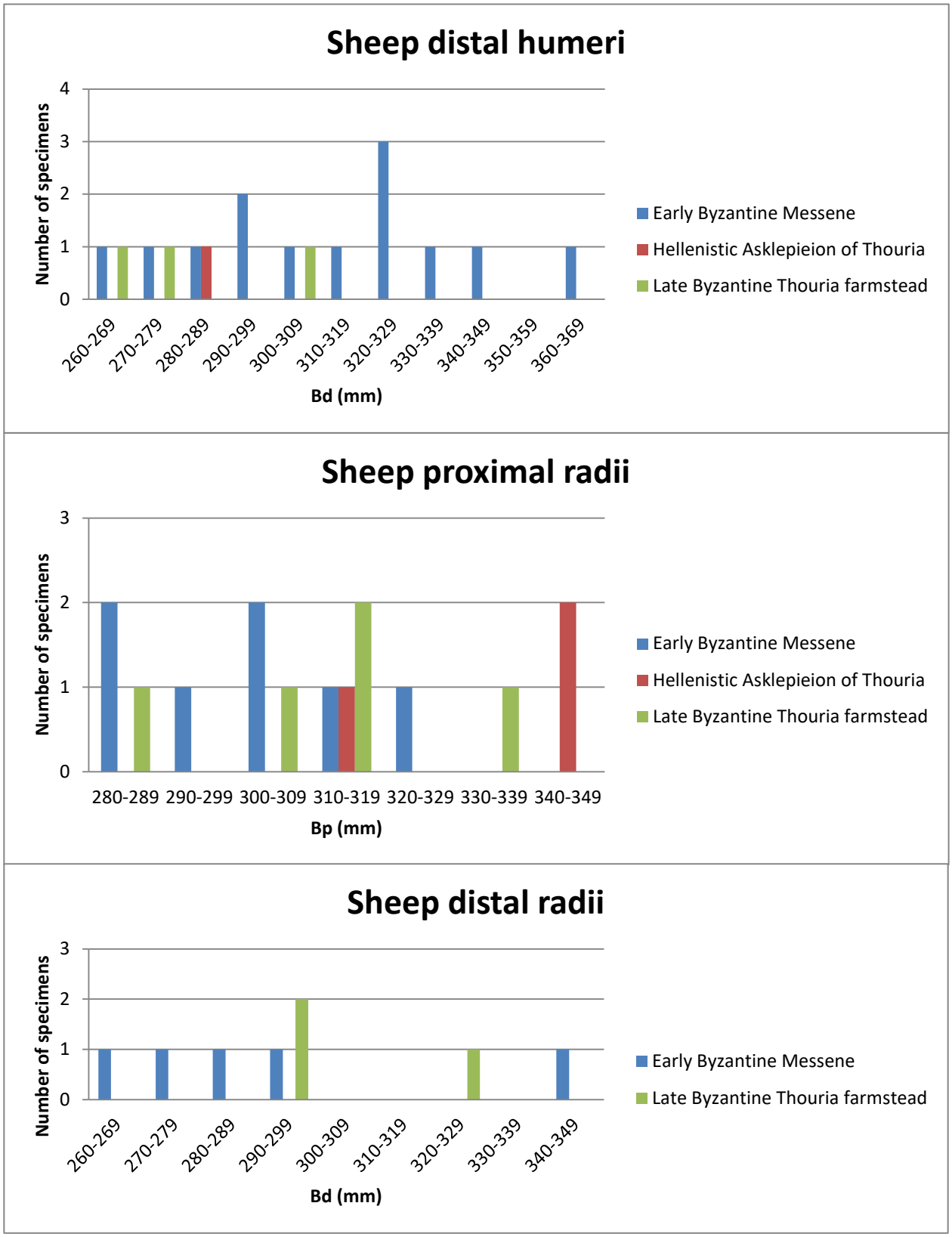


Figure 7.16a: Comparison of the distribution of Bd of the three studied sites for sheep fused distal humeri and proximal and distal radii.

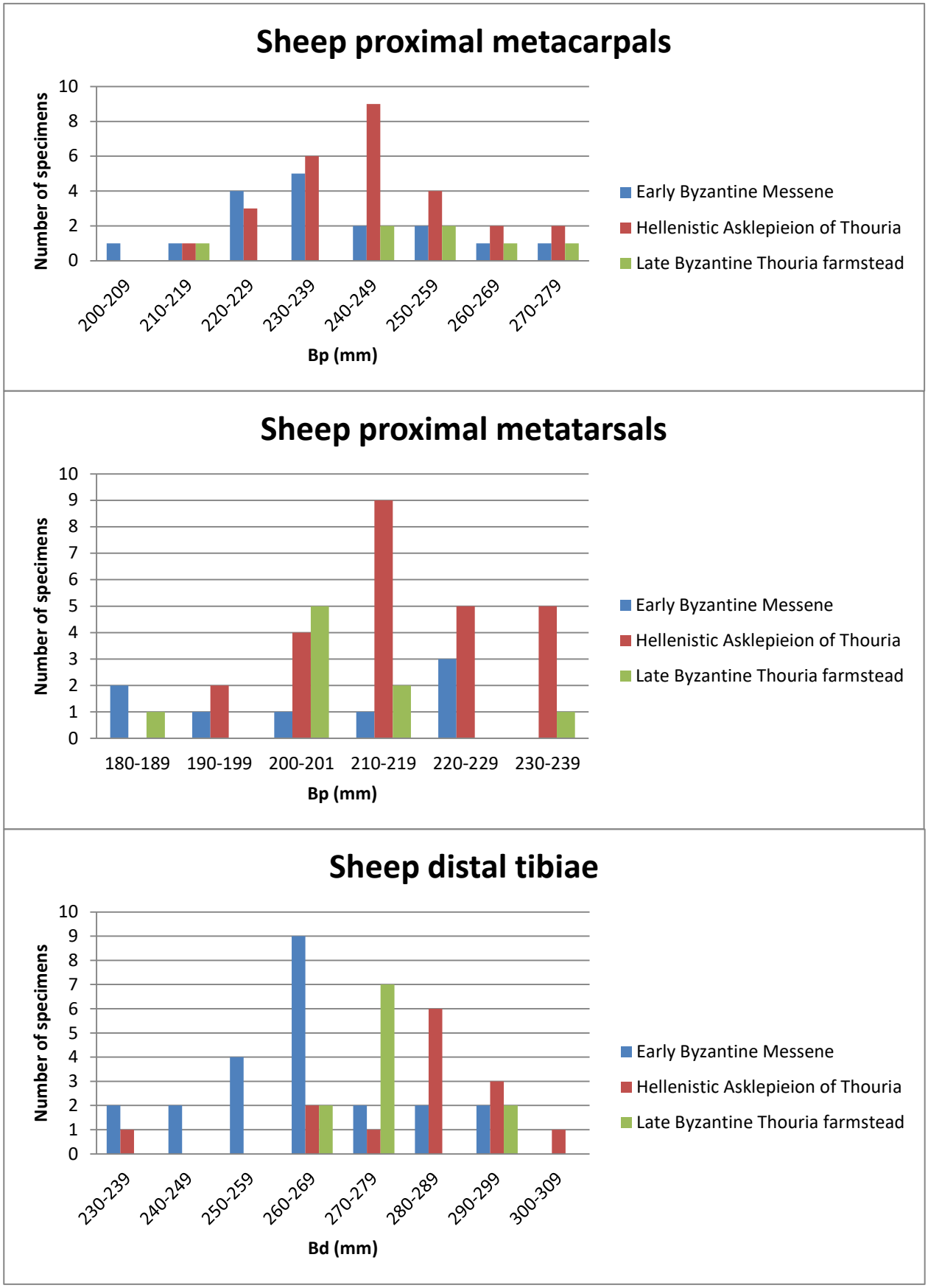


Figure 7.16b: Comparison of the distribution of selected measurements of the three studied sites for sheep fused proximal metacarpals, proximal metatarsals and distal tibiae.

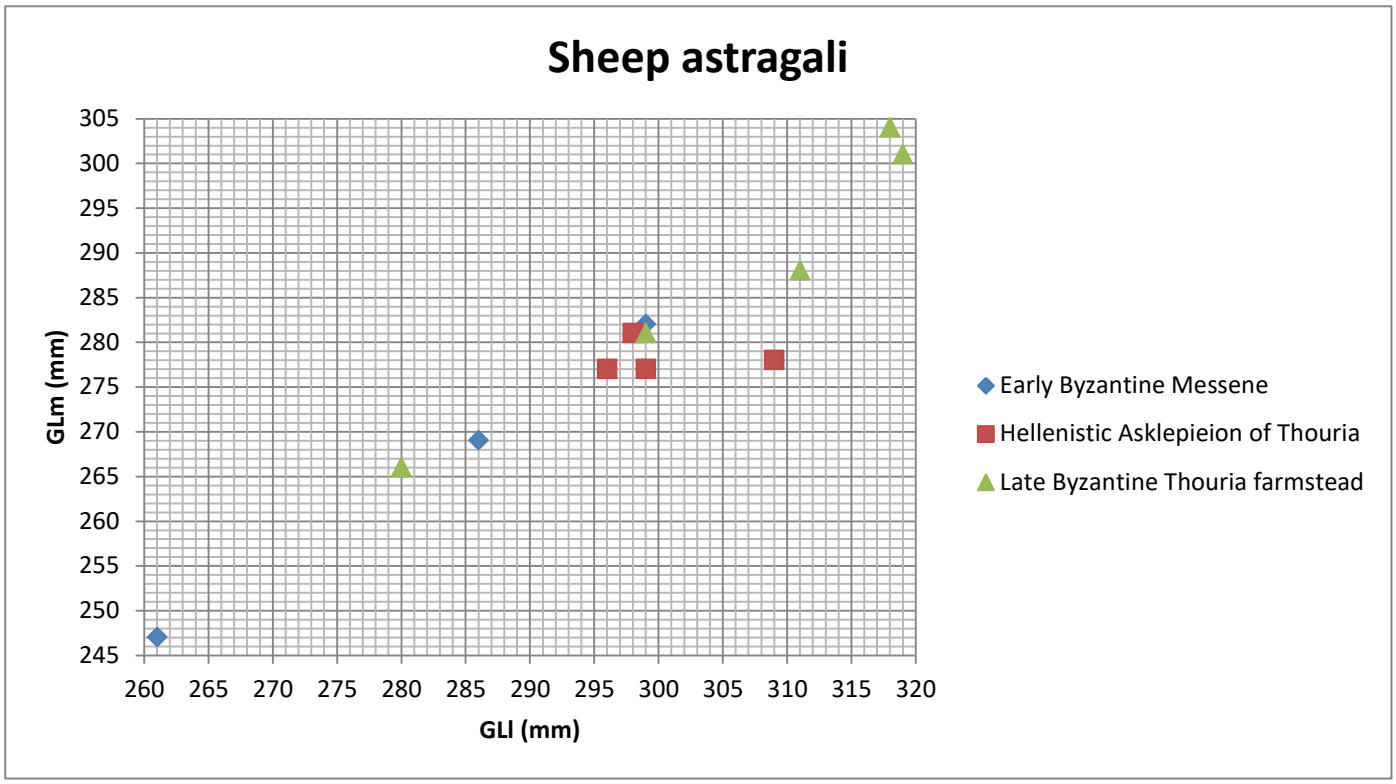


Figure 7.16c: Comparison of the greatest lateral length (GLl) versus the greatest medial length (GLm) of the sheep astragali of the three studied sites.

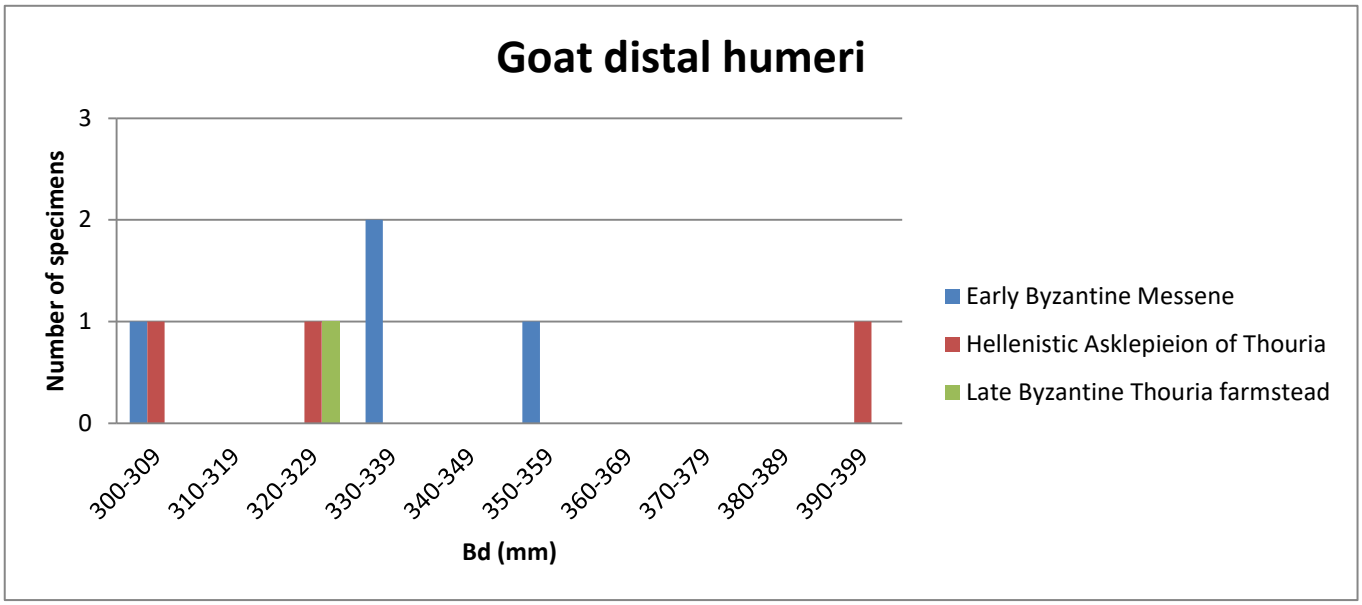


Figure 7.17a: Comparison of the distribution of selected measurements of the three studied sites for goat fused distal humeri.

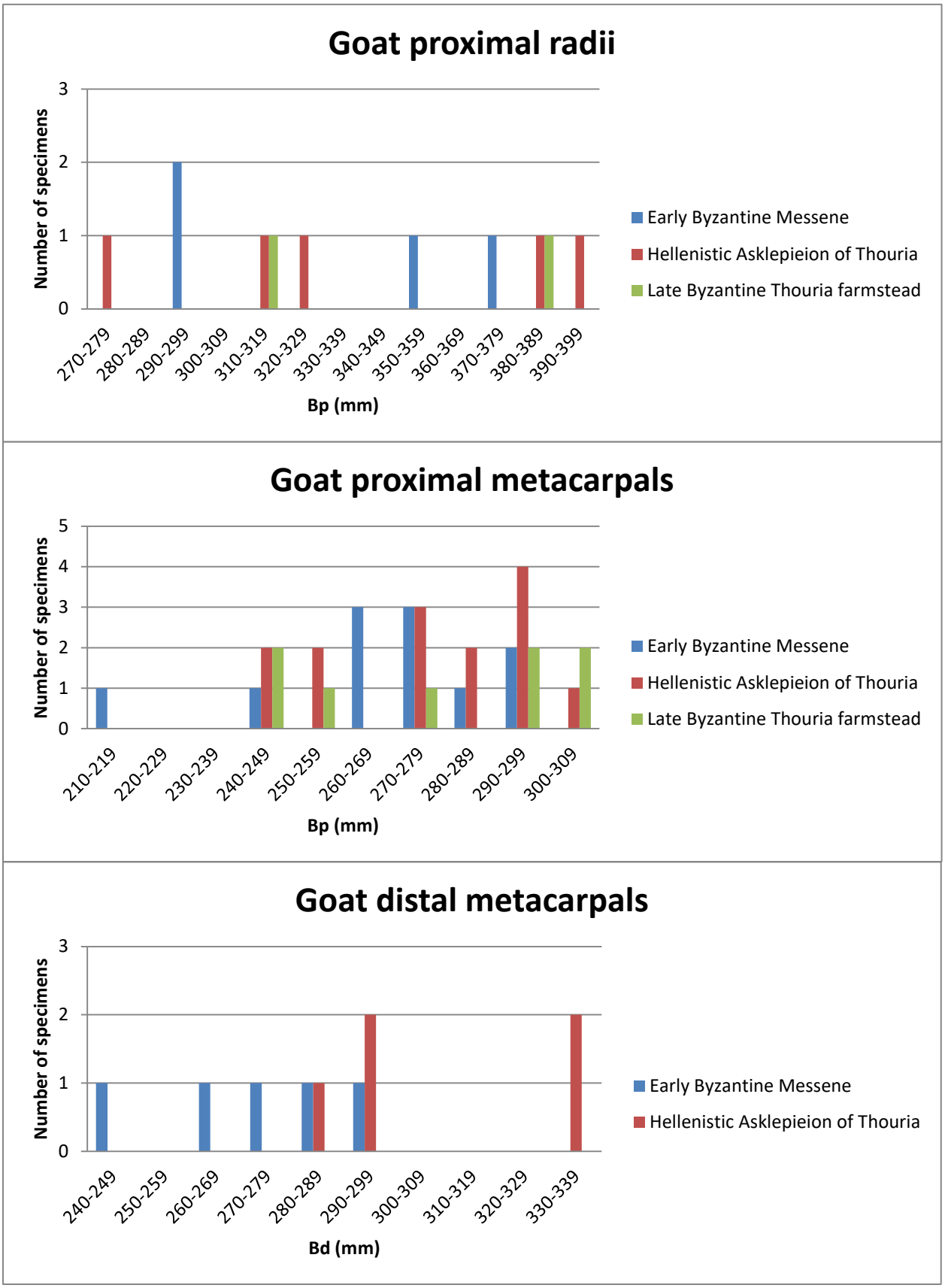


Figure 7.17b: Comparison of the distribution of selected measurements of the three studied sites for goat fused proximal radii and proximal and distal metacarpals.

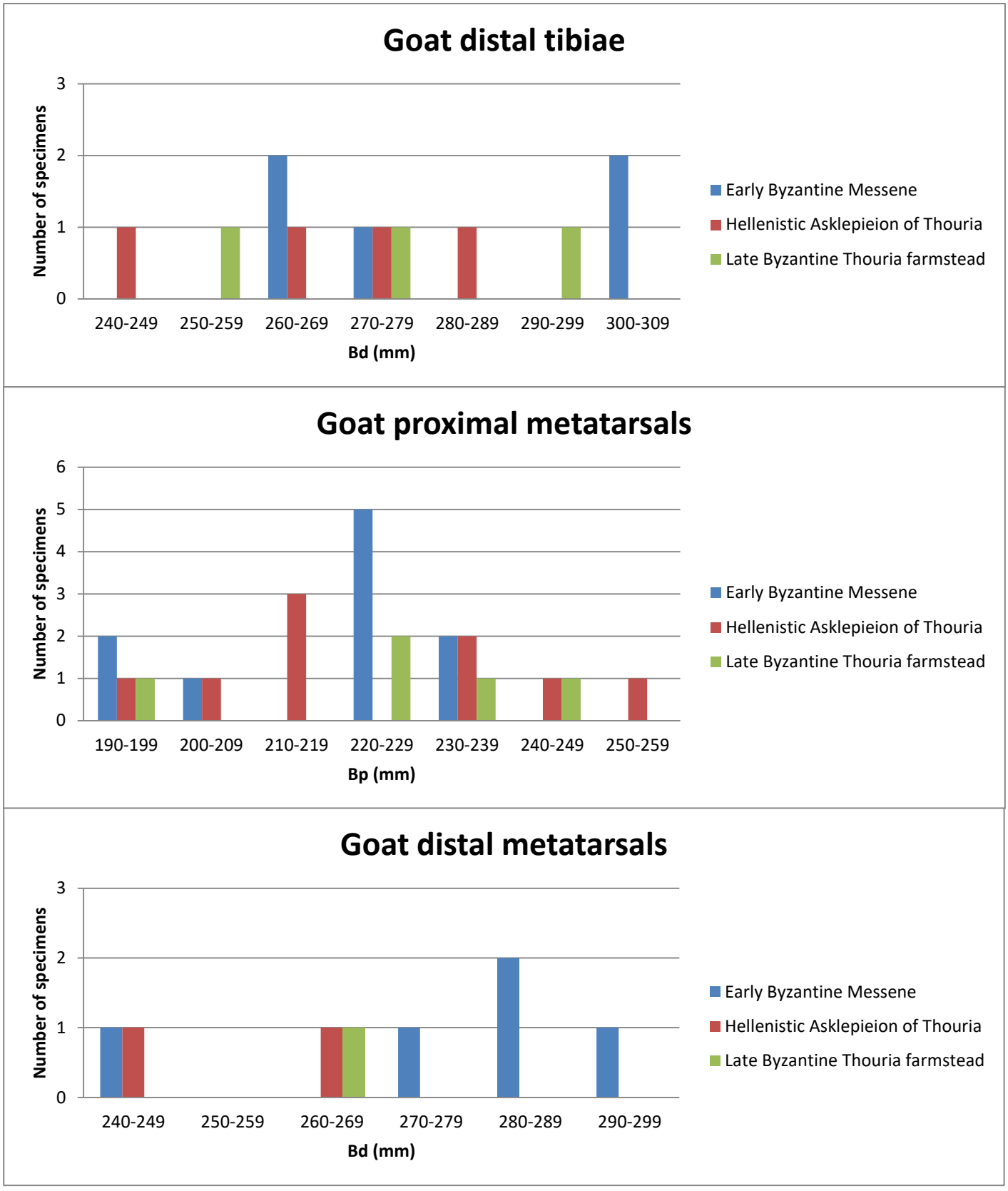


Figure 7.17c: Comparison of the distribution of selected measurements of the three studied sites for goat fused distal tibiae and proximal and distal metatarsals.

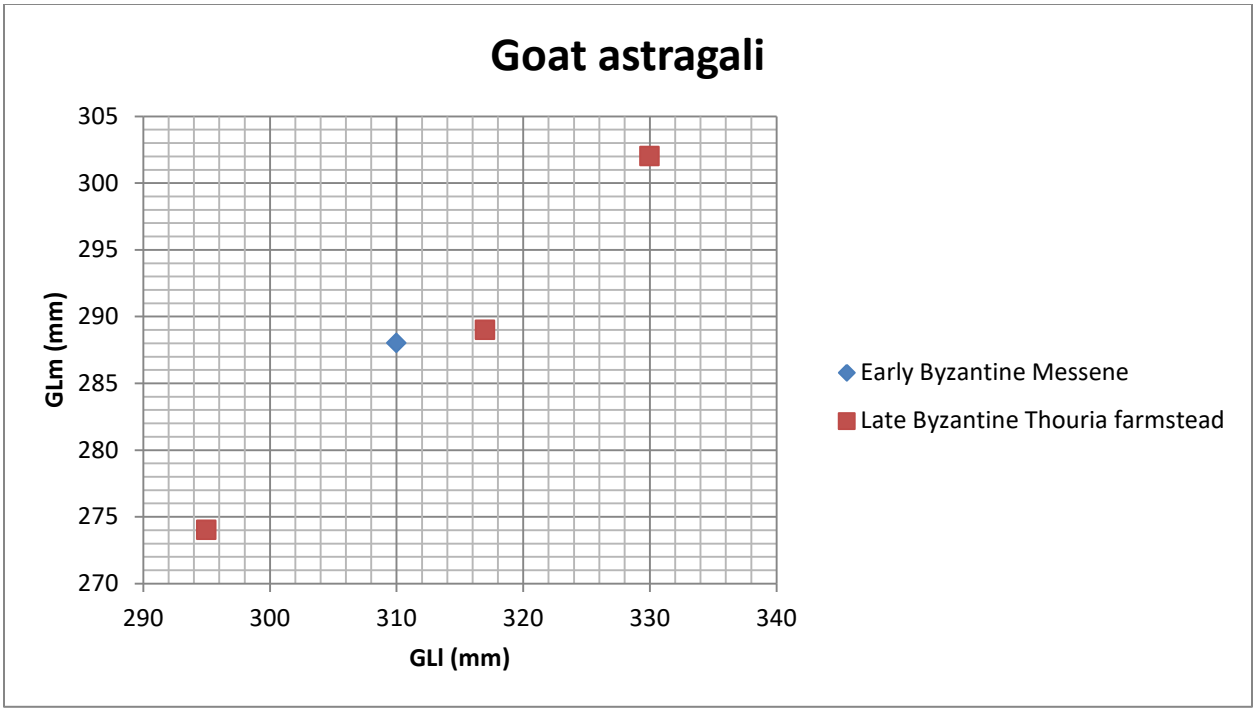


Figure 7.17d: Comparison of the distribution of selected measurements of the three studied sites for goat astragali.

Pathologies on other species

A small number of dog bones from the Late Byzantine Thouria farmstead bore pathologies. These include a radius with a swollen distal diaphysis (the swelling has a porous surface) just above the missing distal epiphysis, a proximal radius diaphysis with the same condition but the pathology is less developed and limited to the medial-posterior corner of the diaphysis (the two radii, one left- and one right-sided, come from the same context and might belong to the same individual), a metapodium with an inflamed distal diaphysis just above the distal epiphysis, and a lumbar vertebra with osteophytes on the proximal two thirds of the centrum affecting the proximal epiphysis too. Moreover, a few pathological bones belong to the dogs that were thrown into the vat of the wine press. More specifically, a first phalanx has a bone mass that extends from the middle of the diaphysis to the distal epiphysis, causing its deformation, and the base of the spine of four lumbar vertebrae exhibits bending.

In addition to the previously mentioned horse first phalanx, Early Byzantine Messene and more specifically the “temple of Isis” produced the following pathological specimens, of unidentified equid species. A thoracic vertebra has large osteophytes on the anterior ventral surface of the centrum at the fusion point, while a second one has large osteophytes on the entire ventral surface of the centrum. A mandible displays pitting and 'platey' bone growth, another mandible has a central large hole and surrounding pitted area on the lateral side below the second premolar (Figure 7.18), a third mandible has a relatively deep depression on its lateral side below the second premolar with a rough bone surface area surrounding it, and a fourth mandible exhibits light depressions and rough bone surface areas on

the lateral side anteriorly and below its second premolar[95], while a fourth premolar has two very small round holes on the medial surface of the second cusp. Lastly, the round structure below the basilica produced a second premolar with calculus deposit.

In conclusion, no pattern is detectable in the nature and anatomical distribution of the recorded dog and equid pathologies and thus no conclusions about the use of the animals can be drawn based on them. As for wild taxa, a red deer first phalanx from the Hellenistic Asklepieion of Thouria has an exostosis on its distal epiphysis.

Figure 7.18: Pathological equid left mandible, Early Byzantine Messene (photo by the author).

Conclusions

Taxonomic representation has been modestly affected by recovery bias in all three assemblages. With allowance for recovery losses, sheep are the most numerous species at Early Byzantine Messene, followed by goats, cattle and, finally, pigs. At the Hellenistic Asklepieion of Thouria, pigs are the most frequent taxon closely followed by sheep with goats and cattle third and fourth in frequency. At the Late Byzantine Thouria farmstead, the primary species in order of frequency are sheep, pigs, goats, dogs and cattle. A number of other species, both domestic and wild, were identified in the assemblages but in very low frequencies. Even though the high percentage of pigs at the Hellenistic Asklepieion of Thouria is unusual for a deity not related to the cult of Demeter, one should remember that most faunal reports from ancient Greek ritual deposits do not separate sheep from goats, thus deflating the apparent relative importance of other sacrificial victims.

Based on kill-off profiles, the cattle management regime in both Thouria assemblages was focused on meat production with just a few individuals kept alive into advanced adulthood, perhaps for labour as

[95] The third and fourth mandibles described belong to the same individual.

well as breeding – a suggestion supported by the identification of traction related pathologies on a number of specimens. At Early Byzantine Messene, however, a nucleated settlement rather than a sanctuary or an isolated farmstead like the Thouria assemblages, the survival of most individuals past their fourth year of life indicates a greater exploitation of the species for traction and/or as breeding stock (and also as a source of manure). Sex profiles lead to the conclusion that work animals were primarily female with males slaughtered at a younger age for meat. Cows are easier to control than bulls and cheaper to maintain than oxen with the additional benefit of being able to provide offspring. Though biometric data are sparse, they reveal dominance of females at Early Byzantine Messene and of males at the Hellenistic Asklepieion of Thouria, the former utilised as draught animals prior to slaughter and the latter as sacrificial victims since less males are needed for reproductive purposes.

Delayed epiphyseal fusion, an aftermath of suspected early castration of male piglets, seems to have distorted the mortality profiles for pigs. Mandibular cheek tooth eruption and wear offer an arguably more reliable picture. Pigs were primarily culled during their second year of life at both Early Byzantine Messene and the Hellenistic Asklepieion of Thouria when they approached their maximum meat weight. Markedly heavier first-year mortality was noted at the Late Byzantine Thouria farmstead. The earlier slaughter age of an important percentage of the species is likely attributable to the nature of the site as a farmstead where excess piglets were culled for fresh on-site consumption to both supplement the diet and to maintain herd numbers at a manageable level. A sex ratio dominated by males in every assemblage, primarily based on loose canines, is influenced by recovery bias. However, the predominance of males in the Hellenistic Asklepieion of Thouria, also reflected in the admittedly small number of sexed mandibles, could be related to the ancient Greeks' preference to match the sex of the victim to that of the worshipped god. Finally, the biometric data did not generate any consistent pattern regarding sex ratios or shifts in size between sites.

Mortality profiles indicate that the management of sheep at Early Byzantine Messene was oriented towards fibre production before culling for meat. In the case of the Hellenistic Asklepieion of Thouria, most sheep and all the goats were culled as young adults. As with other taxa, these animals were purposefully selected for sacrifice and feasting. The reasoning behind such a decision could be related to the availability and/or cost of the victims or their suitability for Asclepius or, most likely, a combination of these factors. However, the culling of young adults, more valuable for their secondary products than their meat, can be interpreted as a selection of prime victims possibly because they were more suited to honour the healing god and as a way to display the status and wealth of the state and elite donors. In addition, some mature sheep were killed-off towards the end of their productive lives. The scarce data for sex ratio do not help to determine the goal of sheep husbandry at Hellenistic Thouria prior to slaughter at the sanctuary. The goats from all three sites exhibit quite similar mortality profiles with most animals culled during their third and fourth year of life. Thus, the targeted goal of goat herding seems to be the production of meat regardless of the varying nature of the three sites. As with pigs, sheep and goats were killed-off slightly younger at the Late Byzantine Thouria farmstead site than at Early Byzantine Messene or the Hellenistic Asklepieion of Thouria. Two possible explanations can be proposed. First, younger animals providing lesser quantities of meat were consumed by the inhabitants of the farmstead while older and thus larger animals were directed to urban markets. Secondly, the farmstead was a potentially a consumption rather than a production unit and its elite owners consumed the young livestock of dependent farmers. The true nature of the site will be likely revealed when the

study of other finds is completed. Finally, the sample of sexed specimens and biometric data is too limited to indicate any useful patterns of economic exploitation or size differences between sites for either species.

Lastly, pathological traces were detected on a number of specimens from the four main domestic taxa as well as dogs, equids and red deer. With the exception of cattle, the anatomical distribution and form of the pathologies did not generate any consistent or intelligible patterns. In the case of cattle, however, the majority of the recorded pathologies were concentrated in the lower feet highlighting the use of the species for traction.

8. Discussion and conclusions

Introduction

In the past chapters, faunal remains from Early Byzantine Messene and from the Hellenistic Asklepieion of Thouria and Late Byzantine Thouria farmstead have been analysed in detail and have produced a wealth of information. Following brief introductions to the region/periods (Chapter 2) and sites (Chapter 3) under study, Chapter 4 outlined the zooarchaeological methods adopted and Chapter 5 explored the impact of formation processes (before and after discard (taphonomy), and during excavation and subsequent storage) on assemblage composition. Chapters 6 and 7 have then explored the faunal evidence (in each case, with allowance for taphonomic distortion) for carcass processing of 'deadstock' and husbandry of 'livestock', respectively. In this final chapter, a synthesis is attempted of this latter information in the wider context of the Hellenistic – Byzantine Peloponnese. Discussion will begin with animal consumption, which is more clearly reflected in the collected data as faunal assemblages essentially represent consumed deadstock. Next, discussion will move on to animal husbandry, for which consumption debris represent a more indirect proxy, before concluding with some suggestions for future research.

Animal consumption within the ritual and secular contexts

Indisputably, a diachronically central aspect of ancient Greek religion was animal sacrifice[96] (Bremmer 2007, 132; Rives 2011, 187), as it was the means through which worshippers communicated with the divine and heroic sphere (Ekroth 2014, 324; Georgoudi 2010, 92). The principal kind of Greek animal sacrifice, the *thysia* (*θυσία*)[97], was practised at least from the 8th c. BC until the prevalence of Christianity in the late Roman period (late 4th c. AD). In brief, the ritual consisted of the following steps. Reaching the altar, cattle were first stunned with a blow to the forehead or over the neck and then their throat was cut with a knife. Sheep, goats and pigs were of smaller size than cattle and so did not need to be stunned first (Ekroth 2014, 326). According to literary and epigraphic evidence, during the Classical and Hellenistic periods, the slaughter and butchering of the sacrificial victims was performed by the *mageiros*, a butcher, meat seller and cook employed by the sanctuaries (Tsoukala 2009, 5-6)[98], an issue to which we will return shortly. The blood of the sacrificial victim was collected in a bowl for the making of sausages and black-puddings, while a small quantity was sprinkled on the altar. Next, the carcass of the victim was either laid down horizontally or strung up vertically and opened up at the abdomen so

[96] How important animal sacrifice was, however, in comparison to other types of offerings (e.g. libations) is an issue currently debated (Ullucci 2015, 401). Georgoudi (2010, 92) considers it as the most central of all rites of worship as many other pious acts of the ancient Greeks (e.g. processions, prayers etc) were associated in some way or another with animal sacrifice. Moreover, Rhodes and Osborne (2003, 306) support the centrality of animal sacrifice in Greek religion as the one religious act that was performed collectively by the community and, thus, affirmed the identity of the sacrificers as a group. The issue becomes even more complicated by the fact that the English language possesses only the single word "sacrifice" to denote a variety of ritual acts for which the ancient Greeks had a number of terms such as *thyein* (*θύειν*), *sphagein* (*σφάζειν*) and *hiereuein* (*ἱερεύειν*) (Hitch 2015, 337).

[97] Van Straten (1995), using primarily iconographic evidence, delivers a very elaborate analysis of the *thysia* ritual.

[98] On *mageiros*, see Berthiaume (1982); Schmitt Pantel (1992, 334-9). For a shorter overview, see Detienne (1989, 11-2).

that its intestines could be removed and inspected to judge whether the animal was proper for the gods to whom it was offered. Next, the femurs (thighbones) were removed, stripped of all their meat, wrapped in fat from the stomach and burnt in the altar fire. The smoke from the burning of the femurs, called *knisē* (*κνίση*), was thought to reach the gods and be inhaled by them. The tail and sacrum, together called *osphys (ὀσφῦς),* were also burnt on the altar and the upward curving of the burning tail symbolised the gods' acceptance of the sacrifice (Ekroth 2014, 326).

Feasting on the meat of the sacrificial victims followed the *thysia*. The innards (the heart, the kidneys, the liver, the lungs and the spleen) were grilled on spits (*ὀβελοί*) on the altar fire by the *splanchnoptes* (*σπλαγχνόπτης*) and consumed on the spot by those closest to the altar. Parts of the grilled intestines could also be offered to the gods by being placed in the hands or on the knees of their statues. Then, the carcass was skinned and butchered by the *mageiros* and the meat was distributed (Ekroth 2008b, 261; 2014, 326), while the entrails (the stomach and the intestines) were made into sausages (Detienne 1989, 10). However, it is not clear whether the employment of a *mageiros* was standard practice or just a necessity during large festivals, when a large number of animals were sacrificed (Tsoukala 2009, 5-6). A number of inscriptions (e.g. *LSCG* 69, 25-8 from 4th c. BC Amphiareion at Oropos; *LSS* 129 from 5th c. BC Chios) do state that the worshippers themselves could perform the sacrifice if the priest was absent (Carbon and Pirenne-Delforge 2017, 153), while the sacrifice of a sheep is performed by a slave in Aristophanes' *Peace* (1016-8) (Hitch 2015, 340) and ordinary people offering perhaps a lamb or a kid to the god probably did not have the means to hire a *mageiros*. Though relevant literary sources are at this point lacking from Hellenistic Thouria, it is tempting to suggest that, in the case of private sacrifices, members of the elite may have hired a *mageiros* not because he was an essential participant in the ritual but as a statement of their status.

The priest or priestess usually took as payment the hide and a back leg, which was considered a prestigious as well as big joint, along with other foodstuff (Carbon 2017, 152). Other pieces of the butchered carcass (e.g. the head or half of it, the ribs, etc.) could be given to the priest(ess) instead of or in addition to the choice cut while another prestigious cut was the meat along the victim's back. Moreover, they could also receive money instead of or in addition to other perquisites (Ekroth 2008b, 266; 2014, 326; Tsoukala 2009, 6-10; van Straten 1995, 154-5).

Shares of sacrificial meat, either of larger quantity than normal portions or from specific parts of the carcass, could also be given to other religious functionaries, magistrates and honorary guests. In addition, shares of sacrificial meat could be offered as awards in athletic and musical competitions. The rest of the meat was divided into portions of equal weight[99], but not of equal quality, and was distributed to those participants who were entitled to it. These shares could be eaten at the sanctuary or at home or they could even be sold at or by the sanctuary or on the market. The priestly perquisites could also have been sold, especially considering the number of hides and the amount of meat a priest

[99] Very few sources (e.g. *IG* XII.7 515, 63-4 from late 2nd c. BC Amorgos: διδότωσαν δέ|[οἱ] ἐπιμεληταί τῶν ἐφήβων ἑκάστῳ αὐ[τ]ῶν ὑός κ[ρε]ῶν μνᾶν˙) give the exact weights or measures of these portions and, in addition, these figures could have differed chronologically, from place to place and from occasion to occasion (Naiden 2013, 264). Ekroth (2018, 271 n. 64) provides further epigraphic examples along with further bibliographical sources on the matter. A final source of evidence on the subject is the weights recovered at a number of Greek sanctuaries, an issue briefly discussed by Ekroth (2008b, 271-2) with further bibliography.

received during large public sacrifices. Finally, the skull of the victim (*bukranion*) could be displayed in the sanctuary (Ekroth 2014, 326-7; 2017b, 35-7; Tsoukala 2009, 10-1).

An important issue is what happened to the sacrificial debris after the conclusion of the rituals, a subject more recently addressed by Ekroth (2017b). As is clearly implied by the number of animal bone assemblages originating from sacred spaces, at least some[100] of both the burnt god's portion and the meal debris does not seem to have been removed from the boundaries of the various sanctuaries but was instead discarded within them. To take matters a step further, in some instances, such debris was either preserved inside the altar (e.g. altar U at Kommos on Crete – Reese 2000; the altar of Aphrodite Ourania at Athens[101] – Reese 1989) or it even made up the altar (e.g. altar of Zeus at Olympia – Benecke 2006b and altar of Zeus on Mount Lykaion – Romano and Voyatzis 2014). Why were the bones kept? A possible theory proposed by Ekroth (2017b, 45) is that the bones were kept to commemorate the ritual that took place there. Furthermore, they were likely considered property of the god and as such could not be disposed of elsewhere (Ekroth 2017b, 48).

A number of questions can be raised from the above description to which zooarchaeology may offer answers using the Hellenistic Asklepieion of Thouria as a case study. First, however, it is essential to determine the nature of the faunal assemblage, namely whether it represented the god's portion, remnants of feasting or a combination of both. The god's portion, as has already been mentioned, consisted of the femur, sacrum and tail vertebrae and thus, in theory, an assemblage consisting primarily of those body parts heavily burnt can be interpreted as a remnant of that stage of the ritual. Lack of those body parts in an assemblage of other well represented meaty parts of the carcass is indicative of feasting activities. Finally, a combination of both (ideally in separate contexts) provides evidence of both actions taking place on site. As established in Chapter 6, sacra and caudal vertebrae are underrepresented for all main domestic taxa. However, the assemblage has been heavily affected by recovery bias[102] and it is thus difficult to determine whether the underrepresentation is due to that or to sacrificial practice. An alternative explanation proposed by MacKinnon (2018a, 93) for the absence of caudal vertebrae from the Archaic faunal assemblage from the shrine of Opheltes at ancient Nemea was that the tails were not burnt on the altar but rather were kept with the hide. Returning to the Hellenistic Asklepieion of Thouria, femurs on the other hand are well-represented. In the case of pigs, a possible explanation based on differential treatment of pigs in sacrificial rituals has been proposed in Chapter 6. As for cattle, sheep and goats, one needs to remember that not all animals consumed at a sanctuary need have been sacrificed, something further supported by the fact that the recovered femur fragments were not heavily burnt. A final clue to the nature of the assemblage is its species composition (Ekroth 2007). Since only the four main domesticates were used as sacrificial victims, the presence of other taxa such as game species once more points to consumption debris. Based on the scarcity of burnt bone and the relatively good representation of femurs (a body part likely to be underrepresented due to vulnerability to attrition as it is late-fusing and relatively difficulty of identification in fragmented state), I

[100] Ekroth (2017b, 45) correctly points out that we cannot know to what extent faunal remains consumed there were removed from the cult places and there is also the possibility that sacrificial meat was consumed by worshippers at home.

[101] Osanna (1993) has instead proposed the identification of the altar as that of Hermes Agoraios.

[102] Identification bias regarding the vertebral column is another plausible contributing factor to their underrepresentation.

propose that the Hellenistic Asklepieion of Thouria assemblage represents dining debris from feasting activities taking place in the vicinity of the temple.

Having established that the assemblage comprises feasting debris, an important question to be addressed regards the degree of egalitarian sharing of meat amongst the worshippers. Again returning to the conclusions of Chapter 6, distribution of butchery marks on the skeletons of the four main domesticates indicates that they were intensively butchered to divide the carcasses into small (pot-sized) parcels of meat. This, combined this with the low incidence of burnt bones, suggests boiling as the preferred cooking method, an interpretation which is in agreement with other published Greek faunal assemblages from sacred contexts[103]. A number of reasons have been proposed to explain the preference for boiling most of the meat rather than grilling it. First of all, it was the most practical and least time-consuming cooking method for large crowds. Moreover, it minimised differences in quality between the various parts of the carcass and the various species sacrificed/cooked, the meat became tender, the fat was retained and the marrow extracted in the broth, and, as the meat was probably cut into portions, it was easier to distribute and consume. In addition, a larger quantity of meat could have been extracted as the bones were removed after the meat was boiled instead of when it was still raw and with meat left clinging to it (Ekroth 2007, 267-8; 2008b, 274; 2017a, 45-6).

In addition, a small number of the Hellenistic Asklepieion of Thouria bones bore traces of scorching. This suggests that they were grilled rather than boiled, with the fire leaving its traces on the parts of the bone not protected by the meat covering it. Two epigraphic examples, the 2nd c. BC sacred law from Kallatis (*LSCG* 90, 3-4) relating to the cult of Dionysus Dasyllios and a 3rd c. BC decree from Haliartos (*SEG* 32:456, 23-5), mention the grilling of meat which had subsequently to be placed in the first case on the sacred table and to be given in the second case to specific high-status individuals (Ekroth 2008a, 102; 2008b, 273-4). As demonstrated by the epigraphic evidence, grilled meat was intended for religious and civic functionaries, who constituted only a minority of the attendees, consistent with the minimal number of bone fragments related to that cooking method at the Hellenistic Asklepieion of Thouria.

As the majority of the meat was cut into small parcels and boiled, its equal distribution among worshippers (apart from the few elite individuals receiving choice cuts and grilled sections of meat) is the most likely scenario. It is of course possible that some individuals received more than one portion of the boiled meat. This question may potentially be answered by publication of the temple's sacred law discovered in 2013 (Arapogianni 2015, 60).

Of paramount importance to the discussion surrounding ancient Greek sacrifice is the issue of meat consumption as it has been a common view that the only sources of meat for ancient Greeks were sacrificial victims and game (Jameson 1988, 87)[104]. Detienne (1989, 3 and 11) takes this one step further by completely ignoring meat from game, while von Reden (2007, 394), stating that the raising of animals

[103] Cf. The faunal assemblages of the sanctuary of Demeter and the Dioscouri at Messene (Nobis 1997, 100), the Heraion on Samos (Boessneck and von den Driesch 1988, 7), the Herakleion on Thasos (des Courtils et al. 1996, 811 and 817), the sanctuary of Poseidon and Amphitrite on Tenos (Leguilloux 1999, 426 and 444), the sacrificial area at Eretria (Studer and Chenal-Velarde 2003, 177 table 2 and 181-2), the Large Circular Pit at Isthmia (Gebhard and Reese 2005, 140 and 153 table 2B), the altar of Artemis at Olympia (Benecke 2006a, 154), Zeytin Tepe at Miletos (Peters and von den Driesch 1992, 124) and the Pilarou cave sanctuary on Thera (Becker 1997, 153, 167 and 170).

[104] Naiden (2013, 234-5) briefly summarises the past views on the issue of all meat consumed being exclusively sacrificial. See Osborne (1993, 394-5 n. 11) as well.

for slaughter was unprofitable for most households, argues that "meat came to private households almost exclusively via sacrifices". This meant that consumption of livestock only took place within sacrificial contexts. However, based on osteological evidence, Ekroth (2007, 268-9) argues in favour of a more complex situation and on a hierarchy of sacredness of meat as the analysis of the faunal assemblages from a number of ancient Greek sanctuaries has revealed the presence and consumption of species normally not sacrificed (dogs, horses, donkeys and game). In addition, Parker (2010, 144) justifiably argues in favour of the consumption of animals judged as imperfect and, thus, unfit to be sacrificed. Inappropriate species and imperfect livestock could have been killed during hunting or at home and their meat brought to the sanctuary to be consumed or they could even have been slaughtered (but not sacrificed) at the sanctuary, again to be consumed. Animals that had died naturally should also be added into the equation (Parker 2010, 140). Meat from sacrificial victims, however, was evidently the most sacred of all types of meat (Ekroth 2007, 270-1) and Parker (2010, 145) arrives at the same conclusion in stating that, although non-sacrificial meat was eaten, the sacrificial killing of animals was "the ideal mode" for the provision of meat for consumption[105]. Furthermore, Naiden (2013, 236-50), citing primarily literary evidence, further discredits the view that the ancient Greeks only consumed solemnly sacrificed meat and concludes (Naiden 2013, 274) that no regulations existed against the consumption of non-sacrificial meat. Scullion (2013), with the support of literary and zooarchaeological evidence, also arrives at the conclusion that Greeks ate meat from non-sacrificial victims, but he also argues that, after the final act of the *thysia* sequence was completed and the subsequent banquet began, any sense of sacrality of the meat disappeared and the same went for sacrificial meat consumed at home, whether it was transported from the sanctuary or bought in the market.

In the case of the Hellenistic Asklepieion of Thouria, anatomical representation suggests that most if not all of the cattle, sheep, goats and pigs were brought to the sanctuary intact and so presumably slaughtered on site, with or without sacrifice *sensu stricto*. In addition, as has already been established, wild taxa bearing butchering marks were present on site. Dogs were also present, but no indications of consumption have been identified on their bones. Finally, a horse radius and an equid scapula bore chop marks, the position of which indicates defleshing of the bones. These could have been inflicted either to prepare them for consumption or, perhaps, to retrieve the bones as raw material for working. Regardless of the role of equids in this, the presence of wild game further discredits the view of past scholars that all meat consumed by the ancient Greeks originated from sacrificial victims.

Let us now turn to the issue of the *mageiros*. The employment of specialist butchers is not a subject limited solely to the Hellenistic Asklepieion of Thouria as the same question arises, in a secular context, for Early Byzantine Messene.

During big public sacrifices, when a lot of animals were slaughtered, a speedy and efficient method for carcass processing was needed and professional butchers may well have been employed during those events. Their presence is best reflected in the butchery traces they left on the animal bones. Chop marks inflicted by cleavers are the most numerous type of butchery trace in the Hellenistic Asklepieion of Thouria assemblage, whereas marks inflicted by small knives dominate in the assemblages of Early Byzantine Messene and the Late Byzantine Thouria farmstead. These paired contrasts between choice of

[105] Ekroth (2014, 342-3) considers the possibility that our difficulty in accepting the possible ritual ties of the meat consumed by the ancient Greeks might be derived from the modern Christian, thus secular, attitude towards meat.

tool (cleaver vs. knife) and depositional context (sacred vs. domestic) cannot be coincidental. As Luff (1994) also observed in a very different chronological and geographical context, cleavers must have been handled by butchers operating in the temple to cover the needs of meat supply for feasting events, while the consistent placement of the chops in specific anatomical areas further strengthens the conclusion that these butchers were specialists. In addition, a butcher's shop must have operated in ancient Messene as a 1st c. AD inscription from the Sebasteion (*SEG* 23.205, *SEG* 23.207 and *SEG* 35.343)[106] names the west portico of the agora "*stoa para to Kreopoleion*", translated as "portico near the butcher's shop" (Themelis 2012a, 44-5), as it connected to a courtyard where the slaughterhouse and butchery shop were located. This is further confirmed by the discovery of a large perforated stone used to bind the animals for slaughter (Themelis 2019, 76), but the structure was abandoned in the 4th c. AD along with the other public buildings of the city and there are no *non*-zooarchaeological indications of the existence of professional butchers at Messene in the Byzantine era. Two lines of evidence, however, provide possible indirect support for specialist butchers in Early Byzantine Messene. First, the documented slaughter of adult cattle, at least some apparently after lengthy service as working and probably breeding cows, would have posed practical challenges for consumption at a household level in a world without refrigeration. Secondly, indications of skilled craftwork using bone of large domesticates as raw material (cf. Chapter 6 as well as Vasileiadou 2012; 2018) imply a ready supply of fresh bone and, since individual households probably slaughtered the relevant large domesticates at rare intervals (judging by the mortality data, perhaps one or two individuals per decade at most if each household owned a single draught pair), this suggests the existence of at least one (as yet unlocated) local specialist butcher. Nevertheless, the dominance of knife-butchery at Early Byzantine Messene suggests that each household butchered their own animals using non-professional tools, or that any resident specialist plied his trade on a small enough scale not to use heavy cleavers as was the case at the Hellenistic Asklepieion of Thouria. The residents of the Late Byzantine Thouria farmstead also processed meat with knives, unsurprisingly perhaps if consumption was restricted to a small productive unit that would have had no need for a professional butcher (but see below).

A final question pertinent to religious activity is the possible continuation of Olympian sacrifice during the transition from paganism to Christianity. The faunal assemblage of Messene, dated to the Early Byzantine era, is ideally placed chronologically to help tackle this issue. What is the earliest evidence of a Christian presence at Messene? As discussed in Chapter 3, part of the studied animal remains were recovered from the "Theatre's Quarter", where an urban villa was operating as an in-house church for possibly the second quarter of the 4th c. AD, not long after the Edict of Milan (AD 313), until its destruction due to the earthquake of AD 365. Its prominent location and the fact it was a villa lead to speculation that its occupant, a member of Messene's elite class, adopted the new religion and transformed part of his residence into a private religious area (Tsivikis 2016, 310-2). However, it is not until the 5th c. AD that a public Christian religious monument is constructed in the town, in the form of the Asklepieion basilica. Tsivikis (2017) explores a different type of evidence to argue for the existence of a Christian community amongst the pagans of 4th c. AD Messene. The discovery of the statues of Hermes, Artemis and either emperor Constantine I or emperor Constantius II in one of the rooms of the late Roman villa to the east of the Asklepieion, all of which previously stood in more prominent locations

[106] For further information on this inscription, related to the raising of funds for the repair of a number of Messene's public buildings, see Orlandos (1965) and Migeotte (1985).

in the city, perhaps reflects the attempt of the pagan owner of the villa to save them from destruction by the Christians.

Focusing on the faunal assemblage, this will have accumulated slowly over a long stretch of time and will have derived from a number of activities, potentially masking any osteological signature of each. Moreover, activities such as fasting[107], characteristic of the Christian diet, would naturally not be discernible in a faunal assemblage. Unfortunately, whether or not Olympian sacrifice continued after the adoption of Christianity as the official religion of the state, is impossible to determine based on present data. If traditional animal sacrifice was performed at Messene's temples and if, as discussed earlier in this chapter, animal bones from feasting activities were kept within the boundaries of the temple, they would consequently be absent from the current assemblage as no sacred contexts other than the sanctuary of Isis and Sarapis are included. Moreover, the Iseion bones originate from the early Byzantine use of the sanctuary's water crypt as a garbage pit and it is highly unlikely that animal bones were deposited within the water-filled crypt while it was still in use for initiatory rituals. Finally, if Olympian sacrifice was performed in private residences, the remnants of the sacred meals would have been mixed with those of secular meals. In conclusion, it is not possible to assess the continuity of Olympian sacrifice under Christianity based on the faunal data analysed in the current thesis.

Animal consumption in the context of herd management

Epiphyseal fusion and tooth eruption and wear show that cattle were mostly killed-off from the time they reached their optimum meat weight at four years old while sex profiles and biometric data indicate that males not only were slaughtered at a younger age than females but also dominate the Hellenistic Asklepieion of Thouria assemblage. Age-at-death data for sheep and goats indicate that young adults of both species were selected for slaughter at the sanctuary. Though sexed pelves are few and biometric data too sparse to offer any useful information, more male sheep/goats seem to have been present in the Hellenistic Asklepieion of Thouria assemblage. Finally, pigs offer no secondary products and were thus reared solely for their meat and this is reflected in the peak of second year deaths, when the animals could already provide a substantial quantity of meat. Sex and biometric data are again sparse, while the former are heavily influenced by recovery bias in favour of male individuals, but nonetheless suggest a preference for male pigs at the Hellenistic Asklepieion of Thouria. As briefly discussed in the previous chapter, there was a preference for matching the sex of the victim to that of the deity[108] and this is consistent with the indications, albeit tentative, of dominance of males in cattle, sheep/goats and pigs alike at the Hellenistic Asklepieion of Thouria. Hygeia was also worshipped at the temple and the female victims, also represented osteoarchaeologically, could have been associated with her. Publication of the surviving fragment of the sacred law from this sanctuary may in future clarify what if any stipulations were in force as to the sex of victims.

[107] The fasting periods included in total about half the days of the year and they were all characterised by the prohibition of meat consumption, with other dietary restrictions occurring on specific days (Nicholas and Louvaris 2005). Wednesdays and Fridays were fasting days for most of the year for all Orthodox Christians, while monks also fasted on Mondays. Four fasting seasons (Advent, Lent, the 'feast' of the Apostles Peter and Paul and the Assumption of the Virgin Mary) were also imposed by the church. Finally, monks, depending on the rules of each monastery, fasted on the eve of certain religious holidays celebrated by their monastery (Koder 2005, 19).

[108] Parker (2011, 134 n. 41) notes that in more than 50% of the surviving epigraphic cases, the sex of the victim matched that of the god.

The dominance of males in a sacred context, especially younger ones, also makes sense from an economic perspective, as the Hellenistic Asklepieion of Thouria was a consumption rather than a production site. Fewer males are needed for reproduction in comparison to females and thus any excess individuals were kept until they reached an optimum meat weight, within the potentially conflicting constraints of available pasture/fodder and consumer demand. Then they were likely sold[109] to the polis's administrators or some of them even donated by individual citizens to be used as sacrificial victims during large celebrations. The older animals present of both sexes must have been stock that had reached or were nearing the end of their useful lives for reproduction, traction or secondary products; such animals would have been slaughtered as it made no economic sense for the owners to keep them alive[110]. Barren and sick or injured animals may have had the same fate. However, most of the livestock consumed was of prime age, chosen doubtless as suitable victims to honour the god being worshipped, but perhaps also to reflect the wealth of the state purchasing them for ritual activities or to display the status of elite donors.

The above paragraph highlights how interlinked were animal husbandry and religion. The *thysia* ritual depended on stock-herders for the continuous flow of sacrificial victims to the sanctuaries while farmers, both large-scale and small-scale, depended on the need of sanctuaries for sacrificial victims not only for an additional source of income but also for a way to dispose, without waste, of excess animals that were of no further productive use[111]. There were practical limits to the amount of meat a household (and their extended family and neighbours) could consume in an era before the appearance of refrigerators[112], especially if a large number of animals needed to be removed from the herd within a short period of time as is usually the case for all but the smallest herds. In effect, if sacrifice and associated commensality dominated meat consumption to the extent that is widely believed in the pre-Christian era, then sanctuaries will have played the role of urban butchers today in providing an outlet for rural livestock too numerous or too large for domestic or local consumption.

At the Early Byzantine nucleated settlement of Messene, according to mortality profiles, most cattle survived past their fourth year of life while sex and biometric information point to a dominance of females within the assemblage. Thus, males were once more slaughtered at a younger age than females for their meat. However, the dominance of females, in contrast to the more selective Hellenistic Asklepieion of Thouria assemblage, shows that they were kept longer as breeding stock and perhaps draught animals, the latter supported by the detection of traction related pathologies that are anatomically concentrated in a way not seen in other species. As for sheep, there are strong indications in their mortality profile that the species was exploited for wool (and stock replacement) prior to slaughter for meat. Goats must have been reared primarily for meat as they were slaughtered somewhat younger than sheep. Unfortunately sex and biometric information are too limited for either

[109] Thus the prices of animals on the various surviving sacrificial calendars.

[110] The identification of traction related pathologies on cattle bones within the Hellenistic Asklepieion of Thouria assemblage confirms that animals past their prime were also consumed on site.

[111] Cf. Rosivach (1994, 83-4 and 92-4) for 4th c. BC Athens; Jameson (1988), who combines zooarchaeological with epigraphic evidence.

[112] Grünbart (2007) discusses the issue of food preservation in Byzantium. In relation to meat, he argues that the dominant method of preservation was a combination of drying and salting while smoking was unknown to the Byzantines. However, the only evidence presented in support of that is solely the mention of salted meat in a few literary sources without any further analysis.

species to offer any reliable additional detail. Finally, the data collected for pigs present an almost identical situation with that of the Hellenistic Asklepieion of Thouria.

At the final site examined, the Late Byzantine Thouria farmstead, emphasis is placed on slaughter for meat and at younger ages in all four principal domesticates than at the Hellenistic Asklepieion of Thouria or Early Byzantine Messene (see below).

The Messenian landscape with its favourable climate (well watered by the standards of southern Greece) was the ideal setting for the practice of traditional Mediterranean mixed farming. Grain, olives and vines[113], widely known as the Mediterranean triad[114], were the main products of the cultivated land. Their importance is reflected in the aforementioned (cf. Chapter 3) Byzantine watermill excavated at ancient Messene, the two Byzantine wine presses constructed over the Hellenistic Asklepieion and theatre of Thouria and the remains of two olive presses visible on the surface in the area of ancient Thouria[115]. Moreover, the Late Roman villa west of the gymnasium at Messene had its own wine presses, in addition to millstones for grinding corn (Themelis 2009, 95-6). Sheep and goats were the dominant domesticates in faunal assemblages from the Hellenistic Peloponnese, while pigs and cattle were of secondary importance. This pattern persisted during both the Roman and the Byzantine eras (Kroll 2012, 97) and is also visible at Early Byzantine Messene and the Late Byzantine Thouria farmstead.

Animal husbandry in Classical and early Hellenistic Greece was probably of small scale and usually practised close to home due to a number of limiting factors such as the small size of individual properties and the political fragmentation of the land as inter-*polis* boundaries restricted the movement of large flocks. With the appearance of larger estates and the creation of inter-*poleis* bonds in the later Hellenistic era, the practice of pastoralism at a larger scale, as well as transhumance over longer distances, was more feasible. In addition, the suggested practice of less intensive agriculture at the time freed some of the fields, especially the more marginal and distant ones, for pasture (Alcock 1993, 88). However, favourable conditions did not necessarily lead to large-scale pastoralism. A demand for its products was also needed. Moreover, such a generalized picture should not be applied to the regionally diverse totality of Greece. An additional problem, which Alcock (1993, 87) has briefly commented on, is the relative lack of zooarchaeological evidence and the ambiguity of the literary sources on the basis of which conclusions are drawn. Furthermore, the use of data from surveys and, more specifically, their report of human presence in areas traditionally associated with pastoralism is not without its problems as land use could have changed in nature quite a number of times over the centuries of human exploitation. Pastoralism may well have been practised in those areas but whether it was of large scale is difficult to determine without direct evidence.

Hodkinson, referring primarily to the Classical and Hellenistic eras (but the same can be applied to the Byzantine era), has listed a number of agricultural practices that involved symbiosis of arable farming

[113] For the agricultural products of Hellenistic and Roman Messene with particular emphasis on vines, see Themelis (2009). Another source of information are the late 3rd c. BC carbonized remains discovered in the heroon of Aristomenes (K4) north of the gymnasium of Messene (Megaloudi 2005).
[114] For the likely addition of pulses to the triad, see Sarpaki (1992), albeit with a focus on prehistory.
[115] For the olive presses, as of yet unexcavated, see Arapogianni 2016c.

with animal rearing[116]. These included cereal–pulse rotation with the pulses sometimes used as fodder or forage crops, cereal–fallow rotation with domesticates allowed to graze the fallow fields, annual cereal cropping which provided stubble for grazing[117], use of the waste of cereal, pulse, olive and grape processing and the waste of tree pruning as fodder, and, lastly, cultivation of specific crops intended for animal fodder such as tree medick or cytisus (*Medicago arborea*)[118]. The various fodder crops could have been cultivated in olive groves as well. Furthermore, land unsuitable for cultivation, such as forests, shrubland and marshes, the latter plentiful in Messenia, was ideal for grazing (Hodkinson 1988, 41-8) while, according to ethnographic examples, crops destroyed by hailstorms, for example, could have been either grazed *in situ* or turned into hay (Halstead 2014, 199). In addition, grazing of early cereal shoots ensured a good secondary growth (Alcock et al. 1994, 152). Ethnographic research in Greece also informs us that light grazing of the cereal shoots retarded growth and, thus, reduced the risk of them being "burning" by late frost or of becoming so tall in a wet spring that rain or wind would have caused them to lodge (Halstead 2014, 193). On the other end of the spectrum, animal dung was applied to cultivated fields and orchards (Hodkinson 1988, 49). Now, the extent to which ancient Greeks actually made use of manure[119], cultivated fodder crops or regularly practised crop rotation has been debated for decades (e.g. Moreno 2007, 14-25; Skydsgaard 1988, 81-3; Hodkinson 1988). Sallares (1991, 303), for instance, using lucerne, which was probably used in antiquity for the feeding of horses, as an example, supports that the widespread cultivation of fodder crops is a quite recent development in Greece. Indeed, extensive need for fodder might have been quite limited in Messenia, an area where natural pasturage must have been more abundant (cf. Strabo 8.5.6) than in other, more arid regions of mainland Greece, such as Attica. The Spartans, judging from various contemporary written accounts, seem to have been able to maintain large herds and flocks in the well-watered plains and river valleys of Messenia (Hodkinson 1988, 66; Howe 2011, 17-19) before they lost control of the area during the early Hellenistic period.

For Messene in particular, its walls enclosed ca. 290 ha of land, most of which was vacant of buildings. Using Pompeii and Sparta as analogies, Themelis (2010e, 98-9) believes that the fields to the south, east and west of the town centre were used for cultivation and the keeping of livestock, while Mount Ithome to the north was probably exploited for grazing, logging and quarrying. Moreover, Polybius (4.3.8-4.1) wrote about an incident of animal theft from a farmstead within Messene's walls with the aid of ladders in the late 3rd c. BC, implying that livestock was kept close to the city and within its walls (Hodkinson 1988, 47). Whether Polybius' *ἐπαύλιον* should be translated as a farmstead or not can be debated but in my opinion both that term as well as the term rural villa must be accurate. The walls[120] include such a

[116] Koster and Koster (1976, 281-3) offer ethnographic examples of interdependent agriculture and pastoralism interdependence in the recent past in the southern Argolid. Another valuable source of ethnographic parallels is Halstead (2014).

[117] Rautman (2006, 178-9) maintains that the Byzantines harvested crops with sickles rather than adopting the more time-efficient western European scythe because the former left longer stubble for grazing by livestock. Most 20th century Greek farmers likewise rejected the scythe as ill-suited for harvesting cereals (Halstead 2014, 85).

[118] Tree medick, today considered wild, is mentioned by a number of ancient writers (e.g. Demokritos of Abdera, Eupolis, Aristotle, Aischylides, Pliny, Columella), some of whom indicate it as a cultivated plant (Hodkinson 1988, 45).

[119] A number of methods employed for soil rejuvenation other than animal dung are mentioned in the sources. These include "green manure", stubble burning, application of mud or some other non-organic matter, "tanner's manure" and use of corpses or blood (Alcock et al. 1994, 147).

[120] For Messene's walls, see Müth 2010; 2014.

vast area of undeveloped, thus agricultural, land that at least a small percentage of the population must have wanted to live closer to their fields and livestock. In the incident described by Polybius, the people at the farmstead were either slaves or waged servants (*οἰκέται*). However, one cannot know whether that was a general phenomenon. Residents of farmsteads could have been the actual owners, tenants, hired labour, depended labour or even slaves of the elite class[121]. No rural farmsteads have yet been located, let alone excavated, at ancient Messene to aid interpretation. However, two 1st c. AD inscriptions refereeing to rights of pasturage and to the leasing of agricultural and grazing land indicate not only some of the practices taking place at Messene but also the involvement of officials such as the governor (*ἔπαρχος*) in the distribution of pasture rights (Themelis 2010e, 99-100). Despite the lack of archaeological evidence for rural villas, three Late Roman urban villas have been excavated at Messene, the residents of which likely owned large expanses of agricultural land. Themelis (2010e, 101-2) maintains that large land holdings owned by Messene's elite class were cultivated on their behalf by slaves and hired labour for the production of grain and especially olive oil. The ownership of large expanses of land is further supported by the aforementioned wine presses of the Late Roman villa near the gymnasium as no need for such installations would have existed had the ownership of vineyards been limited. By the Early Byzantine period, most of the land must have either been divided into smaller plots which were owned by individual families and/or larger plots owned by upper-class men were once more divided into smaller plots and rented to arable farmers. This conclusion regarding the size of cultivated plots is connected to the use of cows as the main draught animals, which were preferred for smaller-scale arable work as discussed in Chapter 7.

What about transhumance? First of all, that term can be used for both long-distance seasonal migration and more restricted movement of livestock as defined by Nixon and Price (2001, 405). However, transhumance in Greece does not necessarily involve long distances due to the country's considerably varying geographic conditions over short distances (Skydsgaard 1988, 80). In order for it to be practised, in addition to the aforementioned issue of land fragmentation that obstructed not only long-distance movement of flocks but also the maintenance of large-sized flocks, high demand for pastoral products, more than a single household could have consumed, is necessary to make specialised production beyond subsistence requirements worthwhile (Nixon and Price 2001, 406-8). However, demand for such products in the era under discussion is unlikely to have been high enough to justify the practice of specialized pastoralism by big segments of a *polis*' population as households tended to be self-sufficient (Hodkinson 1988, 57). For example, the high number of millstones, as well as the thousands of late Hellenistic and Roman loom weights found at Messene, indicates that each household was grinding its own flour and producing its own textiles (Themelis 2010c, 31). Finally, transhumance may have been rarely practised in ancient Greece also due to the apparent limitation of mountain pastures, as extensive forest clearance was a relatively late phenomenon in the country, while lowland pasture resources (e.g. trees, seasonal wetlands) were widely sufficient to support reasonable numbers of livestock through summer without vertical movement (Halstead 1987, 79-81). In the case of both Messene and the Late Byzantine Thouria farmstead, transhumance, whether long-distance or short-distance, is unlikely to have been practised. The relative frequencies of the four main domesticates are quite close at both sites (cf. Chapter 7 – Species composition). In addition, no demand for specialised pastoral products seem to have existed and especially not at a level that would argue in favour of the maintenance of large flocks

[121] Cf. Burford (1993); Jameson (1977; 1992); Osborne (1989).

and the mobilisation of manpower for their seasonal vertical movement. Finally, the wealth of the Messenian landscape must have offered plenty of sources for the maintenance of livestock close to the settlements.

The preceding discussion of the scale of arable and pastoral farming brings us back to the status of the Late Byzantine Thouria 'farmstead'. Was it literally a small productive unit exporting produce to near or distant urban consumers? Or was it part of an elite residence/estate that consumed the surplus of dependent farmers? The status of its residents should ultimately be clarified through the study of the recovered ceramic (e.g. fine wares and imported pottery; amphorae perhaps indicating the import of exotic foodstuffs like garum) and small finds (e.g. loom weights, coins, brooches, etc.), which at this point is at too early a stage to provide answers to this question[122].

At the moment, the only evidence available are its location (fertile land, access to water, broad view of the Messenian plain below), the structure itself (two storeys, wine press, using readily available building material from the theatre) and the associated faunal assemblage. No contemporary farmsteads have been excavated and published in Greece, but the existence of a wine press and second storey suggest that this was no humble rural cottage, but rather the property of a fairly wealthy person; a small farmstead is unlikely to have invested in such a durable and functionally recognizable facility as the wine press if the product was destined solely for on-site consumption or modest sales (cf. Foxhall 2007).

The zooarchaeological data offer tentative support for this latter view. Breeding of all taxa was focused on meat production and the younger slaughter age of an important percentage of the cattle, pigs, sheep and goats points to on-site consumption of animals that a simple farmstead might otherwise have been expected to export to an urban market. The relatively modest representation of cattle (and especially older individuals) may be due to the sale of larger livestock to butchers in surrounding settlements because their carcasses were too big to be consumed on-site. Nonetheless, draught cattle are apparently represented on site and the adult sex ratio, although admittedly based on a very small sample, hints at fairly even numbers of males and females (Chapter 7 – Table 7.7). The implied use of oxen rather than (or as well as) cows as the draft animal of choice at the farmstead suggests arable cultivation on a scale more compatible with an elite estate than a simple farmstead.

Another issue to be raised is the high percentage of dogs and game taxa (red deer especially) at the Late Byzantine Thouria farmstead in comparison to the other two sites. The combination of the two is a possible indicator of the importance of hunting to the farmstead's inhabitants as an additional source of food or even as a pastime activity (or both). This in turn might hint at the elite status of the people living there. Some of the dogs may also or alternatively have been family pets[123] or guard dogs. Such a large number of individuals, however, would arguably not have been required unless hunting was involved.

Finally, the presence of fallow deer in the Greek mainland after the Bronze Age is a complicated issue made even more difficult to untangle by the relatively limited (at least in comparison to earlier chronological phases) number of published faunal reports dating from the Iron Age onwards. The

[122] McHugh (2017, 57-60) offers a detailed synopsis of the role of ceramic evidence in the identification of farmsteads and the interpretation of their nature.

[123] The identified cat bones could likely also have belonged to at least one family pet or an individual used as a means for pest control.

number of reports shrinks significantly when the focus is restricted to the Peloponnese with centuries-long gaps without any information available. Thus a patchy and often confusing picture emerges. In addition, when just a few fallow deer bones are identified, they could have been imported to the site from elsewhere either dead or alive. In sum, even though very likely an autochthonous species in mainland Greece during the Pleistocene and Early Holocene (Becker 1998; Yannouli and Trantalidou 1999) – whether it was managed at that time or not by humans is a completely different matter – it could very well had been extinct and later reintroduced in the Peloponnese. If and when that happened is impossible to determine given the current scarcity of data. Investigation of more Peloponnesian faunal assemblages is needed in order to give a more definitive answer to this issue and the handful of fallow deer bone fragments identified in each of the assemblages under study here cannot offer much information, especially at Early Byzantine Messene where only a single astragalus was recorded.

Future research

First and foremost, I must once more stress that excavation at two of the contexts included in the thesis, the Messene Iseion and the Late Byzantine Thouria farmstead, is still ongoing. Thus results should be considered as preliminary.

Ideally in the future, the four Messenian contexts combined here for the reasons explained in Chapter 4 should also be examined individually for the determination of any subtle differences between them. More importantly, the material reported here from Messene represents only ca. 11% of the total assemblage, while only ca. 9% of the material located in storage has been excluded because of the loss of contextual information. An assemblage eight times larger than that included in this thesis is available for study, therefore, if a solution can be found to the problems of dating the site's upper levels. It would also be worthwhile to re-examine, with different questions and methods of analysis, the faunal material published by Nobis, but unfortunately I was unable to locate this during fieldwork. This thesis has thus exploited only a fraction of the potential of faunal study at Messene and further work is of the highest priority not least because zooarchaeological investigation of the Byzantine period has so far been very limited, both in Greece and beyond (Kroll 2012).

On a more positive note, the Iseion excavations bring new dateable material to the light with every passing year from one of the most interesting and intriguing public building contexts identified thus far on the site. Equally promising is the excavation of Thouria, still in its early stages, with an entire *polis* waiting to be uncovered. An important question that will hopefully be answered in the future is whether the currently studied Late Byzantine farmstead was an isolated structure or part of a settlement, while retrieval of animal bones from domestic contexts contemporary with the Hellenistic Asklepieion will enable comparison between sacred and domestic animal consumption and thus fuller assessment of how animal husbandry regimes accommodated religious demand for meat. Furthermore, the unpublished sacred law of the Hellenistic Asklepieion of Thouria will offer a rare opportunity to study the compatibility between epigraphic and faunal evidence.

More detailed biometric study as well as DNA analysis of the Late Byzantine Thouria farmstead dogs may also reveal the extent to which these represent a specialised breed, for hunting, herding, etc., which might in turn shed light on the status of the site, although success in such a venture is more likely

if similar data become available from other Byzantine sites. Furthermore, logarithm size indexes (LSI)[124], not included in the current work due to lack of time, should in the future accompany the biometric analyses for the main domestic taxa to aid for example the differentiation of sex groups, diachronic changes in size, and the separation between wild and domestic animals in the case of pigs. In addition, study of the bird and fish bones excluded from the current thesis due to the reasons mentioned in Chapter 4, will provide an additional source of information.

Finally, in exploring whether meat supply at Early Byzantine Messene was in the hands of specialist butchers and whether the Late Byzantine Thouria farmstead was a modest farmstead or the centre of an elite rural estate, this thesis has tackled major questions regarding the economic organisation of the Byzantine urban and rural landscapes. While the faunal insights into these issues have been tentative, they show the potential of this approach and highlight the need for more macroscopic study of zooarchaeological assemblages from both urban and rural sites of this period.

[124] For the application of LSI in zooarchaeology cf. Meadow 1999; Wolfhagen 2020.

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