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The Social Role of Hunting and Wild Animals in Late Bronze Age Crete: a social zooarchaeological analysis

by

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ABSTRACT

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THE SOCIAL ROLE OF HUNTING AND WILD ANIMALS IN LATE BRONZE AGE CRETE: A SOCIAL ZOOARCHAEOLOGICAL ANALYSIS

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This thesis investigates the social role of hunting and wild animals in Late Bronze Age west Crete, particularly in Chania. The areas addressed are: the nature of human interaction with wild animals (red and fallow deer and agrimia) in Late Bronze Age Crete, including how might concepts of ‘wild’ and ‘domestic’ have been perceived and enacted; the evidence for the ‘social’ role played by wild animals in Late Bronze Age Crete; and the role human-(‘wild’)animal engagement played in the social and political transformations that were taking place in Late Bronze Age west Crete.

These questions are investigated predominantly through primary zooarchaeological analysis, but also referring to other categories of data such as iconographic material. This analysis is situated within a broader body of theoretical approaches to understanding human-animal relationships and adopts, as far as possible, a non-anthropocentric approach. In order to investigate the data, a framework of analysis was devised to link the relationships with the living animal, with the dead animal, and with the animal bone remains, as an interconnected series of embodied events, termed here ‘a cycle of engagement’.

It is concluded that interaction with wild animals was an important practice in Late Bronze Age Crete, however a ‘wild’ or ‘domestic’ status may, in cases, have been contextually defined. It is proposed that interaction with ‘wild’ animals would have been encounters of (mutually) heightened physical and sensory awareness, which would have contributed to a sense of relationship between hunter and hunted, and perhaps created contexts within which traditional boundaries might be transcended. It is suggested that consumption of these hunted animals in large-scale (multi-species) communal consumption events would have contributed to the development and maintenance of the west Cretan regional identity at the end of the Late Bronze Age.

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DECLARATION OF AUTHORSHIP

I, Kerry Harris, declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

‘The Social Role of Hunting and Wild Animals in Late Bronze Age Crete: a social zooarchaeological analysis’.

I confirm that:

1. This work was done wholly or mainly while in candidature for a research degree at this University;
2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
3. Where I have consulted the published work of others, this is always clearly attributed;
4. Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
5. I have acknowledged all main sources of help;
6. Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
7. Parts of this work have been published as:

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Chapter 1: Introduction

1.1 The study in context: backgrounds

Animals were part of past societies[1]. Traditionally, in zooarchaeological studies the role of animals has been investigated with regard to their capacity for providing products of economic value to past society, or the use of animals as symbols or metaphors of human society. This study starts from the premise that, as equally present beings in the world, physical, social, and emotional interaction with animals, as beings in their own right, was an integral part of past societies: 'they afford the possibility not only of action but also of interaction' (Ingold 2000:163). That some aspects of human-animal interaction resulted in the 'products' that were incorporated in the economies of society is not denied, that in some contexts animals became symbolic of certain elements of society is also not disputed. Rather, these elements were the 'by-product' of a set of relationships. The premise that these relationships had the capacity to be social, and even emotional, (as well as economic and symbolic) is supported here.

Yet there is no monolithic understanding of human-animal relationships, these are myriad and entwined. There is no monolithic understanding of 'animal', 'domestic/wild animal', or even 'sheep', 'deer' and so on; there are interactions between interspecies individuals. Yet in archaeology the extent to which we can unravel these individual entanglements is variable, and to some extent we have to be satisfied with the broader category (to species level at least). Still, there have been some significant studies recently that have interpreted the social nature of human-animal relationships in the past arising between humans and (domestic) animals in their care (or to put it another way, the animals and the humans in their care, e.g. Armstrong-Oma 2007, Jones 2007, Jones 2009, Argent 2010).

This study is concerned with the nature of the interaction, the relationship, between humans and 'wild animals'. Specifically, in the context of Late Bronze Age Crete, it is an investigation of the relationship between people and fallow deer, red deer, and agrimia (Cretan 'wild' goats, see Chapter 6.3.4). To

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[1] Defined as a body of individuals living as members of a community.

reiterate, whilst these animals certainly contributed to the economies of Late Bronze Age society[2], the focus of this study is on the embodied interaction with these animals as beings in their own right, and the social significance and implications of such in Late Bronze Age society.

This study, then, sits at the intersection of a number of wider topics and debates, more broadly: the role of ‘hunting in farming societies’, the place of animals in Aegean archaeology, and the development of a non-anthropocentric zooarchaeology (Overton & Hamilakis 2013).

1.2 Hunting in farming societies

Traditionally, ‘hunting in farming societies’ has been rarely discussed in detail in archaeology, as ‘domestic’ animals are generally considered to be the characterising feature of ‘farming societies’. When ‘wild’ animals are present, they are often grouped together, and simultaneously explained away, as ‘wild resources’.

In cultural evolutionary frameworks the advent of farming was seen as a marker of (unidirectional) technological progress and increasing civilisation, in which continued use of hunting was assumed to be a relict of ‘hunter-gatherer’ life-ways (see Pluciennik 2005). In New Archaeology, an emphasis on the modelling of palaeoeconomies relegated the role of wild animals to ‘fall-back’ resources in risk-buffering scenarios (e.g. Halstead & O'Shea 1989). Other uses have seen the listing of wild species purely for the reconstruction of palaeoenvironmental biomes.

More recently, however, many of the assumptions inherent in these models have been critiqued; for example the division between ‘foraging’ and ‘farming’ societies has been shown to be somewhat artificial and historically constructed (e.g. Pluciennik 2001, see also Bailey, *et al.* 2006, Boyd 2006). Pluciennik’s (and others) main critique, however, is of using ‘subsistence’ as the predominant means of societal categorisation, rather than a denial of the differences between them. Indeed, with domestication the change in the ‘terms

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[2] For example deer hides and agrimi horn are listed as commodities in the Linear B texts, records of the economic transactions of the administrative centres of the Late Bronze Age Aegean (e.g.Chadwick 1976, Palmer 2012).

of engagement' in human-animal relationships is a significant one (Ingold 2000:75). Thus, despite the relativisation of the boundary between foraging and farming societies there are still differences that need to be explored, not least in the changing nature of human-animal interaction. In the Bronze Age Cretan context of this study, farming and the presence of 'domesticated' animals were a long established feature of society, and hunting cannot be interpreted as the only means of acquiring meat.

More problematic for this study, however, is the term 'wild resources'. Firstly, by collapsing the widely varying characteristics of different animals into a single homogenous category, the potential for engaging in detail with individual, species to species interactions (e.g. hunting a hare is unlikely to have been the same experience as hunting a wild boar) is restricted. Secondly, the implication that wild animals (and the environment generally) were seen mostly as objectified and exploitable economic commodities is unsustainable.

This study adopts a non-anthropocentric perspective in which, far from simply being passive resources acted upon by humans, animals are agents forming relationships with humans (Marvin 2010b). Equally, landscapes and the environment are understood socially, based on the nature of experience and engagement with them (e.g. Bender 1993b, Feld & Basso 1996). The focus of this research is on human interactions with particular wild animals performed in interwoven, corporeal and multi-sensory human-animal engagements.

1.3 'Domestic' and 'wild'

Essential to any discussion of 'hunting in farming societies', however, is a critical examination of what constitutes 'wild' and 'domestic' in such spheres. In zooarchaeology, distinguishing between 'wild' and 'domestic' species is a standard practice, distinctions usually being based on contemporary definitions of wild and domestic animals, zoological methodologies based on bone morphology (although not without some critique e.g. Zeder 2005), and a certain amount of archaeological inference[3].

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[3] See also Serjeantson 2000:182, for experiments in zooarchaeological classification according to other criteria.

Investigating domestication was one of the cornerstones of the development of the zooarchaeology discipline, particularly so within the Palaeoeconomy School of archaeology at Cambridge in the 1970s, through which animal domestication was reconsidered within a primarily (zoo)archaeological as opposed to zoological framework[4]. As a result, a number of key conclusions were posited: namely the difficulty of accommodating archaeological data successfully into zoological wild/domestic definitions, the need for a focus on variations in human behaviour rather than zoological and morphological criteria, and a critique of the assumption that only those animals that are domesticated today would have been so in the past (Jarman 1976). Perhaps most important, however, was the recognition that domestication was not likely to have been a single dramatic event (e.g. as proponed by Childe in the 1950s); it was rather a gradual and long-term process encompassing diverse and complex human/animal relations. Domestication is still a topic that is continually being redefined and reconceptualised, ranging from strongly anthropocentric interpretations in which animals are the subject of human 'mastery' over their capture, movement, reproduction, protection and so on, to a more mutual relationship (in the biological sense) in which both partners reap benefits, to others which see the animals as the driving force manipulating unwitting humans into the relationship, at the expense of human fitness (Zeder 2012).

Of importance for this study, however, is the recognition that an uncritical application of a straightforward wild/domestic dichotomy cannot account for the complex variety of human/animal relations (e.g. Hecker 1982, O'Connor 1996, 1997, Fornander*, et al.* 2008, Zeder 2012). An interesting example of this complexity is shown in the study by Albarella and Serjeantson (2002) of the animal bones from the Durrington Walls Late Neolithic henge site in southern Britain. Several bones of domestic cattle and pigs were identified with flint fragments embedded in the lateral areas of the bones that resemble hunting damage; one of which, found in a pig bone, was identified as an arrow tip. The authors suggest that either cattle and pig herds were maintained in a semi-feral state with spears or arrows used to immobilise them for the kill, or alternatively they were kept under close control but their slaughter was used as

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[4] Classifying animals as wild or domestic based on morphological divergence between the two groups was a primary concern of early zoological definitions of domestication.

a hunting exercise, or that ritualised hunting took place within the henge enclosure (Albarella & Serjeantson 2002).

However, it is often the diversity of relationships between humans and ‘domestic’ animals that is investigated more closely; for example O’Connor, reviewing definitions of domestication, notes that the often undefined ‘wild’ category ‘is *presumably* left to encompass animals which have little or no contact with humans, animals which cohabit with humans but which are not domesticated and animals which may actively predate humans’ (O'Connor 1997:150, my emphasis). Pollard, too, suggests that the status of animals came about through their perceived proximity to people; wild animals, however, because of their relative distance from human social life, ‘slipped into the background’ (2006:139).

Yet the human/ ‘wild’ animal relationship is no less diverse. Serjeantson notes that distinguishing between wild and domestic in medieval Europe ‘is complicated by the management of wild animals such as fallow deer, rabbits and pigeons’ (2000:182, as does Grant 1988). Ray and Thomas (2003) argue for the deliberate maintenance of communities of wild cattle for hunting in the Neolithic, and White *et al.* (2004) have classified deer in Maya zooarchaeological assemblages into different groups: wild deer, semi-domesticated or deer purposefully fed for a short period of their lives, and deer that had a very restricted diet indicating purposeful feeding, requiring physical restraint or confinement. Indeed, the apparently deliberate introduction of deer onto Crete during the Bronze Age and possibly agrimia during the Neolithic (see Chapter 6) equally complicates this issue and demands a critical re-evaluation of the status of these species as simply ‘wild’.

Importantly, however, significant discussion has occurred within anthropology and social theory on the social definitions, ontological status and perceptions of wild and domestic from non-western perspectives (e.g. papers in Descola & Pálsson 1996b).[5] Whilst the construction of ‘nature’ and ‘culture’ (and thus ‘wild’ and ‘domestic’) as opposing conceptual domains is of a predominantly modern Western epistemology, Descola and Pálsson note that ‘it is true that many cultures attribute, explicitly or implicitly, the quality of wilderness to

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[5] See also Zimmermann Holt 1996, Emery 2004a, for the ordering of animals according to indigenous taxonomies.

certain portions of their environment' (1996a:9). Although they point out that swapping 'nature' for 'wildness' could be argued to be purely a question of semantics, albeit the latter being more universal and less ethnocentric, a fluid and contextual definition of wildness 'can hardly qualify as a substitute for the ontological concept of nature as it is used in the dualist paradigm' (Descola & Pálsson 1996a:10)[6] . Thus, whilst overly static and homogenous categories of wild and domestic as structural opposites have been rejected in recent theoretical advances, that is not to say that a quality of wildness is not present in certain aspects and understandings of the environment.

1.3.1 Understanding the 'wild' in Bronze Age Crete

Discussion of animals in the context of the Bronze Age Aegean is often related to models of economic production (in zooarchaeological analyses) or as symbolic and iconographic representations (from art historic perspectives). There is less discussion on the sociality of interaction between humans and animals in this context (although see Shapland 2009, 2010, 2013, Harris & Hamilakis 2014, for significant exceptions). In a variety of material relating to animals from Bronze Age Crete, however, there is evidence for the significant complexity in the human-animal relationship, including indications that the 'wild'/'domestic' status of a species, as traditionally understood, is as not clear cut as might be presumed.

In iconographic depictions, for example, cattle occur in hunt scenes (Younger 1995), and seemingly docile fallow deer, possibly wearing collars, are being led to an 'altar' (Militello 1998). In the zooarchaeological material, Isaakidou (2004) identified the co-existence of both a domestic and a feral population of pigs at Knossos during the Neolithic, and 'wild' species such as red and fallow deer also joined humans in the boats to Crete from Greece or even Anatolia. Although some researchers (Nobis 1990, Persson 1993, Nobis 1996) have identified large bovid remains on Crete as aurochs, biogeographically this is somewhat problematic. It does seem, however, that size variation within the 'domestic' cattle population did occur, and that this may be linked to their different roles in society (Isaakidou 2004). Whilst the iconographic data may

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[6] It should be noted that the history of Western interpretations of 'wilderness', whilst too vast to be covered here, is itself a varied and interesting subject (e.g. White 1972, Oelschlaeger 1991, Anderson 1997).

represent stylistic conventions related to different contexts or narratives rather than breeds or species, they certainly indicate that it was possible, and appropriate, to imagine and visualise these animals in such contexts.

The relative ubiquity of the bones of sheep and goats (especially), pigs, and cattle at most archaeological sites on Crete in the Late Bronze Age speaks of a familiarity and consistency of interaction between these ‘domestic’ animals and humans. The generally low quantities and sporadic frequencies of the remains of the different ‘wild’ animals in these assemblages, however, imply a different relationship, an alternative mode of engagement. This should not be mistaken for the lesser ‘significance’ of these animals, as this equation only makes sense within the logic of economic optimisation but, rather, hints at extra-ordinary encounters and a temporal rhythm beyond the regularities of husbandry practice (e.g. Hamilakis 2003, Brittain & Overton 2013).

If a ‘domestic’ or ‘wild’ status is seen as the enactment and embodiment of a particular set of relationships, then we might consider domestic animals as those that are engaged with on a basis of familiarity, that are spatio-temporally associated with the daily rhythms of husbandry practice. Wild animals might be seen as unfamiliar, engaged with via extra-ordinary practices, associated with a temporality outside of daily practice: a relationship based on unpredictability rather than routine (Marvin 2006). Equally important (and here I refer to wild animals specifically but could be considered for domestic animals) is the varying embodied experience that corporeal engagement with different species of animal would entail, based on the specific characteristics of each animal in relation to the human body (e.g. large, small, swift, dangerous etc.). Another parameter of variability is the different types of environment encountered during interaction with different kinds of animals (e.g. mountain peaks, dense forest).

Thus, what is advocated in the approach adopted here is a contextually-specific interpretation of what might constitute ‘wild’ and ‘domestic’ in this sphere, thus requiring a more flexible understanding of such concepts than a straightforward domestic/wild dichotomy would allow. Whilst there may well be correlation with traditional definitions of ‘domestic’ and ‘wild’ categories, interpretation here will take into account factors such as: potential familiarity/unfamiliarity between human and different animal species, the temporalities involved in various human-animal interactions (e.g. daily, seasonal, occasional), the different spatial realms experienced through interaction with different animals, and the variation in the human corporeal experience of engaging with different animals, as well as on physical characteristics of the animals themselves.

1.4 The contexts of study: Chania in the Late Bronze Age

The end of the Late Bronze Age in Crete is characterised as a period of cultural change and political fragmentation, with a resurgence in regional identities being emphasised. In this period, West Crete demonstrates an escalation in political power and a close affinity with the ‘Mycenaean’ southern Greek mainland, especially in the settlement of Chania which expanded and flourished at this time. Of particular interest in this respect, is the seemingly prominent role of hunting in ‘Mycenaean’ elite ideological discourse and identity construction (e.g. Morris 1990, Hamilakis 1996b, 2003).

The animal bones at the heart of this study come from three important sites (Ayia Aikaterini, Odos Daskaloyannis with Khaniamou Plot, and Mathioudaki) within the settlement of Chania, dated to the end of the Late Bronze Age (1300-1100 B.C). The sites appear to be habitation sites, consisting of large, well-built ashlar-masonry buildings with a range of rooms (of various sizes), as well as large open areas and courtyards. In this period, evidence for the deposition of large amounts of animals bones (as well as pottery and other material) in seemingly designated ‘rubbish’ areas, signifies a set of practices (including consumption and deposition) revolving around animals that were intensive and structured enough to leave a significantly durable trace in the archaeological record. Furthermore, these assemblages are unusual (in this historical context) in that relatively numerous quantities of ‘wild’ animals were involved, namely fallow deer, red deer, and agrimia (wild goat), as well as the more usual ‘domestic’ species (sheep, goat, pigs, cattle, dogs, equids etc.).

1.5 Wild animals in Late Bronze Age Crete: research questions

This study seeks to investigate some critical questions in light of the above discussion. Whilst this study is primarily a zooarchaeological enquiry, a close integration of zooarchaeology with other forms of archaeological material and also with recent developments in contemporary archaeological and anthropological theory is advocated. Therefore, the zooarchaeological analysis of this study is situated within a broader body of theoretical approaches to understanding human-animal relationships, as well as an investigation of the presence of deer and agrimia in other material cultural spheres, such as iconographic depictions.

It is perhaps more important to state that this zooarchaeological study is situated within the 'social zooarchaeology' paradigm (see Chapter 2) and adopts, as far as possible, a non-anthropocentric approach. Defined here as the interaction between humans and animals in the past as a relationship between beings of equal presence in the world, not as a relationship between people and a 'resource'.

Therefore through the detailed study of these particular contexts of deposition and the practices leading up to them, and situated within a broader body of evidence, wider questions will ultimately be addressed. Most notably:

- What was the nature of human interaction with wild animals (red and fallow deer and agrimia) in Late Bronze Age Crete, including how might concepts of 'wild' and 'domestic' been perceived and enacted?
- What is the evidence for the 'social' role played by wild animals in Late Bronze Age Crete; both the part 'wild' animals play in human social interactions, as well as the sociality between human and 'wild' animals?
- What role did human-('wild')animal engagement play in the social and political transformations and dynamics that were taking place in Late Bronze Age west Crete?

1.6 A ‘cycle of engagement’: a theoretical and methodological framework

As an attempt to identify a range of arenas in which humans and animals intersect, yet take into account that zooarchaeological material is the remains of animals once dead, a framework for analysis was devised which linked the living animal, the dead animal, and the animal bone remains. That is, to consider the ‘roles and lives of animals before they were eaten’ (Armstrong-Oma & Birke 2013:115), but also the ‘intimate acts’ of killing and eating them (Gittens 2013:124).

Thus, four practices (albeit with which many others would have been linked) were identified in the zooarchaeological record as forming a sequence of interconnected human-animal events, for the purposes of this study this framework is termed a ‘cycle of engagement’. As the main focus of the study is on the ‘wild’ animals (deer and agrimia), the practices proposed are:

- hunting (whether in the ‘traditional’ sense or in a more performative manner)
- consumption of the ‘hunted’ animals
- deposition of the remains
- utilisation and dispersal of synecdochic (the part representing the whole) elements of the animal body as items of material culture.

Each of these practices is considered to be a significant arena of embodied engagement with these animals.

1.6.1 Data analysis

The primary data for this thesis consists of the detailed zooarchaeological analysis of animal bone assemblages from three sites within the Bronze Age settlement at Chania.

Discussion of interaction with the wild species (data for the domestic species will also be presented) will investigate the evidence for practices such as hunting and/ or ‘management’. This will be based on the representation of wild species in the assemblage and the characteristics of the animals involved (e.g. age, sex, etc.). This discussion will also take into account specific technologies and practices, hunting group composition and interaction, and environmental and ethological knowledge.

Analysis of element representation and evidence for butchery, fragmentation, and bone modification in general, will form the basis for discussion of potential food consumption practices. This includes the associated ‘rituals’ of consumption such as food preparation methods, how meat was consumed, portioning, filleting, marrow extraction, whether eating was accompanied with drinking, and so on.

Comparison of the material between different features and feature types (e.g. pits and floors) and microanalysis of specific deposits (e.g. content, relationship between different finds, rate of deposition etc.) will be the focus for the discussion on deposition.

Finally, the evidence for the removal and working of antler, horn, and skins will be discussed in relation to the dispersal of material deriving from deer and agrimia.

Analysis of this data, together the wider archaeological material, will be brought to bear in answering the research questions outlined above.

1.7 Outline of the thesis

Chapter 2 outlines the ways in which the study of hunting and wild animals has been approached in anthropological and social sciences literature and the influence of these frameworks on archaeological discussions of hunting and wild animals. The latter part of Chapter 2 advocates a ‘social zooarchaeology’ in which a more dynamic integration of zooarchaeological analysis with archaeological context and the socio-political context of deposition is called for, as well as integration with developments in contemporary archaeological theory. Chapter 3 then defines a theoretical framework to inform and organise the investigation of the data from a perspective of relevance to a social zooarchaeological analysis.

The following four chapters (Chapters 4-7) provide an outline of the Aegean context within which the research question is situated. Current interpretations of the socio-political landscape of Late Bronze Age Crete are outlined in Chapter 4, and in Chapter 5 depictions of hunting in Late Bronze Age Aegean iconography is discussed. Present knowledge of the zooarchaeological data for Crete is discussed in Chapter 6, including a critical evaluation of the predominant research paradigms within which zooarchaeological analysis in Crete has historically been conducted. The aim of this chapter is to provide a broad outline of current understandings of human-animal relationships in Crete from the Neolithic to Iron Age (a timespan bracketing the period focussed on here). Furthermore, an emphasis is placed on zooarchaeological evidence for the practices central to this study. The archaeological and contextual information on the specific sites used in this study are given in Chapter 7.

Analysis and discussion of the primary animal bone data, presented according to the research themes of this study, form the contents of Chapters 8 and 9. The final Chapters (10, 11) are an integration and discussion of all the data, and the conclusions and outcomes of this research as well as any suggestions for further work.

Chapter 2: Hunting for wild animals in anthropology and archaeology

2.1 Introduction

Interpretations of the role of animals in the past have been significantly shaped by changes in theoretical and interpretive frameworks in archaeology, which in turn have been strongly influenced by developments in anthropological frameworks. Broadly speaking, paradigm shifts (in Anglo-American academic traditions) from 'cultural-ecological' approaches to 'structural symbolism' to 'post-structuralism' and now to 'posthumanism' in anthropology, and in archaeology from culture–historical perspectives to 'New' or 'Processual' archaeology to 'post-processual' archaeology, have been predominant influences on studies of human-animal interaction (Shanklin 1985, Mullin 1999). Put simply, this can be seen as a trend from seeing animals as food, as symbols, to other-than-human persons.

2.2 Animals as subsistence resource

2.2.1 In anthropology

The cultural ecology perspective was situated within a new concern for explaining human society in terms of processes (via ecosystemic models of analysis[7]) rather than events, an outcome of which was to approach human-animal interactions predominantly as strategies for (human) subsistence. In particular 'optimisation theory', 'site catchment analysis' and 'risk and seasonality' models, all drawn from a cultural ecological approach, played a predominant role in both anthropological and archaeological analyses of hunting.

For example, in Kent's (1989b) volume '*Farmers as hunters: the implications of sedentism*', a (primarily North American) collection of ethnographic and

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[7] 'which behave according to laws that can be discerned by natural science' (Thomas 1996:84).

archaeological (although often based on ethnographic studies) analyses of hunting in farming societies, reflect, in many cases, a cultural-ecology influence. Sponsel suggests that hunting wild herbivores can be a means for humans to 'exploit the energy and nutrients in grasses by using herbivores as intermediaries to transform them into edible tissue' (1989:43, see also O'Shea 1989:58). Vickers suggests that, for Siona-Secoya communities in Northeastern Equador, 'hunting and fishing are...integral components of the overall economy since they provide most of the essential dietary proteins and fats' Vickers 1989:60), and Griffin states that 'hunting and other forms of protein procurement dominate the Agta world' (Northeastern Luzon, the Philippines, 1989:61).

Most of these approaches consider hunting in terms of procurement strategies based on a rationale informed by formalist economics. The social complexities of consumption or non-subsistence motivations for hunting are not addressed in detail in this approach.

2.2.2 In archaeology and zooarchaeology

The cultural ecology approach was particularly influential in the development of interpretive frameworks in 'New Archaeology' (c. 1960s), particularly concerning adaptive relations between humans and the environment.[8] The emphasis on ecosystemic models combined with a rigorous scientific methodology saw new value placed on the collection of biological remains from archaeological sites. Within this framework, zooarchaeology developed as a valid field of study in archaeological research. For the study of animals, this resulted in a shift from the creation of taxonomic lists in the zoological tradition, to the analysis of past human-animal interaction as a means of understanding (human) subsistence strategies.[9] The 1970s Cambridge 'Palaeoeconomy School' played a prominent role in New Archaeology, especially in the study of early agricultural societies such as at Early Neolithic Knossos on Crete. In such a framework, animal remains were seen as a means through which to investigate past economies and Payne's (1973) models of

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[8] As opposed to the detailed description of the archaeological record 'for the purpose of establishing a time-space framework' of the culture-history paradigm (Brewer 1992:197).

[9] See Brewer 1992, Hesse 1995, Reitz & Wing 1999 for the detailed discussion of the development of the zooarchaeological tradition, and Pluciennik 2001 for the historical context of subsistence studies.

animal management for intensive, specialised production have been (and still are) widely applied in zooarchaeological studies (e.g. Reese 1995, Wilkens 1996, Helmer & Vila 1997, Isaakidou 2004, for examples in Cretan zooarchaeology). A legacy of the school's influence (although perhaps not an intention of the original researchers, e.g. Jarman 1972b, 1976) resulted in research frameworks in which the study of wild animals had little role to play outside risk buffering scenarios.

In the volume 'Bad Year Economics: cultural responses to risk and uncertainty' (Halstead & O'Shea 1989), O'Shea (1989a) specifically addresses the role of wild resources in combination with agriculture as a 'coping strategy' or 'buffering mechanism' (he does specify that this refers to cases where large domestic animals are not available, 1989:57). O'Shea suggests that the use of wild resources may be entailed as a 'fall-back resource' in poor agricultural years (1989a:58). He provides two ethnographic case studies: the subsistence strategies of the Pawnee in the Plains region of North America (Kansas and Nebraska region), and the Huron in the Great Lakes region (especially central Ontario), and in both cases he provides detailed descriptions of how hunting fits into their respective but differing subsistence economies as an emergency resource measure (see O'Shea 1989:60-66).

More recently, Boyle discusses 'wild game animals…and the question of hunting' in Neolithic Europe at a time when farming as an established way of life is usually acknowledged. Interpretation, however, remains predominantly within a subsistence oriented discourse and/or on reconstruction of palaeoenvironmental biomes:[10]

> *'[I]t is clear that an abundant wild faunal resource base was available in the local environment and it was exploited in a significant way, even if hunting no longer formed the basis for a primary subsistence strategy'* (Boyle 2006:18).

Such explanations are based on predominantly economic concerns: primary subsistence method, seasonal reliance on hunting, exchange, failure in the 'harvest' of domestic animals, protection, and reduction of competition for resources' (*ibid.*). One 'non-subsistence' explanation is offered (the religious,

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[10] Perhaps due to the preliminary and large-scale nature of the analysis.

symbolic and ideological), in which a small amount of game 'characterises hunting which is not related to fulfilling dietary needs' (Boyle 2006:19). Whilst Boyle suggests that any one of these variables may have been present at different times and at different sites, the final discussion focuses on the sustainability of hunting in which 'yields warrant the effort expended' (Boyle 2006:20). At the point at which the hunt was no longer worthwhile for subsistence purposes, it survived 'at a low level as sport, display or as rite de passage' (Boyle 2006:21).

The predominant trend in most of these approaches is an overriding view of animals (and the environment more generally) as objectified and exploitable commodities or resource base. Treating animals only as sustenance and human-animal relations as (human) subsistence strategies (based on maximum calorific return for minimum effort), however, reduces animals to a collection of calories, proteins and minerals and homogenises the complex, social phenomena of eating and drinking to simple biological process (Hamilakis 2008). Furthermore, the implicit reference to formalist economics upon which key models are based (i.e. maximisation of resources for economic benefit based on a logic of rational choice), whilst relevant for societies with modern capitalist economies, cannot be assumed cross-culturally or appropriate for past societies. The following section considers how, as described by Cartmill, '[T]he importance of hunting lies in its symbolism, not its economics.'(1993:28).

2.3 Animals as symbolic resource

2.3.1 In anthropology

As part of a broader shift, in both anthropology (late 1970s) and archaeology (c.1980s), from thinking of human culture as part of an environmentally adapted ecosystem to a perspective in which culture is interpreted as governed by an underlying set of abstract rules or 'grammar', so too was the role of animals reconsidered. As a bid to counteract the emphasis on ecological determinism and/or economics in human-animal studies of the culture ecology tradition, the role of animals as symbols of or metaphors for human society was explored (Shanklin 1985). In such an approach components of the social and cultural realm (e.g. myths, kinship systems, and so on) were seen to be structured through a system of symbols or classificatory set of oppositions (e.g. male/female, culture/nature etc.), employed to most notable effect in anthropology in the works of Lévi-Strauss and Mary Douglas. In Lévi-Strauss' work on why certain species are sacred, his observation that animals are not only good to eat but 'good to think with' has been particularly influential in archaeology (e.g. Serjeantson 2000, Sharples 2000). Consequently, emphasis was placed on the taxonomic, metaphoric or symbolic representations of animals, especially within religious, ritual, sacrificial and cultic spheres. Later developments reflected trends in the history of social analysis, resulting in new concerns with constructions of identity drawn along lines of race, class, gender and so on (Mullin 1999), albeit in a metaphoric or symbolic capacity.

As regards hunting, Kent noted the 'social or symbolic implications beyond the value of the protein or minerals that meat provides' (1989a:131). As such, the symbolic role of hunting as a structuring principle in society has been widely recorded in ethnographic studies.

Key areas include the role of hunting as a 'rite of passage', ceremonially marking stages in the human life-course, often age stages culminating in a symbolic entry into adulthood. Hunting has been described as thus for Peruvian Cashinahua society in which the age stages of young boys are closely related to stages of development as hunters (Kensinger 1989). In North American North Carolina, hunting 'signalled a youth's crossing the threshold over into manhood' (Marks 1991:24), and in present day southeast France the strictly age-related 'phases of apprenticeship' of a hunter are marked by changes in size and calibre of weapon and type of game hunted, only entering perceived adulthood after taking the national hunting exam (1989).

Other roles include the affirmation of kinship ties, for example the Ainu bear hunters of northern Japan are groups of patrilineally close kinsmen, usually male siblings and their sons (Watanabe 1973). In Papua New Guinea men learn hunting spells from their fathers, senior agnates, or their mother's brothers (Huber 1980:48), and in contemporary North America hunting is described as 'a …craft passed on from father to son, often in ritualised fashion' (Fine 2000:807).

However, hunting is more commonly recognised as a mechanism for the expression of hierarchical social status. Kent describes the division of labour in North American Northwest Coast societies as characterised by 'status-related tasks', one of which is whale hunting (1989a:5). Among the Siriono of Bolivia 'a good hunter enjoys a higher status than a poor one, and the informal chief is always one of the group's best hunters' (Holmberg 1969:148-150 quoted in Kent 1989a:6). It is often as an aspect of elite culture, however, that hunting attains its 'greatest…elaboration' (Howe 1981:278); as in Medieval Northern Europe where, once associated with the upper classes, hunting became 'encrusted with courtly ceremony' knowledge of which served as a marker of social inclusion and likewise exclusion (Cartmill 1993:61).

Hunting and status have been scrutinised in great detail in the history of hunting in England, culminating in the foxhunt (Howe 1981, Cartmill 1993, Marvin 2000b, 2001, 2003), and hunting in contemporary rural North America (Marks 1991, Cartmill 1993, Fine 2000). Whilst hunting in these contexts is often seen as sport, most authors would define it as a practice of further complexity and of wider social implications (see Howe 1981, Marks 1991, Cartmill 1993, Marvin 2000b, 2000a, 2001, Almond 2003, Marvin 2003). For example, in England in the late 18th century foxhunting as a distinct 'sport' developed and 'riding to hounds' signalled high status in a number of ways: wealth with which to maintain horses, the leisure and control over one's time necessary to hunt (especially during the week), and an association with the country - a distinct characteristic of the English upper classes (Howe 1981:284). Furthermore, Carr suggested that the 'in-language marked forms of hunting as an aristocratic concern impenetrable to the commoner' (1976:16 in Howe 1981:284). Yet Howe suggests that foxhunting was not only a means for aristocracy to make statements about the social standing of individual participants, but was also a means with which to stress upper class ideologies, such as justification of the upper classes through their accomplishments and behaviour: foxhunting representing displays of personal excellence. Equally, the practice reinforced an image of the ideal structure of late 18th century rural society as a whole: united under the leadership of the upper classes cooperating towards a common goal, yet respecting the social differences between them (Howe 1981).

In North America, Marks suggests that early settlers and planters in the South sought to emulate these ‘Old World aristocratic ideals of pursuit’ (1991:8). Early legislative acts were designed to give planters exclusive rights to game and became associated with ideas of aristocracy, privileges to the rich and oppression towards the poor (Marks 1991:33). Additionally, at this time hunting and hunting rights were particularly important in establishing new social lines between blacks and whites: contingent upon many factors, including social and economic status, and access to land and equipment including dogs. Hunting became not just a question of permission to hunt or not, but rather ‘who can hunt what’ (Marks 1991:81).

Yet, perhaps one of the most universal aspects of the social symbolism of hunting is in its identification as a strongly male gendered activity (as also indicated in the examples above), ranging from begrudged female participation in a male dominated sphere to total exclusion of women. For the Peruvian Cashinahua, hunting is the quintessential male socioeconomic activity and a central feature of male identity (as in many other Amazonian societies), in which only successful hunters are ‘real men’ (Kensinger 1989:19). In New Guinea, hunting is described as being identified with the wild realm and with maleness and women with the domestic and the village (Rosman & Rubel 1989). In West African Mande communities, the role of the hunter has been described as a symbol and institution of male power (Leach 2000); hunters are associated into ‘brotherhoods’ through initiation, apprenticeship networks and shared ceremonies, with ideologies of gender separation reinforced through the exclusion of women from hunting (*ibid.*).

In a western context, Cartmill describes hunting as a ‘stereotypically male activity throughout most of western history’ (1993:233). For example, in present day North America many male hunters believe that hunting affirms their identity as men (Marks 1991, Cartmill 1993, Fine 2000): ‘to engage in hunting is to emulate, to defend, and to advocate what is a tried, proven and proper way of becoming and being a man’ (Marks 1991:5). Although a small percentage of women do hunt, it is generally with male companions, in particular pursuits, or inside circumscribed conditions and is often resented by male hunters (Marks 1991). Relationships on the English hunting field in the 18th century are defined by Howe as ‘those among gentlemen, those between gentlemen and farmers, and those between gentlemen and would-be gentlemen' (1981:286). Today in Britain, although both men and women take part in 'fox-hunting'[11], the gendered nomenclature (Huntsman, Master of Hunt, Master of Foxhounds etc.) indicates a history of primarily male dominated activity. In southeast France, hunting is equally a traditionally masculine and 'virile' activity; a few women do take part but alongside their husbands and are unable to progress, either in terms of weapon or status, beyond the level of a 15 year old boy, forever remaining as 'almost hunters'(Govaroff 1989:231).

By extension, hunting in many cases is thus also a means of expressing sexuality: hunting prowess symbolising sexual prowess. This link is often symbolised in the equation of the arrow (or weapon in general) with the penis (Kensinger 1989, Cartmill 1993, Leach 2000), and in Papua New Guinea the spirit associated with the ritual bleeding of the penis and with hunting is the same (Rosman & Rubel 1989). For a Cashinahua male 'the greater his success as a hunter, the wider his swath of amatory pursuits' (Kensinger 1989:21), in North America some hunters think their sport affirms their virility (Cartmill 1993:233, Fine 2000), and in Western thought in the late Middle Ages the deer hunt became a favoured metaphor for sexual love in upper-class art and literature (Cartmill 1993:37). In the imagery of ancient Greece, Schnapp notes that 'the erotic' is one of the dimensions of the hunt: 'the lover is to the beloved as the hunter is to the hunted' (1989:79). The depictions of hunted animals are indicators of the exotic world of the wild beasts, but also symbolise sexual desire and prowess and belong to the world of Eros (*ibid.*). Hunting can also provide a means for sexuality to be culturally affirmed and recognised. Of the successful young Cashinahua hunter 'men will joke about his desirability as a lover' (Kensinger 1989:21). In the Upper Verdon Valley, France, after his first big-game[12] kill the young hunter will have to put up with certain caresses from his fellow hunters regarded as having 'feminine or homosexual connotations'; the first big kill becomes a metaphor for loss of virginity, and emasculation of the catch transfers virility to the hunter of the day (Govaroff 1989:230).

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[11] Drag-hunting still occurs but killing foxes with hounds was banned in 2005.

[12] Wild Boar or Chamois.

2.3.2 In archaeology

In archaeology, a particularly influential[13] example of re-evaluating animals and the environment through a primarily symbolic rather than economic framework was Hodder's (1990) study '*The Domestication of Europe: structure and contingency in Neolithic societies*'. Hodder uses a structuralist methodology to define a symbolic framework for Neolithic Europe through which social changes associated with the process of domestication were structured. The main structuring principle of this framework was the opposition of nature and culture (1990:29), or in the terms he coined *agrios*[14] and *domus*, and the changing relationship between these two principles through time. Under this basic premise, he imposes a variety of further oppositions on the 'representational system' (e.g. male/female, inner/outer, death/life etc.) in which hunting is linked with 'male' and 'warfare' and comes under the *agrios* rubric. The desire to dominate and control the wild (in general, in society, and in the self), expressed symbolically in the material culture and occurring metaphorically through 'the house' (taming through bringing the wild (*agrios*) into the house (*domus*), e.g. 1990:11, 30), is seen as the driving force of domestication.

However, and perhaps unsurprisingly, the data appear too variable to fit rigidly within the framework (which Hodder himself acknowledges, e.g. 1990:28) resulting in contradictory interpretations, and concerning animal bones specifically, there is certainly 'no hard and fast rule' (Hodder 1990:82). For example, Hodder has problems in fitting the symbolic role of cattle into his binary framework:

> *'…the role of cattle within the symbolism is difficult to grasp. Perhaps this was intentional. Perhaps the symbolic role of cattle was kept deliberately ambiguous. … Small 'stick' figures that may be male are shown in the wall-paintings hunting cattle with bows and arrows, and certainly arrowheads are associated with men in burials. If cattle are to be associated with males in certain contexts at Çatal Hüyük, then it is interesting to note that the cattle bones found on the site are largely*

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[13] See Marciniak 2005.

[14] *agrios* = wild (masculine form) in Greek.

> *domesticated. Cattle, then, may also be involved in both the wild and domestic realms'* (1990:11).

It has to be acknowledged that Hodder's continued research at Çatalhöyük has led him to rethink and de-emphasise much of his strongly dichotomous differentiation, particularly with regard to gender (see Gifford-Gonzales 2007:107). Equally, Gifford-Gonzales' more recent interpretation (albeit still within a structuralist mode) of the iconography surrounding gender roles and wildness at Çatalhöyük, suggests that 'neither men nor women are differentially of 'nature'' (2007:107); she proposes rather that each gender engages with wild animals but differently (males -as predators -as flesh providers; females -as scavengers -as flesh transformers). Crucial to this reanalysis, however, is the deconstruction of Hodder's grouping of all wild animals into a single category; rather the varied habitats, propensities and thus potential qualities and powers of individual species would have been 'thoroughly understood by Çatalhöyük's people' (Gifford-Gonzales 2007:107) and were thus taken into account in this later interpretation (e.g. scavenger, predator, danger potential etc.). Recent research on the cattle horncores and crania discovered at Çatalhöyük also highlights the highly variable contexts from which they are recovered. However, although there appeared to be an emphasis on large, adult male cattle /aurochs, juveniles and females were also present, leading the authors to suggest that 'masculinity was not the exclusive factor in the site's taurine symbolism' (Twiss & Russell 2009:30).

2.3.3 In zooarchaeology

Specifically zooarchaeological responses to the 'sustenance' to 'symbol' shift are often expressed as an intention to 'move beyond' the economic role of animals to a consideration of their symbolic role in society, often through analysis of ritual / religious contexts (e.g. Jones O'Day, *et al.* 2004). In relation to wild animals specifically, the 'symbolic role' is often provided as a brief and homogenous explanation for hunting in cases where only a few remains occur (e.g. Jarman 1996, Choyke, *et al.* 2004, Boyle 2006).

Several recent zooarchaeology volumes have stated an explicit concern with moving beyond subsistence strategies and purely economic interpretations.

‘*Zooarchaeology in Greece: recent advances*’ (Kotjabopoulou*, et al.* 2003), ‘*Behaviour Behind Bones: the zooarchaeology of ritual, religion, status and identity*’ (Jones O'Day*, et al.* 2004), and most recently, ‘*Social Zooarchaeology*’ (Russell 2012, discussed below in 2.5), reflect a concern with using zooarchaeological data to investigate human symbolic behaviour and past social issues (see also Emery 2004b, Morris 2008).

The ‘Zooarchaeology in Greece’ volume is organised into three parts. The first and largest is focussed on the ‘Environment and Subsistence’, the second part reflects the ‘recent…interest in zooarchaeological studies which go beyond subsistence,…which includes studies on consumption, ritual and ideological uses of animals’ (Kotjabopoulou*, et al.* 2003:33), and the third (‘Beyond Bones’) focuses on animals in textual and representational sources, and ethnographic studies. Most of the studies of wild animals are within the ‘Environment and Subsistence’ part and only two of the papers in this volume focus specifically on hunting[15].

Wilkens’ mainly descriptive discussion of hunting in ancient Crete focuses on the presence/absence of wild species recovered from a number of Cretan sites of different dates. The relative ‘importance’ of hunting at these sites is assessed based on the premise that a greater quantity of remains equates to greater importance (presumably to subsistence). She does, however, draw on ancillary evidence in the case of the Prinias site which, in addition to having ‘numerous remains’ of various wild species, in the necropolis area of the site a seemingly ‘great importance’ is placed on the ‘horse-dog association’ (2003:86) and is proposed as being linked to hunting. In response to Hamilakis’ chapter (of the same volume) positing the ideological motives for hunting, Wilkens concurs that this motivation was particularly evident in relation to the scarcity of wild fauna on Crete, necessitating the importation of wild fauna from the continent in order to make hunting possible. Wilkens draws the conclusion that the relationship between hunting and husbandry varies depending on the period: while the latter ‘always prevails as an economic resource, hunting increases in importance during the Bronze Age and Early Iron Age’ (2003:89).

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[15] One in the ‘Subsistence’ section, Wilkens 2003, and one in the ‘Beyond Subsistence’ section, Hamilakis 2003.

Whilst Wilkens views hunting predominantly in relation to subsistence, Hamilakis (2003), on the other hand, suggests that hunting in farming societies is linked to perceptions of place, time and encounter with unfamiliar and distant realms. Wild animals are seen as belonging to a sphere symbolically remote from the realm of people and to a different temporality. Hamilakis proposes that for Mycenaean elites (as in many societies, see Helms 1988), hunting was an important ideological resource as a means of demonstrating successful venture to other geographic, symbolic and temporal realms.

The 'Behaviour Behind Bones' volume results from the 2002 International Council of Archaeozoology (ICAZ) conference at which two (of the 24) sessions were considered to be themes that 'clearly go beyond sheer economic and ecological frameworks' (Rowley-Conwy, *et al.* 2004ix): 'religion and ritual' and 'status and identity'.[16] Many of the papers focus on food consumption, and ritual behaviour, often defined in opposition to 'daily subsistence', is frequently identified (e.g. Muir & Driver 2004, Whitcher Kansa & Campbell 2004). Only two of the papers in this volume discuss hunting specifically (Moreno-García 2004, Potter 2004)[17], although others incorporate it in general discussion (e.g. Choyke, *et al.* 2004, Muir & Driver 2004).

Potter (2004) discusses hunting as a 'potent source of social differentiation' in the late prehispanic American Southwest (AD1250-1375), albeit within largely culture-evolutionary terms. Potter proposes that hunting was a further manifestation of a general transition to increased communalism. This premise rests on the different hunting techniques required for mule deer and pronghorn antelope (species attested in the zooarchaeological assemblage); deer are effectively hunted by one or two hunters, whilst antelope requires large scale communal drives. Consequently, an increase in the remains of antelope over deer bones is seen as an increase in the practice of communal hunting. This is particularly interesting in considering the agency of animals upon human lives, and their ability to effect changes on hunting techniques, due to the different ethological characteristics of each species. This, however, is not an aspect that is developed in this study. Equally, increased

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[16] At the subsequent ICAZ conference (Mexico, 2006) a session was organised (by J. Mulville and A. Powell) relating to the 'social and symbolic' role of wild species in particular, but is as yet unpublished.

[17] Both in the 'Status and Identity' section.

communalism is seen as explaining the change in prey hunted; however, the converse possibility is not considered.

Furthermore, the spatial distribution of different anatomical portions of the hunted animals is seen as reflecting a ‘disproportionate distribution of these resources amongst the community’, with the ‘ritual specialist’/‘Hunt chief’ and the hunter who killed the animal getting the most ‘sizeable portions’ of the kill (Potter 2004:289). This analysis, however, is based on modern (western) assumptions of what constitutes ‘high utility’ (meat and marrow) or ‘low utility’ (lower limbs, feet, crania), based on models proposed by Binford (1978). Such a framework is unable to take into account culturally variable concepts of value relating to animal body parts; thus when Potter notes that the hunter ends up with the head and skin, he is forced to describe these as ‘some fairly low-utility elements’ (2004:290). Interestingly, in describing the Hunt-Chief as he who ‘had “made the talk,” i.e. prayed before the hunt began, asking the deer not to be afraid to give themselves to the hunters’ (2004:289), he indicates an animist ontology for which these particularly formalist economic models of analysis may be of little relevance.

Interestingly, just such a point is reflected in the second paper which discusses hunting, Moreno-García’s (2004) ethno-zoological study of hunting practices in the Rif Mountains of Morocco. This study highlights how animals were not hunted primarily for meat; in most cases, all parts of the carcass are utilised and magico-religious, nutritional or medicinal significance was attributed to a diversity of products derived from hunted animals. The bones, skins, tusks/teeth, eyes and spines of boar, jackal and hedgehog, for example, were seen to have active properties (2004:333). Additionally, consumption of the meat of particular species is thought to transfer perceived qualities in the animal to the consumer: e.g. the wild boar is seen as a very strong animal, thus the local belief suggests that eating the wild boar meat gives strength, and for this reason is also fed to the working animals ‘so they grow strong and as powerful as the wild boar!’ (2004:331; as is also the case in many non-European ethnographies). On the other hand, consumption of the flesh of animals such as the jackal can be seen as an act of revenge (*ibid.*). Moreno-García’s study notes that many of the circumstances surrounding hunting practices would leave no visible trace, thus the complexity of the role could be greater than originally thought (2004:329). This study is significant in highlighting an engagement with the perceived qualities and characteristics of the animals themselves as active agents.

Outside of these volumes, a number of in-depth studies have been published by Sykes (2005a, 2005b, 2006a, 2006b, 2007), demonstrating the link between hunting, identity, ethnicity and social status in Saxon and Norman England (e.g. pre- and post–Norman Conquest). Sykes suggests that the association between hunting and a social elite, indicated in early medieval iconography and funerary deposits, is confirmed by the zooarchaeological evidence with an increased abundance of wild animals on elite settlements than on any other type of site (Sykes 2005a, 2005b). A significant post-Conquest rise in aristocratic hunting (evidenced by the increase in wild animal bones on elite sites) is suggested as reflecting increasing social division typical of this time (11th-12th centuries A.D, Sykes 2005a). Norman hunting practice was characterised by elaborate rituals that a knowledge of and ability to participate in was deemed a mark of nobility and was adopted as a symbolic device to reinforce the new Norman social and political authority (Sykes 2005a, 2005b). Equally, the Norman introduction of new and exotic species such as herds of fallow deer, maintained in parks and available only to a social elite, were likewise ‘statements of authority, rank and social exclusion’ (Sykes 2005b:196).

Whereas in the culture ecology and processual archaeology paradigm animals were predominantly seen as an objectified subsistence and/or economic resource, in the structuralist framework animals became symbols or ‘metaphors’ for human society, abstract concepts rather than physical beings. In both approaches, however, animals were viewed as objects for ‘consumption’ by humans either as a subsistence or a symbolic resource, but always passive objects of human agency (Mullin 2002). Equally, a shift in emphasis from ‘economic’ practices to the ‘ritualistic’ or ‘religious’, reinforced conceptual oppositions between spheres of the sacred and profane: the symbolic as separate from the everyday. These points are part of the broader critique of the culture-ecology and structuralist epistemologies, discussed below. Only Moreno-García’s ethnozoological study, mentioned above, engages with the agency of the animals.

2.4 Animals as ‘other-than-human persons’

2.4.1 In anthropology

Perhaps one of the most fundamental critiques of structuralist anthropology is the interpretive framework of binary opposition as an analytical device. On one level this is critiqued for its ‘extreme intellectualism’ in which ethnographic information was seen as ‘far removed from any individual actors and any particular cultural or historical context’ (Mullin 1999:208, see also Jones 1998:309). This is, however, part of a more fundamental issue in the assumption of ‘nature’ and ‘culture’ as separate ontological domains; historically and culturally attributable to the thought traditions of the Enlightenment and the philosophical objectives of Descartes of early modern Europe (‘the whole point of which…was to develop a practical science…through which we could make ourselves “masters and possessors of nature” ’, Cartmill 1993:96). The influence of the perceived superiority of the ‘cultural’ over the ‘natural’ is also associated with tenets of Judeo-Christianity (‘God gave man dominion over earth’, Oelschlaeger 1991:43). As such the opposition of nature to culture (within which sub-categories such as mind/body, society/individual, domestic/wild, and human/animal, are of particular interest here), is attributed to a philosophy of naturalism typical of western cosmologies (Descola 1996).

The recognition that the categories of difference between ‘nature’ and ‘culture’, and ‘human’ and ‘animal’ are not universal has had significant consequences for studies of human-animal relations. For example, the assumption in the naturalism ontology of an objective universality of the body (shared biological structures etc.) and ‘subjective particularity of spirit’ (Viveiros de Castro 1998:470) or uniqueness of the human mind, is contrasted with the animist ontology[18] which supposes a shared inner essence (‘soul’ or ‘spirit’) between humans and animals (and some ‘inanimate’ beings) and a variable bodily appearance. For example, Viveiros de Castro (1998) and Willerslev (2004) describe the ability of different species (human and animal) to take on another’s perspective through the adoption of different bodily affects (see also Conneller 2004).

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[18] A philosophy more often characteristic of small-scale societies, e.g. Viveiros de Castro 1998, Bird-David 1999, Willerslev 2004).

In anthropological studies of hunting in certain contexts, particularly the circumpolar north (predominantly within animist ontologies), hunting is understood as a long term relationship of reciprocal exchange in which animals as other-than-human persons[19] give themselves to hunters, who in turn repay them through certain ritual obligations (e.g. food taboos, ritual feasts), respectful procedures and prudent use of resources etc. (Kwon 1998, Ingold 2000, Nadasdy 2007, Watson & Huntington 2008, also papers in Descola & Pálsson 1996b).

Willerslev (2004), influenced by Viveiros de Castro's study of 'perspectivism' in Amerindian societies (noted above), suggests that the hunting process for the Siberian Yukaghir is also based on the ability to take on another species perspective. However, to counter the potential for 'undue abstraction' of the perspectivist approach and to connect with the lived experience of the Yukaghir, Willerslev proposes this practice is grounded in 'decisively corporeal, physical and tangible' qualities (Willerslev 2004:647-8). Thus, he proposes that the process through which a hunter aims to take on the point of view of the animal occurs via mimetic empathy, the bodily imitation of the other species corporeal characteristics: to mimic something is to be 'sensuously filled with that which is imitated, yielding to it, mirroring it – and hence imitating it bodily' (2004:638-9). This 'taking on' of the physical characteristics of the other species enables the 'reproduction in one's own imagination the form of the Other's perspective' (*ibid.*).

Willerslev describes how the process begins with the hunter attempting to 'conquer' his human smell by going to the sauna, he will not speak of animals by their real names rather in allegorical terms or special expressions to 'screen out the reality of being a human predator', and will sacrifice exotic trade goods to the fire on the evening before the hunt (2004:642). During the hunt, Yukaghir hunters attempt to assume an animal point of view through acting as an incomplete copy of the animal, by taking on its bodily appearance, movement and smell. The hunter wears skis covered in elk skin to imitate the sound of the animal moving through snow and moves his body like an elk 'from side to side in a waddling manner' (Willerslev 2004:639). If the hunter's mimetic performance is convincing the elk will leave its hiding place and go towards the hunter, 'the two parties will thus approach one another each doing

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[19] This is a term coined by Hallowell (1960).

what the other is doing – that is imitating the actions of the Other' (Willerslev 2004:641).

Yet to adopt the 'point of view' of the animal in the absolute sense the hunter runs the risk of actually becoming the animal and should be avoided at all costs (Willerslev 2004:638). This acting between identities allows the hunter a 'new potential for action, free…from the bodily limits of both his own species and those of the species imitated' (*ibid.*). The importance of this, suggests Willerslev, is that in the manipulative power of hunter-imitating-prey rests the dual capacity to incorporate the animal 'otherness' while in some profound sense remaining the same (2004:639). The hunter is both hunter and animal, or is 'not animal but is not *not* animal' (Willerslev 2004:629).

In a modern western society, Marvin (2000a) too notes how hunting is a context in which the boundaries of human and animal are transcended, in this case as an event in which both are mutually created as performers. Marvin is careful to emphasise, however, that hunting (foxhunting in his study) is more than a performance in the sense of a sporting enactment, or that it is dramatic in the sense of exciting; rather the key feature is that it unfolds as a drama -a flow of encounters and mis-encounters. Furthermore, rather than simply seeing the fox as a central character, the complexity lies in seeing the behaviour of the animal as performance. Acknowledging that the animal may be obeying its natural instincts, an unwilling participant unaware of performing, its very attempts at resistance are part of the performance. Thus its behaviour is read, responded to and experienced as though it were:

> *'In this framework the animals are transformed, by the attention paid to them, by the perceptions of them, and by the demands made of them, into performers'* (2000a:109).

Often, however, the human participants do believe the fox is aware of itself and consciously adapts its behaviour, i.e. by masking its scent. Birke *et al.* too argue that notions of performativity 'allow us to think about the complexity of human/animal interrelating as a kind of choreography, a co-creation of behaviour' (2004:167).

With the hierarchical positioning and boundaries between 'human' and 'animal' (of naturalism) being eroded (Mullin 1999, Fuentes 2006, Russell 2010), the traditionally anthropocentric perspective, which encompasses the previous interpretive frameworks discussed above, in which animals are seen as passive objects which are acted upon or thought about by humans rather than being agents or subjects their own right, is being critiqued and redressed. (e.g. Noske 1993, Nadasdy 2007). In recent feminist theory Birke *et. al*. advise that 'both human and animal can conjointly be engaged in reconfiguring the world' (2004:167), Haraway proposes that categories such as nature and culture are in fact 'imploded' in the, historically specific, intertwining of dog and human lives which she describes as being bonded in 'significant otherness' (2003:16), and the field of Human-Animal Studies has developed (Shapiro 2002).

2.4.2 In archaeology

The critique of anthropocentrism in human-animal studies has had significant (although not yet widespread) influence on archaeological studies of human-animal relationships, notably the recognition of and engagement with animal agency, of the lived presence of animals, and of the potential sociality of human- animal relationships (e.g. Conneller 2004, Armstrong-Oma 2007, Jones 2009, Argent 2010, Overton & Hamilakis 2013). Recently, two significant volumes reflecting this trend have emerged. A special edition of the archaeology journal *World Archaeology: Humans and Animals*, aimed to bring the ontological (as well as the social and economic) role of animals to a more central position in archaeology (Armstrong-Oma & Hedeager 2010), and a special edition of the human-animal studies volume *Society and Animals: 'Archaeology and Human-Animal Studies'* (Armstrong-Oma & Birke 2013 eds)[20] sought a greater integration of archaeology with the aims of human-animal studies as well as contributing time-depth to understandings of human-animal relations.

With these aims coming to the fore in studies of human-animal relations in the past, a number of significant and interesting studies have emphasised the sociality of the relationships between people and the domestic animals in their

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[20] It is interesting to note the belated integration of archaeology into the latter volume, as an edition published in 2002 on the state of human-animal studies includes 14 papers from the humanities and social sciences that does not include archaeology (Shapiro 2002).

care, and the agency of the animals in the co-creation of these relationships. Armstrong-Oma (2010), for example, describes the relationship between humans and domestic animals in Bronze Age Scandinavia as a ‘social contract’ based on trust (*contra* Ingold 2000). Jones suggests that in the context of Early Neolithic Cyprus the continual daily involvement of herders and their goat flocks would have temporally, spatially and socially bound their lives together; a connection that was potentially continued after death as suggested in the co-burial of a small group humans and caprids in a well (2009:85). And Argent (2010, 2013) proposes that in Iron Age Inner Asian communities, horses were social actors with identities and statuses linked to character attributes of the horse, and were bound up in long-term interpersonal relationships with humans based on a shared bond between horse and rider.

However, whilst long-term daily routine and interaction facilitates the development of a relationship based on familiarity between humans and domestic animals, the human relationship with different wild animals perhaps requires a different perspective.

Pollard (2006) suggests that in Early Neolithic Britain the ‘status’ of animals came about through their perceived proximity to people, an understanding of their habits and their involvement in social relations. Thus, in relation to wild animals this led Pollard to suggest that the ‘regular under-exploitation of wild ungulates’ could be explained by ‘their relative distance from human social practices rather than any position within predetermined symbolic schemes’ (2006:138). Pollard is making an important point in rethinking human-animal relations beyond a direct wild/domestic dichotomy, but to suggest the ‘status’ of wild animals was ‘lessened by their existence outside mainstream social life’ (*ibid.*) or that ‘engagement with non-domesticated ungulates slipped into the background, simply because these beings were less entwined in social life’ (2006:139) probably over-simplifies relations with wild animals. Sharples, for example, discusses an Early Neolithic pit assemblage from Coneybury, Wiltshire, in which a wide variety of animal species were present, cattle being the most predominant but also including red and roe deer, beaver and fish. Apparent differences in butchery patterns suggest that cattle were butchered and the meat removed and consumed elsewhere, whereas roe deer were butchered and consumed at the site. This assemblage leads Sharples to suggest that ‘wild animals may have had a more important role in the Neolithic than would appear from a superficial examination of the principal sites' (2000:109).

Brittain & Overton (2013), on the other hand, propose exploring the multiple layers of 'rhythm' of interspecies participation as a potential method for understanding human-animal relations in prehistory, in this case between humans and Whooper swans in Mesolithic Denmark (see also Overton & Hamilakis 2013). Discussing a site temporarily inhabited by humans and migrating Whooper swans, they note how tracking and hunting these swans would have necessitated a synchronisation of distinct human and swan rhythms. They suggest that the practices of (human) anticipation and preparation, such as leaving their own larger and more perennial dwelling place to temporarily inhabit the same site as the swans, might imply that the human communities recognised swans as sentient individuals undertaking their own preparation and journeying to the site (Brittain & Overton 2013:144). Furthermore, through similar ways of attending to the world, e.g. diurnal tracking through the same landscape, and consumption of the same foodstuffs, humans and swans would have been bound together (*ibid.*).

From a different perspective, Conneller (2004) and McNiven (2010) discuss the extension of animal agency through animal-derived items. Conneller (2004) draws upon aspects of Viveiros de Castro's theories of Amerindian perspectivism (above) in re-analysing the role of antler frontlets at the Mesolithic site of Star Carr (UK). Rather than seeing these items as masks for the purposes of concealing the human body during hunting or in ritual dances (as traditionally interpreted), Conneller proposes instead that the antler frontlets (and antler barbed points) incorporated elements of their original animal agency and rather were seen as extending and transforming the human body, rendering the human-animal boundary ambiguous, and facilitating an engagement with the world through another's perspective. McNiven (2010), discussing marine mammal hunting in the Torres Strait, northeast Australia, proposes that the ontological status of 'prey animals' is as kin. For hunters to ensure hunting success in this context, 'prey body parts, particularly the sensory organs of the head' (2010:215) are used to ritually mediate and establish an interpersonal dialogue between hunter and prey.

These studies address specifically the prospect of animal agency, both of the living animal and of animal derived artefacts.

2.5 Social zooarchaeology

Many of the studies discussed in the previous section, however, are from non-zooarchaeological backgrounds – if zooarchaeology is defined as the study of animals through analysis of their remains from archaeological sites (e.g. Reitz & Wing 1999). Indeed, in the '*Archaeology and Human-Animal Studies*' volume discussed above (2.3.2), zooarchaeology, ironically, is heavily criticised for leaving the animals out, and it is considered notable that 'those that try to carve out new frameworks for animals in archaeology come from outside of the zooarchaeological tradition' (Armstrong-Oma & Birke 2013:117). In some ways this is partly true, there is often a significant lack of engagement in zooarchaeology with developments in the wider theoretical debates taking place in mainstream archaeology. Furthermore, the minimal presence of theoretically informed zooarchaeological studies in the wider archaeological discourse has resulted in a particularly narrow view of zooarchaeology from outside the discipline resulting in its being seen as a primarily methodological tool, e.g.:

> *'The empirical remains of the animals themselves, the bones, have provided us with a framework by which to study the complex phenomena that the bones are subjected to from table to trowel [sic], thus vastly increasing our understanding of the processes that form the archaeological record and the context in which they appear' (Armstrong-Oma & Hedeager 2010:156*).

On the other hand, it has been noted that some sweeping claims have been made by non-zooarchaeologists regarding human attitudes to animals in the past, that on zooarchaeological reinvestigation have been based on some particularly 'shaky foundations' (Albarella & Serjeantson 2002:145; see also Garrow 2012).

These points highlight the significant potential and scope for a fruitful integration of different approaches to investigating human-animal relations in the past. Fortunately, this is going some way to being addressed with the 'social zooarchaeology' paradigm that has emerged over the last decade.

Early developments in social zooarchaeology saw the establishment by staff and students at the University of Southampton, UK, (2004-2005) of a 'Social Zooarchaeology' seminar series, in which a number of the participating researchers presented results of their research in which social questions were investigated through zooarchaeological analysis. Perhaps more importantly, however, within this seminar series an early attempt was made to define a 'social zooarchaeology' and set an agenda for its establishment going forward. It should be noted, however, that an emphasis on sociality was not necessarily seen as a rejection of economics, rather recognition of the socially embedded nature of economy and a reflexive critique of the type of economics being utilised. Concomitantly, the Laboratory for Social Zooarchaeology was established at the University of Southampton, from which specific studies with a social zooarchaeological framework were undertaken, presented and published (e.g. Hamilakis 2003, Harris 2003, Hamilakis & Konsolaki 2004, Armstrong-Oma 2007, Sykes 2007, Harris & Hamilakis 2008, Hamilakis & Harris 2011, Overton & Hamilakis 2013).

Elsewhere, Marciniak's book '*Placing Animals in the Neolithic: Social Zooarchaeology of Prehistoric Farming Communities*'[21] critiqued a tendency in Central European archaeology to use animal bone remains to address purely the subsistence and environmental conditions of prehistoric groups, and proposed instead an analysis in which bone fragments 'may invoke the social and spatial milieus of the early farming communities' (2005:2). Later, Morris, in relation to his work on 'special animal deposits' in British archaeological contexts, suggested that often social interpretations have only been applied to 'animal burials' rather than disarticulated remains, and proposed a methodology for the latter that 'enables us to move beyond the perceived economic straitjacket towards a social zooarchaeology' (2008:iv). Interestingly, both these authors advocate a biographical approach to the understanding of animal bone deposits and thus a change of focus from macro to micro scale events:

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[21] Described as the 'first study in an innovative approach...called interpretative social zooarchaeology' (Marciniak 2005:1).

> *'I postulate looking at animal bone fragments as an outcome of the complex life history of an animal…'* (Marciniak 2005:2)

and

> *'each bone group is created by specific actions and it is the investigation of these individual events that moves us closer to the societies we wish to understand'* (Morris 2008:iv).

Elsewhere, Emery (2004b:8-11) also mentions social zooarchaeology in relation to new research directions in Mayan archaeology.

However, none of these authors make explicit in any detail their definition of a social zooarchaeology in relation to their contexts of study. Marciniak's book for example, whilst advocating the use of the 'mainstream dialogue of theoretical archaeology' (particularly Hodder in this case), in terms of methodology proposes to 'scan back and forth between…archaeological and faunal data' (2005:7) rather than achieving integration of both in any real sense. Additionally, and whilst I agree with his observation that '[T]he interpretation of faunal assemblages in social terms requires explicitly formulated and systematically conducted analytical procedure' (2005:6), his 'analytical procedure of social zooarchaeology' (2005:102) is based almost entirely on the uncritical adoption of some of the most 'processual' of zooarchaeological methods he previously critiqued (Binford's 'Marrow Index' and 'Modified General Utility Index', 1978), rather than any attempt at adaptation in order to relate methodologies to the proposed changes in research paradigm.

David Orton's (2008, 2010) recent studies of animal bone assemblages from Neolithic Serbia represent a significant body of work to social zooarchaeology, in which he recognises the economic and symbolic role of animals, but also that animals are 'living beings that interact with people in a variety of ways' (2008:2). Furthermore, he investigates in depth how concepts of wild and domestic, beyond their opposition in the Cartesian framework, may have been constructed in the Neolithic. Whilst Orton (2008) considers animals within a well-integrated theoretical framework, his original zooarchaeological analysis is fairly traditional being based on large quantities of material to investigate wide-scale regional trends and diachronic patterns. Although he notes that 'more socially-oriented zooarchaeologists often approach their interests through consumption and deposition' (2008:2) and proposes to attempt such in his study through addressing the data on a smaller scale, ultimately for such he concentrates on a study of taphonomy.

These studies are indicative of an anxiety in zooarchaeological discourse at present centring on a concern with methodology, as indicated in the recent (2010) ICAZ conference session: '*Grounding social zooarchaeology: bringing methodology to bear on social questions*'. In the abstract for this session it was stated that:

> *'it is rarely clear how ideas drawn from anthropological theory and ethnographic studies might actually be applied to (zoo)archaeological data'*[22]

It is clear, however, that there will be a tension in trying to apply a suite of methods developed to answer the research questions of a previous paradigm, to the concerns of a new interpretive framework. Social zooarchaeology needs first to reconfigure and make explicit its broader philosophical and theoretical objectives, and then assess to what extent uncritical use of standard or formulaic zooarchaeological methodologies are useful, or whether it is now necessary to adapt methodological approaches in order to create a more appropriate way with which to recover and analyse evidence relevant to new research directions.

Although social zooarchaeology is now a fairly widely accepted term –

> *'Now that we all turn out to be doing 'social zooarchaeology' I have been chasing up who was the first person to publish the expression'*
> (zooarch jiscmail mailing list Mon, 8 Oct 2012 10:32:05)

-there are extremely few explicit definitions of a framework (cf. Overton & Hamilakis 2013). A recently published text book '*Social Zooarchaeology: Humans and Animals in Prehistory*' (Russell 2012), is a volume with a wide

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[22] http://alexandriaarchive.org/bonecommons/exhibits/show/icaz2010paris/session6_2/overview accessed 17.07.13

range and diversity of examples of animals in 'non-economic' contexts, however in the opening statement we read:

> *'Until recently, archaeological analysis of faunal evidence has primarily focused on the role of animals in the human diet and subsistence economy. This book, however, argues that animals have played many more roles in human societies: as wealth, companions, spirit helpers, sacrificial victims, totems, centrepieces of feasts, objects of taboos, and more.'*

This appears to do little more than mirror the 'sustenance' to 'symbol' shift discussed above, and implies that many of the debates occurring in post-structuralist discussions of animal-human relations (2.3) have been passed by.

At its most basic, the term has been used in cases in which traditional zooarchaeological methods have been used to answer 'social questions' or as a means of 'moving beyond' a focus on 'economics' in zooarchaeology. Perhaps the most explicit definition of a 'manifesto' for social zooarchaeology is outlined by Overton and Hamilakis (albeit with its roots in the University of Southampton Social Zooarchaeology seminar series) which calls for an inclusive rather than dichotomising framework (rather than social vs. economic for example), the 'severing of links with anthropocentric ontologies', and an engagement with the sensory and embodied nature of inter-species interaction (Overton & Hamilakis 2013).

Yet there is a paradox that needs working at: whilst the recent recognition in archaeology of the agency of non-human animals as living, sentient beings has been significant, there is no avoiding the fact that zooarchaeology is grounded in the material remains of animals once dead. Furthermore, to set up an opposition between understandings of animals as 'the animals themselves' or as 'mere meat and bones' (Armstrong-Oma & Birke 2013:117) restricts some significant avenues of discussion.

Armstrong-Oma and Birke criticise traditional zooarchaeology for failing to recognise animals 'as having roles and lives before they were eaten' (2013:115), yet the animals' bones do very often come from specific contexts of consumption and deposition. Armstrong-Oma and Birke's criticism is not unjustified however, zooarchaeologists do need to recognise the role and lives of animals before they were eaten; however if zooarchaeology is to be the rich resource it has the capacity to be, then there also has to be recognition that the killing and consumption of animals was, too, a mode of human-animal engagement. This does not have to be understood, however, within parameters objectification and exploitation as has been the case (although there is the potential for such in any relationship), rather that killing, consumption and utilisation of the animal body are also ‘intimate’ (Gittens 2013) arenas in which animal agency can have a role (e.g. Conneller 2004, Armstrong-Oma 2007, McNiven 2010).

Furthermore, and contrary perhaps to the impression given by subsistence studies, consumption of animals in the past is unlikely to have been a commonplace activity (e.g. Papathanasiou 2006, Halstead 2007) and it is doubtful that animals would have been considered ‘mere meat and bones’. Rather, consumption episodes incorporating animals would have been distinctive and meaningful events that recalled the nature of engagement with the living animal, which in turn would have impacted on the treatment of the remains (Isaakidou 2007, Hamilakis 2008, Hamilakis & Harris 2011, Overton & Hamilakis 2013).

2.6 Conclusion

In short, traditional zooarchaeology has been recently criticised for failing to consider to roles and lives of animals before they were eaten. Whilst this is an over generalisation to some extent (consider studies of dairying, herding etc.), what has perhaps been less well emphasised in zooarchaeological studies to date is an acknowledgment of the significant embodied presence and effect of animals in society and the full range and significance of the variety of relationships, including social and emotional, that constituted human-animal interaction in the past. Social zooarchaeology is starting to address this, with some important studies conducted thus far, yet a more dynamic dialogue between ‘human-animal studies’ and ‘zooarchaeology’ needs to take place. This study, therefore seeks to bridge some of these gaps through investigating the multiple nature of human-animal engagement both with the living animal and the animal body after death.

Chapter 3: The 'cycle of engagement': creating a theoretical framework

3.1 Introduction

As stated in Chapter 1, the aim of this study is to reconsider the role of animals in an Aegean Bronze Age context from a non-anthropocentric perspective. This is not an attempt to write a story from an animal point of view, rather recognition of (the significance of) the intertwining of animal and human lives (Marvin 2010b), in which animals were equally active participants (albeit perhaps some more willing than others). As such, rather than describing animals in the past purely as a (passive) resource whether economic or symbolic, it is considered here that the embodied, corporeal and multi-sensory nature of human-animal interactions was a significant part of past societies. Of which the interactions between humans and 'wild' animals - notably fallow and red deer, and agrimia in Late Bronze Age west Crete - are the main focus of the study.

At the close of Chapter 2 it was suggested that investigating the multiple nature of human-animal engagement with both the living animal and the animal body after death is a potential avenue for bridging some gaps occurring between the fields of 'human-animal studies' and 'zooarchaeology'. Therefore as a framework for this study, a number of social practices incorporating humans and animals as an *inter-connected sequence of events*, starting with the living animal and recognisable in the zooarchaeological record, is proposed.[23]

It is suggested that through these practices humans and animals/animal bodies were incorporated in a set of physical and sensory relationships, an essential feature of which was the potential for creation of heightened embodied, sensory and mnemonic experience.

Incorporating the living animal as a starting for point for analysis, 'hunting' is the initial practice proposed in this sequence (although it is recognised that

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[23] This is possible due to the context-oriented approach to the analysis and the relatively small-scale nature of the assemblage (see Chapter 9).

other forms of human-deer/agrimia relationships most likely existed prior to this specific interaction). It is considered that through hunting the death of the animal and its subsequent incorporation into the human settlement context was brought about. However, whether this was hunting in the 'traditional' sense or a in a more performative manner resulting in a death through 'sacrifice' will be investigated through the thesis. These 'hunted' animals were subsequently consumed and their remains deposited (within the settlement), resulting in the zooarchaeological assemblage. Potentially synecdochic elements of the hunted animal (e.g. antler and horn) may have been dispersed as tools and objects. These practices should not be seen as separate unconnected events, rather, as a sequence of inter-activity which I have termed for this study a '*cycle of engagement*'.

3.1.1 Archaeology of the senses

Starting from the premise that interaction with animals (with agency!) in the past, particularly in the practices described above, would have been a physical and multi-sensory one, based on elements of heightened sensory awareness (e.g. stalking / fleeing), physical corporeal clash (e.g. capture / kill), and potentially transcendence of bodily boundaries (e.g. through consumption / adoption of bodily effects), necessitates that this theoretical framework is situated within the broader context of an 'archaeology of the senses'.

Of particular relevance here to human / animal interaction is the statement by Hamilakis that:

> *'sensorial experience is activated at the moment of a trans-corporeal encounter'* (2013:411).

That is between bodies both human and animal, and bodies, things, and environments (*ibid.*), and is equally the case for both humans and animals.

Hamilakis notes that sensory experience requires 'materiality in order to be activated' (Hamilakis 2013:209, see also Jones 2003), and this is almost certainly the case in terms of food consumption, material deposition, and the manufacture of animal based objects (3.3-3.5 below). I would add, however, in the case of human/deer and human/agrimia encounter through stalking and hunting (3.2, below), what should also be considered are less tangible elements such as wind and weather to sensory 'activation'.

The role of sensory and embodied experience and the activation of memory through such have been shown to be integral to the social construction of (human) histories and identities in the past (e.g. Lillios & Tsamis 2010, Hamilakis 2011, Day 2013). Connerton discusses how the social memory of groups is conveyed and sustained through the bringing together of 'recollection and bodies' (1989:3), and describes memory as 'sedimented or amassed in the body' (1989:72) As such, social memory can be formed through (repetitive) performative and bodily practices (e.g. commemorative ceremonies) to create and support a sense of individual and community identity, and used to naturalise or legitimate authority (Van Dyke & Alcock 2003). Yet the creation of social memory is an active and ongoing process which makes it possible for 'multiple and conflicting versions of events to co-exist' (2003:3, see also Hamilakis 2010). This study will contribute to the role of human/animal interaction as embodied and mnemonic experience.

The following sections, therefore, consider how each of the practices bound up in the 'cycle of engagement' hypothesis (hunting, food consumption, deposition, dispersal) might be interpreted from a non-anthropocentric perspective (as defined above) and investigated through the embodied and multi-sensory dimensions of these (trans-corporeal) encounters.

3.2 Hunting and multi-species encounter

Hunting as a practice is historically situated and a tight and prescriptive definition is thus difficult. However, a number of observations (based on cross-cultural ethnographic studies) regarding some characteristics of human and animal interaction through hunting should made in order to differentiate it from a domestic context. The broader parameters for consideration here, therefore, are the nature of the embodied and sensory dimension of hunting, including the environmental context, and how these contribute to a sense of relationship between hunter and animal. Examples will be taken predominantly from deer hunting experiences.

A number of studies that offer a definition of hunting state that for hunting to occur the animals should be in their ‘natural habitat’, to be able to be in inaccessible places - *the hunter must enter the space of the wild animal* (e.g. Cartmill 1993, Marvin 2010a, see also Hamilakis 2003). Although in some cases (e.g. in modern western contexts) this is interpreted as a confrontation between ‘humanity and wilderness’, ‘culture’ and ‘nature’ (Cartmill 1993:30), as discussed in Chapter 1(1.1.2) in many cases a quality of wildness is present in cross-cultural understandings of the environment (e.g. Descola & Pálsson 1996b). Understanding hunting as venture to other realms ‘from the arena of…human habitation to engage with animals in other spaces’ (Marvin 2000a:111), either geographically or symbolically (in deer parks for example), is important. As noted by Helms (1988), in many (human) societies it is used as a mechanism for the generation of social power (see also Hamilakis 1996b, 2003).

Key to such ventures is the embodied experience of place and time (Bender 1993a, Casey 1996, Feld & Basso 1996, Thomas 2000). Hamilakis, for example, suggests that hunting occurs beyond the familiar temporality or landscape of agriculture (2003; see also Brittain & Overton 2013). Whereas Marvin proposes that that through the process of hunting the environment is transformed, the ordinary becomes transcended. The physicality of the landscape becomes intensified through the potential for drama it offers as ‘sites of encounter’ (Marvin 2000a, 2003). However, the landscape is constituted not only of physical places but as ‘sites of story and memory’ (Bell 1994 in Marvin 2000a:109), of what has or has not already happened there before, the excitement of potential and the experience generated. To quote Schnapp:

> *‘[T]he world of the hunt, like that of the erotic, is a space in which anything may happen and the hunter become the game…’* (1989:72, referring to ancient Greece).

This potential for the ‘hunter [to] become the game’ is fundamental. For hunting to occur the animal is uncontrolled, able to remain hidden, to flee, to resist, to shun the human, *to attack back*. To bring about an encounter with an animal in such circumstances requires a change in sensory engagement, an intensifying or ‘peaking of the senses’ (Marvin 2010a). Both hunter and animal will be acutely alert and mindful of the world around them. Hunters must understand the world -the terrain, sound, sight, scent, wind direction, stillness and movement - from the viewpoint of the hunted animal, to think of themselves as a deer, to act as deer – ‘not animal, not-*not* animal’ (Willerslev 2004, see also Prior 1987, Marvin 2010a). Animals on the other hand will also be observing and studying the hunters and modifying their behaviour accordingly (Prior 1987:19, see also Chapter 2.4.1).

Animals living in the forest or the forest edge have acutely developed senses, especially hearing and scent; deer, for example, live in a world of scent (Prior 1987). The direction of the wind is paramount, the hunter has to remain downwind of them, be alert to the shifts and eddies of wind which will bring waves of scent to the deer. Deer are well aware of this and ‘often choose to lie where the twisting, eddying winds of woodland or open hill bring messages of danger successively from one direction and then another’ (Prior 1987:19). The huge ears of deer analyse the faintest sounds separating normal woodland sounds from anything out of the ordinary. Sight is less important to deer (for example an image as perceived by a fallow buck is probably blurred, lacking definition, colours are transmitted as varying tones of grey), however they are much more sensitive to movement, the blink of an eye or the stealthy movement of a hand, for example (*ibid.*). To get close, the hunter must develop the art of moving slowly, ‘slow enough to give your eyes time to take in the minutest sign of the presence of deer: a vague movement in the bushes, a line of a back or the silhouette of a pair of ears, patches of colour which are out of keeping with the woodland scene’ (Prior 1987:170).

In the case of hunting with dogs an extra dimension is added. Hunters and hunted will have to ‘read’ the dogs behaviour too, the addition of dog bodies and dog voices will contribute to the sensory experience for both human hunter and animal hunted. As Marvin (2001) notes of foxhunting, the challenge of attempting to engage with a wild animal (the fox) is enacted through another animal (the foxhound). The physical and sensory combination of human and animal bodies and voices, hunting equipment, the landscape, the weather, and the emotions and memories generated, could be interpreted as a ‘sensorial assemblage’ - the co-presence of diverse entities connecting the material with the sensorial and the mnemonic (Hamilakis 2014).

The moment of confrontation, for example with a fallow buck or red deer stag, would be impressive.[24] Face to face, these animals appear huge; with a full head of antlers, when hardened and cleaned of velvet, are polished fighting weapons and increase the animal's apparent size. When the antlers are in this condition coincides with the breeding season or rut (autumn time for red and fallow deer). At this time red deer stags develop a swollen neck and dark rough mane, they wallow and cover themselves in dark mud, all serving to reinforce an enhanced appearance of size; he appears bigger, more formidable, more impressive to an adversary (Prior 1987). It is no coincidence that in some contexts the hunting 'season' coincides with the rutting time (Dahles 1993).

A rutting stag smells strong, even to the blunted human senses. He rolls in mud saturated with his own urine, sprays urine directly onto his head, legs and underside of his body, and glands around the penis sheath become exposed, contributing to the strong and characteristic smell of a rutting stag[25]. The odour of a hind too changes in breeding season (Prior 1987). At this time, characteristic loud calls can be heard, for example the guttural roar of a red deer stag would echo widely in a mountain environment. Stags and bucks make themselves obvious by loud challenges, displays of strength and aggression by thrashing the trees and vegetation with their antlers, and fighting between themselves; the clash of antlers in a fight can be heard a long way off (Prior 1987).

The intensity of this heightened embodied and sensory engagement is often described by hunters as creating a personal and emotional connectivity between the hunter and the hunted (and the environment), although the animal may well be resistant to being brought into a relationship with the hunter (Cartmill 1993, Dahles 1993, Willerslev 2004, Marvin 2006, Marvin 2010a, McNiven 2010, Gittens 2013).[26]

> *'The challenge that hunters set themselves is to attempt to bring about an engagement with the wild animal, to create a relationship where none existed. It is a relationship which might last only a few moments*

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[24] Red deer stags would have been the largest mammal, with domestic bulls, on Crete at that time.

[25] Urine is used for the transmission of scents which are significant in reproductive behaviour (Prior 1987).

[26] Although see understandings of hunting in animist ontologies for example, which is seen as a long-term relationship of reciprocal exchange, Chapter 2.4.1.

> *or a few hours but it is one that, for both humans and animals, is highly emotionally charged, although those emotions will be differently configured, experienced and expressed'* (Marvin 2006:45).

As deer and agrimia's main predator in Bronze Age Crete, a hunting encounter with humans (and/or dogs) will also necessitate a 'peaking of the senses' in the animals.

Yet it is also a relationship characterised by unpredictability, and the death of the animal is not inevitable: 'humans might desire the death of the animal but they cannot demand or command it' (Marvin 2006:22). This creates a space in which individual animals might become recognised, for example Prior suggests: '[A]n old fallow wild buck is one of the most crafty animals you could wish to try and outwit' (1987:91). Certainly the highly visually distinctive and individualised coat patterns of fallow deer, and the antler formations of the red and fallow deer stags and bucks, and indeed coat and horns of agrimia, would allow for the recognition of individuals. Stags that had frayed[27] their antlers against conifer trees might end up with antlers that are coated in turpentine and nearly black (Prior 1987). It is possible that individual animals might be recognised by their particular calls (e.g. 'groans' of fallow buck during the rut, see Reby, *et al.* 1998, Vannoni & McElligott 2007), and even on the basis of variation in individual personalities (Briffa & Weiss 2010, Bergvall, *et al.* 2011).[28]

It is important to note that hunting in a deer park in which deer might be considered as 'tame', is no less a heightened encounter. A context in which a deer has lost its fear of humans can be even more dangerous, especially in the rutting season. The females can inflict nasty wounds with their feet which they use as flails, the stags and bucks are potentially lethal (Prior 1987, Massetti pers. comm.).

In Late Bronze Age Crete, whilst the actual mode of killing is not known (killed by humans and/or dogs, in the hunt context or as sacrifice etc.), the final kill

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[27] Scraping antlers against trees to remove the velvet

[28] Defined as: 'individuals consistently differ from one another in behaviour in such a way that these behaviours can be described as individual traits' (Briffa & Weiss 2010:R912)

would have been an intense corporeal and sensory experience, and one of close proximity and conjunction of human and animal bodies.

The following section considers the practices incorporating the animals that have been killed in such contexts and have been brought into the settlement arena for ‘consumption’.

> *‘The process of hunting an animal and killing him or her, taking him or her away from his or her group and into one’s own gathering, is an intimate relationship. [... S]o that when they were brought back to site, the sharing of the important meaty parts was quite a formalized process and not something that happened without care or without meaning’* (Gittens 2013:130).

3.3 Consumption and incorporation

Subsequent engagement with the animal body after death would be equally an embodied encounter. At this stage, the animal body is fragmented (at human hands). Practices such as letting the blood, removing the skin, the antler/horn, the internal organs, the flesh was a potent sensory experience (and potentially a highly ritualised procedure, e.g. Sykes 2007). There would have been the smell, the sight, the sound, and touch of hide, of flesh, of sinew, of blood, of viscera and of bone. In a preindustrial society, these practices would have necessitated an *intersection* of the human and animal body. Parts of the human body would get covered in animal blood, human fingers would have to work their way between animal skin and muscle, human hands would enter animal abdominal cavities, human feet would have held animal body parts down. Would human sweat drip onto animal bodies? Possibly on occasion, the slip of a knife, and the human body is cut and bleeds, maybe the human and animal bloods merge.

The body is disarticulated at the joints, the flesh is stripped from bones, the bones broken for marrow, internal organs prepared (?), and readied for consumption (little is wasted, see Halstead 2007). It is unlikely, however, that consumption of animals in the past was a commonplace activity, the main diet being one based on cereals and legumes (Papathanasiou 2006, Halstead 2007, Isaakidou 2007 for Bronze Age Crete). Consumption episodes incorporating animals would have been meaningful events, events incorporating 'hunted' animals such as deer would have been more distinctive still (judging by the generally fewer remains in archaeological contexts), and the 'presence' of these animals would have characterised the events. Isaakidou (2007), for example, suggests the consumption of fallow deer at Knossos during the Bronze Age may have signified an 'haute cuisine' of the elite.

Whilst we don't know who or how many people would have participated in the fragmentation of the animal body (the hunters? the butchers?), it is possible to presume that consumption of (possibly multiple) large animals such as deer would have necessitated sharing and consumption amongst the wider community and extended social groups (Halstead 2007).

The socio-political dimensions of food consumption and more particularly feasting has received significant attention within recent archaeological discourse (e.g. Hamilakis 1998a, 1999a, Dietler & Hayden 2001, Miracle & Milner 2002, Halstead 2004, Wright 2004b, Mee & Renard 2007, Hitchcock*, et al.* 2008, Aranda Jiménez*, et al.* 2011, Hamilakis & Harris 2011)[29]. Dietler's work has been particularly influential on archaeological discussions of feasting, noting that '[f]ood is a prime political tool; it has a prominent role in social activity concerned with relations of power' (1996:87)[30]. Although Dietler focuses predominantly on the symbolic aspect of feasting, he notes the potential it offers for groups or individuals to manipulate, alter or 'make statements about their relative position within the social order as it is perceived and presented' (Dietler 1996:86). It is the potential for hospitality to be manipulated as a tool in defining social relations however, which in Dietler's view, lies at the crux of commensal politics (*ibid.*). He acknowledges, however, that its 'special attribute' is the intimate nature of the practice of sharing food (1996:92).

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[29] Earlier studies of food consumption in archaeology (and anthropology) were developed within nutritional and resource optimisation parameters and as structuralist symbolic code systems (see overviews in Fischler 1988, Murcott 1988, Hamilakis 1999a, 1999b, Sutton 2001).

[30] cf. Hayden's (1996, 2001) focus on the economic aspects and practical benefits of feasting.

The intimate nature of the practice of sharing of food amongst a social group or community has been noted as a means of embodying a group identity. Falk, for example, suggests that the 'sharing and incorporation of food in a ritual meal implies the incorporation of the partaker into the community simultaneously defining his/her particular place' within it (1997:20). Identity is produced through the incorporation and material nature of the same shared food, creating a bond and identity between those sharing the same food and experience (Falk 1997:84).

It is the condition of embodiment, the involvement of the human body 'with all the associated senses and feelings' that Hamilakis (2002a:123, 2008) suggests constitutes food consumption, and feasting particularly, as a powerful social resource. Central to this phenomenon are the powerful mnemonic effects produced and embodied through the sensory experience of communal consumption and the opportunities they afford for socio-political manipulation: what is remembered, how, and by whom, and equally, what is forgotten (see also Eves 1996).

Central to this thesis is the premise that consumption of hunted animals such as deer and agrimia would have constituted highly distinctive consumption events, extra-ordinary occasions. Events such as these, Hamilakis proposes, would have served as a 'disruption of time' (2008:13); that is, a disruption of daily, habitual time, and may have been linked to other temporal cycles such as annual harvests, inauguration of socio-political leaders, rites of passage etc. (see also Brittain & Overton 2013). As such, these distinctive events, these disruptions of time, would have served as occasions of heightened embodied and mnemonic experience (Hamilakis 2008).

The issue of incorporation is equally important here. Whilst most discussion on the consumption of animals, start from the equation of animals as meat, and thus the shared embodied experience of *meat* consumption, albeit as a rare or particularly distinctive substance (e.g. venison, with unusual herbs, spices etc., see Isaakidou 2007). What should not be lost sight of is that these occasions would have been of the consumption of *animals* (and this applies to domestic and wild animals). Whilst in a modern western context we are accustomed to a significant amount of distance between the animal and the meat for consumption, it is possible, or perhaps highly likely in a feasting context, that the transformation from 'animal-to-meat' happened before your very eyes, ears, and nose. The feeling of consuming (of incorporating) an animal (possibly an individual animal known to you), would have been real and immediate. If this is the case what might the wider implications be?

Firstly, it is important to note that 'animal sacrifice' has often been interpreted as a means of justifying or sanctioning the violence involved in killing animals (Hamilakis & Konsolaki 2004, Recht 2011). This might be particularly important if the interaction between humans and animals is viewed as a relationship based on trust as perhaps with domestic animals (e.g. Armstrong-Oma 2007, 2010) or as equals in the case of wild animal adversaries. Secondly, it has been shown in ethnographic studies that consumption of the meat of particular species can be thought to transfer perceived qualities (strength, for example) in the animal to the consumer (e.g. Moreno-García 2004). And thirdly, it has been proposed that as part of the lived landscape and their particular occupation of it according to habitat and season, animals embody specific aspects of the spatial and temporal landscape (Jones 1998). Jones suggests that animals are a means through which people identify themselves with a landscape; they embody the memory of a particular place, experiences are linked through memory and may be evoked through the use of animals (1998:302).

Whilst this final point is perhaps an interpretation which sees animals in symbolic terms, it is still of interest to the argument. Namely, that the consumption of meat is more than purely consumption of meat, it is the consumption of animals. It is the consumption of animals embodying particular environments and temporalities, of animals with perceived qualities, characteristics, and histories.

3.4 Deposition and recollection

For the remains of events such as these to be preserved in the archaeological record requires particular sets of circumstances and conditions, both cultural and natural; arguably the most essential of which is a rapid deposition of the material shortly after the event (see also such issues as soil condition etc., Lyman 1994).

Traditionally, the practice of deposition has been interpreted in archaeology as evidence for either 'rubbish' or 'ritual'. Many traditional archaeological treatments, often within the processualist paradigm for example, have analysed refuse disposal and discard practices as a reflection of the spatial patterning of 'activity structures' (e.g. Schiffer 1972) and / or site formation processes. However, more socio-symbolic interpretations of 'rubbish disposal' have recently been offered, particularly, for example, in the context of midden curation in British later prehistory (e.g. McOmish 1996, Needham & Spence 1997, Tullet & Harrison 2008). Equally, there has been significant discussion on evidence for 'structured deposition', that is the apparent deliberate positioning of animal body parts (especially skulls) and other objects in contexts of deposition. Interpretation of these deposits are usually defined within frameworks of 'ritual' action, often in structural opposition to mundane activity (Grant 1984, Richards & Thomas 1984, Davis & Payne 1993, Wilson 1999, although see Morris 2008, Garrow 2012).

More recently, however, a number of studies have focussed on the practice of deposition as a mnemonic device and means of marking temporality (e.g. Thomas 2001, 2003, Hamilakis 2008). Fowler, in discussion of Neolithic society, suggests that deposition was one of a number of practices for maintaining the 'tempo' (the rhythm of social activity) of the Neolithic world. The remains of the dead and of other past activities acting as 'mnemonic vehicles', as visible reminders of decay and potential 'transformations towards new articulations of materials' (Fowler 2003:51). Thomas suggests that Neolithic pit deposits, through the act of crossing the threshold between 'above-ground' and 'below-ground', commemorate particular events (feasts, gatherings, periods of occupation etc.). Furthermore, that the placing of representative residues of such events in the ground creates a durable trace of their memory, transforming the significance of a place and associating it with a particular practice or social grouping (Thomas 2001:70-1).

The accumulation and deposition of food remnants and other material cultural elements was also seemingly an important practice in the context of the Bronze Age Aegean (D'Agata 1997-2000, Andreadaki-Vlasaki & Papadopoulou 2005, Driessen, *et al.* 2008, Hamilakis 2008, Hamilakis & Harris 2011). Hamilakis proposes that the practice of curating feasting paraphernalia, either in singular special deposits or through the repeated filling of features with the remains of feasting episodes, and their subsequent concealment produces a mnemonic record of the commensal event (Hamilakis & Harris 2011, Hamilakis 2008). Through feasting, along with sensuous memories stored in the body, an additional, external, material mnemonic record was produced and, in the context of the Bronze Age Aegean, may have served to 'preserve materially the collectivity which ate and drank together....to *objectify* and perhaps preserve, the already dispersed and perhaps potentially already dissolved social unit' (2008:15, original emphasis).

Depositing large quantities of feasting remains serves as a conspicuous demonstration of the events and experiences that have taken place. The act of their accumulation and deposition would have contributed to the social memory formed through (repetitive) performative and bodily practices (after Connerton 1989, see 3.1.1 above). That a significant component of the remains deposited was animal bones would perhaps not only serve as a reminder of the distinctiveness of consumption event, but, in the final act of deposition, would have recalled again the animals consumed.

3.5 Transformation and dispersal

Not all the parts of the animal body would have been consumed or buried, however. It is highly probable that some elements would have been retained for manufacture as items of material culture, such as tools and objects (e.g. Isaakidou 2003). It is proposed here that elements such as skins, deer antler and agrimia horn may have been retained and perceived synecdochically as embodying qualities and histories of the animal from which they derived.

Recent theoretical developments in material culture studies that suggest objects can be seen to embody significant past events, make tangible links to people, events and places, and act as mnemonic stimuli between past, present and future (Rowlands 1993, Gosden & Marshall 1999, Gosden 2004). Objects, rather than being purely functional or passive recipients of ascribed meaning, themselves have a certain 'agency' (Gosden & Marshall 1999, Conneller 2004). Although the scholarship on material culture and agency is extensive, here I want to emphasise the link between objects and their 'biographical' origins and particularly those studies that refer to objects from animal remains. Many of these approaches draw influence from Kopytoff's (1986) biographical approach which suggests objects cannot be fully understood at only one point in their existence, rather, cycles of production, exchange and consumption should be looked at as a whole. Thus, not only are objects seen as accumulating histories, but the significance of an object and the emotional response it generates derives from the persons and events to which it is connected. Connerton notes that the ways in which the present world is experienced is 'causally connected with past events and objects' (1989:2), and Jones also states that remembering (and forgetting) as social practices are mediated by material culture (2003:67).

In archaeological studies of objects of animal origin specifically, interesting interpretations have been made by Conneller (2004) and Armstrong-Oma (2007). Armstrong-Oma suggests that in the European Late Bronze Age knowledgeable links existed between an animal and the end product through a process of transformation of the animal into substances, parts and objects. As such, single objects of animal origin were seen as part of a larger whole (the original animal), highlighting the biographical properties of animal objects. Conneller, also suggests that a lingering connection was made between certain objects (red deer antler frontlets and barbed antler points) and the animals from which they originally derived. She suggests that these artefacts can be seen as incorporating elements of their original animal agency, or more particularly, animal 'effects' (after Viveiros de Castro 1998). In her interpretation of the red deer antler frontlets she proposes that wearing the frontlets allowed the wearer to take on the effects of the animal enabling a transformation and extension of the human body and an altered perspective.

In an anthropological study of the significance of the hunting trophy (in this case taxidermies of hunted animals), Marvin suggests the trophies act 'metonymically'; one level of reference is to a particular hunt out of which it was produced, at another to the specific animal to which it refers (2011:357). At the material level it is a vestige of the animal, but at a more complex, experiential level it is also the vestige of a relationship formed during the process of hunting. These taxidermies are not concerned with preserving the dead animals, however; trophies are now 'cultural objects created through craft' (*ibid.*). They are material objects from elsewhere, and from another time, imbued with meaning and memory as ‘tokens of heightened moments’ (Marvin 2011:356).

It should be noted that, in the case of antler, there is the potential for its collection without recourse to physical interaction with the living animal. That said, however, in the wild cast antler is not easy to find and as a rich source of calcium and phosphorus antler that has been on the ground for several months is likely to be chewed by small mammals and other deer (Prior 1987). The antler collector therefore needs to have a detailed knowledge and understanding of the behaviour and habits of the deer, their whereabouts, and of the local landscape, that can only be acquired through practical engagement (Ashby 2013). For example, shed antler is frequently associated with couches (resting places), and features that cause a deer to jump such as banks, ditches and streams etc. that may encourage loose antler to fall (Prior 1987, Ashby 2013). So whilst face-to face interaction with the deer may not necessarily occur here, an understanding and empathy with deer behaviour and the landscape-as lived-by deer is still key. What is more, the (age-related) shape and size of antler gathered will speak of the animal from which it came.

Thus in this study the practice of dispersal of the animal body as objects imbued with the significance of the origin animals and biographically associated with the practices which went before (the hunt, the feast, the deposition), is considered to be an essential and significant component of the cycle of engagement.

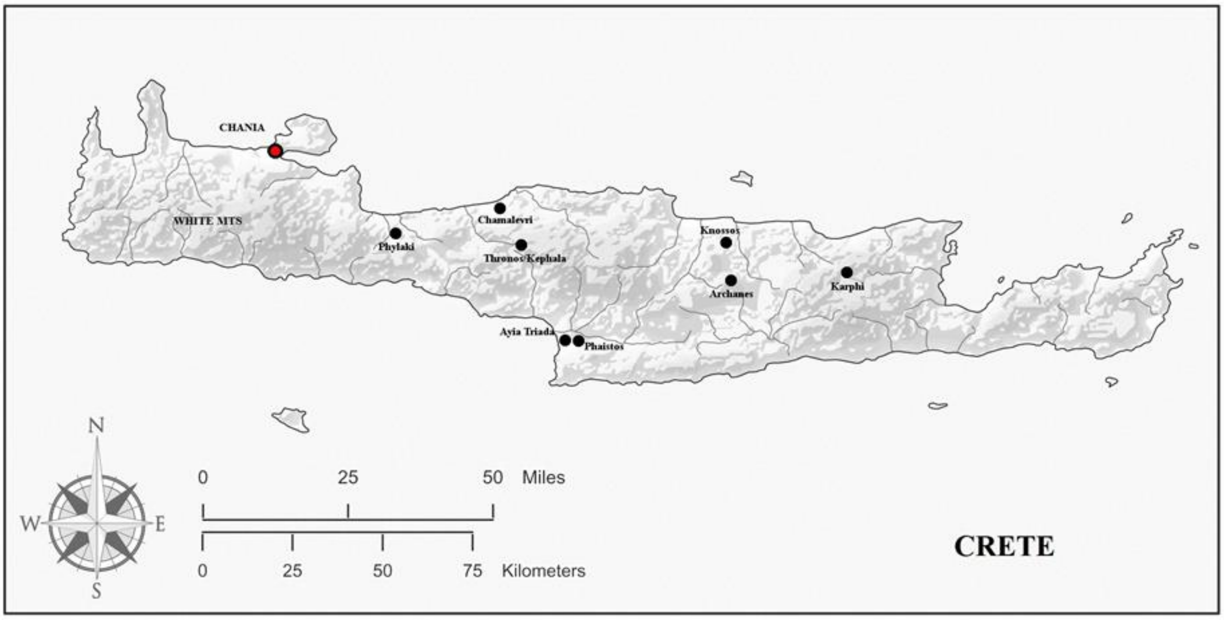
3.6 Conclusion

This Chapter has aimed to highlight the potential for investigating the social implications of human–animal (/animal body) interaction based on a number of specific practices: hunting, feasting and food consumption, deposition of remains, and dispersal of animal body parts. Importantly, however, it is proposed that the significance of such is in the heightened physical, sensory, and perhaps emotional experience of the human/animal relationship, however fleeting. The broader socio-political context, which human-animal interaction would have contributed to, is discussed in the following chapters.

Chapter 4: Crete in the Late Bronze Age (Late Minoan III)

4.1 Introduction

The sites from where the faunal material studied here originates (Ayia Aikaterini, Odos Daskaloyannis, Khaniamou, and Mathioudaki) are part of an important Bronze Age settlement located in Chania in western Crete (see Figure 4.1, also Chapter 7). The contexts forming the primary focus of this study date from c.1300-1100 B.C, a period associated with the end of the Late Bronze Age.



Map by Tom Elliott. Copyright 2003, Ancient World Mapping Center

Figure 4.1 Map indicating location of sites discussed in this study

The study of the Aegean Bronze Age has had a long history (e.g. for Crete see Huxley 2000, Hamilakis & Momigliano 2006), an early feature of which was the application of cultural labels to the populations of specific geographic regions; for Crete it was ‘Minoan’ after King Minos of Knossos. To each region was also applied a tripartite chronological framework, Early, Middle and Late, which was further subdivided into I, II, III. The Bronze Age in Crete is thus defined as Early, Middle and Late Minoan[31] , I, II, and III respectively, within which further chronological subdivisions occur. An additional chronological terminology is used for the Bronze Age of Crete based on phases of monumental architecture interpreted by early excavators as palaces (e.g. Protopalatial, Neopalatial, Postpalatial).

The Cretan Late Bronze Age timespan of study here covers a period dated c.1300-1100 B.C, termed the Late Minoan IIIB (c.1300-1200B.C) and Late Minoan IIIC (c.1200-1100 B.C.) periods. These periods, Late Minoan IIIB particularly, tend to be seen as sub-phases within a broader socio-political timeframe often defined as ‘Mycenaean’ Crete (Late Minoan II-Late Minoan III; also described as ‘Postpalatial’, see Table 4.1).

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[31] Often abbreviated to EM (Early Minoan), MM (Middle Minoan) and LM (Late Minoan).

Approx. Date BC	*Phase*	*Key Events*	*'Political' Phase*
1600- 1490	LMIB	LMI period considered to be the 'highpoint' of 'Minoan' civilisation. The end is defined by widespread destructions destroying most major sites resulting in settlement disruption and possibly depopulation, except Knossos. Discussion over intrusion by mainland 'Mycenaeans'.	Neopalatial (Linear A)
1490- 1430	LMII	Knossos prospers and dominates, administratively and politically, large areas of Crete. General disintegration of major urban centres elsewhere. End of this period defined by an end to Knossian administration of the island. Linear B archive preserved in final conflagration at Knossos.	'Mycenaean' Crete: widespread introduction of mainland derived artefact types and symbols (Linear B)
1430-1390	LMIIIA1		
1390-	LMIIIA2 early		
-1300	LMIIIA2	Resurgence in elite display (monumental architecture, ostentatious tombs) at previously important sites (decline at Knossos), increased regionalism in ceramic styles, fragmented political landscape.	
1300-1200	LMIIIB	Larger sites decline in prosperity/elite ostentation, except Chania which survives and prospers, has Linear B archive. The end of this period is characterised by destruction or abandonment of most major sites albeit as a gradual process.	
1200-1100	LMIIIC	Settlements are generally small, levels of social complexity lower than II-IIIB. Population destabilisation, sites abandoned, others established often in defensible locations.	Destruction of mainland Mycenaean palaces

Table 4.1 Chronological framework of key events for the postpalatial period, Crete (dates follow Davis in Shelmerdine 2008a; key events relating to phase follow interpretation by Preston 2008; LM=Late Minoan).

4.2 Socio-political framework of the Cretan Late Bronze Age

4.2.1 The end of the 'Minoan' era (Late Minoan I)

The preceding Late Minoan I period is generally considered to be the 'highpoint' of 'Minoan' civilisation, the end of which was marked by widespread destruction, settlement disruption, depopulation, and discontinuity in material cultural traditions at most of the major sites. Concurrently on the mainland, Mycenaean palatial polities were developing and exerting increasing influence throughout the Aegean (Wright 2008). The cultural change subsequent to the destructions on Crete is considered so significant that it is often attributed directly to a 'Mycenaean' population influx from mainland Greece (Younger & Rehak 2008). The widespread introduction of artefact types and symbols from the mainland cultural repertoire (burial practices, pottery styles, iconography etc.), particularly of high status level, are traditionally attributed to an invading 'Mycenaean' elite. It is often considered that these 'invaders' directly caused the widespread destructions, or at least exploited an internal political crisis, and seized control at the site of Knossos. The discovery of Linear B tablets at Knossos is often seen as conclusive evidence of an actual Mycenaean presence there, introducing Greek as the administrative language and replacing the earlier, non-Greek, Linear A.

However, the implicit assumption that the terms 'Minoan' and 'Mycenaean' denote specific ethnic groups (applied to the populations of Crete and mainland Greece respectively) is problematic. These terms were coined in the late 19th /early 20th century after key excavations: the 'Palace of King Minos' at Knossos, Crete, and Mycenae, Greece. The characteristics of artefact types from these sites were subsequently taken to be a direct representation of distinct ethnic groups; concomitantly discontinuity in material cultural traditions was equated with population movement, as described above. Broader developments in material culture studies have long since proved a direct correlation of material culture characteristics with ethnic groups to be problematic, and some critique has occurred within Aegean archaeology (e.g. Bennet 1999, Bennet & Davis 1999, Hamilakis 2002c, Preston 2004b, Bennet 2005, D'Agata & Moody 2005, Nafplioti 2008). Nonetheless, certain types of material culture do characterise Crete and the mainland respectively, yet this need not demonstrate expressions of ethnic difference. Bennet (1999, 2005), for example, suggests the seemingly uniform ‘Mycenaean’ material culture was constructed by elites in the palatial centres, whereas groups beneath the upper levels of the power hierarchy may have shared aspects of culture but were linguistically diverse. Simple equation of material culture groups with ethnic groups creates an impression of population homogeneity and masks the complexity of both socio-political organisation and material culture.

That the reality in the past was more complex is evidenced by recent bioarchaeological analysis (Nafplioti 2008). Following the post-Late Minoan IB destructions, cemeteries occur at Knossos that bear close similarities to mainland Mycenaean cemeteries. In particular, the ostentatious ‘warrior graves’, shaft graves and chamber tombs, first seen on the mainland, are on Crete often thought to belong to ‘Mycenaeans’ (e.g. Rehak & Younger 1998:152). Analysis of the skeletal material in the Knossos cemeteries, however, has shown the burials to be of locals and thus further supports the hypothesis of factors internal to Cretan society as being the cause of the Late Minoan IB destructions. A mainland symbolic system was, however, drawn upon in the legitimisation of the new power structure.

4.2.2 ‘Mycenaean’ Crete (Late Minoan II-III)

The period immediately following the Late Minoan IB destructions was defined by the apparent emergence of Knossos as the politically dominant centre on Crete (Late Minoan II-Late Minoan IIIA2 early). The extent of the Knossian political and economic regime is indicated in the Linear B record. Apparent Knossian control was focussed mainly in the central, western and mid-western regions of the island (based on known toponyms in the Knossos Linear B archive), although it is suggested that Chania (*Ku-do-ni-ja* toponym) maintained a relatively high degree of local autonomy (Preston 2008). The far east of the island seemingly remained independent. It is thought that the Linear B data suggests that control was exercised through an administrative hierarchy; Knossos being the dominant centre administering regional areas via ‘second-order’ centres, of which Chania was one. During this time none of the previously major centres of the preceding period prospered, there was little monumental building and scarce evidence for elite burial. According to Preston both ideological and economic reasons may have been the reason: ‘an active suppression of status display in subjugated centres by a Knossian elite still consolidating its authority, and a lack of resources on the part of local elites still recovering from the crisis that had culminated in the Neopalatial destruction horizon’ (2008:314).

Knossos, on the other hand, did prosper in this period: the palace underwent substantial modifications, new high status buildings were constructed and many frescoes were found. Ostentatious burials were also far greater than before, with tomb designs heavily influenced by mainland types (tholoi and chamber tombs) and frequent ‘warrior’ symbolism in the burial assemblages. However, in the new architecture, iconography and most extravagant tombs, both traditional Minoan and new Mycenaean high status symbolism and design elements were combined in innovative ways. Preston (2008) suggests that, following a period of significant socio-political destabilisation, ideas from both Cretan and mainland elite traditions were experimented with by an elite seeking to consolidate its authority.

The demise of Knossian political control was marked by a number of major destructions in the palace. A destruction episode in which the majority of the Linear B archive was burnt is considered to represent the final collapse of its purported hegemony (Late Minoan IIIA2early)[32]. The decline at Knossos (although it may have continued as a regional centre) coincided with a resurgence in elite display elsewhere at several previously important centres, with an increase in monumental building construction and ostentatious burial practices (Late Minoan IIIA2-Late Minoan IIIB). Of interest in relation to the latter is D’Agata’s (1999) suggestion (based on funerary material) that sex-based burial distinctions are emphasised during this period. Additionally, an increased regionalism in ceramic styles occurred and a noticeable change in material culture (Rehak & Younger 1998). Variation occurred in the layout of monumental buildings between major sites, again reflecting features of both mainland (e.g. megaron type rooms) and earlier Cretan architectural styles. The political landscape is thought to have become increasingly fragmented with a number of centres thriving across the island (including Chania), and the

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[32] The date of this destruction has been subject to considerable debate, the proposed alternatives are the early fourteenth century (Late Minoan IIIA2) and the early thirteenth century (early Late Minoan IIIB). It appears that, based on a variety of new evidence, a greater consensus prefer the earlier Late Minoan IIIA2 dating (Preston 2008).

emergence of local identities combining a ‘rebirth of regional traditions and absorption of external elements’ (D'Agata & Moody 2005:12). In the context of the wider Aegean, the prosperity of the mainland palatial sites was increasing with international economic and trade expansion affecting the entire Mediterranean (*ibid.*).

With the exception of Chania (see below), an ensuing decline in prosperity of the larger Cretan sites was seen in the subsequent Late Minoan IIIB period (discontinuation of wealthy burials, reduced monumental construction). In contrast, the mainland sites continued to prosper although the latter part of this period (Late Helladic IIIB2) was one of instability and decline of the ‘palace system’ (Deger-Jalkotzy 2008). By the end of the Late Minoan IIIB most of the major Cretan sites (again with the exception of Chania) were destroyed or abandoned, a gradual process affecting different centres at different times. On the mainland at the end of the Late Helladic IIIB period, the Mycenaean palatial period came to a dramatic end, with many palaces destroyed never to be rebuilt (Deger-Jalkotzy 2008). These broader political and economic crises in the Aegean (and in the Near East), as well as internal upheavals, are thought to have contributed to the demise of Cretan prosperity in the Late Minoan IIIB (Preston 2008).

On the mainland in the aftermath of the destruction of the palaces (Late Helladic IIIC), new settlement plans and political and economic structures and a marked cultural regionalism emerged (Deger-Jalkotzy 2008), a pattern that was to occur in the wider Mediterranean area. On Crete (Late Minoan IIIC), fragmentation of the larger-scale political regions accelerated to be replaced by a socio-political landscape characterised by smaller-scale societies (Preston 2008). Settlements were smaller than in the preceding periods, with many sites abandoned and new sites established. In southern and eastern Crete these new settlements were often in naturally defensible locations, whereas in western and west-central Crete nucleation occurred around lowland, coastal settlements (e.g. Chania, Chamalevri, Thronos/Kephala, Phaistos, Figure 4.1) in the final Late Minoan IIIB phase to become main regional centres in the Late Minoan IIIC (Borgna 2003). In this context of wide regional variation it is thought that the Late Minoan IIIC levels in Chania (evidenced at the Ayia Aikaterini site) are thought to represent a direct continuation of the Late

Minoan IIIB phase with many practices continuing as before, albeit on a reduced scale (4.3, below).

4.3 Chania in the Late Minoan III period

Chania was occupied throughout the Bronze Age with evidence for an extensive and important settlement in the Late Minoan I period and a Linear A based administrative system (Andreadaki-Vlasaki 2002). However, here too major destruction occurred in the Late Minoan IB period. Discussion of the following periods is based on evidence from the Ayia Aikaterini excavations (see Chapter 7).

Following the Late Minoan IB destructions, clearance and resettlement took place during Late Minoan II- Late Minoan IIIA1. However it is not until the Late Minoan IIIA2- Late Minoan IIIB1 that evidence for extensive new construction occurred. The settlement was destroyed again by fire but was rebuilt and extended in the Late Minoan IIIB2 period (Hallager 1988). In both phases of rebuilding new architectural elements were employed, such as the fixed circular hearth, that were characteristic of architectural features on the contemporary mainland. Figurines, both local and imported from the Argolid, were found in the vicinity of the hearths, a practice also considered to be a 'typical Mycenaean trait' (Hallager 1988:117).

In contrast to the general decline of most major centres in Late Minoan IIIB, Chania became an important centre. The development of a distinctive pottery workshop in Chania in the Late Minoan IIIA period flourished in the Late Minoan IIIB, with pottery exported from Chania across Crete and the Aegean. Extensive trade links are also evident in the variety of imported pottery, with Mycenaean imports constituting the largest group (Hallager 2005). Transport stirrup-jars bearing Linear B inscriptions produced in Chania and exported to the mainland belong to the Late Minoan IIIB period (Hallager 1987). Linear B tablets recovered from Late Minoan IIIB(1) levels at the Ayia Aikaterini excavations, the only known site with a Linear B archive in Late Minoan IIIB Crete, indicates its role as an important administrative centre. Furthermore, Preston (2004b) suggests that a shift in the focus of mortuary ostentation towards the far west of Crete occurred in the Late Minoan IIIB, and is possibly linked to an escalation in the political power of elites in this region and maybe increased levels of competition between elites at different centres.

The settlement was destroyed again by fire at the end of the Late Minoan IIIB2 period and subsequently rebuilt in the Late Minoan IIIC as a direct continuation of the preceding Late Minoan IIIB phase. During the Late Minoan IIIC period pottery was still produced in Chania, and contacts with the wider region still persisted albeit on a much smaller scale. There is no evidence for a continued Linear B administrative system, as accords with elsewhere on Crete. It is suggested that in Late Minoan IIIC Chania daily life continued much as before, but the clear signs of prosperity of the previous periods had ceased or been drastically reduced (Hallager & Hallager 2003). The settlement was finally abandoned, although not destroyed, at the end of the Late Minoan IIIC early phase.

4.3.1 Identity construction in Late Minoan III Chania

As described above, during the Late Minoan III period Chania prospered and developed into an important centre. During this time, the influence of Mycenaean Greece was expanding across the Aegean and eastern Mediterranean. Significant trade links between Chania and the Mycenaean mainland and a common administrative system were in place at this time. However, in the ostentatious burial practices that also flourish in west Crete at this time, there is evidence too for a shared elite ideology, or at least the incorporation of elements of a mainland elite symbolism, notably the ‘warrior’ grave.

Chania has an extensive Late Minoan III cemetery of over 50 tombs (Whitley 2005), similar in form and content to mainland Mycenaean burials (and other cemeteries across Crete with ‘Mycenaean’ features, Rehak & Younger 1998, but see Nafplioti 2008). Finds include numerous bronze weapons including swords, spears and arrowheads, as well as ceramic vessels, seals and jewellery (Whitley 2005). An example of an un-robbed Late Minoan IIIB chamber tomb contained a single burial accompanied by a wide array of rich finds, including 29 pots, one bronze vessel, bronze weapons, nine sealstones, gold and silver beads, and ornaments and beads of other materials (French 1992). One of the largest and most impressive tombs contained faience necklaces, traces of gold, and clay vases (all that were left of the rich burial), but also several bone plaques made of hippopotamus and elephant tusk depicting warriors wearing helmets, heraldic lions, figure-of-eight shields etc., that would have adorned a wooden box. Similar plaques were found in the tholos tombs of Archanes and Phylaki (Figure 4.2, Andreadaki-Vlasaki 2000, Blackman 2000). Another Late Minoan IIIB chamber tomb burial contained an agate seal showing a deer between two standing lions (French 1994), and in a further chamber tomb a collection of human bones and a dog burial had been deposited next to the entrance (Blackman 2000). This latter example is particularly interesting in light of Hamilakis' (1996b) proposal that in Mycenaean high status burials depositions of dogs functions in a similar way to deposition of grave goods, and represents the ideological role of hunting in Mycenaean societies (discussed further in the following Chapter 5).

Figure 4.2 Bone plaque depicting the head of a 'warrior' wearing a boar's tusk helmet, Phylaki (after Andreadaki-Vlasaki 2000)

Depictions of warriors with boar's tusk helmets (e.g. Figure 4.2) and depictions of wild/fierce animals (themselves made from material of exotic and unfamiliar animals in the case of the plaques noted above) were part of a broader high status iconographic repertoire, of which hunting is a prominent theme. This, as well as deposition of bronze weaponry and hunting paraphernalia in high status burials, should be seen as part of a wider Mycenaean ideological apparatus for the generation and legitimisation of elite power.

Also deposited in these burials is a wide array of food and drink consumption vessels, similarly testifying the significance of these practices in the construction of identity and associated social status (see also Bendall 2004). Feasting, too, was an important theme in the Mycenaean power iconographies. The ubiquity of feasting vessels in assemblages, however, especially of the mainland palace sites such as Pylos, as well as zooarchaeological evidence (e.g.Halstead & Isaakidou 2004), indicates the wider occurrence of feasting as an embodied practice in Late Bronze Age society, one that is thought to have contributed to the formation and maintenance of a warrior elite (Bendall 2004, Wright 2004c). On Crete, 'The Camp Stool' fresco from Knossos depicting a ceremonial feast with men drinking from kylikes (the Mycenaean drinking vessel associated with banqueting), further suggests a shared elite ideology or the use of a symbolic system associated with the mainland. Furthermore, Borgna, in her analysis of functional and stylistic features of Late Minoan III period ceramics, suggests that '[T]he pictorial scenes of Aegean LBIIIC pottery point to a kind of formulaic communication including themes such as hunting, fighting, sailing and banqueting, selected by the emerging Aegean elites and related to values particular to a shared aristocratic ideology' (2004b:180).

A Late Minoan IIIB:2 krater fragment recovered from below a floor at Ayia Aikaterini, Chania, depicts an armed warrior, chariot and horse (Hallager 1999). A Late Minoan IIIC krater sherd from Chamalevri depicting a dog is noted to be very similar to a krater sherd from a chamber tomb near Pylos displaying a hunting scene of a pack of three dogs with a helmeted hunter. Eder suggests the sherds from Chamalevri and Pylos might be part of a very similar pictorial scene and considers 'iconographic and stylistic similarities in 12th century vase painting an indication for exchanges of iconographic patterns, and probably also related ideological values, that took place between Crete and the Greek mainland in LM/LHIIIC' (2005:405).

4.4 Chania in context: a summary

It is generally considered that during the Late Minoan IIIB/C period across Crete the political landscape became increasingly fragmented with greater variation in regional identities (e.g. Borgna 2004b, Smith 2005). Incorporation of Mycenaean stylistic features, for example in architecture, burial practices, and ceramic styles, was apparently not a case of passive wholesale adoption; rather it was selective, and adapted and fused with local traditions in innovative ways, assumed to be by elites in increasing competition for socio-political power. It is often stated that in Chania a distinctive regional identity was developed and /or maintained[33] that was characterised by expressions of affiliation with the Mycenaean mainland, as D'Agata notes: 'LMIII Khania shows features marked strongly by stable, continuous contacts with the Greek mainland, which – on present knowledge- are unique in Crete' (D'Agata & Moody 2005:12).

The high status burials, notably the 'warrior' grave, are considered to be evidence for participation in a shared wider Mycenaean elite ideology and utilisation of elements of a mainland elite symbolism; a significant resource for which was hunting - or the deployment of hunting symbolism - and communal consumption through feasting. Depictions of hunting in Late Bronze Age Aegean iconography are explored in the following Chapter.

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[33] See Preston 2004a for a distinctive west Cretan mortuary tradition.

Chapter 5: Hunting, deer, and agrimia in Late Bronze Age Aegean iconography

5.1 Introduction

The previous chapter concluded by noting the importance of hunting and feasting in the communication of a shared elite ideology in the Aegean Late Bronze Age, symbolic elements of which were incorporated in the high status burials of the Chania Late Minoan III cemetery. It was also concluded that a distinctive regional identity was developed in the Chania region that was characterised by affiliations with the Mycenaean mainland, and the combination of both mainland and local traditions in various architectural and material cultural developments. Therefore, in this chapter the iconographic evidence for hunting from both the southern Greek mainland and Crete will be discussed. More specifically, the focus will be on the iconography of hunting deer and agrimia (as the animal species at the main focus of this study), and the act of feasting in association with hunting. However, discussions of the practice of Aegean Late Bronze Age hunting more widely (e.g. of other species) will also be consulted. This evidence will also be considered in relation to aspects of hunting, feasting and deposition that were discussed in previous Chapters.

In the broader context of the Late Bronze Age Aegean, hunting, deer and agrimia are depicted in a variety of iconographic media (e.g. frescoes, sealstones, on pictorial pottery and larnakes) in a range of different contexts. In 'Minoan' iconography the agrimi is one of the most popular motifs (Hiller 2001, Bloedow 2003, Masseti 2003b), whilst deer, on the other hand, are rare. Deer do, however, occur frequently in 'Mycenaean' depictions (Morgan 1988, Masseti 2003b, Wright 2004b) - a fact Morgan attributes to the 'Mycenaean predilection for hunting subjects' (Morgan 1988).

5.2 Frescoes and paintings on the southern Greek mainland and the Cyclades

It is perhaps the large scale wall-paintings of the Mycenaean palaces that are most well-known; predominant themes being scenes of warfare and hunting, with many motifs (costumes, spears or lances, horses and chariots) common to both (Immerwahr 1990, see also Morris 1990). In these hunting scenes, wild boar (predominantly) and deer are depicted.

The most notable example of the depiction of the (human) hunting of deer in this context is the hunting scene from the Mycenaean palace at Pylos (the 'Pylos Hunt Scene', Figure 5.1). Recovered fragments of this scene have been reconstructed to depict parts of three dogs and a hunter throwing a spear at a stag (as well as parts of six other men in various postures, Lang 1969). It is thought that this frieze was located on the north-western wall of a large upper room and depicted the actual hunt; across the room on the south eastern wall was pictured the return from the hunt with tripods being carried for the feast (*ibid.*; Figure 5.2). Interestingly, Lang notes that one piece of upper border, the same as that of the hunting scene, shows a pair of large scale horns as of a life-size goat, although she states that it is difficult to say whether this might belong to the hunt scene, as the border suggests, or be part of the decoration of the room below (1969:206-207). It is considered that the hunting scene was on the walls of the palace at the time of its destruction (Lang 1969:17). Besides this scene, deer were also depicted on the walls of at least four other rooms at Pylos, although in these cases associated with women, plants and altars (Morgan 1988:55). The deer in the hunt scene (16 H 43, Figure 5.1) is detailed with cross-hatching, although somewhat stylised, giving the effect of the spotted coat indicative of fallow deer. Another fragment (4 C 19) depicts in detail a stag's head on which the palmate antler of fallow deer is clearly portrayed; fragment 6 C nw, however, bears more similarity to red deer. Red deer remains were recorded in the Pylos faunal assemblage from deposits interpreted as a burnt animal sacrifice (burning of selected parts of the carcass previously stripped of meat), dated to the final phase of the palace (Isaakidou, *et al.* 2002, Halstead & Isaakidou 2004).

At Tiryns too an extensive hunt scene (the 'Tiryns Boar Hunt') was depicted on the walls of the later Palace (although its exact location in the palace is not known, Immerwahr 1990). In this scene three major themes are repeated: the hunters on foot with large dogs on leashes, and carrying spears over their shoulders; chariot groups, including female participants, (chariots are thought to represent conveyance to the hunt rather than shooting platforms for archers, Crouwel 1981:137); and the pursuit and killing of predominantly wild boar, but deer are perhaps also pursued (one fragment depicts an antler the shape of which suggest fallow deer, Morgan 1988:56). A similar scene of a boar hunt (fleeing boar, hunting dogs in pursuit, hunters with spears and boar's tusk helmets) was also displayed in the Orchomenos palace (*ibid.*).

A further group of fresco fragments from Tiryns (the 'Tiryns Deer Frieze', Figure 5.3), and recovered from the same area (west slope rubbish deposit), depicts deer and stags in a variety of poses: standing singly or in groups with heads turned back; running in 'flying gallop'; running two abreast; and two stags fighting. Distinct features of the animals have been detailed: 'palmated antlers, short tail, spotted coat, white under-belly and rump, and pubic tuft of hair' indicate the portrayal of fallow deer (Morgan 1988). Due to its fragmentary nature this composition is only reconstructed in very general terms, however the scale and decorative borders at the top and bottom are similar to those of the Boar Hunt and it is thought that the Deer Frieze may have decorated another wall of the same room as the Boar Hunt, although perhaps not as part of the same composition (Immerwahr 1990). A small quantity of fallow deer remains were recorded in the faunal assemblage from Tiryns (von den Driesch & Boessneck 1990).

In contexts other (and earlier) than the mainland Mycenaean palaces, the depiction of deer in hunting scenes also occurred in miniature frescoes from the contemporary settlements of Ayia Irini, Kea (from what Morgan proposes could have been a banqueting hall, Marinatos & Morgan 2005:120) and Akrotiri, Thera; however in these cases the hunt is incorporated as part of a larger composition rather than being a separate subject (Morgan 1988). At Ayia Irini, architectural facades, figures of men and women, deer, dogs and horses were represented. Part of the scene depicts seven hunters, one with a spear over one shoulder and a pole balanced horizontally on the other from which 'dangles a large brown crescent shaped object', and five (possibly seven) deer, one extended in 'flying gallop' pursued by a white 'greyhound-like' dog (Figure 5.4, Abramovitz 1980:61). Elsewhere in the scene, several men are leaning over and stirring the contents of two large cauldrons while a third man brings 'something brown to them from a red table (?). … [T]he same brown used for this unknown object is used for the hunter's burden', thus Abromovitz suggests should be interpreted as venison (1980:62). The depiction of these deer with white-spotted brown coats indicates fallow deer, although no actual faunal remains of fallow deer were recovered from Ayia Irini (red deer antler was recorded, Yannouli & Trantalidou 1999).

At Akrotiri, deer are depicted in two friezes ('The Landscape' Figure 5.5, and 'The Ship Procession', Figure 5.6), and although Morgan (1988:54) suggests they play 'the minor role of the hunted animal' in this case the deer are not hunted by humans but show a small deer chased by a griffin in the former, and three stags chased along the tops of hills by a lion in the latter. Morgan (1988) suggests that the inclusion of the deer-hunt theme within the miniatures is evidence for a close association between the Theran artists and those of Mycenae. In these depictions the palmate antlers and spotted coats are indicative of fallow deer, however interestingly Morgan notes some inaccuracies in the details of the representation (e.g. position of antlers and coat coloration) and takes this to suggest the artists were 'confused' and that fallow deer were a relatively rare sight (1988:56). Again, no fallow deer remains were recovered from Akrotiri, only a very small amount of red deer bone, thought to have been imported (Trantalidou 2000).

Studies of hunting imagery in Mycenaean palatial iconography have highlighted its role as a representation of Mycenaean power dynamics, either real (e.g. Bloedow 1999)[34] or metaphorical (e.g. Hamilakis 2003). Marinatos (1990), for example, suggests that hunt imagery (lion-art specifically) was primarily a symbolic device associated with social power and dominance hierarchies. The location of hunt frescoes in Mycenaean palaces, often visually prominent in high status areas such as the megaron, supports such an interpretation (e.g. Morris 1990, Hamilakis 2003). Morris suggests that the Tiryns Boar Hunt fresco indicates that hunting was a highly organised palatial activity involving a

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[34] Blodeow (1999) suggests representations of lion hunts depict actual events

significant degree of display[35], and may have been a means of laying claim to and asserting authority over territory by competing centres in close geographical proximity 'jostling for power' (1990:150). Thomas (also based on lion art) defines the hunter as the most 'popular masculine power metaphor in all Late Helladic art' (1999:306) and Hamilakis (2003) too suggests Mycenaean hunting imagery represent strong ideological statements of Mycenaean male identity and authority (see also Wilson 2008). Related to this is the strong association between images of hunting and images of warfare in Mycenaean iconography; Immerwahr (1990) highlights the many representational motifs common to both themes (chariots, horses, weaponry, dress, boar's tusk helmets etc.) as does Morris (1990) who notes the overlap in practical skills required for both hunting and warfare. Thomas (1999) suggests that 'warrior' was also contained within the 'hunter' metaphor (as well as 'Chief' and, occasionally, 'Ritual-maker') and Hamilakis also suggests representations of hunting acted as a source of metaphors for 'otherness', enemies (real or perceived) and warfare (2003:244).

The fresco fragments from Pylos and Ayia Irini portray a link between hunting and feasting, both of which associate hunts scenes with those showing preparations for a feast (Wright 2004a, Marinatos & Morgan 2005, although see Pini 2008). The Pylos fresco fragments depict men with hunting dogs, carrying large tripod cooking pots presumed to be for cooking the meat from the hunt (Figure 5.2, Wright 2004a:158). The Ayia Irini fragments depict a helmeted hunter carrying a large, brown, crescent-shaped object hanging from a spear /pole, men standing over tripod cooking pot, possibly depicted with black burning marks indicative of cooking, to which another man brings a brown object, possibly venison (Abramovitz 1980, Wright 2004a). That deer may have been consumed at Pylos is suggested by presence of their remains in a burnt sacrifice deposit, predominantly of cattle bones. The meat filleted from these bones and the remainder of the carcass (only mandibles, femora, and humerii were part of the burnt sacrifice) is presumed to have been available for human consumption (Halstead & Isaakidou 2004).

Wilson (2008:23) suggests that the Pylos (and Tiryns) frescoes depict 'the exploits of high status men' and thus a subsequent feast for a specific group

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[35] The Tiryns Boar Hunt fresco depicts at least six chariots, dogs and dog-handlers, snaring of the prey with a net and final kill with spear

of men. Fox (2008) notes that the Linear B texts do not document deer in feasting supplies records as is the case for other species, implying that deer were not requisitioned for consumption but obtained through other methods such as donations from an elite or subsequent to hunting activities (see also Wright 2004:160). However, deer are recorded in the Pylos Linear B archive and as Palaima notes ‘the presence in the archives of two sets of tablets recording deer written by two different scribes indicates that deer were of considerable importance in the life of the Palace of Nestor’ (1992:72), and suggests that they ‘might have been selected as objects for ceremonial hunts from carefully monitored preserves’ (or captured as part of a land clearing operation, the records indicate that deer are being monitored at small-scale sites, Palaima 1992:73).

Venison may thus have been reserved for a restricted group of people of elite status, often assumed to be those who had participated in ‘the ritual of the hunt’ (Wright 2004a:160, Fox 2008, Wilson 2008). Wright states that at Mycenaean feasts, beef would have been roasted over an open flame whereas meat from the hunt would have been boiled; whilst this is an assumption that needs to be more widely investigated zooarchaeologically, he goes on to suggest that this boiled ‘game meat’ would have been distributed to a more exclusive audience and the ‘tripod would have been the appropriate vessel for such preparation’ (2004:160). Interestingly, he suggests this was a possible reason for prizing bronze tripods and making them larger than ceramic ones. On the basis of such, Wright goes on to propose that ‘one type of Mycenaean feast was restricted to elites who were members of hunter-warrior groups and who used bronze tripods and other equipment found in their tombs for the preparation and consumption of meats of the hunt’(2004:161).

Finally, the visually prominent location of hunt frescoes, such as those at Pylos, Tiryns and Orchomenos, in halls and megara of the palaces further reinforces the connection between hunting, feasting, status, and display (Bennet 2007). Morgan also suggests that the Ayia Irini (Kea) hunt fresco was located in a banqueting hall (2005). Furthermore, it is noted (Wright 2004, n. 116) that deer were a popular zoomorphic motif in Mycenaean pictorial vase painting, and the kraters on which they appear are likely to have played some role in Mycenaean feasting (e.g. Figure 5.7).

Figure 5.1 The Pylos Hunt Frieze, Plate 121, 16H43 (Lang 1969).

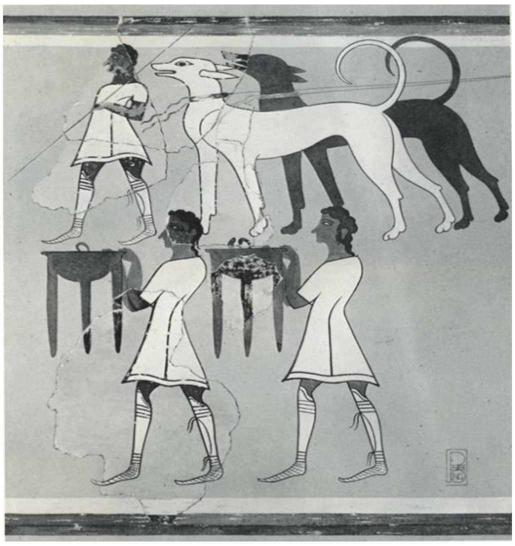

Figure 5.2 The Pylos Hunt Frieze, Plate 122, 21H48 (Lang 1969).

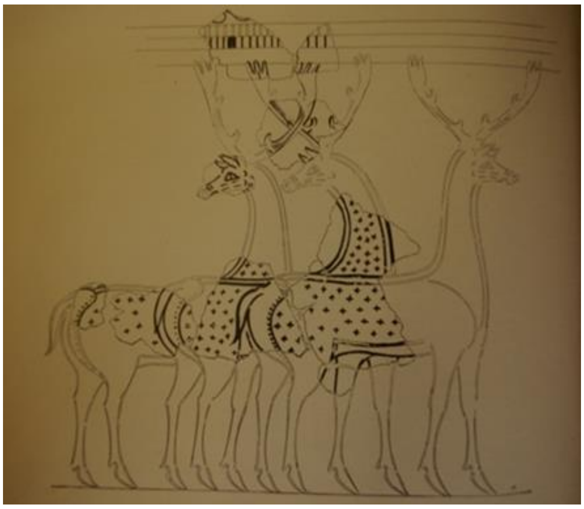

Figure 5.3 The Tiryns Deer Frieze (Rodenwaldt 1912:142 Abb.60).

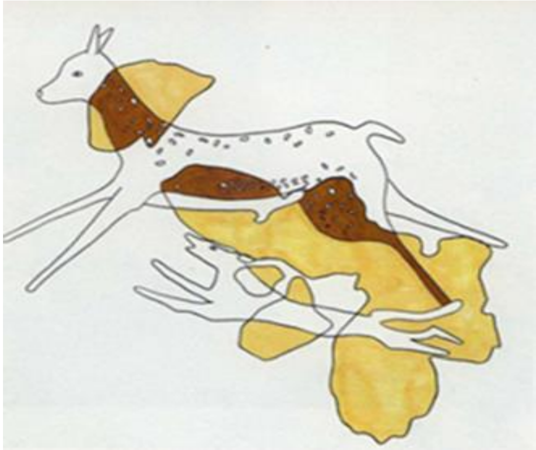

Figure 5.4 Dog and deer from the Miniatures of the Northeast Bastion, Ayia Irini, Kea (Marinatos, N. & Morgan, L. 2005. Pl 15.2) (LMIB).

Figure 5.5 The Landscape, Akrotiri, Thera (Abramovitz 1980, Doumas 1992:65).

Figure 5.6 The Departure Area, Ship Procession, Akrotiri, Thera (Abramovitz 1980, Doumas 1992:71) (LCI).

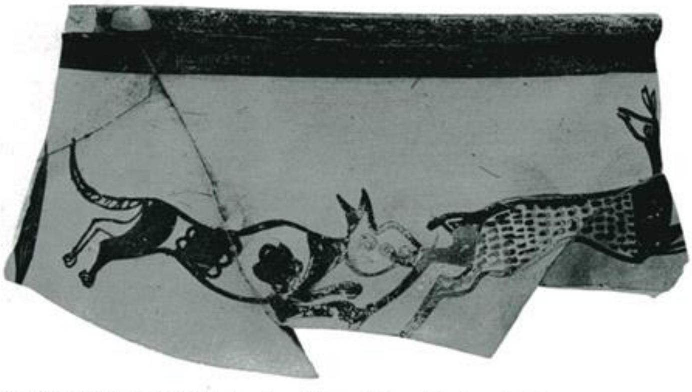

Plate 89. Fragment of LH IIIC krater from Tiryns with hound hunting deer.

Figure 5.7 Krater fragment depicting hound hunting deer (Immerwahr 1990:139).

5.3 Sealstones and Cretan hunting imagery

On Late Bronze Age sealstones animals are the most commonly represented motif (62% of over 4,500 representations;Younger 1988), depicted in a limited variety (54, more commonly 36) of conventional poses. Whilst images of deer do occur on sealstones (two were recovered from the necropolis of Chania), they are less commonly represented than other species, with lions, bulls and agrimia occurring most frequently (*ibid.*, 125 examples of deer compared to 1,014 of goat in the online database of the Corpus of Minoan and Mycenaean Seals, although no distinction is made between domestic and wild goats[36]). Most animal scenes, deer and agrimia included, consist of single animals, animal pairs or as or one animal attacking another (Younger 1988). However, both deer and agrimia are represented in 'hunt' scenes as attacked by dogs and/or spears.

Depictions of goats (the horn size suggests agrimia) being hunted is one of the most common themes of sealstone hunting imagery (Hiller 2001, Bloedow 2003, Eiring 2004), in which scenes show goats being pursued and/or attacked by dogs. Other scenes depict 'men' with collared dogs, and one such seal, showing a man restraining a large (hunting?) dog by the collar, was found in Chania (see Figure 5.8).

Frequently, in sealstone imagery a connection between hunting and animal sacrifice as a ritually connected sequence of events is postulated (Marinatos 1986, Rehak 1995a, Hiller 2001). Marinatos proposes that in Late Bronze Age Crete there is an equivalence between hunting and sacrifice, with many 'priests' portrayed as hunters and ritual hunting almost certainly practiced (1986:42). An example of a three-sided seal (Figure 5.9) depicts a 'running goat' (the very long horns of which suggest an agrimi), a man's head between a bow and arrow (whom Marinatos describes as a 'priest'), and a 'stylised bucranium' which supposedly indicates the sacrificial context (Marinatos 1986); a combination which Marinatos interprets as the 'priest' as sacrificer but also as hunter, pursuing the running goat (*ibid.*).[37] Brecoulaki *et al.* also suggest that in 'Minoan' art the bow could form part of 'a ritual or mythological vocabulary' (2008:376). Whilst such terms as 'priest' imply a 'religious' context which may or may not be appropriate for Late Bronze Age Crete, the performative elements of human-animal engagement through hunting and sacrifice may have been linked in some cases.

Although goats/agrimia (as well as bulls, pigs, and sheep) are most commonly portrayed in sacrifice contexts in sealstone art, that deer too were apparently considered sacrificial animals is the interpretation of a seal depicting a deer

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[36] http://arachne.uni-koeln.de/drupal/?q=en/node/196, accessed 24.06.2012.

[37] See Hiller 2001 for interpretation of goats/agrimia in 'religious' contexts, although see Bloedow 1990, 2003 for arguments against religious interpretations.

above a table/altar attacked by a griffin (Marinatos 1986, Recht 2011; Figure 5.10).

Of particular interest is the only example of deer in a fresco medium from Crete[38] discovered at Ayia Triada (Figure 5.11), dated to the Late Minoan IIIA1-2 period, and thought to have originally come from the inner room of the megaron (Palmer 2012). The fresco fragment depicts the lower part of an altar and female figure, walking to the left, and the legs and bodies of two spotted deer, on white, one light red, moving in the same direction. A third deer fragment depicts ‘the spotted rump of a chestnut deer moving left’ (Palmer 2012:372). The spotted coats again indicate fallow deer, and fallow deer bones have been recorded in Bronze Age contexts from Ayia Triada (Wilkens 1996). The image has been interpreted as women leading fallow deer to an altar (Militello 1998), and is described as a ‘rare example of this animal in a cultic context’ (Morgan 1988:55). As such, it could be considered that this is not the realistic representation of a practice but the idealised perception of a docile animal subjecting itself to sacrifice. However, the light-red deer appears to be wearing something that looks like a collar, suggesting perhaps some sort of ‘tamed’ status. Other scenes depict men and women carrying musical instruments and vessels in procession (as well as running men and a chariot, Palmer 2012). Therefore, could these animals be interpreted as processing along with humans, procession being a well-known theme in Cretan frescoes? Might the difference in colour of the hides of the two fallow deer and the presence of the collar denote the individuality of each animal (Harris & Hamilakis 2014)?

Also from Ayia Triada and dated to the Late Minoan III period, is a burial larnax (the ‘Ayia Triada Sarcophagus’) which, on one of the painted end panels, depicts female figures riding in a chariot drawn by agrimia. The panel on the opposing end similarly depicts female figures in a chariot drawn by griffins. The scenes on the sarcophagus are considered to be funerary and ritual in nature (Long 1974, Watrous 1991). Another clay burial larnax example from Crete (Figure 5.12), discovered in the Armenoi cemetery, Rethymon and dated to Late Minoan IIIA2, was decorated with hunting scenes painted onto one of

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[38] A possible early example (Late Minoan IA) depicting a fragmentary ungulate with a cat and a bird has been variously described as deer or ibex, but is not particularly clear (Morgan 1988:55).

the sides. The rather stylised depiction shows, on the left panel, a spear-carrying hunter with a dog chasing a deer, possibly towards a forest (represented by the arcade pattern, Watrous 1991), and on the right panel a wild goat and its young. Similar scenes in which figures hunt wild goats with spears and dogs also occur on a larnax discovered at Episkopi, Ierapetra, Crete (*ibid*. Figure 5.13).

Figure 5.8 Man and hunting dog, Chania (CMS-VS1A-174-1).

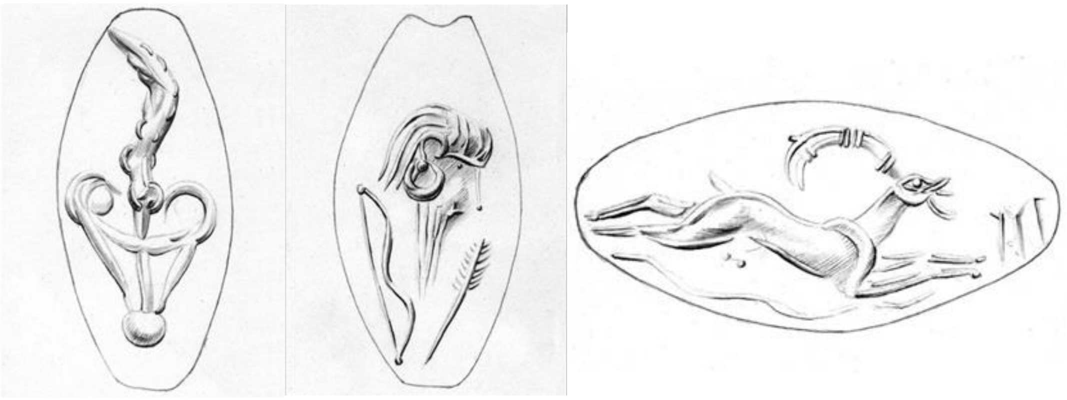

Figure 5.9 Three-sided seal: bucranium; 'priest', bow and arrow; running agrimi (CMS-VIII-110).

Figure 5.10 Deer with Griffin and altar (CMS IX D020). Stylistic dating: LB IIIA1-LB IIIA.

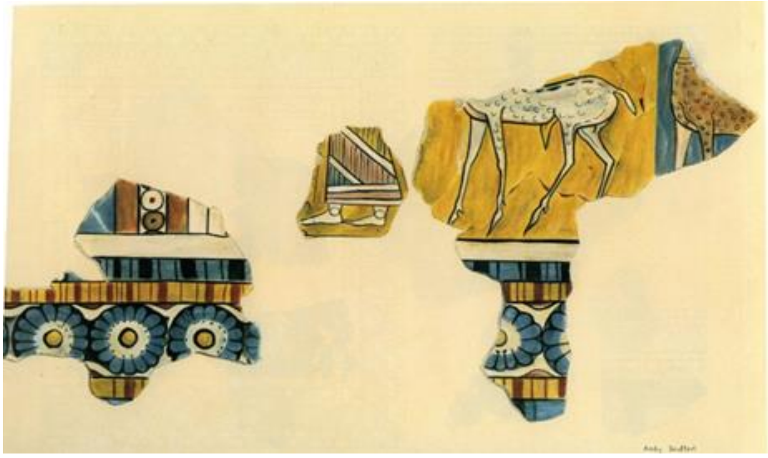

Figure 5.11 'Women leading deer to altar', Ayia Triada (Militello 1998, Tav. I) Late Minoan IIIA.

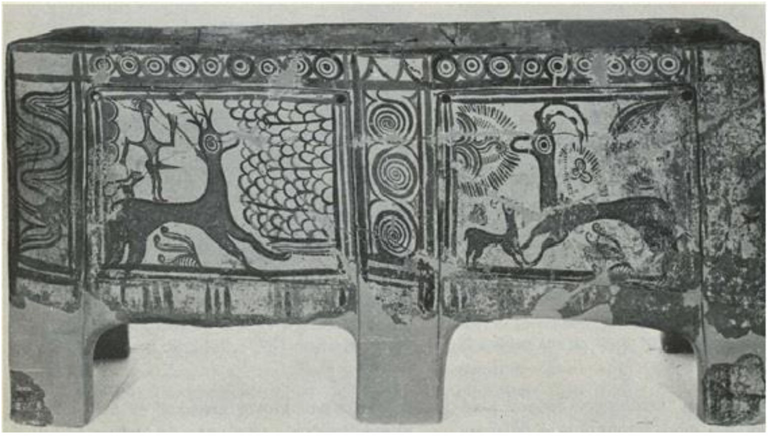

Figure 5.12 The Armenoi larnax (Tzedakis 1971:218) Late Minoan IIIA2.

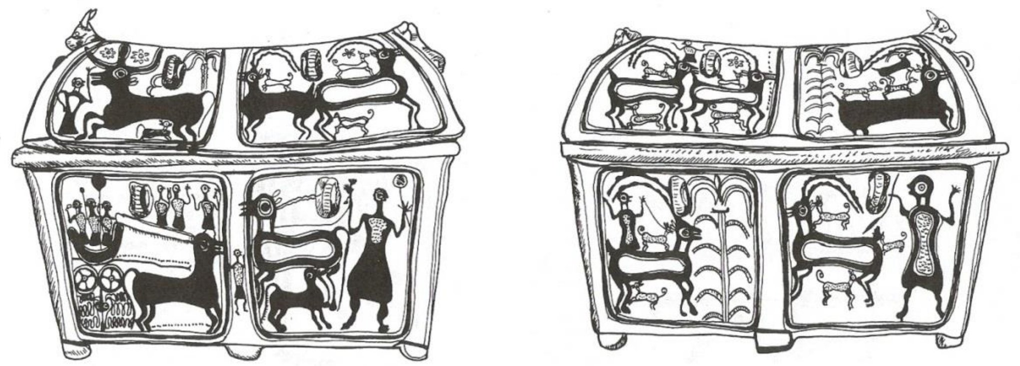

Figure 5.13 The Episkopi larnax (after Marinatos 1993:236-7) Late Minoan IIIB.

5.4 Hunting as a transgression of boundaries in the Aegean Bronze Age

Having reviewed the iconographic depictions of hunting in the Late Bronze Age Aegean it is now possible to pick up on some of the themes relating to hunting that were developed in Chapter 3. The following discussion will highlight specific aspects of the Aegean hunting iconography in relation to interpretations of hunting as a transgression of boundaries: geographical, metaphorical, and perhaps even corporeal.

In Chapter 3, studies were referred to (Helms 1988, Marvin 2000, Hamilakis 2003) that identified hunting as a means of demonstrating participation in remote realms either geographically or symbolically. Hamilakis (2003, see also Morris 1990) specifically addresses this aspect of hunting as an ideological resource for Mycenaean elites. In the following discussion particular elements of Aegean Late Bronze hunting iconography will be drawn upon in order to explore this theme in this context.

Firstly, however, perhaps a stance should be adopted in relation to the discussion in Chapter 1 in which I suggested the disbanding of the homogenous category 'wild species' in zooarchaeological discourse, in order to consider the different affordances of individual species-to-species relationships. A similar argument might be made for hunting iconography; rather than discussing the practice of ‘hunting’ as a generic category, the different species represented in hunt imagery should be considered as signifying and referring to (and based upon) species-specific contexts of experience (and the varying qualities required, e.g. bravery, skill, knowledge of distant realms etc.).

This is indicated in the contrasting characteristics of single-species studies of Aegean hunting iconography, namely Mycenaean and Minoan lion-art (most commonly, e.g. Marinatos 1990, Bloedow 1999, Thomas 1999, Shapland 2010), and the Mycenaean boar hunt (Morris 1990).[39] For example, Morris notes that the boar does not appear in the ‘symbolic cycles’ of hunting and sacrifice as discussed by Marinatos (1986), and that in Mycenaean imagery the boar is shown in only two ways, either as an isolated image or in a hunt scene. In the latter, Morris (1990:152) notes how ‘limited yet how sharply defined’ the image of the boar is and the consistent details of the hunting method (hounds with dog-handlers, snaring with a net, final kill with spear at close quarters) suggests an authenticity of encounter (contrast with often stylised lion-art encounters). It is proposed that boar hunt imagery, as well as other referents such as the boar’s tusk helmet, demonstrate qualities of bravery and hunting skill.[40] Contrast this with the complex imagery of lion art, which is often interpreted as symbolic or metaphorical representations of power relations and social hierarchies (see 5.2 above), albeit given meaning through the original encounter with the real lion (Shapland 2009). This is perhaps further demonstrated in the much greater frequency of boar bones compared to the very rare lion bones encountered in zooarchaeological assemblages. What then is the position of deer and agrimia in iconographic representations?

As noted, the majority of depictions of deer in the iconographic repertoire seem to portray the fallow deer species (e.g. frescoes at Ayia Irini, Akrotiri, Pylos, Tiryns, Ayia Triada), yet the zooarchaeological remains of fallow deer in these contexts are often absent or scarce and are often fewer than those of red deer (Yannouli & Trantalidou 1999). It has been proposed that fallow deer may have been imported and maintained and ‘hunted’ in hunting parks, akin to

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[39] The Cretan iconography of hunting has yet to be explored in detail.

[40] It is the skilfulness of the hunter that Hamilakis (2003) proposes would have been the power-generating value for Mycenaean warrior elites, not the simply the practice of hunting.

those of medieval northern Europe (e.g. Jarman 1996, Hamilakis 2003, Isaakidou 2004). It is possible then that fallow deer in this context may represent an exotic species evoking links to, participation in, and knowledge of distant geographical realms, such as the Near East – the post-Pleistocene native habitat of fallow deer (Sykes, *et al.* 2013). Yet the, albeit minimal, zooarchaeological evidence for possible fallow deer herds does indicate the importance of actual encounter with the live animal, as well as their representation in visual media.

The gold finger ring (Figure 5.14) recovered from a shaft grave at Mycenae depicting hunters shooting at a fallow deer (indicated by the spotted coat and palmated antler) from a chariot with bow and arrow, suggests that this type of human-fallow deer engagement may have been restricted to a (human) 'elite' group, albeit across the wider eastern Mediterranean region (the use of the chariot as a shooting platform and the bow and arrow are thought to represent borrowed imagery from the Near East, Crouwel 1981, Brecoulaki*, et al.* 2008).

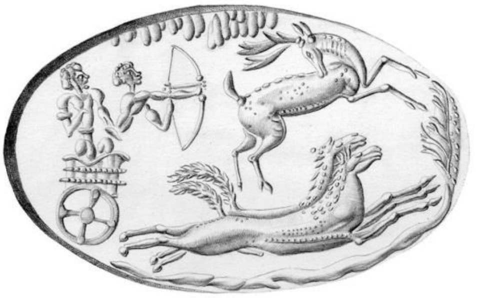

Figure 5.14 Gold Finger Ring from Shaft Grave IV, Mycenae (CMS-I-015-1), Late Helladic I.

Furthermore, in a number of deer-hunting depictions the representation of the hunting landscape also suggests a certain amount of geographical or metaphorical distance from the everyday. In discussion of the hunt scene in the Ayia Irini fresco a lack of landscape detail is noted, and it is proposed that the scene is thought of as 'taking place beyond the vision of the eye', beyond the settlement (Marinatos & Morgan 2005:120). In the Theran frescoes the deer are not hunted by humans but show a deer chased by a griffin, and three stags chased along the tops of hills by a lion (Figure 5.5, Figure 5.6 respectively), and as noted above (5.2) Morgan proposes a certain amount of unfamiliarity with fallow deer in this context (1988). Lang notes of the Tiryns frescoes that, whilst boar, horses and dogs appear in a 'human context' (as 'victim' or 'helper'), the Deer Frieze is exceptional in that it 'takes creatures out of their natural habitats' (Lang 1969:27). Furthermore, in both the Tiryns deer frieze and the Ayia Triada deer fresco the deer are brightly coloured with 'little attempt at naturalism' (Lang 1969:96). Watrous suggests of the hunt scene on the Armenoi larnax (Figure 5.12) that the presence of an argonaut (marine mollusc with spiral shell) at the bottom of the composition indicates that the event is taking place beyond the water 'that is, in the Afterworld' (1991:299), and interprets the scene as the deceased hunting in the Afterworld. However he also notes that the running spirals and wavy lines on the panel frames and antithetical birds on the side panel also imply an overseas setting for the scenes (*ibid.*).[41]

In the case of agrimia in Minoan art, these animals too evoke a certain distance from the everyday, often depicted in the rocky or high mountain terrain that they inhabit (e.g. on the Zakros Rhyton). Note also that goats are one of the species listed on the Linear B tablets dealing with the distant areas of Crete (Chadwick 1973b:130). On the depiction of agrimia and female deities in Minoan art Shapland proposes that, instead of the association with the deity explaining the presence of the goats, rather 'the animal body [agrimi] acts as a marker of difference from the familiar domestic world: in association with a human body it creates a context in which one can interpret the females as deities' (Shapland 2009: 122) 'it is the goats and landscape which define the women' (*ibid.*).

One last aspect will be considered in relation to the studies of Marvin (2000) and Willerslev (2004) that were discussed previously in Chapter 2. Both authors consider, through hunting, the potential blurring of human - animal boundaries. Marvin suggests (fox)hunting is a performance in which the boundaries of human and animal are transcended as both are mutually created as performers. Willerslev, discussing Yukaghir hunting practice, suggests that through the use of mimetic empathy the hunter is acting between identities which allows a 'new potential for action, free...from the bodily limits of both

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[41] Watrous notes similar scenes in Egyptian tomb paintings (1991).

his own species and those of the species imitated' (Willerslev 2004:638), the hunter is both hunter and animal.

There is a dimension of Aegean hunting iconography that might be mentioned in light of such interpretative schemes: the 'Minoan Genius', also described as a 'Demon'.[42] This figure is described as having leonine characteristics with a prominent snout, sharp claws and a spiked shell on its back (Marinatos 1993:197). Chryssoulaki suggests it has human behaviour as regards its posture and movement, and that certain aspects of its physique (e.g. delicate limbs, narrow waist, graceful arm movement) can be 'associated with the [Minoan] ideal figure of a male young man' (Chryssoulaki 1999:115). The main activities with which the genius is associated are the hunting and sacrifice of animals (Figure 5.15, as well as the pouring of libations, Marinatos 1993, Rehak 1995).[43] As a hunter / sacrificer, genii are depicted as 'wild hunters' (Marinatos 1993:200) stabbing bulls (predominantly) or deer; of the latter Rehak notes that the 'antlered stags' represented are similar to those on hunting scenes (1995:219). Occasionally, goats too are depicted (Figure 5.16). Rehak describes how the genius appears as hunter, 'in imitation of a human activity' (and as a preliminary stage to sacrifice, 1995:221). In other scenes the genius carries the dead animal which is interpreted as the victim of hunting and/or destined for sacrifice (Figure 5.17); again humans, as well as genii, carry animal 'victims' (Rehak 1995:219, and themselves can be carried by genii).

It is not the intention to transpose Marvin and Willerslev's observations onto an Aegean Bronze Age context (mimetic empathy is not appropriate here, in that the animal characteristics of the genius are not those of the animals it hunts). The key point, however, is to note how here, too, hunting (as well as other activities such as sacrificial ritual) is also considered an appropriate context in which the conventional corporeal boundaries of human and animal may be transcended and merged, in this case in the image of the genius. The genius is made up of animal physical features, yet retains a human-like form (e.g. stands upright, limbs and waist similar to Minoan male depictions) and participates in 'human' activities such as hunting and the carrying of the hunted/sacrificial

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[42] First on Crete in the Middle Minoan period (Weingarten 1991), subsequently on the mainland from Late Helladic II-Late Helladic III (Rehak 1995a). Also visible in Near Eastern iconography (Shelmerdine 2008:417).

[43] A similar role as Marinatos' interpretation of the 'priest', see 5.3 above.

animals, activities which humans are also portrayed as doing. Younger even suggests the possibility that 'people-monsters depicted often on seals are really people with animal-masks' (Younger 1995:521). In the broad range of Aegean Bronze Age iconography the image of hunter can encompass hunter, warrior, sacrificer, 'priest', genius.

Figure 5.15 Genius stabbing a deer (CMS-III-369-1). Stylistically dated to Late Minoan II- Late Minoan IIIA1.

Figure 5.16 Genius and goat (agrimi) (CMS-VS1A-122-1). Stylistically dated to Late Minoan IIIA. Found at Ayia Aikaterini, Chania.

Figure 5.17 Genius carrying dead deer (CMS-VI-307-1). Stylistically dated to LB II-LB IIIA1.

5.5 Conclusion

Through the data presented in this chapter a number of key points are raised. Firstly, that in the wall-paintings of the mainland ‘Mycenaean’ high status sites, deer are depicted in hunt contexts (although not perhaps as commonly as is assumed), but also occur in other scenes; for example, at Pylos where, on the walls of at least four other rooms, they are also associated with women, plants and ‘altars’, and at Tiryns where they are depicted in scenes of ‘natural’ herd behaviour.[44] Secondly, when hunt scenes are portrayed, including deer hunts, they often also show preparations for a subsequent feast. Thirdly, the display of hunt/feast scenes and other deer scenes in visually prominent areas of high-status sites, indicates the socio-political significance attributed to this type of human-animal encounter - or the demonstration of it at least - by Late Bronze Age ruling ‘elites’.

In the sealstone imagery, it is interesting to note that animals are the most commonly represented motif, signifying their importance. Both deer and, more commonly, agrimia are represented, and both are frequently depicted in hunt scenes as attacked by spears and/or dogs.[45] The dominant narratives on

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[44] At Akrotiri (Thera), the deer are pursued by lions and griffin rather than humans.

[45] As well as in ‘natural’ postures.

hunting in ‘Minoan’ Crete, however, often link it to ritual sacrifice, and the possibility, that, in some contexts, hunting may have been a ritualised and performative practice resulting in animal sacrifice, is an interesting and worthy line of enquiry. It is of interest, in this respect, that some deer and agrimia representations are interpreted as being ‘hunted’ by, or as the hunted/sacrificial ‘victim’ of, the ‘Genius/Demon’, a figure that combines both human and animal characteristics. Whilst interpretation of this figure is not attempted here, it is of interest to note that hunting (and/or sacrificial ritual) is considered an appropriate context in which to display a transcendence or merging of conventional human/animal corporeal boundaries.

One final point to be emphasised, is the perhaps symbolic representations of ‘distance’ and ‘familiarity’ in (fallow) deer and agrimia imagery. It was discussed above (5.4) that, in certain depictions incorporating fallow deer on the ‘Mycenaean’ southern Greek mainland and the Cycladic islands, a number of representational devices (e.g. use of colour, symbols, absence of detail etc.) appear to have been employed in order to convey an element of physical or metaphorical ‘distance’ from the ‘everyday’ and/ or human context. Whilst this may be linked to perceptions of hunting as a venture to other realms, it might also indicate a human perception of and relationship with fallow deer. For example, it is likely that in this region at this time, fallow deer may have been a relatively rare or exotic animal, perhaps only present in maintained herds at limited number of ‘elite’ sites (such as Tiryns, for example, where a few fallow deer remains have been recovered). Depictions of fallow deer on a wider scale then may have been a means of demonstrating links with regions such as the Near East (where fallow deer would have been a native species), and perhaps part of a shared ‘elite’ symbolism on a broader scale.

Conversely, depiction of fallow deer in a fresco medium from Ayia Triada on Crete, suggests a different mode of interaction; one of close human-animal physical proximity, familiarity, individuality of particular animals, perhaps even some level of partnership as co-processors. Whilst it could be argued that this image perhaps portrays an idealised representation of, rather than actual, events, it is perhaps no coincidence that the history of fallow deer origins and their long-term establishment on Crete (which would have necessitated a certain level of interaction and care), follows a different trajectory to the establishment of fallow deer on the southern Greek mainland. The introduction of fallow deer on Crete would have necessitated humans and deer travelling together on the same boats, possibly directly from the Near East, and was potentially a practice that started during the Neolithic period. On the southern Greek mainland, fallow deer may have come from the Near East via the Balkan region to the north where fallow deer remains are often present in prehistoric contexts (this is discussed in more detail in the following Chapter).

That said, however, what is of importance to this study is that representation of these animals, and representation of interaction with these animals, was seen as the means of conveying particular socio-political statements; the power of these messages would, however, have derived from actual encounter with these animals at some point, and speaks of the considerable significance of animals and human-animal interaction in the past. The zooarchaeological evidence for actual physical encounter with these animals will be discussed in the following chapters.

Chapter 6: Animals in prehistoric Crete

6.1 Introduction

The importance of hunting, animal sacrifice, and feasting in Late Bronze Age Aegean iconography and the social significance of such practices were discussed in previous chapters (2, 3, and 5). However, zooarchaeological analysis in Crete is, more often than not, interpreted within frameworks of subsistence and focussed on (modern perceptions of) the economic importance of the various domestic species, often adopting Payne's (1973) proposed management models for intensive specialised production (e.g. Jarman 1972a, Reese 1995, Wilkens 1996, Helmer & Vila 1997, Isaakidou 2004; there are some exceptions, e.g. Hamilakis & Harris 2011, Mylona 2012). In general, the role of animals beyond an economic capacity is little discussed, although the symbolic value of deer and agrimia are occasionally mentioned (Jarman 1996, Isaakidou 2004, 2007). It is not the intention here, however, to juxtapose the 'social' and the 'economic' as separate domains. Rather, to highlight the potential of a more context-specific zooarchaeology in understanding the role of animals and animals remains in the social relationships that would have existed as well as (or as part of) economic ones (see also Shapland 2009, 2010, 2013).

In this chapter, firstly the historical context of Cretan zooarchaeological analysis is briefly discussed (6.2). This is followed by an outline of some characteristics of human - animal relations in prehistoric Crete based on the available zooarchaeological data (6.3). Finally, the zooarchaeological evidence from elsewhere in Crete for hunting, feasting, deposition and the use animal remains as tools or objects is presented (6.4). Discussion will focus on assemblages dated to the Late Bronze Age, but Neolithic and Iron Age data will also be referred to in some cases.

6.2 History of research: faunal analysis in Crete

A survey of faunal analysis in Crete to date indicates that significant variation occurs in both the type of zooarchaeological analysis undertaken and the relative importance attached to the recovery of bioarchaeological remains in excavation strategies.[46]

The number of published comprehensive zooarchaeological reports are very few (Klippel & Snyder 1991, Snyder & Klippel 1999, Ruscillo 2012). Reports that have been published often prove lacking in relevant methodological and zooarchaeological detail (e.g. Bedwin 1984, Reese 1995), are of a preliminary nature (e.g. Jarman & Jarman 1968, Walker 1996, Wilkens 1996, 2003), or produced by specialists of a non-archaeological background such as zoologists and palaeontologists (Nobis 1988, 1990, 1993, Persson 1993, Tsoukala 1996, Persson & Persson 2000). On the other hand, detailed analysis by highly qualified zooarchaeologists has been undertaken but was not or has yet to be published (e.g. Mylona in Tzedakis & Martlew 1999, Isaakidou 2004). It is of note that the one synthesis of studies of Cretan faunal remains (Reese 1996) covers both Pleistocene and Holocene fauna, of which zooarchaeological reports on the latter comprise only five of the total 29 chapters (of which three are preliminary reports Tsoukala 1996, Walker 1996, Wilkens 1996).[47]

The second issue relates to the collection of bioarchaeological remains. Prior to the development of New Archaeology, in Crete as elsewhere, zooarchaeological remains were not often collected in excavations as a matter of course and the systematic collection of bioarchaeological remains has only started relatively recently.[48] In general, the size of the zooarchaeological assemblage is affected by the nature of the site; e.g. multi-period, large-scale settlements producing large assemblages are relatively rare on Crete (with the exception of Knossos and Kommos, see below). Reduced further by the limited collection methods, most of the zooarchaeological assemblages published to date consist of very small sample sizes, usually only a few hundred fragments or less. The largest assemblages come from the long-term, large-scale excavations at Knossos and Kommos.

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[46] For discussion of zooarchaeological analysis in Greece more generally see Payne 1985, Reese 1994, Trantalidou 2001.

[47] This volume arose from a seminar initially concerned only with the non-anthropogenic Pleistocene faunal remains of Crete, and archaeological themes were added only for the publication.

[48] Mostly in the last 20-25 years; see Isaakidou (2004) for a more detailed history of the development of Cretan zooarchaeology.

The faunal material from Knossos provides the largest and most temporally continuous assemblage in Crete (Jarman 1996, Isaakidou 2004, although still not fully published). The material was recovered during the 1957-1960 excavation seasons directed by J.D Evans under the auspices of the British School at Athens and a preliminary report was published in 1968 (Jarman & Jarman 1968). At this time, British archaeological research was developing within the 'Processual' or 'New Archaeology' paradigm and research agendas, especially within zooarchaeology, were focused on reconstructing subsistence strategies and palaeoeconomic models (as discussed in Chapter 2).

In general, the majority of zooarchaeological analysis undertaken in Crete has continued this trend of interpreting faunal remains within parameters of subsistence and the formulation of economic models for the past. However, some recent zooarchaeological studies have focussed more on the socio-political dimensions of consumption practices (e.g. Isaakidou 2007, Mylona 2010, Hamilakis & Harris 2011, Mylona 2012).

Research agendas based on analysis of material cultural remains, particularly pottery[49], have dominated archaeological discourse in Crete. Whilst this research has vastly contributed to the creation of fine resolution dating sequences, the important role of animals in the past as understood from their material remains (and of bioarchaeology in general) has consequently been neglected. Animals, however, have been discussed from iconographic perspectives (e.g. Porter 1996, Vanschoonwinkel 1996) and also in discussions of early colonisation of Crete (see below).

6.3 Animals on Crete

6.3.1 Early fauna

At the time of first permanent settlement on Crete, none of the indigenous large Pleistocene mammals[50] were left. Some authors propose that Pleistocene species survived into the early Holocene and their subsequent extinction at this

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[49] Usually as a means for creating dating typologies.

[50] Dwarf hippopotamus, elephant, deer, as well as various species of microfauna (Masseti 2003a).

time could have been caused directly by human predation (Broodbank & Strasser 1991, Lax & Strasser 1992, Rackham & Moody 1996), or indirectly as the result of habitat destruction (Lax & Strasser 1992). However, there are no Pleistocene zoological remains with convincing evidence for human involvement (Hamilakis 1996a, Mavridis 2003), and a distinct lack of cultural remains in pre-Neolithic levels containing Pleistocene deer (Strasser & Broodbank 1991). Although recent evidence does indicate a human presence on the island prior to the settlement in the Neolithic[51], as yet there is still no direct association of human cultural remains with Pleistocene fauna. Evidence for a contemporaneous existence of Pleistocene fauna and human occupation of Crete, as yet, remains inconclusive (Mavridis 2003).

The apparent hiatus in the faunal sequence is also illustrated by the lack of species such as sheep, goat, cattle and pigs prior to the first evidence for human occupation on the island. Given the distances it is unlikely that these animals would have swum to the island, therefore deliberate human introduction of these species seems the most plausible explanation (Broodbank & Strasser 1991).

6.3.2 Introductions

It is generally accepted that sheep, goats, cattle, pigs and dogs, were introduced onto Crete as domesticated animals in the Aceramic Neolithic (Jarman 1996), whereas the introduction of the various wild species is less clear. However, as will be indicated in the discussion below, it is becoming more evident that uncritical application of the terms ‘domestic’ and ‘wild’ as homogenous and stable categories is masking the variety of animal status within both the traditionally defined domestic and wild categories. For example, feral groups of some of the ‘domestic’ species have been identified (Isaakidou 2004), and the larger ‘wild’ species must also have travelled with humans to the island.

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[51] A recent survey along the southwest coast of Crete identified twenty-eight preceramic lithic sites located close to caves and rockshelters with evidence for Mesolithic and Lower Palaeolithic artefact types (Strasser, *et al.* 2010).

6.3.3 Fallow deer (*Dama dama*), red deer (*Cervus elaphus*), and roe deer (*Capreolus capreolus*)

Deer on Crete are mainly represented by two species, red deer and fallow deer. Roe deer has also been recorded at the site of Eleftherna by Nobis (1993), and possible examples have also been recorded in the Sentoni cave assemblage (Hamilakis 1998b), and at Kommos (Ruscillo 2012), however the presence of roe deer in Crete is not widely reported (see also Jarman 1996).

As noted above, although there is evidence of Pleistocene cervids from palaeontological sites (de Vos 1996), there is no link between these species and those of the Holocene. Therefore, the deer from archaeological deposits, at least the earliest ones, must represent animals from a population that was originally imported. In general, fallow deer occur more frequently than red deer, and are present on a greater number of sites (see Table 6.1)[52] .

The earliest identification of deer is a fallow deer bone from the Aceramic levels at Knossos (Isaakidou 2004). As this element is from one of the main meat bearing areas of the body it suggests the presence of an animal rather than just the skin. A second fallow bone comes from the Late Neolithic deposits at Knossos and it is possible that these examples may represent an early introduction but unsuccessful establishment of fallow deer at this time (Isaakidou 2004:297). A similar suggestion of limited introduction is made for the few fragments of red deer, also from Late Neolithic deposits at Knossos (Jarman 1996, Isaakidou 2004). Vigne (1999), however, is not convinced of the early introduction of living deer onto Crete but rather proposes the acquisition of hides or head trophies from the Greek mainland; Isaakidou (2004) also suggests that importation of portions of dressed carcasses may account for the remains.

In general, during the Neolithic deer remains on Crete are few. Whilst red deer would have existed in the wild on mainland Greece at this time, fallow deer were being introduced, probably from Anatolia, onto other islands in the Aegean (Yannouli & Trantalidou 1999). For example, fallow deer are present in significant quantities in Neolithic deposits at the site of Kalythies, Rhodes

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[52] Based on published data in which actual numbers of remains are given (excludes the data from sites analysed as part of this study and sites for which the data is as yet unpublished).

(Halstead & Jones 1987), and on Cyprus fallow deer remains are numerous enough on Neolithic sites to the extent that they are thought to have been 'a major economic resource' (Jarman 1996:219)[53] . However, there is no evidence for fallow deer remains from sites on the southern Greek mainland at this time (a specimen from Francthi is doubted), although they are more frequent on Neolithic sites in the northeast of Greece (Yannouli & Trantalidou 1999). An interesting question for future investigation is whether fallow deer were being brought into Crete from the north via the Greek mainland or, as is perhaps more likely, from Anatolia to the east.

During the Bronze Age, however, deer remains on Crete become more numerous and it is likely that there are established populations by this time; the finding of a range of elements from all parts of the body in this period supports this. Although a single fragment of fallow deer was recovered from the Middle Minoan deposits at Ayia Triada, the Neopalatial (Late Minoan IB) period contains the most frequent zooarchaeological evidence for deer, with remains coming from Knossos, Ayia Triada, Mochlos, Chalinomouri Farmhouse, Chania (Papadopoulos plot), and Kommos. Kommos and Ayia Triada also produced fallow deer remains from the Final palatial deposits (Late Minoan II, Late Minoan IIIA). At the Minoan Unexplored Mansion (Knossos) the Final palatial deposits contained 22 fragments of red deer; and a fragment of unspecified deer was recovered from the Final palatial deposits at Kommos. From the Postpalatial (Late Minoan III) period, 6 fragments of red deer antler were recovered from Karphi[54]; and deer remains were recorded as a significant part of the assemblage at Chamalevri (Mylona 1999a), Thronos/Kephala (D'Agata 1997-2000) and in the initial report from Ayia Aikaterini (Hallager & Hallager 2000, 2003).

On the southern Greek mainland in the Bronze Age, fallow, red and roe deer are also present at Tiryns (although combined constitute only 1.3% of the assemblage, Yannouli & Trantalidou 1999). A possible fallow deer fragment was found at Asine (Nilsson 1996) and a few other fallow remains have possibly been found at other sites in central Greece. This apparent paucity of deer remains in zooarchaeological assemblages on the southern Greek

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[53] Cypriot fallow deer are *Dama mesopotamica*, rather than *Dama dama* as on Crete.

[54] Only faunal remains of exceptional interest (antler, tusks, horns etc.) were recorded, so whether any post-cranial material was present and the percentage of the assemblage deer comprised is unknown.

mainland is of interest in light of the importance of the depiction of deer in Mycenaean elite sites at this time (Immerwahr 1990, Masseti 2003b, as discussed in the previous chapter, see also 6.4.1 Hunting, below).

During the Iron Age, deer remains as a general percentage seems to decrease again; fragments of fallow deer were recovered from Kastro, the Iron Age temple at Prinias, and Kommos. At Thronos/Kephala too, a marked decrease in wild animal remains occurs from the Late Minoan IIIC to the Protogeometric (D. Mylona in D'Agata 1997-2000). Fallow deer remains, of unknown date, have also been suggested at the sites of Eleutherna (Nobis 1993) and the Dictaen Cave (Boyd-Dawkins 1902), and red deer from Trapeza Cave (Pendlebury, *et al.* 1935-1936) and Tylissos (Jarman 1996).

Period	**Site**	**Phase**	**Total**	**Fallow**		**Red**		**Deer sp.**		**Based on data from:**
			#	**#**	**%**	**#**	**%**	**#**	**%**	
Neolithic c.7000-3000 B.C	Knossos	Neolithic	14882	2	0.02	2	0.02			Isaakidou 2004
Bronze Age c.3000 - 1100 B.C.	Knossos	MMIII-LMIII	3481	19	0.5					Isaakidou 2004
	Monastiraki	MM	1539					18	1.2	Mylona 2012
	Ayia Triada	MM	218	1	0.4					Wilkens 1996
	Ayia Triada	MM III / LM IA	203	2	0.9	1	0.5			Wilkens 1996
	Kommos	MMIII-LMI	452					4	0.9	Reese 1995
	Kommos House X	LMIA	112	1	0.9					Ruscillo 2012
	Kommos House X	LMIB	136	2	1.5					Ruscillo 2012
	Mochlos Chalinomouri farmhouse	LM IB	670					12	1.8	Reese 2004
	Chania, Papodopoulou	LM IB	68	5	7.3					Mylona n.d
	Kommos	LMI-LMII	240					2	0.8	Reese 1995
	Kommos House X	LMII	262	12	4.5					Ruscillo 2012
	Knossos (Minoan Unexplored	LM II	2760			22	0.8			Bedwin 1984
	Kommos	LMIII	729					1	0.1	Reese 1995
	Kommos House X	LMIIIA	289	5	1.7					Ruscillo 2012
	Ayia Triada	LM (IIIA)	312	7	2.2					Wilkens 1996
	Karphi	LM III C	?			6				Pendlebury 1937-1938
Iron Age c.1100-700 B.C.	Kastro	LM IIIC- LG	15,909	10	0.1					Snyder & Klippel 1999
	Prinias	IA Temple	449	11	2.4					Wilkens 2003
	Kommos	IA Temple	27300					3	0.01	Reese et. al 2000
	Knossos (sanctuary of Demeter)	Geometric	24	1						Jarman 1973
remains present (Bronze & Iron Age)	Mallia	MM-LM		p						Helmer & Vila 1997
	Tylissos	MM, LMI, LMII				p				Jarman 1996
	Chamalevri	LMIIIC		p		p				Mylona 1999
	Karphi	LMIIIC-SM		p						Mylona in Wallace 2012
	Thronos/Kephala	LM IIIC		p		p		p		Mylona in D'Agata 1997-2000
	Thronos/Kephala	SM		p		p		p		Mylona in D'Agata 1997-2000
	Thronos/Kephala	PG						p		Mylona in D'Agata 1997-2000
	Eleutherna	LM- Early Byz.		p						Nobis 1993
	Dictean Cave	Myc.-Early Greek		p						Boyd-Dawkins 1902
	Trapeza Cave					p?				Pendlebury 1935-1936

(MM=Middle Minoan, LM=Late Minoan, IA=Iron Age, SM=Sub-Minoan, PG =Protogeometric, p=remains present)

Table 6.1 Data for deer from sites across Crete, based on published data.

6.3.4 Agrimia (*Capra aegagrus cretica*)

The agrimi is a type of goat particular to Crete which bears a physical resemblance to its Near Eastern wild progenitors the Asiatic bezoar goat and was originally thought, based on the physical resemblance, to be a subspecies of such (see Bar-Gal*, et al.* 2002). Subsequent, and most commonly accepted, interpretations based on biogeographical (Schule 1993, Rackham & Moody 1996, Vigne 1999, Masseti 2003a) and genetic data (Ciani*, et al.* 1999, Manceau*, et al.* 1999, Bar-Gal*, et al.* 2002) proposed that the agrimi was in fact a feral subspecies derived from domestic goat herds introduced onto Crete in the Neolithic, albeit from primitive domesticates hence its physical resemblance to the wild bezoar type goat. However, whilst it is accepted that the agrimi was introduced onto Crete by humans, its status as wild, feral, or domestic at the time of its introduction is far from clear. The genetic data is less than conclusive[55] and a more recent study (Horwitz & Bar-Gal 2006) proposes that the same genetic data may in fact support an alternative hypothesis. In this recent interpretation it is proposed that agrimia were in fact introduced onto the island as wild animals and subsequent interbreeding with domestic animals affected the genetic profile. This latter interpretation is influenced by recent archaeological evidence for pre-Neolithic visits to and /or occupation of islands in the eastern Mediterranean (e.g. Youra) and the presence of introduced fauna in these levels. Consequently, they suggest that 'free living' goat populations may have been established by the releasing of wild animals onto the islands and thus represent not feral animals but relics of wild taxa. Further research taking into account the archaeological, zooarchaeological, and biogeographical peculiarities relating specifically to Crete, and further genetic analyses based on specifically zooarchaeological questions and materials are needed.

The earliest evidence for agrimia remains so far are from the Late Neolithic levels at Phaistos (Wilkens 1996, 2003). No agrimia remains have been identified in the preceding Neolithic levels at Knossos or from pre-Neolithic palaeontological sites on Crete (Ciani*, et al.* 1999). Therefore, whilst it has been proposed that these animals may have been introduced on and/or for pre-Neolithic hunting expeditions (Horwitz & Bar-Gal 2006; see also Rackham &

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[55] For these contrasting interpretations compare Bar-Gal*, et al.* 2002, Horwitz & Bar-Gal 2006, for example.

Moody 1996), in early settlement on Crete they remain absent from the assemblages until the Late Neolithic (although it should be noted that inter-observer variation may play a part in this). The importation of wild goats in the Late Neolithic could be considered, however, and a greater concern with hunting in the Late Neolithic has been identified elsewhere in Greece and Europe (e.g. Zvelebil 1992, Halstead 1999, Hamilakis 2003).

An agrimi horncore with cutmarks at the base was noted in the Middle Minoan levels at Smari (Tsoukala 1996), and agrimia have been recorded as present at a number of sites across Crete throughout the Bronze and Iron Ages (see Table 6.2), although not identified in the Knossos assemblage until the Roman levels. The ‘symbolic’ importance of the agrimi is indicated by the placement of horncores in special deposits (e.g. Gesell 1985, Hiller 2001, Day & Snyder 2004, Hamilakis & Harris 2011, Haggis*, et al.* 2007), as will be discussed further below (6.4.3).

Wilkens identified the agrimia remains at Phaistos based on their ‘large size and increased robusticity’ which she suggests is ‘clearly distinguishable’ from the domestic goat in this period (Wilkens 1996, 2003:83). At Knossos, Isaakidou (2004) notes the presence of some large goat remains but suggests, due to the paucity of metrical data, that it is not possible to conclude that these represent feral animals. This point of identification is an important one, as there is as yet no established methodology for distinguishing between agrimia and domestic goats based on morphological differences in the post-cranial remains (only agrimia horncores are clearly identifiable). Therefore, like Wilkens, identifications of archaeological agrimia post-cranial remains tend to be based on size. Thus recognition of agrimi remains in the zooarchaeological record is probably highly subject to inter-observer variation (see Chapter 8.2.3 for identification methods used in this study).

Period	Site	Phase	Total	Agrimi		Based on data from:
			#	#	%	
Neolithic c.7000-3000 B.C	Phaistos	LN	1121	56	5	Wilkens 1996
Bronze Age c.3000-1100 B.C.	Kato Syme	M	775	c.9	1.2	Nobis 1988
	Nopigia	MM III / LM IA	995	11	1.1	Hamilakis & Harris 2011
	Kommos (House X)	LMII	262	1	0.4	Ruscillo 2012
	Vronda	LM IIIC	1197	2	0.2	Klippel & Snyder 1991
Iron Age c.1100-700 B.C.	Kastro	LM IIIC-LG	15,909	30	0.2	Snyder & Klippel 1999
	Prinias	IA temple	449	1	0.2	Wilkens 2003
	Azoria (Northeast Building)	Archaic		2		Haggis et al. 2007
remains present (Bronze & Iron Age)	Poros	MM IA		p		Nobis 1993
	Ourania Cave	MM		p		Mylona 2012
	Monastiraki	MM		p		Mylona 2012
	Mallia	MM-LM		p		Helmer & Vila 1997
	Kommos	LMIII		p		Reese 1995
	Chamalevri	LMIIIC		p		Mylona 1999
	Karphi	LMIIIC-SM		p		Mylona in Wallace 2012
	Dictean Cave	Myc.-Early Greek		p		Boyd-Dawkins 1902
	Tylissos	MM, LMI, LMII		p		Jarman 1996
	Smari	MM-LG		p		Tsoukala 1996

(LN=Late Neolithic, MM=Middle Minoan, LM=Late Minoan, IA=Iron Age, SM=Sub-Minoan,
PG =Protogeometric, LG=Late Geometric, p=remains present)

Table 6.2 Data for agrimia from site across Crete, based on published data.

6.3.5 Sheep (*Ovis aries*) and Goat (*Capra hircus*)

Sheep and goat are the most predominantly occurring species throughout prehistory on Crete. Their remains are present on all sites for which animal bones occur, and in the greatest quantities (Table 6.3). As Crete lies outside the natural distribution area of sheep and goats these animals are considered to have been introduced with the first settlers to the island (Jarman 1996).

Only the sites of Phaistos and Knossos have faunal remains reported for the Neolithic period, and it is thought that sheep and goats were kept for variety of purposes during this time (Wilkens 1996, Isaakidou 2004). A marked increase in sheep and goats occurs in the Bronze Age and many authors, influenced by its mention in the Linear B texts (see Halstead 2003), attribute the raising of sheep herds at this time for the production of wool (Jarman 1972a, Wilkens 1996, Helmer & Vila 1997). For example, at Knossos the evidence for sheep kept into older age, plus an increase in adult males including some identified as castrates, is also thought to show a more specialised management with an emphasis on wool production (Isaakidou 2004). A similar pattern of increased survivorship of adult and male goats at Knossos in the Bronze Age has also been interpreted as evidence for a more specialised regime for the production of hair and/or large carcass size rather than milk (*ibid.*). However, this is mostly a palatial industry; sheep and goats were likely raised by other people outside the palaces, for other purposes.

6.3.6 Pig (*Sus domesticus*) and Wild boar (*Sus scrofa*)

Pigs tend to be the next most abundantly occurring species (after sheep and goat) and are also present from the earliest levels (e.g. Neolithic Knossos) onwards (Table 6.3). Again, already domesticated pigs are thought to have been introduced with the first settlers.

At a number of sites across Crete the relative percentage of pigs in the faunal assemblages is highest during the Neopalatial (Middle Minoan III-Late Minoan IB) phase of the Bronze Age (the only period in which several sites have a percentage of pigs at >30%, Table 6.3). This general increase in the consumption of pigs in the Palatial, particularly the Neopalatial phase, is interesting in light of the hypothesis of factional competition for material and social resources as a component of social and political organisation in the Bronze Age (Hamilakis 2002b). Hamilakis (2002) identifies a number of criteria for the archaeological identification of factional competition, one of which is evidence for the intensification of feasting (see also Hamilakis 1999b, for evidence of increased wine production at this time). Perhaps in this particular socio-political arena pigs were also considered as a means for demonstrating conspicuous generosity through their consumption in feasting contexts. It has been suggested that ‘pigs, having large litters and being fast growing, are ideal animals to be used for the production of meat for feasts; large quantities can be produced in a relatively shorter time than from cattle or sheep’ (Albarella & Serjeantson 2002:35). This accords well with Isaakidou’s (2004) data that pigs were being bred for largest possible animals at this time. Furthermore, a brief review of the age data for pigs from the sites identified as Palatial period (Knossos, Kommos, Ayia Triada, Nopigia) indicates that the majority of pigs were killed between 1-3 years, an age at which ‘the animals have grown enough to produce a substantial amount of meat, but at the same time still young enough to produce good quality meat’ (Albarella & Serjeantson

2002:36). Therefore, the increase in the percentage of pigs in the Palatial period assemblages could be related to the intensification of feasting.

An interesting development resulting from Isaakidou's (2004) analysis of the Knossos assemblage is her identification of a distinct population of feral pigs. She proposes (based on metrical, age and sex data) that feral pigs existed at least in the Middle Neolithic to Late Neolithic and possibly from the Early Neolithic. She also proposes that the breeding of pigs to reach the maximum body size during the Prepalatial and Palatial phases at Knossos could have resulted from inter-breeding with the feral populations (Isaakidou 2004). In other studies researchers have recorded 'wild boar' specimens, although not in any great quantity and the majority of these identifications seem to have been 'tusks'. It should be noted, however, that there is no evidence for an endemic population of wild boar on Crete (Rackham & Moody 1996) and if these identifications of wild boar are secure they must represent introduced animals or animal elements. Although the existence of 'true' wild boar populations in Crete is unlikely, it should be considered that very large pigs of feral status existed which may well have been perceived as wild and that could have been hunted (see also Isaakidou 2004).

6.3.7 Cattle (*Bos taurus*)

Cattle are also present at most sites across Crete, although in smaller quantities than sheep, goats and pigs, and are also thought to have been introduced as domestic species (Table 6.3).

At Knossos, from the earliest levels onwards, cattle remains are of animals smaller than wild cattle and fall largely within size ranges for domesticates from elsewhere (Jarman 1996, Isaakidou 2004). A few specimens occur that fall within the size range of wild cattle but Isaakidou suggests that the bone morphology is not consistent with what might be expected of wild cattle (e.g. pronounced muscle attachments), and that there is 'no indication that large specimens enjoyed a radically different lifestyle from smaller counterparts'– of course this only refers to 'radically different lifestyles' that lead to changes in bone morphology (2004:238). At Knossos therefore, Isaakidou (2004) proposes a single population of cattle existed in which size variation is based on sexual dimorphism rather than a separate larger feral population (as does

Jarman 1996). Finds of ‘aurochs’ in Cretan assemblages have been reported by Nobis (1990, 1996) and Persson (1993; see also Jarman 1996). If these identifications are correct then the importation of some individuals from the mainland should be considered; however the presence of aurochs as an indigenous species on Crete is improbable (e.g. Vigne 1999). The presence of large cattle individuals is evident, however, whether of traditionally defined ‘domestic’, ‘feral’ or ‘wild’ status.

Isaakidou’s work at Knossos suggests that during the Neolithic a high percentage of, mainly male, cattle were killed before reproductive age or use for traction and are therefore thought to indicate their rearing for meat. The remaining, mainly female, animals are thought to have been used for breeding, but evidence for specific pathologies associated with traction also indicates the use of adult females as work animals (Isaakidou 2004). It is recognised that some larger animals may also have been valued as ‘symbolic resources’ (Isaakidou 2004:245). At Late Neolithic Phaistos adult cattle also prevail, however these have been identified as small-medium sized animals and are thought to have been used for farm work (Wilkens 1996).

Of significant interest, however, are the quantities of cattle in the Neolithic assemblages (see Table 6.3): at Phaistos cattle represent 25% of the remains, and at Knossos from 30% in the (late) Early Neolithic, peaking at 31% in the Middle Neolithic to 25% in the Late Neolithic. Broodbank suggests that this distinct increase in the use of cattle at Knossos coincides with a period of rapid settlement growth and population expansion at this time (1992:66). Isaakidou (2004) attributes this to a premium on cattle ownership for transport and ploughing in order to cultivate better land (due to decreasing land fertility as a result of the population expansion). However, in this period of ‘social re-ordering’ at Knossos evidence for intensive consumption of cattle occurs (many male cattle killed before an age of use for traction, see above), commensally as ‘prestige food for conspicuous on-site butchery, consumption and discard’ and also symbolically through an increase in bovid figurines (Broodbank 1992:62). Isaakidou’s (2004) analysis of the butchery evidence suggests the manner in which consumption occurred was roasting of large portions of meat that were shared through the wider community. Of interest here, is the seemingly varied roles attributed to and taken on by cattle, and that cattle were seen as significant ‘mediators’ in renegotiating the social order at Knossos at this time.

A reduction in the quantity of cattle occurs between the Neolithic and Bronze Age at Knossos and lower quantities of cattle are also noted at Bronze Age Ayia Triada compared to Neolithic Phaistos (Wilkens 1996). At Knossos during the Bronze Age an increase in the proportions of adult animals occurs and is interpreted by Isaakidou (2004) as an increased emphasis on the management for secondary products (milk and/or traction). However, during the Palatial phase a high proportion of young animals was also killed and this has been proposed as indicative of the consumption of ‘gourmet’ young meat. The increase in the proportion of adult animals, of which more males are represented than previously, is thought to be consistent with a specialised strategy using oxen. The lack of associated pathologies, however, and the slight increase in body size is recognised as potentially reflecting the breeding of large males for prestige events (Isaakidou 2004:248).

The importance of cattle beyond an economic role, however, is also evident in the representation of the bull as one of the most important pictorial themes (in a variety of media) and particularly characteristic of the Neopalatial period at Knossos (Rehak 1995b). A significant theme within this corpus is the depiction of bull-leaping, in which human figures are seen ‘somersaulting’ over the back of a bull, a meaningful representation of human engagement with these animals (see Shapland 2013). It is of interest that at Knossos, at times of intensification in socio-political relationships (rapid population expansion and social reordering in the Middle Neolithic, and increased factional competition in the Neopalatial period), an increase in the consumption of cattle occurs, commensally in the former and ‘symbolically’ in the latter. This is of particular interest in light of Rehak’s (1995) observation that across the Aegean the majority of bull representations in material culture, especially bull rhyta, are found in the Knossos area of Crete.

Period	Site	Phase	Total frags id	N s/g	% s/g	N pig	% pig	N cattle	% cattle	Based on data from:
Neolithic c.7000-3000 B.C	Knossos	AN-LN	14882	5108	34.3	2068	13.9	3827	25.7	Jarman & Jarman 1968,
	Phaistos	LN	1121	541	48.3	252	22.5	268	23.9	Wilkens 1996
Bronze Age c.3000-1100 B.C	Myrtos Fournou Korifi	EMII	301	121	40.2	11	3.7	2	0.7	Jarman 1972
	Knossos	EMI-EMIII	1996	690	34.6	232	11.6	230	11.5	Isaakidou 2004
	Ayia Triada	EM	195	133	68.2	26	13.3	35	17.9	Wilkens 1996
	Poros	MMIA	100	60	60.0	20	20.0	15	15.0	Nobis 1993
	Ayia Triada	MM	218	146	67.0	58	26.6	13	6.0	Wilkens 1996
	Monastiraki (Archive Buildin	MM	197	151	76.6	26	13.2	19	9.6	Mylona 2012
	Petras	MM	299	229	76.6	46	15.4	8	2.7	Mylona 2010
	Monastiraki East	MM	1539	1052	68.4	270	17.5	180	11.7	Mylona 2012
	Knossos	OP	529	109		116	21.9	56	10.6	Isaakidou 2004
	Kommos	MMIII-LMI	452	289	63.9	136	30.1	13	2.9	Reese 1995
	Ayia Triada	MMIII / LMIA	203	110	54.2	63	31.0	27	13.3	Wilkens 1996
	Nopigia	MMIII / LMIA	995	480	48.2	319	32.1	184	18.5	Hamilakis & Harris 2011
	Knossos (Minoan Unexplored Mansion)	LMIA	149	104	69.8	34	22.8	11	7.4	Bedwin 1984
	Kommos House X	LMIA	112	82	73.2	28	25.0	0	0.0	Ruscillo 2012
	Kommos House X	LMIB	136	98	72.1	27	19.9	3	2.2	Ruscillo 2012
	Knossos	NP	3009	1293	43.0	757	25.2	271	9.0	Isaakidou 2004
	Kommos House X	LMII	262	199	76.0	40	15.3	8	3.1	Ruscillo 2012
	Knossos (Minoan Unexplored Mansion)	LMII	2760	1665	60.3	658	23.8	330	12.0	Bedwin 1984
	Knossos (Minoan Unexplored Mansion)	LMIIIA:2	183	117	63.9	43	23.5	22	12.0	Bedwin 1984
	Kommos House X	LMIIIA	290	179	61.7	97	33.4	1	0.3	Ruscillo 2012
	Kommos	LMIII	729	517	70.9	171	23.5	34	4.7	Reese 1995
	Vronda	LMIIIC	1197	838	70.0	190	15.9	59	4.9	Klippel & Snyder 1991
Iron Age c.1100-700 B.C	Kastro	LMIIIC-LG	15,909	12903	81.1	1281	8.1	1241	7.8	Snyder & Klippel 1999
	Prinias	IA	108	81	75	17	15.7	7	6.5	Wilkens 2003
	Prinias	IA temple	449	304	67.7	47	10.5	74	16.5	Wilkens 2003

(ordered chronologically; (AN=Aceramic Neolithic, LN=Late Neolithic, EM=Early Minoan, MM=Middle Minoan, OP='Old Palace', NP = 'New Palace', LM=Late Minoan, IA=Iron Age, LG =Late Geometric; sites have not been included for which the data is presented only as MNI)

Table 6.3 Numbers and percentages of the main domestic species from sites across Crete.

6.3.8 Horse (*Equus*)

Horses are present at only a few sites and generally only in small quantities (Table 6.4). Isaakidou (2004) notes the rarity of equids in the Knossos assemblage and suggests (in conjunction with textual evidence) their use mainly for transport, display and hunting rather than consumption, although equid remains with dismembering marks and cutmarks do occur. Horse remains are often deposited in a seemingly structured manner; for example in the 'Pillar Hall' of the Minoan Unexplored Mansion at Knossos, an unusual deposit of horse bones consisting of three groups of articulating elements and a complete skull, possibly all from a single animal, were placed on the floor (Late Minoan IA; Bedwin 1984). Horse remains have also been found in burial contexts; at Archanes Phourni a Late Minoan IIIA:2 tholos tomb containing a rich burial also contained the ‘carefully piled heap of a butchered horse’ (Rehak & Younger 1998:153), and a variety of horse and dog inhumations were excavated at the Iron Age site of Prinias (Wilkens 1996, 2003).

6.3.9 Dog (*Canis familaris*)

Dogs are represented at a number of sites across Crete (Table 6.4). The earliest evidence, thus far, is a few specimens in the lower levels at Knossos. Jarman (1996) suggests that as there is no evidence that jackal or wolf existed on Crete, they most likely represent domestic dogs. All later levels at Knossos contain specimens of domestic dogs (Jarman 1996). In a number of cases the presence of cutmarks observed on dog bones indicates the consumption of this animal (Snyder & Klippel 2003, Isaakidou 2004). At the Minoan Unexplored Mansion at Knossos (Pillar Hall) the complete skeletons of two young dogs were found, many of the bones of which had been charred (Bedwin 1984). Dogs have also been noted in burial contexts, and the variety of dog and horse inhumations noted at Prinias may have been linked to hunting with hounds (Pendlebury, *et al.* 1937-38, Wilkens 1996, 2003); as noted in the previous chapter dogs are often represented in hunting scenes.

6.3.10 Badger (*Meles meles*)

From the Early Neolithic onwards badger, presumably introduced, are apparently well attested at Knossos (Jarman 1996), one specimen derives from the Aceramic levels but the possibility that this element is intrusive should not be discounted. Badger remains have been recorded in low numbers, or noted as present, on a number of other sites during the Bronze and Iron Ages (Table 6.4). The greatest quantity of badger remains comes from the Late Bronze/Early Iron Age site of Kastro from which 43 fragments were identified, many of which bore cut marks indicative of skinning and food consumption (Snyder & Klippel 1996). The consumption of badger is also evidenced at Knossos (Isaakidou 2004). Jarman even posits a relationship of ‘semi-domestication’ for badger (1996:217).

6.3.11 Hare (*Lepus europaeus*)

Hare is frequently represented in contexts from the Bronze Age onwards (a single tooth is recorded from Aceramic Neolithic levels at Knossos but is not considered conclusive proof for their presence at this time). Hare is one of the most widely occurring of the wild species, having been identified at 20 sites thus far (Table 6.4). It is assumed that the hare was introduced and used primarily as a food animal (e.g. Tsoukala 1996, Massetti 2003), and a number of hare bones were found in a cooking pot at the site of Mochlos (over 100 bones representing a minimum of two individuals, Reese 2004). Jarman suggests that it could also have been introduced 'for sporting purposes' (1996:219).

6.3.12 Marten (*Martes sp.*), Weasel (*Mustela sp.*), and Wild Cat (*Felis silvestris*)

The earliest archaeological examples of marten also come from the Early Neolithic Knossos assemblage, and are present in small quantities throughout the Bronze Age and into the Iron Age. Weasel, however, has only been identified at Iron Age Kastro (Snyder & Klippel 1999). A Middle Minoan clay figurine from the site of Petsofa is thought to be of a weasel or marten (Masseti 2003b). Wild Cat occurs very infrequently and has only been identified at three sites between the Bronze Age and Iron Age (Trapeza Cave, Kastro, Smari; Pendlebury*, et al.* 1935-1936, Tsoukala 1996, Snyder & Klippel 1999). Marten, weasel, and wild cat may have been introduced and used for furs, but their low numbers suggests this was not a regular occurrence (see Table 6.4).

Period	**Site**	**Date**	**Total frags id**	**horse**	**dog**	**badger**	**hare**	**wild cat**	**marten**	**Based on data from:**
Neolithic c.7000-3000 B.C	Knossos	AN	510		1	p	1			Jarman & Jarman 1968, Isaakidou 2004
	Knossos	EN1a	655		6	p				Jarman & Jarman 1968
	Knossos	EN1b	945		18	p				Jarman & Jarman 1968
	Knossos	MN			p	p				Jarman 1996
	Knossos	LN		?	p	p				Jarman 1996
	Phaistos	LN	1121		4					Wilkens 1996
Bronze Age c.3000-1100 B.C	Chrysokamino	FN - EMIII	1				1			Reese 2001
	Ayia Triada	EM	195			1				Wilkens 1996
	Kommos	EM II-MMIII	204						1	Reese 1995
	Monastiraki East	MM	1539	2	4	4	1			Mylona 2012
	Pseira (Plateia building)	MM-LM	61				10			Reese 1998b
	Mallia	MM-LM	?	p	p	p	p		p	Helmer & Vila 1997
	Knossos (Houses by the Acropolis)	MMIII / LMI	72		4		1			Jones 1979
	Kommos	MMIII-LMI	452		10					Reese 1995
	Pseira	LM	12		3 dog/fox					Reese 1995b
	Kommos House X	LMIA	112				1			Ruscillo 2012
	Mochlos Artisans' Quarter	LMIB	1304		6		100+ MNI2		3	Reese 2004
	Mochlos Chalinomouri farmhouse	LMIB	670		2?		2?			Reese 2004
	Kommos House X	LMIB	136		2					Ruscillo 2012
	Ayia Triada	LM	312			1	1		2	Wilkens 1996
	Knossos (Minoan Unexplored Mansion)	LMII	2760	52	17					Bedwin 1984
	Kommos	LMI-LMII	240		1					Reese 1995
	Kommos House X	LMII	262				1			Ruscillo 2012
	Kommos House X	LMIIIA	289		1		1			Ruscillo 2012
	Knossos (Minoan Unexplored Mansion)	LMIIIA:2	183		1					Bedwin 1984
	Kommos	LMIII	729	1	1		4			Reese 1995
	Mochlos Chalinomouri farmhouse	LMIII	34				2			Reese 2004
	Chamalevri	LMIIIC	?	p	p					Mylona
	Halasmenos	LMIIIC	95	2	2					Snyder & Klippel 1994
	Karphi	LMIIIC			p					Pendlebury 1937-1938
	Thronos/ Kephala	LMIIIC	p	p	p					Mylona
	Vronda	LMIIIC	1197	12	31	2	57			Klippel & Snyder 1991
Iron Age c.1100-700 B.C.	Thronos/ Kephala	PG	?		p					Mylona
	Kastro	LMIIIC-LG	15,909	9	202	43	184	4	2	Snyder & Klippel 1999
	Kommos	IA (temple)	27300	5	8 MNI		32			Reese et. al 2000
	Prinias	IA	108		3					Wilkens 2003
	Prinias	IA temple	449	1	10					Wilkens 2003

(AN=Aceramic Neolithic, EN=Early Neolithic, LN=Late Neoltihic, FN=Final Neolithic, EM=Early Minoan, MM=Middle Minoan, LM=Late Minoan, PG=Protogeometric, IA=Iron Age, p = remains present)

Table 6.4 Presence of horse, dog, badger, hare, wild cat, marten on sites across Crete for which data was available.

6.4 Hunting, feasting, deposition, and dispersal in the zooarchaeological data from Crete

6.4.1 Hunting

Hunting is not often addressed in analysis of Cretan faunal assemblages (with the exception of Wilkens 2003), presumably due to the fact that the remains of wild species do not often occur in 'significant' quantities. However, an important point that should not be understated in relation to hunting on Crete is the lack of indigenous wild species. Wild animals, therefore, would have been deliberately brought to Crete, as is almost certainly the case for deer and possibly for agrimia (see above). The release of wild animals for hunting has also been proposed for other Mediterranean islands (e.g. Vigne 1999, Masseti 2003a, Horwitz & Bar-Gal 2006).

At Late Neolithic Phaistos, Wilkens states that 'hunting does not seem to have been practiced very much and the only wild animal present is the agrimi' (2003:86). This conclusion is somewhat surprising considering that she has identified the agrimi as a wild animal, and the agrimia remains from Phaistos constitute the largest assemblage of agrimia remains in an archaeological context on Crete thus far. Of further interest is the fact that no agrimia remains were identified in the Knossos assemblage for the Neolithic or, indeed, for any period until the Roman levels (Jarman 1996, Isaakidou 2004; again it is possible that inter-observer variation may have played a part). Ruscillo suggests that in the Bronze Age agrimia may have been hunted opportunistically or for 'ritual purposes' (2012:780).

Hunting is generally considered to have gained importance during the Bronze Age (Wilkens 2003), and the presence of deer becomes much more widespread at this time (see 6.3.3 above, Table 6.1). However, in comparison with evidence from Rhodes and Cyprus for example, the quantity of deer remains is minimal leading analysts (working within subsistence frameworks) to conclude that the economic value of deer was low and thus a 'symbolic' significance is assumed (e.g. Jarman 1996). Deer, therefore, are often interpreted as prestige 'objects' for the purposes of hunting and consumption by an elite (e.g. Jarman 1996, Wilkens 2003, Isaakidou 2004). Both Jarman and Isaakidou suggest fallow deer may have been kept in parks, and at Knossos possibly penned and closely monitored by the palace - an interpretation based on the presence of head and feet bones in the assemblage (Isaakidou 2004:298). This latter point, however, is based on the economic logic that only the 'useful' meat parts would have been brought into the settlement; if the deer had been hunted in the wild it is possible that the whole animal may have been important and had to be brought in.

At the Iron Age site of Prinias, Wilkens (2003) suggests hunting was of considerable importance as numerous remains of various wild species were recovered. Of further interest in this respect is the number of horse and dog inhumations at the site, an association that may also be linked to hunting.

An additional dimension that is also worth considering here, however, is the presence of feral groups of the domestic species. There has been considerable discussion on the status of the agrimi as being a feral animal descended from 'escapees' from the original domestic goat stock, less often discussed, however, is the possibility of animals deliberately released. Isaakidou's (2004) recent identification of a population of feral pigs at Knossos, which she proposes were potentially hunted, further highlights the variation that may have existed. In the absence of indigenous large wild animals, it is possible that 'wild' populations were deliberately created, both through the importation of animals such as deer, and potentially through the development of feral groups of the, traditionally assumed, 'domestic' species.

Furthermore, in Late Bronze Age Cretan iconography there are a number of depictions of bulls with nets across their backs and of bulls being speared (see Rehak 1995b for examples). A particularly interesting depiction on an ivory *pyxis* (small box) found in a tomb at Katsamba near Knossos, shows a bull hunting scene (men spearing a bull) yet the image also incorporates elements reminiscent of bull-leaping scenes (a man somersaulting over the bull's horns; *ibid*.). In light of this juxtaposition, it is perhaps not hard to imagine an engagement with bulls through bull-leaping operating as a ritualised hunting encounter, perhaps referring to an 'origin myth' of Anatolian bull hunting (Rehak also describes some Cretan stone bull's head rhyta as having a closer connection to Anatolian zoomorphic rhyta, 1995:445).

As discussed in Chapter 1, a distinct wild/domestic dichotomy is perhaps overly simplistic to account for the variety of human /animal relationships, and an interesting line of enquiry would be the deliberate creation of animal populations, albeit of the same species, external to those within domestic husbandry practice. In such a scenario, it is the perceived status rather than genetic status that is of most importance here. However, the larger question of whether animals had been captured in the wild on the mainland and released for hunting or to fulfil cosmological beliefs about the landscape, remains an important focus for future research.

6.4.2 Feasting and deposition

It has been noted previously (Chapter 3) that consumption occasions incorporating animals would not necessarily been commonplace but rather distinctive and meaningful events, of which feasting would have been one such practice (although food consumption on a small scale or daily basis is no less a social act). Feasting is often defined as the performative and ritualised communal consumption of food and drink (e.g. Hamilakis 2008, Hamilakis & Harris 2011); however, it is becoming apparent that the zooarchaeological manifestations of feasting are highly variable, highlighting how problematic 'check-list' type approaches for its identification in the archaeological record are (e.g. Hayden 1996).

At Bronze Age (Neopalatial) Knossos, for example, consumption debris from the public/elite core of the palace suggests evidence for 'special commensal events' characterised by an elaborate cuisine based on distinctive etiquette (as indicated by the butchery evidence) and the rare consumption of 'exotic species' such as fallow deer (Isaakidou 2004, 2007). Isaakidou (*ibid.*) interprets these events as involving the participation of large or public groups, albeit with an asymmetric dynamic between guest and an elite host (see also the evidence from Pylos, Isaakidou*, et al.* 2002, Halstead & Isaakidou 2004, Stocker & Davis 2004).

A different picture is provided by the feasting deposit at the site of Nopigeia of the same date (Hamilakis & Harris 2011). Located a few hundred metres from the settlement, a linear ditch contained pouring vessels, cooking pots, incense burners, saddle querns and thousands of standardised plain conical drinking cups and numerous animal bones. The animal bones indicated a high percentage of pigs and cattle relative to sheep and goat, and which appear to have been especially selected for the occasions in terms of species and age (mature animals). The manner of consumption appeared to be based on the boiling and stewing of meat and of marrow extraction, a pattern at odds with the more ‘economically wasteful’ practice of roasting often thought to be an indicator of feasting. It is proposed, based on the material culture and familiar cooking methods, that through these feasts rather than social division a feeling of homogeneity and unity was created (Hamilakis & Harris 2011). Yet the deposition of a mature male agrimi skull in the base of the ditch, an initiatory deposit with ‘meaningful connotations’ (Hamilakis & Harris 2011:231), indicates that in this case ritualised elements such as animal sacrifice may have marked these occasions as different from everyday practices. Interestingly, it is possible that this ditch feature was the site of multiple episodes of deposition[56] indicating repetition of these practices in the same locale (*ibid.*). This seeming evidence for the deliberate accumulation and deposition of the remnants of distinctive consumption events is suggested as being ‘an important way through which people in Bronze Age Crete dealt with memory and temporality’ (Hamilakis & Harris 2011:240), and is arguably seen elsewhere in Crete.

Furthermore, during the Late Minoan III period a distinctive consumption practice appears to characterise certain areas of Crete and is described as the ‘ritual’ deposition of food preparation and feasting remains in ‘ceremonial pits’, as evidenced at the sites of Chamalevri (Andreadaki-Vlasaki & Papadopoulou 2005), Thronos/Kephala (D'Agata 1997-2000), and perhaps Malia (Driessen, *et al.* 2008). At Chamalevri from the Late Minoan IIIB-C transition until the middle Late Minoan IIIC, and at Thronos/Kephala starting in Late Minoan IIIC early and continuing into the Protogeometric, an extensive sequence of pits was discovered with strong similarities observed in the characteristic features of the pits between both sites[57] (and also with the pits of the Rubbish Area North at Ayia Aikaterini, ‘Discussion’ in Andreadaki-Vlasaki & Papadopoulou 2005). The predominant artefactual material from the Chamalevri and Thronos/Kephala pits too was fragmentary pottery[58] and

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[56] Possibly suggested by the preliminary soil micromorphology report (Hamilakis & Harris 2011).

[57] c. 28 at Chamalevri, 47 at Thronos/Kephala; the shape of the pits tend to be circular or oval in plan, with dimensions generally of 0.1-0.2 m diameter on the surface, and a maximum depth of 0.1 m.

[58] Both fine and coarse ware, mainly deep bowls, cooking vessels (predominantly tripods), and craters and skyphoi, and cooking jars in Protogeometric period deposits at Thronos/Kephala.

animal bones which, along with the remains of domestic species, featured high percentages of deer as well as agrimia horns (Mylona in Tzedakis & Martlew 1999 and D'Agata 1997-2000). Preliminary analysis of the animal bones suggests they were also the remains of food consumption events prior to their deposition (*ibid.*). At Thronos/Kephala it is thought that the individual pits were filled in single depositional events, and some groups of pits displayed such similarities in depositional features that the excavator concluded they were the result of 'a similar behavioural pattern' (D'Agata 1997-2000)[59]. The interpretation of the pits by the excavators is one of communal food preparation and consumption events followed by deposition of the remains in a ceremonial and/ or ritualised manner, perhaps combined with other 'ritual' activities (D'Agata 1997-2000, Andreadaki-Vlasaki & Papadopoulou 2005).

6.4.3 Dispersal

The final deposition of some animal remains is not always in contexts of consumption however, although they may have been incorporated in consumption practices at same point in their biography. [60]

This section refers to the potential evidence in the zooarchaeological data for the modification and/or dispersal of elements of the animal body as items perhaps of 'material culture'. At the site of Vronda, a Late Minoan IIIC context contained an in situ 'special deposit' dominated by a number of deliberately modified cattle skulls consisting of the frontal bone and horncores only, which the authors describe as seemingly cut and shaped to produce flat 'plaque-like' segments which they suggest were possibly intended for display (Day & Snyder 2004:71). The deposit also contained a pair of heavily eroded agrimi horncores which had been 'chopped free of the skull but remain articulated as a pair by a portion of frontal bone' and had been placed inverted but equidistant between the cattle skulls (Day & Snyder 2004:69-70). Apparently pairs of agrimia horns treated in a similar manner have been found elsewhere at Vronda and nearby

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[59] At Thronos/Kephala, the quantity of material in the pits varied greatly, perhaps indicating that the numbers of participants at each event varied, although some pits were entirely devoid of artefactual material.

[60] A further practice involves the deposition of animals in burial contexts, such as deliberate burials of the animals themselves (e.g. Wilkens 2003), as possible food remains (e.g.Pendlebury, *et al.* 1937-38) and as 'symbolic' deposits (e.g. Sakellarakis & Sapouna-Sakellaraki 1997), however this will not be addressed here.

Kastro (*ibid.*). At Karphi, antler, pierced 'boars tusks', 'bull's horn' and a 'flattened fragment of bone' were also noted (Pendlebury *et al.* 1937-8).

A number of cases of goat (domestic and agrimia) horncores have been described with cutmarks around the base (e.g. Tsoukala 1996, Mylona n.d-b), a practice usually associated with the removal of the horn or skin. Bone and antler working is proposed at Malia (Helmer & Vila 1997), Reese (1995) suggests that at Kommos deer were not eaten but antler was used for working, and at the Mathioudaki plot in Chania a 'deer's horn cut for re-working' was reported (Catling 1983). At Knossos, dog bones were used for tools in the Neolithic (Isaakidou 2004:207). Isaakidou's analysis of the bone tools at Knossos has led her to conclude that the vast majority of Neolithic tools appear to have a practical function, however during the Bronze Age bone and possibly horn appear to have been used 'almost exclusively in the manufacture of non-utilitarian objects' (Isaakidou 2004:211). Furthermore, Isaakidou suggests that (in the latter case) the rarity of such finds indicates a specialised element to this activity, and identification of bone and horn working remains within elite/core area suggests close control of such activities by palace (Isaakidou 2004:295). This evidence indicates a great significance attributed to items of animal origin, and the importance of animal based items in a varied range of contexts.

6.5 Conclusion

The above survey serves to show the significant diversity that exists in the zooarchaeological record. Not only in the ways in which this type of data has been recovered and reported but, more significantly, in the variety and complexity of human-animal interactions in prehistoric Crete. As noted in the Introduction to this chapter (6.1), in this context the predominant narratives involving animals focus on their capacity to provide products of economic value and/or their role in (human) subsistence strategies. The above data, however, suggest that (as well as these aspects) there was also a desire to engage with animals via a more complex and varied range of relationships than just as 'producer/consumer'.

For example, the considerable act of bringing ‘wild’ animals to Crete and the perhaps deliberate development of feral animal groups, indicates a need to interact with animals beyond the familiar domestic practices; that is, with ‘other’ animals, on their terms, and in their places. Equally, cattle appear to have been a significant animal at Knossos since its establishment, and were seemingly key players in the development of social structure within the community. Practices such as bull-leaping could be seen as an enactment of the entwined human/cattle history on Crete - the shared biography - and a demonstration of its significance. These, as well as other practices, such as animal inhumations in combined human-animal burial contexts (e.g. at Prinias), may indicate a recognition of animal ‘personhood’ in the past (see also Pappi & Isaakidou In press). The modification of synecdochic elements (or perhaps all elements) of the animal body and their incorporation into networks of deliberate human action (e.g. the agrimia horn and cattle skull ‘plaques’ at Vronda) tell of the continued significance and agency of the animal after death.

These are just a fraction of the potential avenues for examining the complexity of human-animal interaction in the past which a general survey of the literature raises. It is without doubt that these lines of enquiry could provide fascinating insights into past human-animal relationships if they became the focus of research questions, rather than just pieced together out of a reading between the lines of the traditional narrative.

The specific archaeological contexts which provide the case studies for the human-animal interactions discussed here are outlined in the following chapter.

Chapter 7: Late Bronze Age Chania: the archaeology

7.1 Introduction

Previous chapters (4, 6) highlighted the significant regional variability occurring across Crete at the end of the Late Bronze Age (Late Minoan IIIB/C). The establishment of new, smaller settlements in naturally defensible locations was characteristic of eastern and central Crete, whereas in west and west-central Crete nucleation occurred around lowland coastal settlements which became main regional centres; amongst them, Chania was particularly influential.

The Bronze Age settlement of Chania is centred on the Kastelli hill and Splantzia area of the old town (see Figure 7.1). The earliest remains are dated to the Early Minoan period and consist of large, well-built houses and fine quality pottery. By the Middle Minoan the settlement had developed into a thriving centre with evidence for overseas trade as well as farming (Andreadaki-Vlasaki 2000). The most extensive architectural remains, however, are dated to the Late Minoan I period with many features (sunken basin, ceremonial hall, light wells, facades and drainage systems) often associated with 'palace' architecture elsewhere in Crete. Although no central court has been found to date, it has been suggested that Chania was a 'palatial' centre in the Late Minoan I period (Andreadaki-Vlasaki 2000, 2002, although see Driessen, *et al.* 2002). The discovery of an extensive Linear A archive consisting of tablets and roundels contains lists of agricultural products and censuses of people and animals, indicating an advanced administrative system (Andreadaki-Vlasaki 2002). The Late Minoan I remains were destroyed by fire at a time when widespread destructions were occurring across Crete.

Some reoccupation of the earlier buildings occurred in the Late Minoan II period, but it was during the subsequent Late Minoan III period in which Chania again became an important centre, and it is the Late Minoan III period (Late Minoan IIIB and C specifically) that is the focus of this study. Although fewer architectural remains have survived than in the previous periods, the discovery of Linear B tablets in the Late Minoan IIIB(:1) levels of the Ayia Aikaterini site indicates that Chania was an important administrative centre at this time. Its role in extensive Cretan and overseas trade networks is attested through the export of pottery from the local workshop across the Aegean, including stirrup jars inscribed with Linear B text, used to transport wine and oil (Andreadaki-Vlasaki 2000). The extensive Late Minoan III cemetery of Chania was discussed in Chapter 4 (4.3.1).

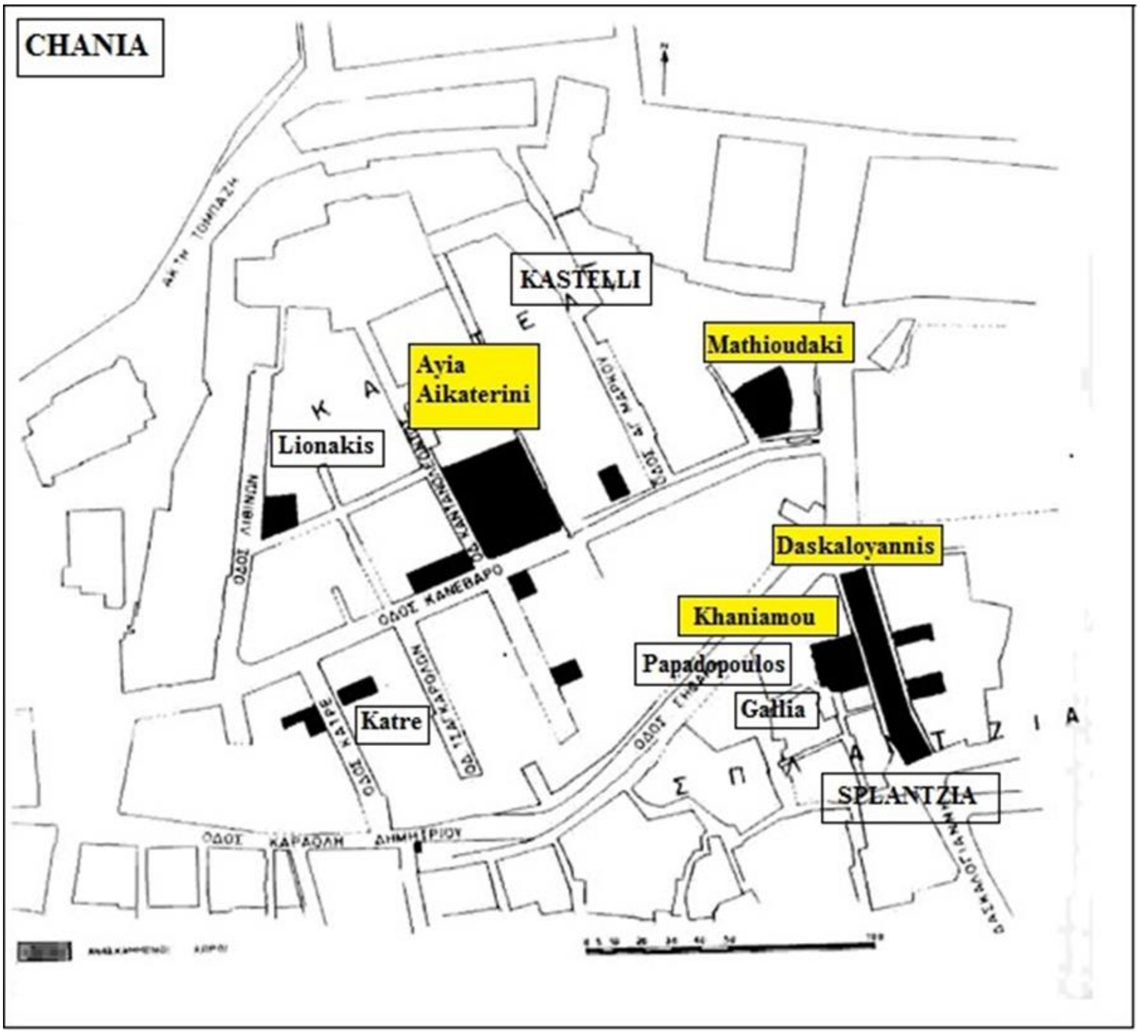

Figure 7.1 Location map of excavations in the Kastelli hill and Splantzia quarter (after Andreadaki-Vlasaki 2002). Sites used in this study are highlighted in yellow.

7.2 Ayia Aikaterini

7.2.1 Introduction

The Ayia Aikaterini site is located in the Kastelli area of Chania and was excavated by a combined Greek and Swedish team between 1970 and 1987. Although the site produced remains from as early as the Final Neolithic, as yet only the more recent phases have been published in detail, of which the Late Minoan IIIB:2 and the Late Minoan IIIC settlements (Hallager & Hallager 2000, 2003) are of relevance here.

The excavated LMIII site consists of two complexes of large spacious buildings, with an open courtyard area between them and extending to the south. During the LMIIIB:2 period a large space to the north of the buildings was created and used as a 'rubbish' area and continued in use as such during the Late Minoan IIIC. It is from this area and a further rubbish area to the southeast that the majority of the material comes and are considered to be closed stratified deposits.

7.2.2 Buildings

During the Late Minoan IIIB:2 period the settlement was destroyed, at least partly, by fire but almost immediately the debris was cleared, and the new (Late Minoan IIIC) settlement built (apparently before the actual end of the Late Minoan IIIB period, Hallager & Hallager 2000:32). Many of the Late Minoan IIIC floor levels were built at the level of the previous Late Minoan IIIB:2 floors, therefore there is not a great deal of material from closed floor deposits. Most of the rooms/spaces were reused unchanged from the old buildings, but some rearrangements and new constructions occurred (see Figure 7.2, Figure 7.3). Two possible doorways were identified in the Late Minoan IIIC architectural remains. One of these was situated in the wall corner as characteristic of Minoan Neopalatial architecture, the other door was broken into the wall as was often the case with Mycenaean architecture (Hallager & Hallager 2000:127).

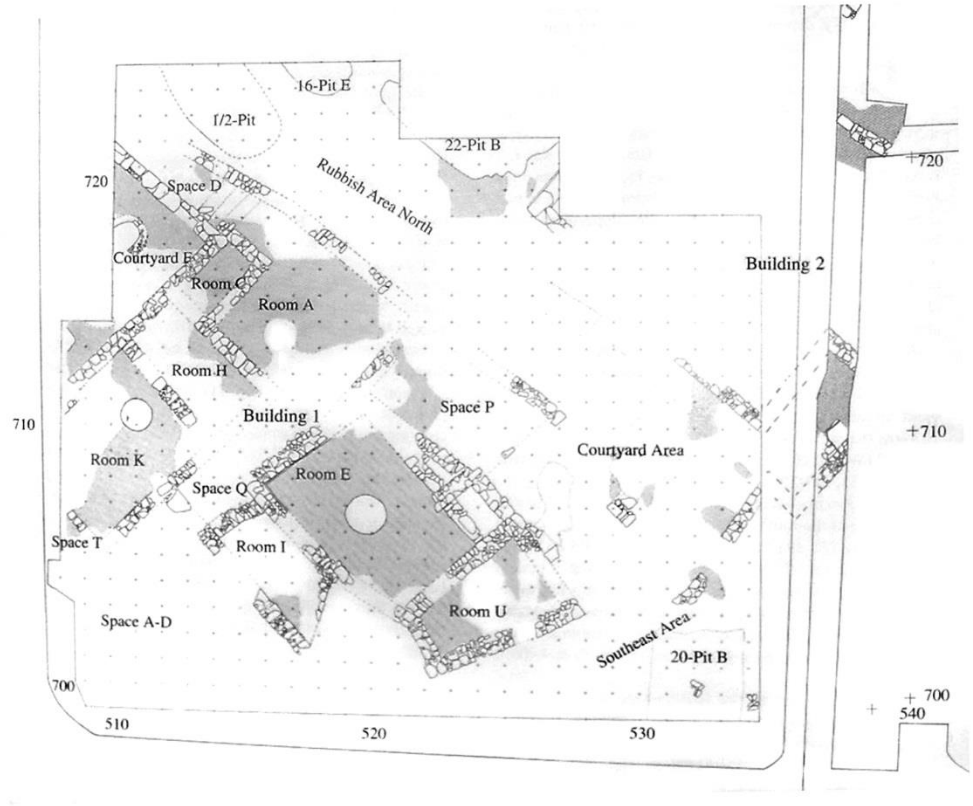

Figure 7.2 Ayia Aikaterini: Late Minoan IIIB:2 phase site plan (after Hallager & Hallager 2003).

The Late Minoan IIIB:2 phase building contained three spacious rooms (Rooms A, E and K) surrounded by smaller rooms (Figure 7.2). Rooms E and K contained large circular hearths; in Room E complete cooking vessels were found indicating that food was prepared in this room, and in Room A complete vases indicate small-scale storage as well as food preparation. Room E is the only room in the building which indicated clear cooking activities in the Late Minoan IIIB:2 phase, and the excavators suggest that this single cooking installation in the Late Minoan IIIB:2 building supports an argument that it formed a single unit (Hallager & Hallager 2003:286).

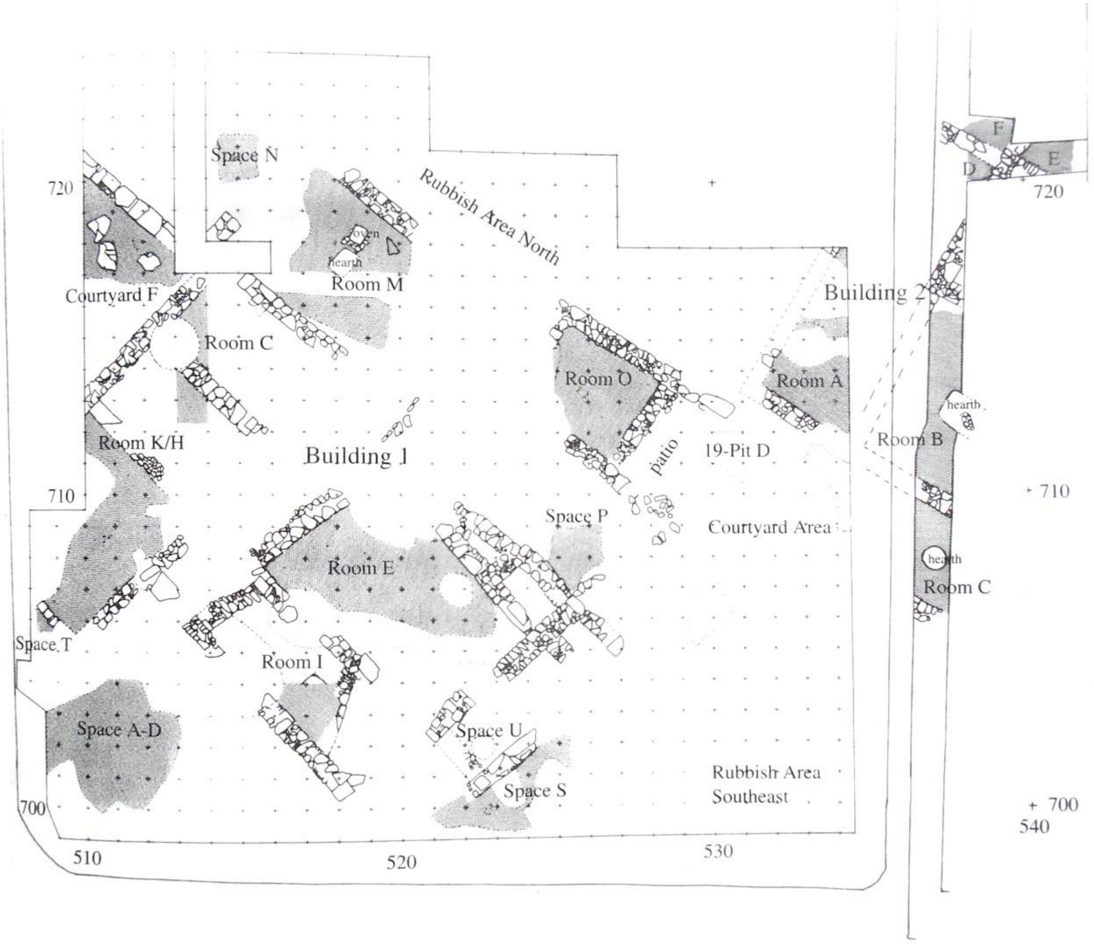

Figure 7.3 Ayia Aikaterini: Late Minoan IIIC phase site plan (after Hallager & Hallager 2000)

In contrast, a generally more extended use of fire areas in the Late Minoan IIIC than in the previous period was noted, with some kind of permanent fire installation (fire area, hearth, or oven) present in most of the rooms of the Late Minoan IIIC settlement (Hallager & Hallager 2000:129; Figure 7.3). Most of the hearths here are thought to have been used for cooking and perhaps lighting (*ibid.*). Interestingly, however, it is noted that the 'only convincing evidence' for cooking from the pottery data – if tripod cooking pots were restricted to cooking food –was outdoors: in Space O 'Patio', where the larger part of a tripod cooking pot was found close to a fire area, and in Space A-D where the full base of a tripod cooking vessel was found together with a rudimentary spit stand (Hallager & Hallager 2000:168). There is some discussion as to whether the Late Minoan IIIC Building 1 represents one large complex or several smaller architectural units (see Hallager & Hallager 2000:132-133) and the finds are considered to indicate a multiple function for most rooms.

Of interest, especially in relation to the use of animals, is the suggestion that some of the obsidian tools might have been used in tasks such as butchery, shearing, leatherworking and the working of bone at the site, and projectile points may have been used in hunting (Karantzali 2000, 2003). However, most of the Late Minoan IIIC rooms are considered to be notably empty of finds (Hallager & Hallager 2000:91).

According to the pottery data, bowls, cups and kylikes predominate in the Late Minoan IIIB:2 whereas the most common Late Minoan IIIC shape are bowls. An increase in bowls and kraters occurs in the Late Minoan IIIC from previous phases, with only limited use of cups and kylikes (Hallager & Hallager 2000). The pottery from pits and rubbish areas is considered to be contemporary waste from the settlement. However, the average percentage of decorated pottery from the Late Minoan IIIB:2 levels across the site is 12% but rises to 14% in the Rubbish Area North, and in the Late Minoan IIIC levels across the site is 14%, but rises to 18% from the Rubbish Area North (Hallager 2001). This appears to indicate a different (more conspicuous?) mode of consumption represented by the deposits in the Rubbish Area North. The change in predominating vessel type – seemingly from cups to bowls – occurring between the Late Minoan IIIB:2 and Late Minoan IIIC phases may also reflect changes occurring in the social dynamics of communal consumption over time (see Borgna 2004a, Day & Wilson 2004, Catapoti 2011).

7.2.3 Rubbish Area North

The Rubbish Area North is an open area consisting of alternating dumps and pits. This area was created in the Late Minoan IIIB:2 period and continued in use into the Late Minoan IIIC period. No architecture existed in this area. (Hallager & Hallager 2003:128).

The Late Minoan IIIB:2 Rubbish Area North strata consists of four main features: two large pits (16-Pit E and 22-Pit B) and two ‘dump’ areas (Central Dump and Southern Dump). A further large pit (1/2 Pit), similar in nature to 16-Pit E and 22-Pit B, was also located in this area but the bone assemblage from this feature has not been published. These features and dumps are themselves also made up of several layers or deposits (Table 7.1).

Period:	**LMIIIB:2**				**LMIIIC**
Feature:	*16-Pit E*	*22-Pit B*	*Central Dump*	*Southern Dump*	*Dump*
Deposits:	Upper layer	Upper layer	Upper layer	Upper layer	1st layer
	Middle layer	Lower layer	Middle layer	Middle layer	2nd layer
	Lower layer		Lower layer	Lower layer	3rd layer
	Bottom layer				4th layer

Table 7.1 Stratigraphy of the Rubbish Area North.

In 16-Pit E four major levels are distinguished but the contents are so similar that contemporaneity is assumed, and the excavators note that both the finds and the pottery indicate a very homogenous deposit (four sherd joins occur between the lower and bottom layers). Although in the published report (Hallager & Hallager 2003) animal bones are described from each of the four levels, it appears that after their initial analysis the bones from these levels were mixed together. Therefore the 16-Pit E bones recorded in this study are analysed as a single assemblage in which the layers have been combined.

22-Pit B consisted of two main layers: an upper layer of three deposits that were dug into the lower homogenous layer. The excavators note that there are some differences between the two layers and cannot be sure that the pit represents one closed deposit, but possibly two. The upper layers contain sherd joins with other areas of the Rubbish Area North.

A sherd join between 16-Pit E and 22-Pit B is thought to signal contemporaneity between these pits. A similarity between pits 16-Pit E, 22-Pit B and 1/2 Pit both in the nature of the deposits and in design (e.g. all large and orientated northwest-southeast) is noted.

The Central Dump is part of the pit/dump area in the north, and is divided into three clearly recognisable layers. These levels are situated below the Late Minoan IIIC dump levels. The general appearance of these layers is of soft, reddish-brown soil with small stones and pieces of charcoal and ash, as well as fragments of lime and clay. Sherd joins occur between the upper and middle layers of the Central Dump, and there are also several connections with other pits in the Rubbish Area North (except 1/2 Pit).

The Southern Dump is located in the south part of the Rubbish Area North and is also made up of three layers. These layers are noted to 'fit' part of the Rubbish Area to the north and the soil descriptions are similar to the layers in the Central Dump.

The Late Minoan IIIC deposits have also been divided into four strata: 4th layer (oldest) - 1st layer. Although not all the soil descriptions are exactly similar, they are considered to be contemporaneous based on their stratigraphic position. Interestingly, the report states that no bones came from the 2nd layer (Hallager & Hallager 2000). These Late Minoan IIIC layers are located above the Late Minoan IIIB:2 Central Dump layers.

That the general dump layers and the deposits in the pits are closely connected, both physically and stratigraphically, is indicated by the description of the 4th layer being partly covered by the upper layer of 22-Pit B which is connected to the 3rd layer, with the 1st and 2nd layers being above 22-Pit B (Hallager and Hallager 2000:103).

There are a number of points of interest relating to the finds from the Rubbish Area North. The excavators note a higher percentage of decorated pottery from this area compared to the rest of the site, including decorated stirrup jars. Many and well preserved small finds, numerous bronze objects including complete fishing hooks and an arrowhead, bronze and bone needles, fragments of figurines and beads etc. came from this area. Conversely, spindlewhorls and loomweights were few, whereas evidence for textile manufacture is prominent in other Late Minoan deposits (Hallager 2001). The quantity of obsidian pieces was also relatively low. Differences in the faunal material will be examined in detail in this thesis. The excavators suggest that this rubbish represents waste from a shrine or is connected to a shrine in the area (Hallager 2001).

7.2.4 Rubbish Area Southeast

From Late Minoan IIIA:1 onwards, this area was used as a ‘rubbish area’ and like the ‘Rubbish Area North’ was also dominated by alternating pits and dumps. The Late Minoan IIIC levels, however, were destroyed by modern disturbance leaving only a small area of a once much larger Late Minoan IIIC pit (20-Pit E) surviving. The remaining deposits of this pit were between 0.35 and 0.36m in depth; 3,895 kg of pottery was collected, 17% of which was decorated. Shapes counted included pottery to do with eating, drinking, and serving of food and drink (cups, bowls, footed cup and a ladle, a krater and a closed vessel were also recorded). No small finds were recovered.

7.2.5 Late Minoan IIIC activity post-dating occupation of the buildings

A number of features represent activity at the site, shortly after the buildings had been deserted. The pottery from these features is described as latest Late Minoan IIIC, whilst the pottery from the rest of the site is early Late Minoan IIIC (Hallager & Hallager 2000:135).

One of the pits (19-Pit D), which cut through the Courtyard outside Room O, contained almost purely Late Minoan IIIC phase pottery and is thus thought to represent later activity. This pit appeared to be c. 0.4m in depth (Hallager & Hallager 2000:94), the original extent is not unknown but the plan indicates dimensions of c. 1.5 x 1.25m. The majority of pottery fragments recorded come from vessels associated with food and drink consumption, serving of food and drink, cooking, and storage (bowls, also a krater, a storage jar, a cooking jar, an amphora, a stirrup jar and a stand, as well as other open and closed vessels). The pit is noted as being unusual in that it contained a high percentage (22%) of decorated pottery and no small finds.

Immediately to the south of Room E is a ‘corridor-like space’ (Hallager & Hallager 2000:38), Space U. No Late Minoan IIIC floor survives as the area was destroyed by a large pit (13-Pit F), which partially overlies, and thus post-dates, the south east wall of Room E; the pit however is still of Late Minoan IIIC date. Pottery fragments from bowls, a cooking dish, jug, pithos, a lid and a closed vessel were found, and also a loomweight and a bead/button.

Another later pit, again of Late Minoan IIIC date, destroyed the outer north corner of Room O; this feature was noted as containing an unusually high percentage (29%) of decorated pottery (Hallager & Hallager 2000:85).

Although no apparent ‘occupation’ deposits associated with these later Late Minoan IIIC features have been recorded, the material within these pits seems to indicate a continuation of consumption practices. The high percentage of decorated pottery in some features might even indicate conspicuous consumption. It is of interest that this practice continued at the site even after the buildings had been deserted; an important point in relation to the social production of memory (see Chapter 3).

7.3 Odos Daskaloyannis and Khaniamou plot

7.3.1 Introduction

The Daskaloyannis and Khaniamou excavations have been discussed together here as they are located adjacent to one another and relate to the same archaeological site.

These excavations are located in the southeast part of the Kastelli hill in the region of the Bronze Age settlement (see Figure 7.1). The site of Daskaloyannis street was excavated in 1997 in advance of the installation of a sewage pipeline. Aside from the remains of a Venetian stone built drain, some small constructions from the Turkish occupation, and a Classical period pit, for the whole length of the site (77m x 8.5m) the remains are dated almost exclusively to the Bronze Age period (Andreadaki-Vlasaki 2003). The Khaniamou site was excavated via six trenches over a period of two years and the deepest area of the site contained Early Minoan and Middle Minoan period building remains, as well as the Late Minoan I building discussed below.

The Daskaloyannis and Khaniamou excavations revealed the remains of an extensive building complex. Earlier excavations of an adjacent plot (Papadopoulos plot, see Figure 7.1) had also revealed part of this complex, including a room containing an *adyton* or lustral basin (small sunken room of unknown function; Niniou-Kindeli 1995). The first phase of construction of this building complex is dated to the Middle Minoan III period and its final destruction by fire is dated to the Late Minoan IB, a time when many large Cretan settlements were also destroyed by fire. Re-use of the building and courtyard continued in the Late Minoan III period.

7.3.2 The Late Minoan I remains

The most extensive (and most well reported) remains date to the Late Minoan I period and indicate a building with many rooms, some containing hearths and conical cups, seemingly for gathering and eating (Andreadaki-Vlasaki 2003). One of the rooms appeared to be a large ceremonial hall (*polythyron*) which exited onto an external monumental platform made from thick polished stones and surrounded by a drain which contained many complete and broken conical cups. Chemical analysis of four of the conical cups indicates they may have contained a mixture of wine, barley beer and honey mead (Andreadaki-Vlasaki 2002). A further drain to the north was also found filled with conical cups. The drains appear to form a system which starts inside of the building, goes into the yard, surrounds the platform, and exits into a deep pit (*lakkos* 10) in the courtyard. Finds recovered from the drains and pit include many conical cups, pieces of plaster, pumice, obsidian, shells and animal bones (Andreadaki-Vlasaki 1997).

To the north of the building complex is the large exterior courtyard with several layers of compacted earth floors. Many artefacts were found on the floor surfaces, including hundreds of inverted conical cups seemingly deliberately placed, as well as other pottery types –especially tripod pots-, various stone artefacts, occasional bone tools and animal bone (Andreadaki-Vlasaki 1997, Blackman 1998, Andreadaki-Vlasaki 1999). What appears to be the main floor of the courtyard dates to the Late Minoan IA period; the remains of the activity taking place in the courtyard, however, were not cleared away but rather subsequent floors, dating to Late Minoan IB, were laid on top.

A ‘niche’ (small open area) in the southeast corner of the courtyard close to the monumental platform, contained a thick layer of loose ash with many conical cups and animal bones (Andreadaki-Vlasaki 2002). It appears that this area was paved in places with traces of burning and a hearth or ‘pyre’ in the area (Andreadaki-Vlasaki 1999). The bone remains excavated from consecutive layers of the ‘pyre’ were of pigs less than one year-old (MNI 6), but also two adult female sheep, two goats (hind legs only), three cows (fore and hind legs only), one male dog, one fallow deer (2 bones, fore and hind leg), the horns of two male agrimia, and a bone of a bird (Mylona 1999b, n.d-c).

Andreadaki-Vlasaki suggests that features of the architectural complex such as the *adyton*, monumental platform and pyre were the focus of ‘special ceremonies’ (2002:162) and rituals (1999). The large quantities of pottery (both cooking and consumption vessels) and animals bones indicate that feasting would have been a significant feature of these practices. Interestingly, Andreadaki-Vlasaki states that this area ‘keeps a ceremonial and sacred character in later times as well, according to quite a few findings in huge pits dug there during the last Minoan centuries…’ (2002:163).

7.3.3 The Late Minoan III remains

Whilst the Late Minoan I remains are of interest in themselves, what is particularly important here (especially so because of the minimal reporting on the Late Minoan III layers) is the suggestion by the excavator that activities centred on the open courtyard (drains, clay construction and hearth etc.) were continuing, with little change, during the Late Minoan III period (Andreadaki-Vlasaki 1997). During the Late Minoan III period the open area consists of two successive floors of compacted earth; the earliest (Late Minoan IIIA1) is characterised by dark brown earth with burnt areas. Above this, the second floor (Late Minoan IIIA2) had fine gravel surfacing in various places and the southern part was red and harder with burnt bones suggesting a hearth was in the vicinity; on this floor were a grindstone and a painted clay figurine. A built drain, containing Late Minoan IIIA/B pottery and a clay animal figurine, was directed towards the same location of the previous Late Minoan I drain pit (*lakkos* 10).

Along the southern end of the Daskaloyannis excavation part of a building of Late Minoan IIIA/B date was found, it was orientated north-south and seemed to have several phases of repair. The south part of the building appears to have been a later addition for use as a storage area, but initially appeared to have been an external area with hearths. The central part of the main building has been destroyed by a 4th century BC rubbish pit. The rest of the Late

Minoan IIIA/B building consists of rooms with earth floors (on one of which was found a group of 5 bronze stone mason’s tools), and the whole building is based on strong foundations made of big limestone blocks with smaller rock packing. To the north of the building the ground was at a lower level. A much earlier Middle Minoan IA building in the same area was repaired and incorporated into the Late Minoan III period buildings, and both appear to be of a common layout. Further north only isolated remains from this period exist, a Late Minoan IIIA pottery kiln was built on top of the Late Minoan I monumental platform and the remains of some floors continue to the northeast under the pavement.

The whole of the south part of the site was covered by what is described as a large pit containing abundant pottery attributed to the Kydonian workshop of Late Minoan IIIA, B and C periods. This pit contains a significant quantity of animal bone material from the site, and analysis of this assemblage forms the focus of this study. However, based on analysis of the context data (labels in the animal bone bags in conjunction with excavation notebook descriptions), it is possible that this feature, rather than being a single pit, could represent instead a pit complex albeit of a few pits of limited/singular depositional episodes. The remaining animal bones from the Daskaloyannis site come from floor deposits and smaller pits across the site.

This site appears to have been an important, ‘high status’ site with many architectural features indicative of ceremonial activity. It is thought ceremonial practices centred on the large, open courtyard took place both in the Late Minoan I and the Late Minoan III period. The practices associated with the digging and deposition of significant quantities of material in large pits, however, appears to be a characteristic of the Late Minoan III period.

7.4 Mathioudaki

7.4.1 Introduction

The Mathioudaki site is also located in the eastern part of the Kastelli hill area in the region of the Bronze Age settlement (see Figure 7.1) and archaeological remains dating to the Middle Minoan, Late Minoan I-II, and Late Minoan III periods have been recorded (Tzedakis 1978, Andreadaki-Vlasaki 2002). The earliest phase, the Middle Minoan, is represented mainly by pot sherds (Tzedakis 1978), whilst the later phases have associated building remains.

7.4.2 The Late Minoan I- Late Minoan II remains

Part of a large building dated to the Late Minoan I-II period was identified. The southern part consisted of a hall with characteristic Neopalatial architectural features.[61] To the north of the hall is a room (room A), possibly unroofed, with a floor constructed of broken red plaster. This room originally communicated with another room (room B) to its north. In the eastern part of room B a staircase was constructed below which was a pit deposit containing '70 clay vases, mainly conical cups, pieces of fresco painting, four fragments of plaster in the shape of conical cups and a seal with a talismanic motif' (Andreadaki-Vlasaki 2002:160). It is thought that the construction of this part of the room related to a subterranean area, possibly an *adyton* (small sunken room). During a later building phase this area was filled in, a paved floor was constructed above the deposit, and the entrance to room A was blocked. In room B, the floor was covered in a thick layer of pumice. The large, rough limestone blocks of the Neopalatial outer walls form the western walls (Andreadaki-Vlasaki 2002:160). Excavation of a thick layer of ash was thought to relate to the destruction of the (roof of?) the Neopalatial building.

7.4.3 The Late Minoan III remains

A Late Minoan IIIA/B room was excavated on the floor of which was found a stirrup-jar and a 'deer's horn cut for reworking' (Catling 1983). However, despite minimal reporting of the Late Minoan III archaeological remains, according to the site notebooks a significant quantity of the animal bone material comes from apparently Late Minoan III contexts, including pits.

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[61] 'Pier and door' partitions and a triple door opening with characteristic Neopalatial doorjamb bases.

7.5 Evidence elsewhere in Chania?

Another large Late Minoan IIIB pit, similar in nature to the Late Minoan III pits associated with the Daskaloyannis and Ayia Aikaterini site, is reported from the rescue excavations on Odos Kanevaro (Figure 7.1, Whitley 2005). Associated with the large Late Minoan IIIB pit are large quantities of pottery, animal bones, stone grinders and pounders, obsidian blades and flakes. The pit was sealed by Late Minoan IIIB:2 occupation layers and an associated hearth which was badly preserved due to a later Late Minoan IIIC pit. Next to the pit two deep wells were discovered, the first contained large quantities of pottery including kylikes and champagne cups, and animal bones. The second well contained concentrations of human bones associated with pottery, including fragments of *pithoi*. Occupation remains dating to the Middle Minoan, Late Minoan I and Late Minoan III were also reported. Although the material is not part of this study, this report is of interest as it potentially indicates that the practices relating to the deposition of large quantities of pottery and animal bone material were occurring beyond the sites of this study, albeit in the same general region (see Figure 7.1).

7.6 Conclusion

To summarise, the Ayia Aikaterini site in the Late Minoan III period is represented by large well-built masonry buildings with numerous rooms, as well as open areas and courtyards with evidence for food preparation and cooking taking place. The ‘rubbish areas’, particularly Rubbish Area North, consist of large pits and dump deposits and also indicate significant episodes of deposition of large quantities of material. Finds analysis indicate that a higher percentage of decorated pottery, bronze objects (including complete fishhooks and an arrowhead), figurine fragments and beads etc. were recovered from the Rubbish Area North compared to the rest of the site, whereas evidence for textile industry and obsidian manufacture is low in contrast to other deposits (Hallager 2001). The possibility that this material also represents waste from a shrine has been raised, although is inconclusive (*ibid.*).

The Daskaloyannis/Khaniamou building complex is an extensive and well-constructed building with a large external courtyard and hearths. During the Late Minoan I phases archaeological remains indicative of food preparation, cooking and consumption are described and activities of a ceremonial and/or a ritual nature are proposed. During the Late Minoan III period there is evidence that significant aspects of the spatial dynamics continue, in particular the large external areas with hearths, monumental platform and drains, and the impression gained by the excavators is of a certain amount of continuity in the activities taking place in the yard. During the Late Minoan III period, however, there is evidence for significant depositional episodes of large quantities of material in pits. The excavators suggest the finds from these pits indicate a 'ceremonial or scared' aspect to this area in the Late Minoan III period also (Andreadaki-Vlasaki 2002:163).

The depositing of large quantities of material, including animal bone, in pits also seemingly occurred at the site of Mathioudaki and possibly elsewhere in the area, and was potentially a more widespread practice than has been recognised and properly investigated. The detailed excavation and recording of the 'rubbish' pits from Ayia Aikaterini, and to some extent Daskaloyannis/Khaniamou, indicate the possibly 'special' nature of these types of feature.

The information presented in both this Chapter and Chapter 4, portrays Bronze Age Chania as an 'elite', urbanised settlement. During the time-frame of this study (Late Minoan IIIB-C) - ultimately the final phases of the Aegean Late Bronze Age - Chania is described as a settlement of significant political importance, possibly brought about through escalating inter-regional competition between elites at different centres (Preston 2004b).

In this environment, in Chania, there appears to be evidence for the introduction of new orchestrations of communal, 'structured', activity[62]. By which I mean the apparent creation (in LMIIIB:2) of the 'Rubbish Area North' at Ayia Aikaterini, and at Ayia Aikaterini and Daskaloyannis/Khaniamou (and possibly Mathioudaki and others) evidence for consumption events and the deposition of the remains in large pits, on a significant scale.

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[62] As well as practices which seem to deliberately maintain material links with the past (reuse of buildings and building plans from preceding periods, the continuation of 'ceremonial behaviour' in the large courtyard at Daskaloyannis/Khaniamou).

It is possible that these events may be linked to ‘elite’ efforts to manipulate socio-political change. The fact that interaction with and consumption of animals constituted a significant component of these events, not only highlights the significance of the human-animal relationship in the past, but also provides us with an opportunity to investigate the role of the human-animal relationship in the social and political transformations and dynamics that were taking place in Late Bronze Age west Crete.

Chapter 8: The zooarchaeology and the animals

8.1 Methodologies

8.1.1 Hypothesis for investigation

In this study the faunal material has been analysed in order to investigate human-animal relationships in the Bronze Age. In Chapter 3 a theoretical framework was proposed as a means through which to examine human-animal interaction, in particular between human and deer (red and fallow) and human and agrimia. The theoretical framework is constructed around four particular practices involving humans and animals or the animal body. Crucially, these are not seen as four separate unconnected events; rather they are interpreted as an inter-related series of physical and sensory interactions, termed here a ‘cycle of engagement’. This cycle of engagement is proposed as the hunting of wild animals, consumption of the hunted animals, deposition of the remains, and dispersal of the animal via the incorporation of synecdochic elements of the animal body into the material culture repertoire. The cycle would have been completed through the use of animal elements in the hunting equipment itself (for example the possible use of wild goat horn in the construction of bows, Chadwick 1973, Wachsmann 1987). Each of these events included a series of other events. For example consumption would also have included (public?) butchery and carcass processing, cooking and so on, all of which would have been meaningful.

In this chapter, the first of these themes (hunting and consumption practices) are considered on an assemblage-wide basis; for example, the species present at each site, including detailed discussion of the nature of the deer and agrimia remains, and evidence for hunting practices are some of the issues discussed. Element analysis, analysis of butchery, and burning patterns are employed to investigate whether the animal bone remains are associated with consumption practices, and these data are compared between species in order to highlight any species-specific variation within these practices. In the following chapter

(Chapter 9) these data will be analysed in relation to specific spatial feature types, in order to understand consumption events on a more context specific basis, but also how the practice of deposition itself is bound up with the rituals of consumption. Finally, any evidence for the bone, horn, and antler working will be discussed, as it is proposed that the influence/presence of animals is continued/materialised after their death in items made of animal remains.

8.1.2 Method of analysis

As stated in Chapter 1 (the Introduction), the research emphasis of this thesis is on the zooarchaeological assemblage as the remains of specific social practices. As such, this study employs recognised zooarchaeological analytical techniques, although the detailed application of particular methods of analysis and the lines of enquiry to which they have been applied is innovative. Thus, the main methodological concern of this study is to investigate the zooarchaeological material in units of analysis that correspond to social practices and deposition episodes. This requires a much tighter integration of zooarchaeological, archaeological and excavation data, and significant attention is paid to zooarchaeological 'sub-assemblages' on a context specific basis (e.g. according to feature type rather than arbitrary units of analysis, see Chapter 9).

An important component of this study is the incorporation of the *living animal* as the starting point of the analysis rather than the animal carcass. Importantly, this has been attempted here in order to discuss the nature of the engagement between human and animal beyond its conception as a 'walking larder' or provider of economic commodities, as has been the tendency in traditional zooarchaeological studies in this context.

8.1.3 The zooarchaeological assemblages

The total quantity of animal bones recorded in this study is 10,025 fragments (see Table 8.1, below), of which just over half (55%) are identifiable to species level. These quantities are significant for zooarchaeological assemblages coming from Cretan prehistoric sites (see Chapter 6), yet the relatively small size of the assemblage, compared to many traditional British or European zooarchaeological studies, allows for detailed context-orientated analysis. The preservation condition of the bones is, in general, very good. There is little damage to the bone surface caused by soil erosion or the effects of weathering; for example, only 0.6% of the assemblage was affected by weathering damage, and 4.6% of the assemblage showed evidence for carnivore gnawing (see Table 9.19). The majority of the material is recorded as being between 3-6 cm or 6-9 cm (see Figure 8.1, below). The animal bones were hand collected during the excavation, and it is thought that some dry sieving was also carried out.

Site:	**Ayia Aikaterini**	**Daskaloyannis/ Khaniamou**	**Mathioudaki**	**Assemblage total**
Total fragments	5,981	3,129	915	10,025
Identifiable	3,176	1,935	388	5,499
% Identifiable	53%	61%	42%	55%

Table 8.1 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: assemblage quantities for the sites used in this study (Late Minoan III material only).

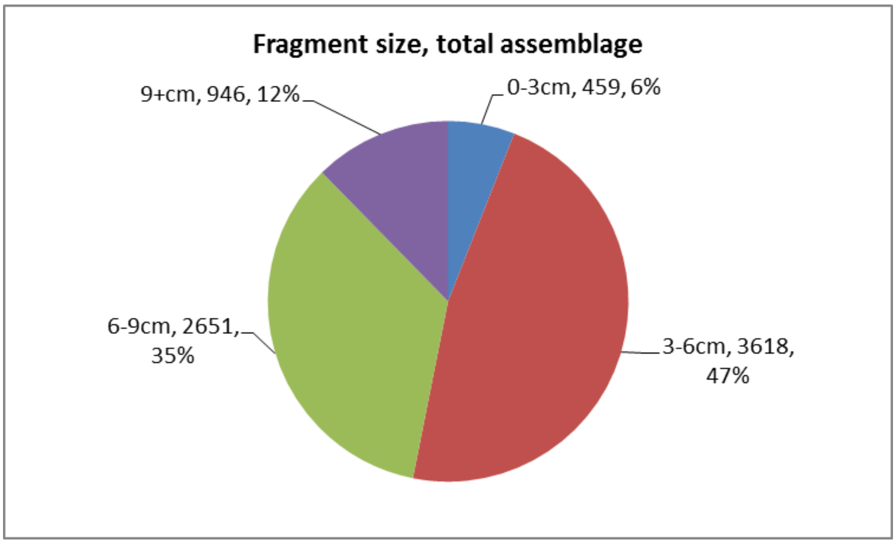

Figure 8.1 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: quantities and percentage of bone fragments within each fragment-size category.

The Daskaloyannis, Khaniamou, and Mathioudaki assemblages have not previously been studied in their entirety, and this study represents the first intensive analysis of this material. Dr Dimitra Mylona has analysed a small quantity of material from these sites (Khaniamou: 141 ids, Mathioudaki: 5 ids) and produced unpublished internal reports for the Greek Archaeological Service (Mylona n.d-c, a).

The Late Minoan III animal bones from the Ayia Aikaterini assemblage have been previously analysed and published (Hallager & Hallager 2000, 2003); the range of the published information, however, is limited, generally providing only a minimum number of individuals per species present, in each context.

8.1.4 The recording model

The assemblages were transported from Crete to the Fitch Laboratory, British School at Athens where they were washed and recorded. Because of the value placed on the context specific nature of deposition in this study, an important and valuable part of the analytical procedure involved the initial laying out of the entire zooarchaeological sub-assemblage recovered from an individual feature. For example, where one large pit feature contained many bags of faunal material from different layers the material from each bag would be laid out together (but not mixed) in order to display the assemblage from the pit as a whole. With the feature assemblage arranged in such a way any initial impressions, observations, and characteristics were described and significant time was spent cross-checking the assemblage for articulating elements, conjoining unfused epiphyses and diaphyses, and any refitting material (only fresh breaks were reconstructed). This process was repeated for each feature. Noting any conjoining elements within and across different deposits within a single feature, enables discussion regarding the nature of deposition (e.g. rapidity, quantity) to occur. After this initial assessment of the feature assemblage as a whole, the material from it was then sorted into identifiable and unidentifiable fragments. The former consisted of any fragment that was identifiable where possible, rather than a restricted suite of element portions. The latter also included all rib and vertebrae fragments.

The identifiable material was identified to species using the faunal reference collection of the Fitch Laboratory, material loaned from faunal reference collection of the Laboratory for Zooarchaeological Research at the University of Southampton, and on occasion the faunal reference collection of the Wiener Laboratory, American School for Classical Studies, Athens. Distinction between sheep and goats was made using the diagnostic criteria of Boessneck (1969), Prummel & Frisch (1986), and Halstead *et al*. (2002). Distinction between red and fallow deer was made according to criteria identified by Lister (1996).

The identifiable material was quantified using the Number of Identified Specimens (NISP) method, and each fragment was given an individual entry into the spreadsheet and an individual specimen number. The database was organised into a number of categories within which a comprehensive range of criteria were recorded (see Table 8.2). The unidentifiable material was categorised according to size and element (e.g. cattle sized, long bone fragment) and recorded under the same criteria as the identifiable material.

Site Data	**Bone Detail**	**Fragmentation**	**Cultural Modification**	**Natural Modification**	**Records**	**Age/sex /size**
Excavation date	Specimen number	Breaks – fresh/old	Cutmarks	Weathering	Butchery sketch	Age
Trench	Species	Fragment size	Chopmarks	Soil erosion	Photo jpg	Sex
Layer	Element	Articulations	Burning	Root etching	Comments	Metrics
Basket	Quantity		Burning location	Gnawing		Tooth wear
Feature	Side		Burning colour	Gnawing location		
Context info	Fusion					
	Zone (1-8)					

Table 8.2 Database recording categories.

Site context information, such as the date of excavation, trench number, and feature type etc., was included and allows for aspects such as spatial patterning and distribution to be discussed.

Identification of the individual bone was made according to species and element, side of the body, and state of fusion (unfused, fusing, fused). Number of anatomical 'zones' present for each bone was recorded (based on the recording system devised by Serjeantson 1996; a zoning system for mandibles was adapted from Dobney & Reilly 1988) which also allows a Minimum Number of Elements (MNE) and Minimum Number of Individuals (MNI) to be estimated, and fragmentation patterning to be reconstructed.

Record of the state of fragmentation noted whether breaks were fresh or old, and the size of the fragment to within one of four size groups (0-3cms, 3-6cms, 6-9cms, 9+ cms). Note was also made of any articulations between elements, and these were cross-referenced via the specimen numbers.

Any cultural or natural modifications to the bones were recorded. The former consisted of any butchery marks and burning marks on the bone. Butchery marks were categorised as either cutmarks or chopmarks and entered in the database as present or absent; the location of marks were also visually represented on pre-printed bone drawings, and good examples were recorded with a digital photograph. Any marks not recorded visually were described in the 'Comments' section. If a bone was worked or modified for tool/object manufacture this was also recorded in the same way. Any burning on the bone was recorded as present or absent and the location and colour of the burning was also recorded and digitally photographed. Recording these modifications in such detail was considered to be a crucial means for investigating consumption practices relating to this assemblage and context.

Any natural modifications to the bone surface such as weathering, erosion caused by chemicals in the soil, root etching, and gnawing were recorded as present or absent. Gnawing was further recorded as either rodent or canid, and location of the gnawing on the bone was noted. This information is regarded as important for analysing the deposition history of the material, e.g. long term surface exposure or rapid deposition and preservation.

Age of the animal was noted (neonatal, juvenile, and so on) and age stages based on tooth wear data were recorded and calculated according to the criteria devised by Payne (1973, 1987) for sheep and goats, Grant (1982) for pigs and cattle, Chaplin & White (1969) and Brown & Chapman (1990, 1991) for fallow deer, and Brown & Chapman (1991) for red deer. Age stages based on epiphyseal fusion data for fallow deer was calculated after Carden & Hayden (2006), and Silver (1969) for all other species. Where possible, the sex of the animal was recorded as male, female, possibly male or possibly female (see Hatting 1995 for sheep/goat). Most measurable elements were measured following von den Driesch (1976).

Any other observations were recorded in a ‘Comments’ section.

8.2 The Animals

8.2.1 Introduction

In general, the range of species present at the sites is not uncommon for this time period on Crete. The presence of cattle, pig, sheep, goat and dog remains in this assemblage is not unexpected, and these species occur frequently in zooarchaeological assemblages across Crete (see Chapter 6). Also present, but less frequently occurring elsewhere, are horse, donkey, red and fallow deer, agrimi, badger, hare, marten and a dolphin vertebrae. A few fragments from bird and fish (species unidentified) were recovered, as was a small amount of human bone. Where deer remains could not be positively attributed to red or fallow with certainty, they have simply been recorded as deer.

The relative percentages of the most commonly occurring species in the assemblages are presented in Figure 8.2 - Figure 8.4; the data for species representation are presented in Table 8.3 - Table 8.7 (see also Appendix A). A comparison of the NISP per species (for the most frequently occurring ones) at each site indicates that the pattern of species representation at each site is similar (albeit with variation in the overall quantities from each site), particularly so for the Ayia Aikaterini and Daskaloyannis/Khaniamou sites, whereas the data from Mathioudaki are much fewer (Figure 8.5).

The overall number of deer remains from the Ayia Aikaterini and Daskaloyannis/Khaniamou sites is similar; in the Daskaloyannis/Khaniamou assemblage, however, a greater number were positively identified as fallow deer. The number of equid remains (NISP) from Daskaloyannis/Khaniamou is conflated by the presence of a partially articulated group of bones. In the Daskaloyannis/Khaniamou and Ayia Aikaterini assemblages both horse and donkey remains were identified on the basis of metrical data (discussed further below 8.2.7).

A comparison of species representation (NISP) between the Late Minoan IIIB:2 and Late Minoan IIIC phases at the Ayia Aikaterini site (Figure 8.6) indicates that the pattern of species representation is similar between the two phases, although the overall quantity of Late Minoan IIIC material is less (Table 8.4, Table 8.5).

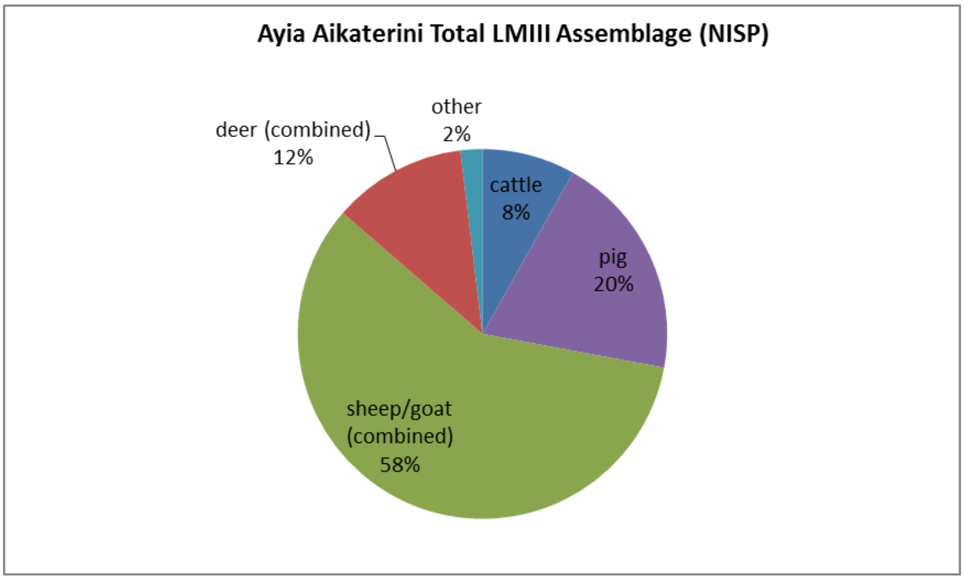

Figure 8.2 Ayia Aikaterini: representation of the most frequently occurring species as a percentage of the NISP, Late Minoan IIIB:2 and Late Minoan IIIC phases combined.

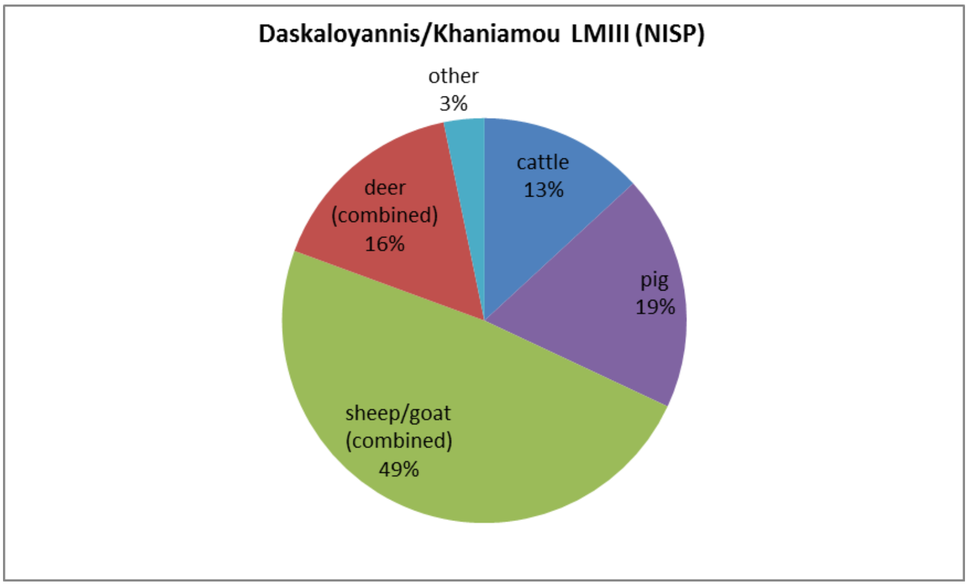

Figure 8.3 Daskaloyannis/Khaniamou: representation of the most frequently occurring species as a percentage of the NISP, Late Minoan III period.

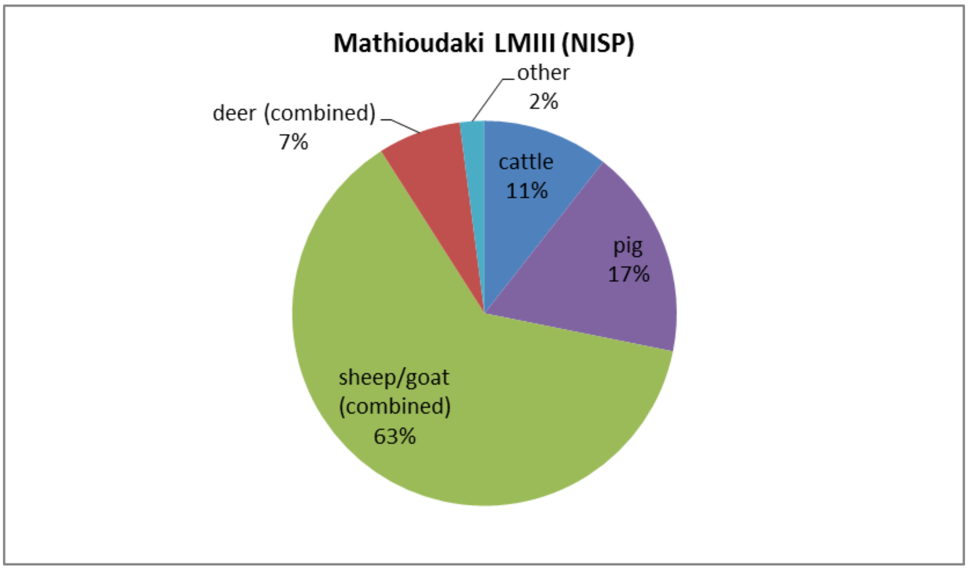

Figure 8.4 Mathioudaki: representation of the most frequently occurring species as a percentage of the NISP, Late Minoan III period.

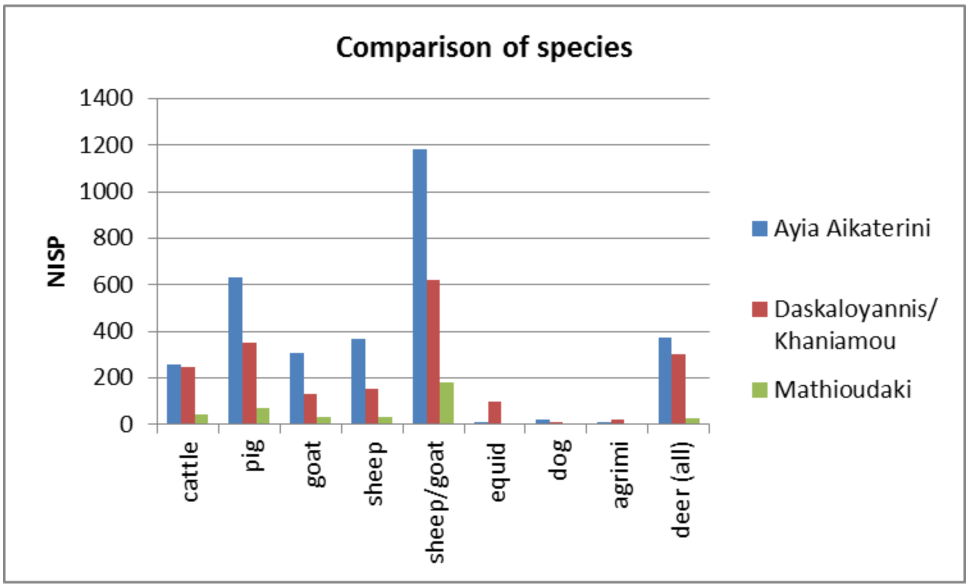

Figure 8.5 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: comparison of representation of main species (NISP) at each site.

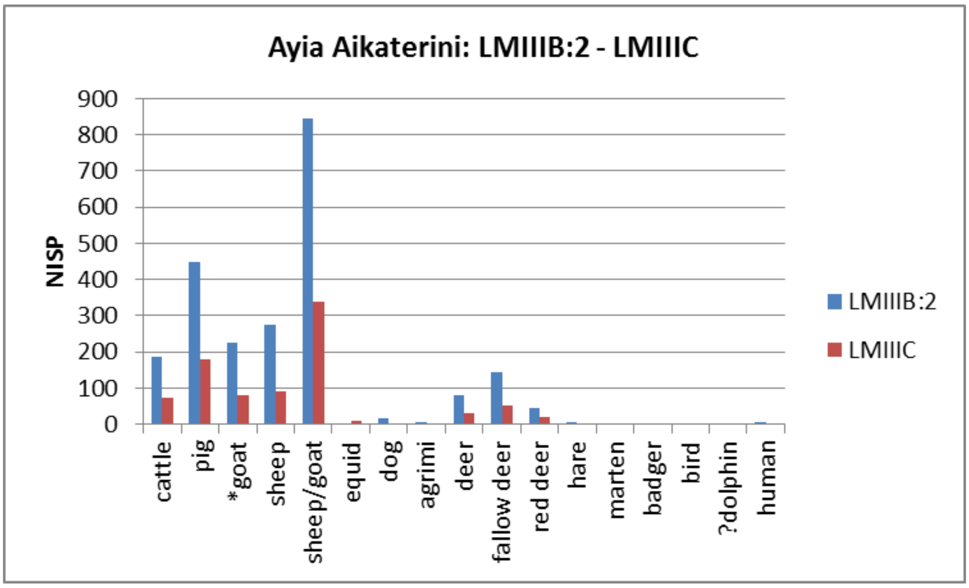

Figure 8.6 Ayia Aikaterini: comparison of species representation (NISP) between LMIIIB:2 and LMIIIC phases (*goat= possible agrimia: LMIIIB:2 N=2, LMIIIC N=6).

Ayia Aikaterini LMIII (combined)						
1	2	3	4	5	6	7
Group	**Species**	**N**	**%total**	**% ids**	**Group % total**	**Group % ids**
Domestic	cattle	259	4.3	8.2	46.3	87.2
	pig	629	10.5	19.8		
	goat*	306	5.1	9.6		
	sheep	366	6.1	11.5		
	sheep/goat	1181	19.7	37.2		
	equid**	11	0.2	0.3		
	dog	19	0.3	0.6		
Wild	agrimi	8	0.1	0.3	6.6 (total deer 6.2)	12.4 (total deer 11.7)
	deer	113	1.9	3.6		
	fallow deer	195	3.3	6.1		
	red deer	65	1.1	2.0		
	hare	8	0.1	0.3		
	badger	2	0.0	0.1		
	marten	1	0.0	0.0		
	?dolphin	1	0.0	0.0		
Not studied	bird	1	0.0	0.0	0.2	0.4
	human	11	0.2	0.3		
Sub-total (id)		**3176**	**53.1**	**100**		**100**
Unidentified	cattle size	376	6.3		46.9	
	sheep size	1911	32.0			
	small size	19	0.3			
	unidentifiable	499	8.3			
Grand Total		**5981**	**100**		**100**	
Notes: 8 *large size possible agrimi, ** 3 donkey (see 8.2.7)						

Table 8.3 Ayia Aikaterini: representation of species, Late Minoan IIIB:2 and Late Minoan IIIC phases combined.

Ayia Aikaterini LMIII:B2						
1	2	3	4	5	6	7
Group	**Species**	**N**	**%total**	**% ids**	**Group % total**	**Group % ids**
Domestic	cattle	185	4.3	8.1	46.6	87.4
	pig	449	10.5	19.6		
	goat*	225	5.3	9.8		
	sheep	276	6.4	12.1		
	sheep/goat	844	19.7	36.9		
	equid	2	0.0	0.1		
	dog	15	0.4	0.7		
Wild	agrimi	5	0.1	0.2	6.6 (total deer 6.3)	12.3 (total deer 11.7)
	deer	81	1.9	3.5		
	fallow deer	143	3.3	6.3		
	red deer	44	1.0	1.9		
	hare	6	0.1	0.3		
	badger	1	0.0	0.0		
	marten	1	0.0	0.0		
	?dolphin	1	0.0	0.0		
Not studied	bird		0.0	0.0		
	human	7	0.2	0.3		
Sub-total (id)		**2285**	**53.3**	**100**		**100**
Unidentified	cattle size	270	6.3		46.7	
	sheep size	1347	31.4			
	small size	6	0.1			
	unidentifiable	377	8.8			
Grand Total		**4285**	**100**		**100**	
Notes: *2 large size possible agrimi						

Table 8.4 Ayia Aikaterini: representation of species, Late Minoan IIIB:2 phase.

Ayia Aikaterini LMIII:C						
1	2	3	4	5	6	7
Group	**Species**	**N**	**%total**	**% ids**	**Group % total**	**Group % ids**
Domestic	cattle	74				
	pig	180				
	goat*	81				
	sheep	90				
	sheep/goat	337				
	equid**	9				
	dog	4				
Wild	agrimi	3				
	deer	32				
	fallow deer	52				
	red deer	21				
	hare	2				
	badger	1				
Not studied	bird	1				
	human	4				
Sub-total (id)		891				
Unidentified	cattle size	106				
	sheep size	564				
	small size	13				
	unidentifiable	122				
Grand Total		1696				
Notes: *6 large size possible agrimi, ** 3 donkey						

Table 8.5 Ayia Aikaterini: representation of species, Late Minoan IIIC phase.

Daskaloyannis/Khaniamou LMIII						
1	2	3	4	5	6	7
Group	**Species**	**N**	**% Total**	**% Ids**	**Group % Total**	**Group % Ids**
Domestic	cattle	244	7.8	12.6	51.2	82.8
	pig	349	11.2	18.0		
	goat	130	4.2	6.7		
	sheep	154	4.9	8.0		
	sheep/goat	618	19.8	31.9		
	equid*	97**	3.1	5.0		
	dog	11	0.4	0.6		
Wild	agrimi	22	0.7	1.1	10.3 (total deer 9.6)	16.6 (total deer 15.5)
	deer	16	0.5	0.8		
	fallow deer	227	7.2	11.7		
	red deer	57	1.9	3.0		
Not studied	bird	2	0.1	0.1	0.3	0.5
	fish	2	0.1	0.1		
	human	5	0.2	0.3		
	? human	1	0.0	0.1		
Sub-total (id)		**1935**		**100**		**100**
Unidentified	cattle size	239	7.6		38.2	
	sheep size	863	27.6			
	small size	2	0.1			
	unidentifiabl	90	2.9			
Grand Total		**3129**	**100**		**100**	
Notes	* 2 donkey, ** 81 from 1 individual (see 8.2.7)					

Table 8.6 Daskaloyannis/Khaniamou: representation of species, Late Minoan III period.

Mathioudaki LMIII						
1	2	3	4	5	6	7
Group	**Species**	**N**	**% Total**	**% Ids**	**Group % Total**	**Group % Ids**
Domestic	cattle	41	4.5	10.5	39.2	92.3
	pig	68	7.4	17.5		
	goat	29	3.2	7.5		
	sheep	32	3.5	8.2		
	sheep/goat	181	19.7	46.6		
	equid	5	0.5	1.3		
	dog	2	0.2	0.5		
Wild	agrimi	1	0.1	0.3	3.3 (total deer 3%)	7.7 (total deer 6.9%)
	deer	1	0.1	0.3		
	fallow deer	18	2.0	4.6		
	red deer	8	0.9	2.1		
	hare	2	0.2	0.5		
Sub-total (id)		**388**	**0.0**	**100**		**100**
Unidentified	cattle size	50	5.5		57.5	
	sheep size	432	47.2			
	small size	1	0.1			
	unidentifiable	44	4.8			
Grand Total		**915**	**100**		**100**	

Table 8.7 Mathioudaki: representation of species, Late Minoan III period.

8.2.2 Deer: Fallow deer (*Dama dama*) and Red deer (*Cervus elaphus*)

The percentage of deer occurring in the Chania assemblages of this study (Daskaloyannis/Khaniamou 15.5%, Ayia Aikaterini 12%, and Mathioudaki 7%) is significantly higher than at most other sites on Crete at any time (see Figure 8.7), and outnumber cattle in the Daskaloyannis/Khaniamou and Ayia Aikaterini assemblages. Both fallow deer and red deer species were identified in each of the assemblages of this study, with fallow deer occurring more frequently than red deer at each site (see Figure 8.8, Figure 8.9). The fallow deer in these assemblages have been identified as European fallow deer (*Dama dama*) rather than Persian fallow deer (*Dama mesopotamica*) based on the shape of the antler which differs between the two species, the latter typically having a flattened base and little palmation at the free end (Chapman & Chapman 1975, Davis 2003). Furthermore, the metrical data from the fallow deer of these assemblages are, on average, too small to be Mesopotamian fallow deer (compared with data for Mesopotamian fallow deer from Cyprus, Simon Davis pers. comm.). The identification of these deer as European rather than Persian fallow deer is in accordance with evidence from elsewhere in Crete.

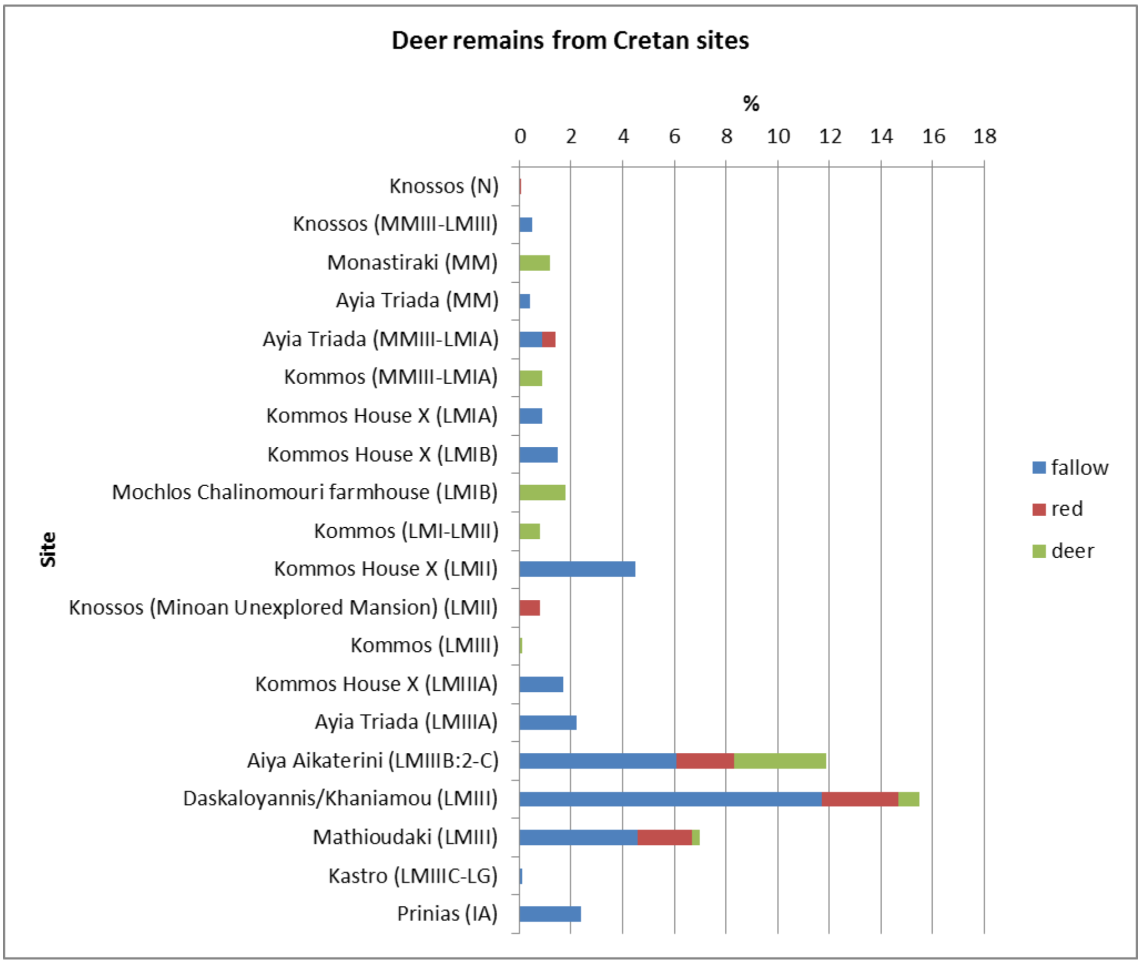

Figure 8.7 Percentage of deer remains from sites across Crete where NISP >100, based on data in Table 6.1 and including the sites of this study (N=Neolithic, MM=Middle Minoan, LM=Late Minoan, LG=Late Geometric, IA=Iron Age).

The majority of the deer remains are represented by postcranial material, particularly the limbs; yet the occurrence of skull, neck and feet elements also suggests the presence of the whole animal rather than simply imported joints of meat (Figure 8.42 - Figure 8.45 below, Appendix B). There does not appear to be any deliberate selection of elements for side (Figure 8.10 - Figure 8.19;

the data for Mathioudaki are few), although it is perhaps worth noting that of the red deer humeri, only left side (MNE 1) are present at Ayia Aikaterini and only right side humeri (MNE 4) at Daskaloyannis/Khaniamou; the data, however, are too few to be meaningful. Element representation will be discussed further below (8.3.1).

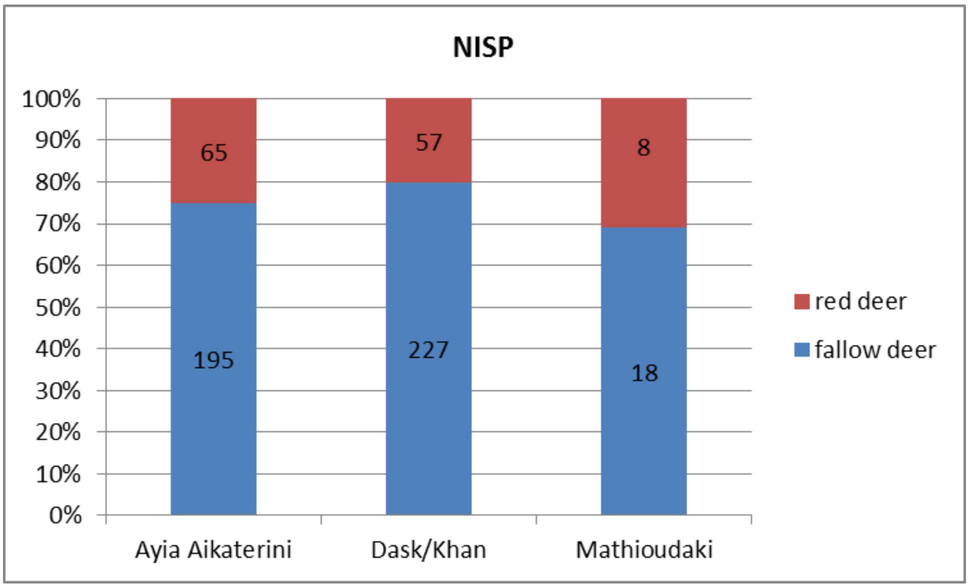

Figure 8.8 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: relative quantities and percentage of fallow deer to red deer remains (NISP).

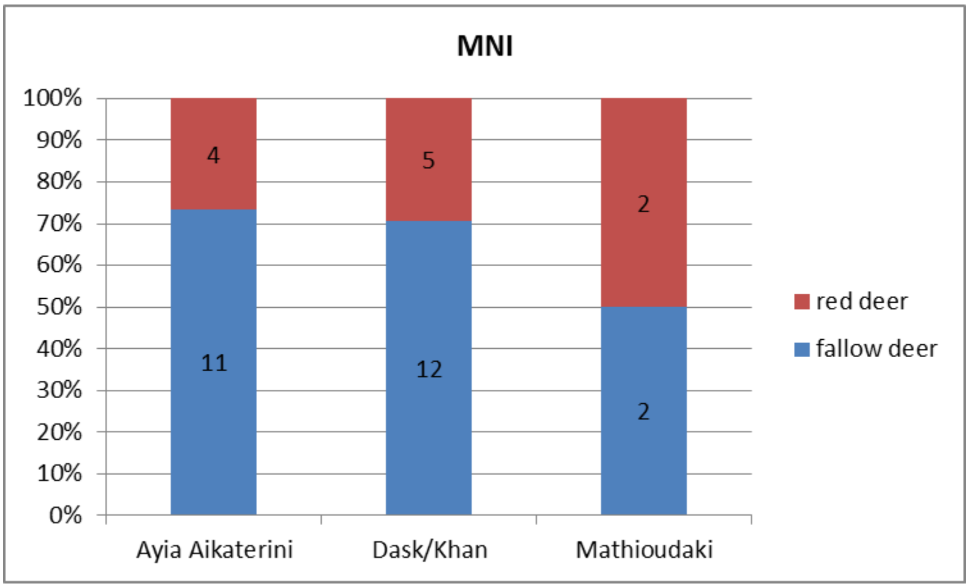

Figure 8.9 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: relative numbers (MNI) of fallow deer to red deer.

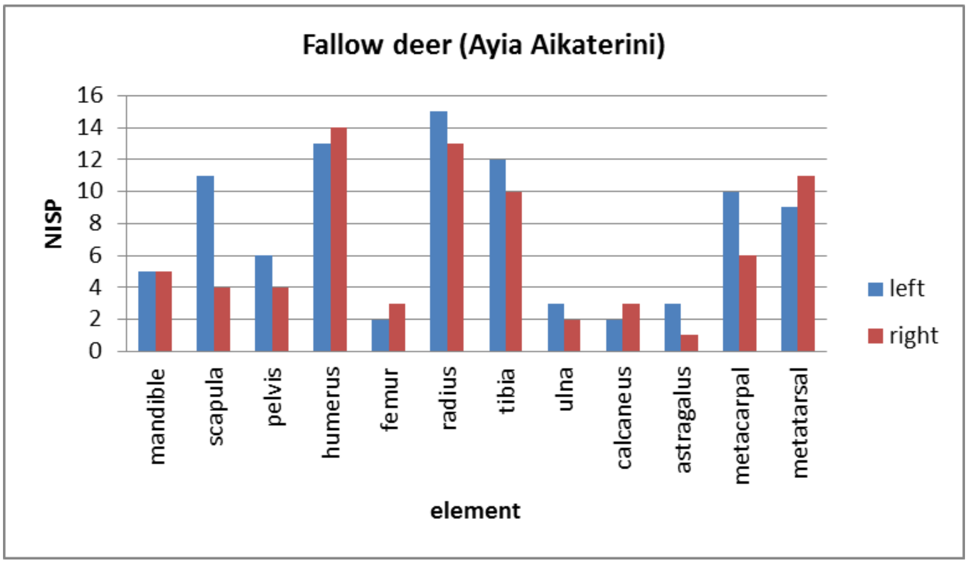

Figure 8.10 Ayia Aikaterini: element representation by side for fallow deer (NISP).

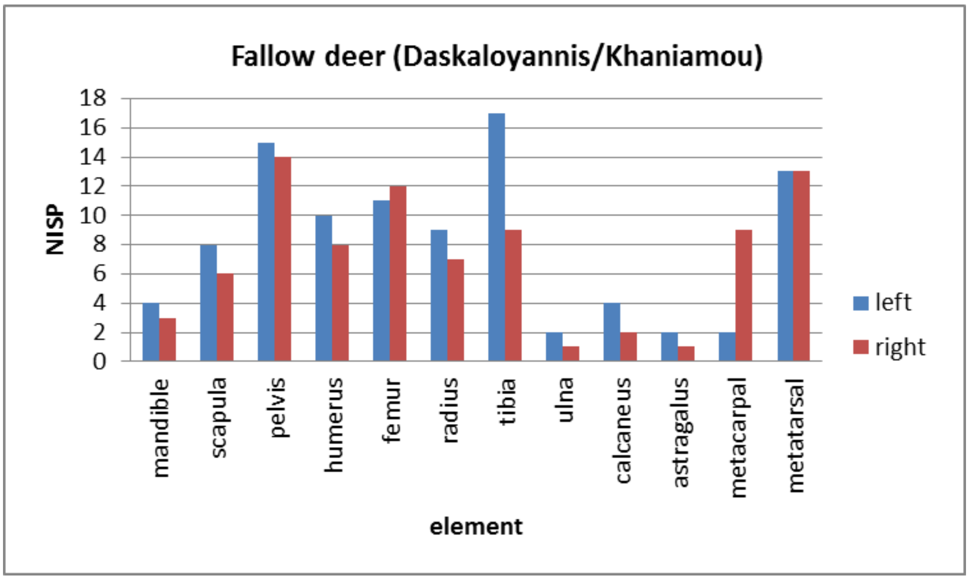

Figure 8.11 Daskaloyannis/Khaniamou: element representation by side for fallow deer (NISP).

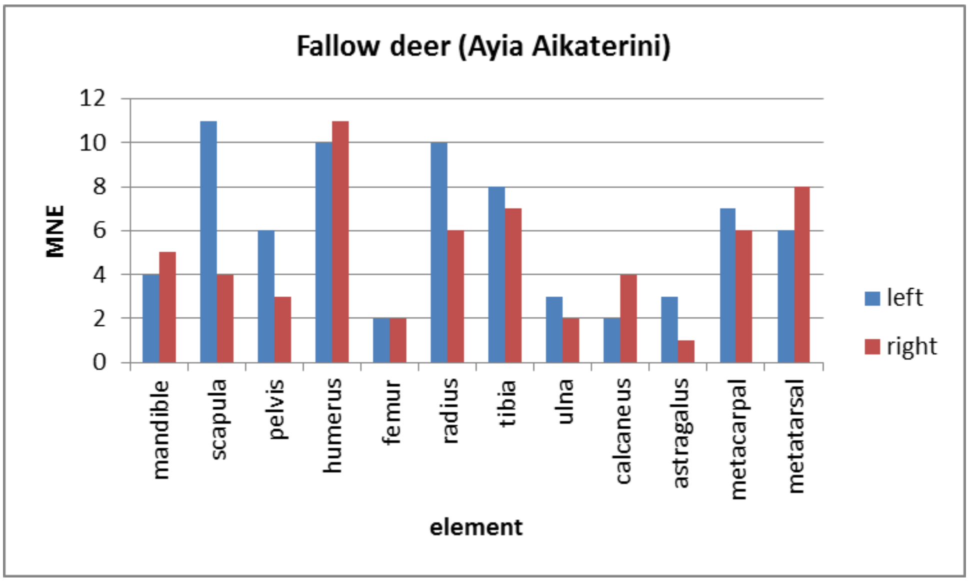

Figure 8.12 Ayia Aikaterini: element representation by side for fallow deer (MNE).

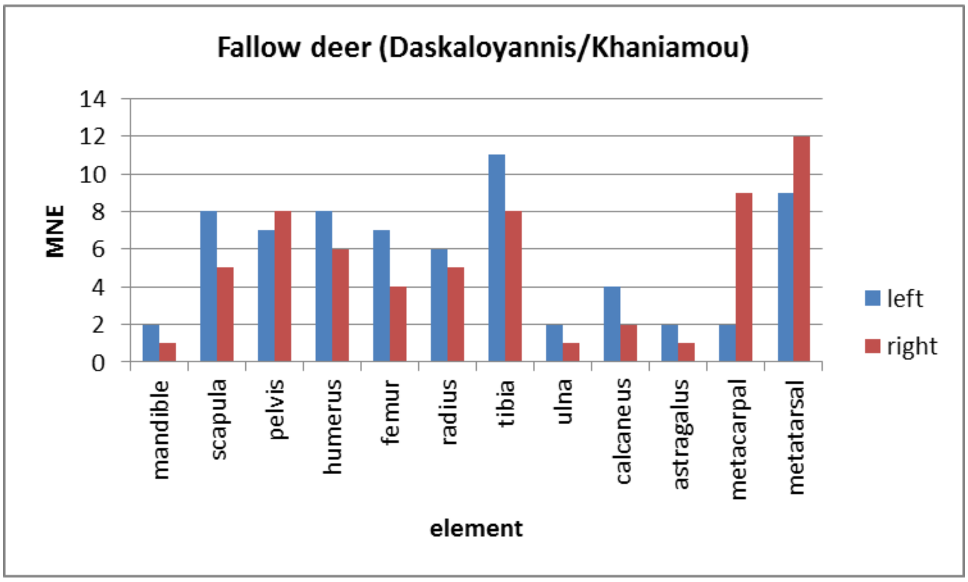

Figure 8.13 Daskaloyannis/Khaniamou: element representation by side for fallow deer (MNE).

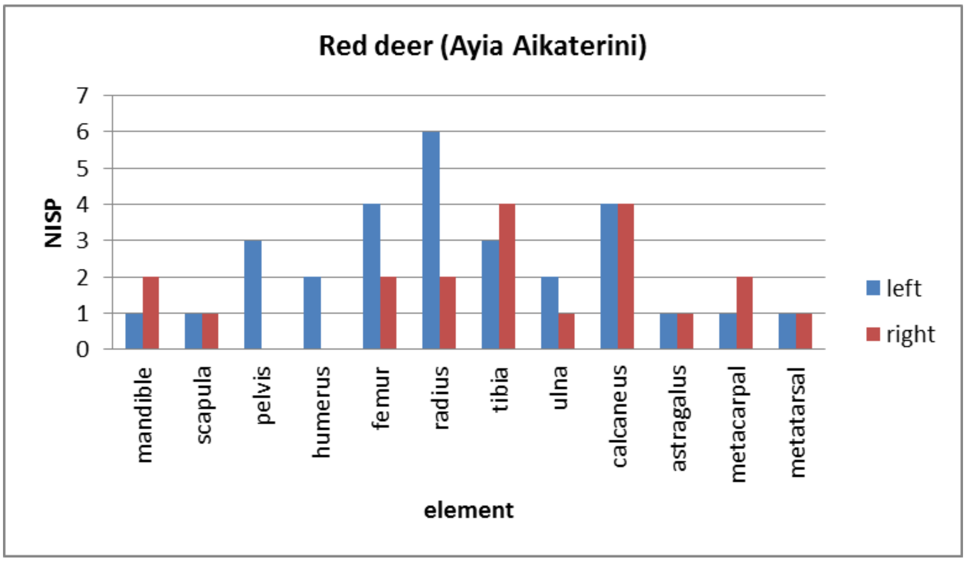

Figure 8.14 Ayia Aikaterini: element representation by side for red deer (NISP).

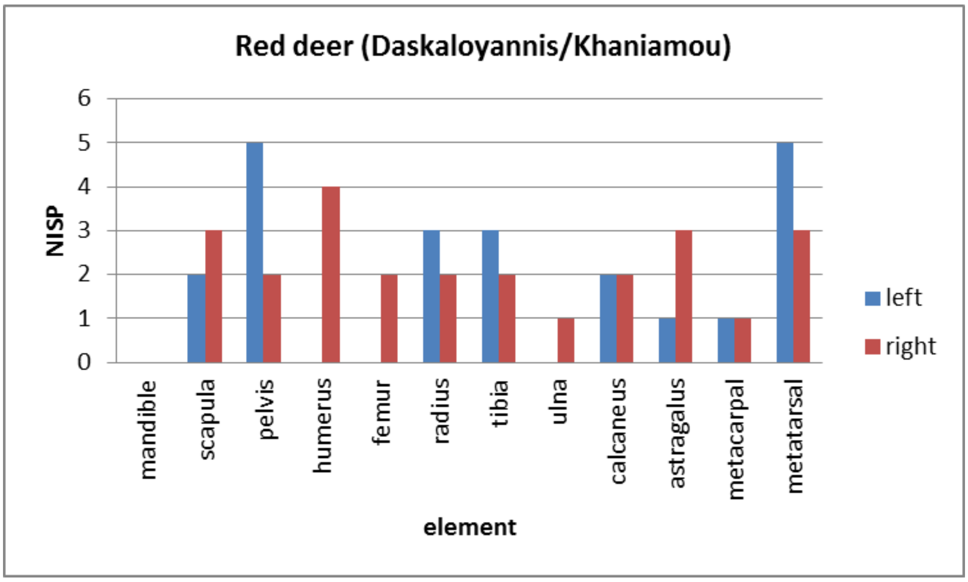

Figure 8.15 Daskaloyannis/Khaniamou: element representation by side for red deer (NISP).

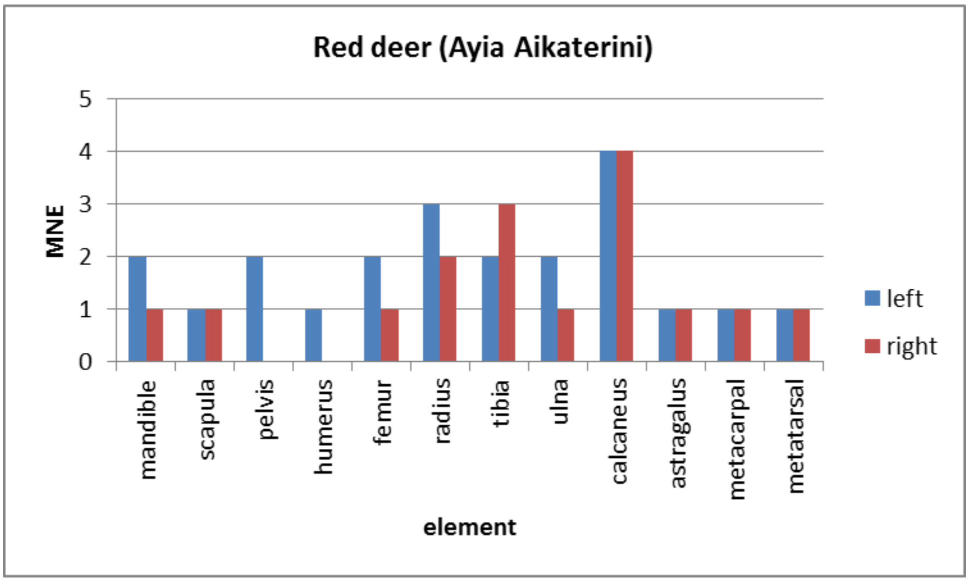

Figure 8.16 Ayia Aikaterini: element representation by side for red deer (MNE).

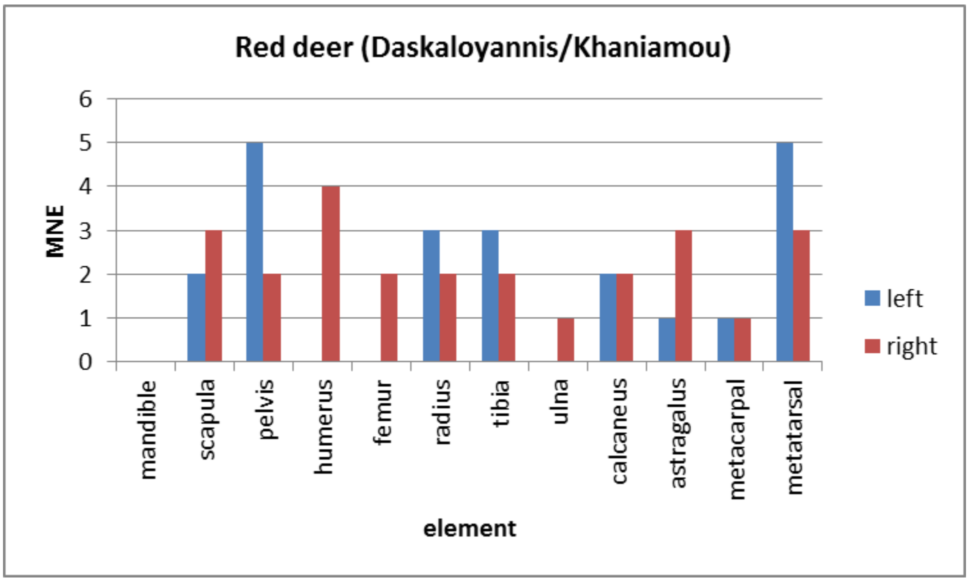

Figure 8.17 Daskaloyannis/Khaniamou: element representation by side for red deer (MNE).

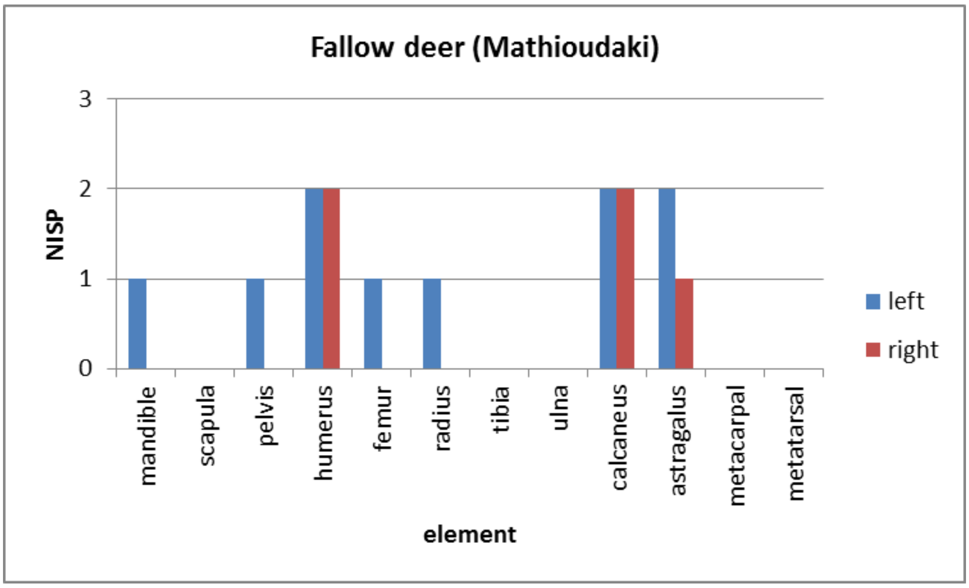

Figure 8.18 Mathioudaki: element representation by side for fallow deer (NISP).

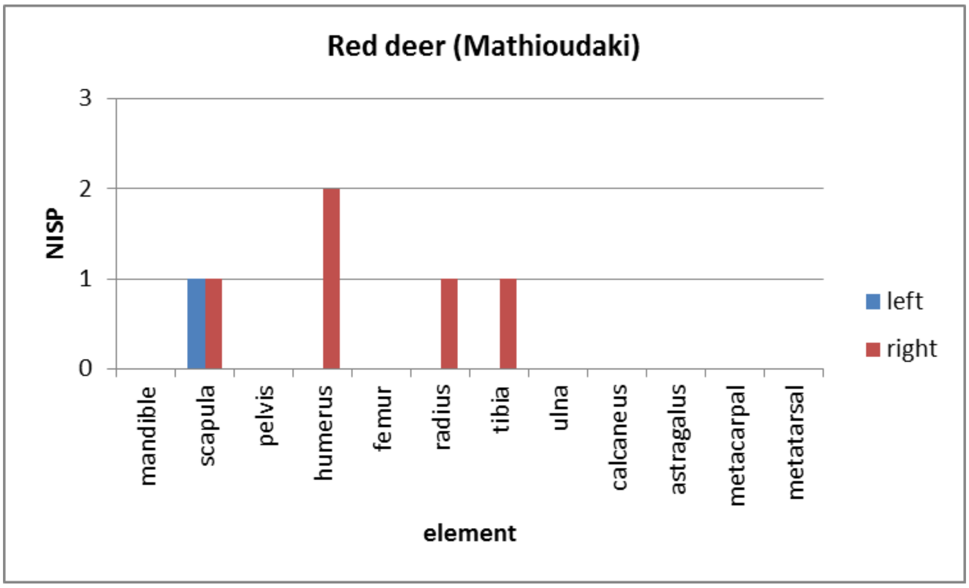

Figure 8.19 Mathioudaki: element representation by side for red deer (NISP).

8.2.2.1 Ageing

Epiphyseal fusion data (based on a known sequence of fusion at different ages for the various limb diaphyses and epiphyses), provides a broad age range based on the age at death of an animal, either before (unfused), during (fusing) or after (fused) fusion of a particular element. The epiphyseal fusion data for both fallow deer and red deer suggest that very few deer were killed as juveniles, the majority being killed as adults of 4 years or more (although it should be noted that unfused specimens are more vulnerable to taphonomic attrition than fused specimens). Figure 8.20 and Figure 8.21 indicate the number and percentage of fused, unfused and fusing fragments occurring at each age stage for fallow deer and red deer respectively (the data are presented in Appendix C). Obviously, with this method it is not possible to identify animals any older than the last age stage of epiphyseal fusion.

The toothwear data, however, are able to offer a more refined ageing sequence, based on the known order of tooth eruption and subsequent wear rate of the tooth's occlusal surface. Through this method, narrower age brackets are defined (in this case on yearly increments, after Chaplin & White 1969) and for the fallow deer indicates animals killed at a range of ages but with a strong emphasis on animals of 3-4 years. There are very few individuals showing extensive wear suggestive of elderly animals of possibly 7 years or more (Figure 8.22)[63]. The mandibles recovered from the Daskaloyannis/Khaniamou site represent a particularly narrow range of ages of between 2-4 years, the majority of which are between 3-4 years (accounting for most of the animals in this age bracket overall). There is, however, antler evidence for fallow deer yearling bucks (1-2 years old) in the Daskaloyannis/Khaniamou assemblage (see below). The mandibles from the Ayia Aikaterini site represent animals from across the age range. Only one red deer mandible with toothwear data was recovered (from Ayia Aikaterini) and indicates an animal of approximately 2 years (after Chapman & Brown 1991).

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[63] The average life expectancy of fallow deer in the New Forest in southern Britain today is 8-10yrs; in the enclosed herd in Phoenix Park, Dublin, Ireland it is 15-22yrs (Carden & Hayden 2006).

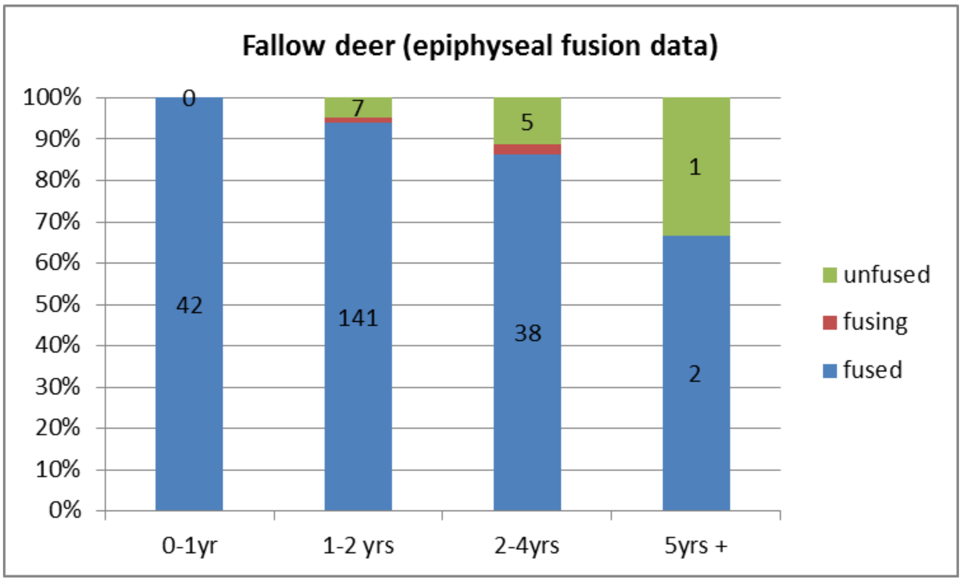

Figure 8.20 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: epiphyseal fusion data for fallow deer (after Carden & Hayden 2006).

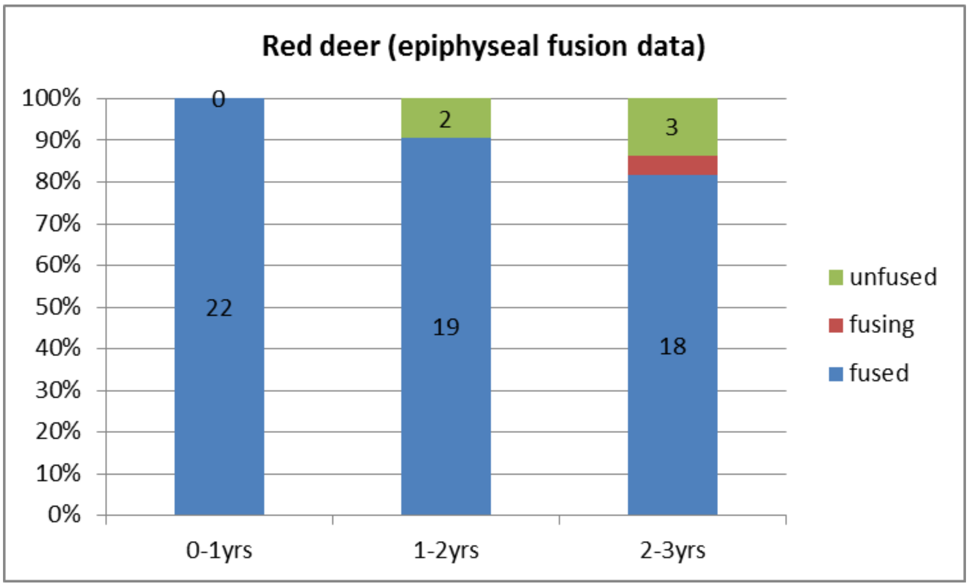

Figure 8.21 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: epiphyseal fusion data for red deer (after Heinrich 1991).

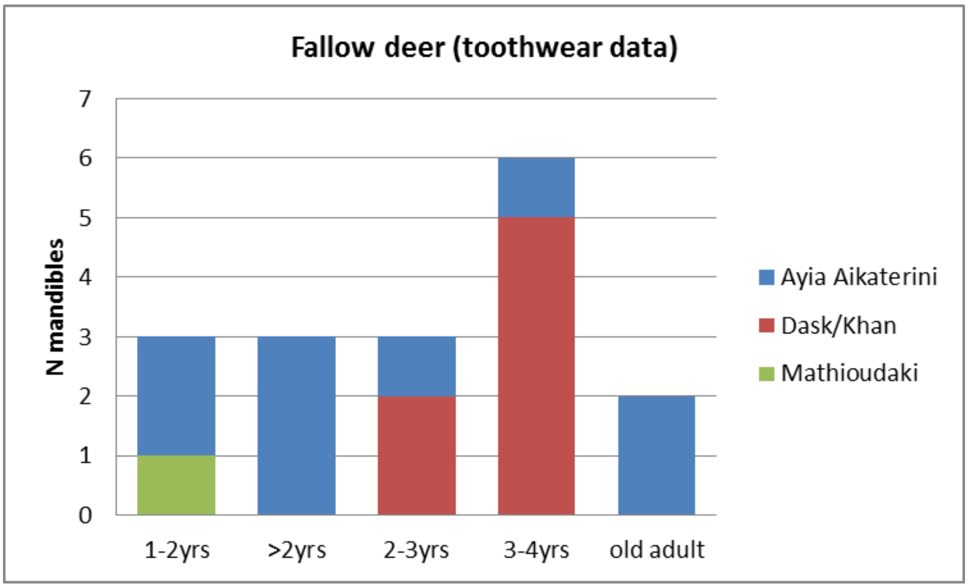

Figure 8.22 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: toothwear data for fallow deer (after Chaplin & White 1969; N.B the 'old adult' stage could represent 7+ years; see Chapman & Chapman 1975:232).

Most of the antler fragments, too, seem to indicate adult animals, and range from small fragments not identifiable to species to almost complete antlers (see Appendix G). The majority appears to be fallow antler, with occasional red deer antler fragments. There is evidence for both cast antler and for skull fragments with antler retained.

Five fallow deer skull fragments (MNI 4 from the Daskaloyannis/Khaniamou site and possible MNI 1 from Ayia Aikaterini) retain the first antler, a single unbranched spike, indicating yearling bucks that were killed between 1 and 2 years old.[64] These first antler spikes can range in length from 1 cm to 20 cm in a well-developed head and have club-shaped thickening at the base which may form a 'very irregular pearled coronet up to about 5cm in diameter' (Chapman & Chapman 1975:108, as seen in these specimens). These antler spikes are well grown by the time the fawn is almost a year old (May/June), they are retained until the following summer and cast around June, when the young bucks are about 2 years old (*ibid.*). Adult bucks cast their antler in late April/May and new antlers start to grow as soon as the old ones are cast

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[64] Appendix G specimen numbers D32, D263, D676, D2138, D2145, AA1510.

(Chapman & Chapman 1975). Two specimens (MNI 2) of fallow skull fragment with pedicle and antler base from the Daskaloyannis/Khaniamou site indicate bucks of two years or more.[65] It is not possible to postulate a precise season of death for these animals. The yearlings were probably killed sometime between early summer of their first year and early summer of their second year. As the adult bucks still retained their antlers, we can suppose that these animals were probably not killed in spring.

A number of fallow antler fragments bear resemblance in size and form to second and third heads of antler (e.g. 2nd and 3rd year growth, compared with images in Chapman & Chapman 1975; see Appendix G). However, as these examples are either of cast antler or antler fragments without the coronet, it is only possible to say that bucks of a minimum of 2 and 3 years old were present in the area, as corroborated in the epiphyseal fusion and toothwear data.

A fragment of red deer skull with pedicle shows the antler to have been cast[66]; as the new antler set begins to grow soon after the old set has been cast (April time for red deer), it is highly possible that a spring death for this animal could be posited.

Many of the antler and skull-plus-antler fragments have cutmarks or, more commonly, chopmarks. This aspect will be discussed in more detail in the following chapter (9.4).

8.2.2.2 Sexing

Several elements, namely pelvis, skull and antler fragments, are potentially indicative of the sex of deer (see also 8.2.2.3 below). Whilst naturally shed antler may have been gathered without immediate contact with the living animal, the presence of skull fragments with pedicles or unshed antler is evidence for the presence of male animals (antler fragments unless attached to the skull, have been excluded from Table 8.8).

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[65] Appendix G, specimen numbers D609, D931.

[66] Appendix G, specimen numbers D676.

The data recorded and presented in Table 8.8 show the presence of both male and female animals in the assemblages from the Ayia Aikaterini and Daskaloyannis/Khaniamou sites (there were no data from Mathioudaki). Where several fragments of a given element are present, the MNI is also provided. For fallow deer, of the potentially sexable deer pelves (based on thickness of the pubis and ventro-medial wall of the acetabulum), the data represent both male and female animals in equal quantities, and is the case for both the Ayia Aikaterini (MNI 3 of each) and Daskaloyannis/Khaniamou (MNI 2 of each) sites. However, taking skull fragments with evidence for presence/absence of antler into account, at the Daskaloyannis/Khaniamou site it is possible that more male (MNI 6) than female fallow deer were represented. For red deer, only one sexable fragment was recovered from each of the Ayia Aikaterini and Daskaloyannis/Khaniamou sites, and in both cases indicates a male animal.

Site	**species**	**element**	**female**	**?female**	**MNI**	**male**	**?male**	**MNI**	**Total**
Ayia Aikaterini	fallow deer	pelvis	3	1	MNI 3	5		MNI 3	9
	red deer					1			1
	deer		1	2			2		5
		skull + antler				2			2
	Sub-total		*4*	*3*		*8*	*2*		*17*
Daskaloyannis /Khaniamou	fallow deer	pelvis		3	MNI 2		3	MNI 2	6
		skull + antler				7		MNI 6*	7
	red deer	skull				1			1
	Sub-total			*3*		*8*	*3*		*14*
	Total		**4**	**6**		**16**	**5**		**31**
Notes: *4 from animals 1-2yrs old, 2 from animals 2+ yrs old (see Appendix G)									

Table 8.8 Ayia Aikaterini, Daskaloyannis/Khaniamou: representation of deer sex data (NISP unless otherwise stated).

8.2.2.3 Metrics

The osteometric analysis of the fallow deer material (the red deer data are too few, although see Appendix D) is discussed in relation to sexually dimorphic size differences, and the overall size of the Cretan fallow population placed in a wider context. It has been previously shown that in antler (and horn) bearing animals the forelimbs bear a greater proportion of the body weight and thus the forelimb elements show a greater degree of sexually dimorphic osteometric variation (e.g. Weinstock 2000).

Osteometric analysis of the fallow deer forelimb elements (humerus, radius, metacarpal) is presented in the form of grouped frequency distribution histograms (Figure 8.23 - Figure 8.27, see Appendix D for data). The bimodal distribution plotted in these graphs further suggests the presence of both a male and a female fallow deer population; the data are relatively evenly represented, with perhaps a slightly higher frequency in the larger (male) end of the range.

In terms of the overall size of fallow deer on Crete, a recent pan-European osteometric study of European fallow deer (Sykes*, et al.* 2013) has shown that on Crete, as on Aegean islands elsewhere (Rhodes and Chios), prehistoric fallow deer tend to be smaller than mainland Greek and Anatolian populations. Similarly, comparison of the metrical data for the red deer 1st phalanx[67] with those from the Neolithic /Bronze Age site of Bademagaci Hoyuk, Turkey[68] also indicates that the Chania red deer are smaller than the earlier, mainland red deer of Turkey (Figure 8.28).

The decline in body size of insular artiodactyl populations is a recognised phenomenon and is often attributed to a range of causes such as restricted island resources, lack of predation, or possibly selective hunting of larger individuals (e.g. Lomolino 1985, Sykes*, et al.* 2013). However, Sykes *et al.* (*ibid.*) note that of the Rhodes, Chios and Cretan fallow deer samples, the fallow deer specimens from Crete (the largest island) are larger than those from Rhodes and Chios, suggesting that in this case the size and resource availability of the islands was indeed a factor in body size decline. However, it is not known how rapidly this change in body size takes place (it is possible that it might only take a few generations, Masseti, pers. comm.), or whether the diminution in fallow size on Crete argues for a relatively long-lived population by the time of the Late Bronze Age (the date of these samples).

Unfortunately, too few data are available for a chronological comparison of Cretan fallow deer metrics. However, it is possible that here the metrical data

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[67] The only element available for which osteometric comparisons could be made.

[68] Data from de Cupere*, et al.* 2008, accessed via the Deer Bone Database (14.02.13). http://www.nottingham.ac.uk/zooarchaeology/deer_bone/search.php.

for both male and female fallow groups and for red and fallow size diminution compared to the Greek and Anatolian mainland perhaps adds further support to the hypothesis that fallow deer populations were well established by the end of the Late Bronze Age.

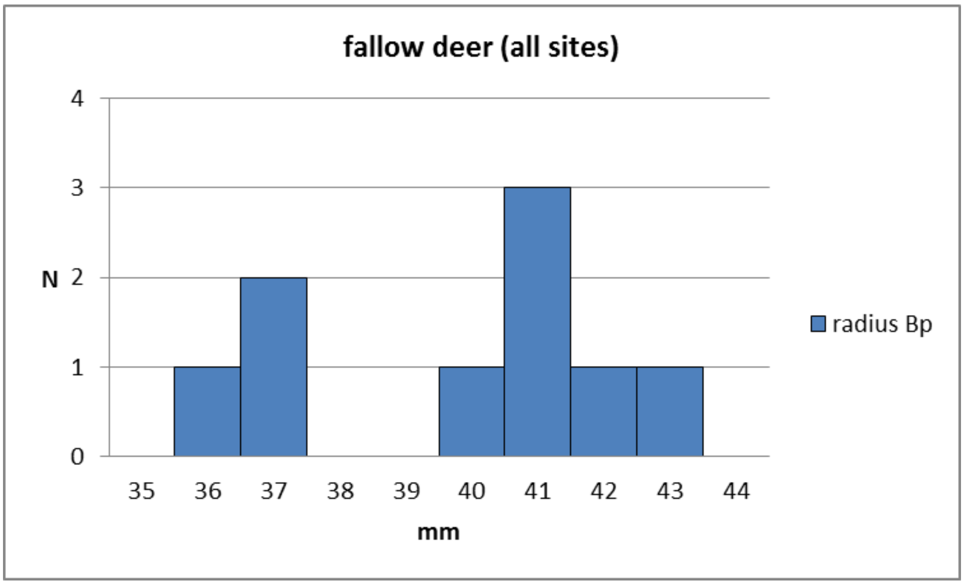

Figure 8.23Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: frequency distribution histogram for fallow deer proximal radius (mean 39mm).

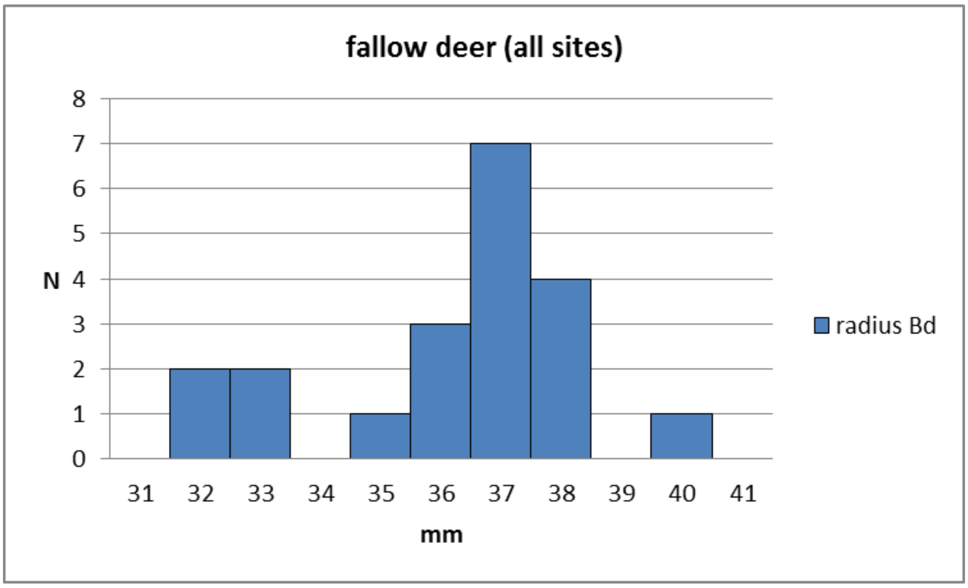

Figure 8.24 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: frequency distribution histogram for fallow deer distal radius (mean 35.7mm).

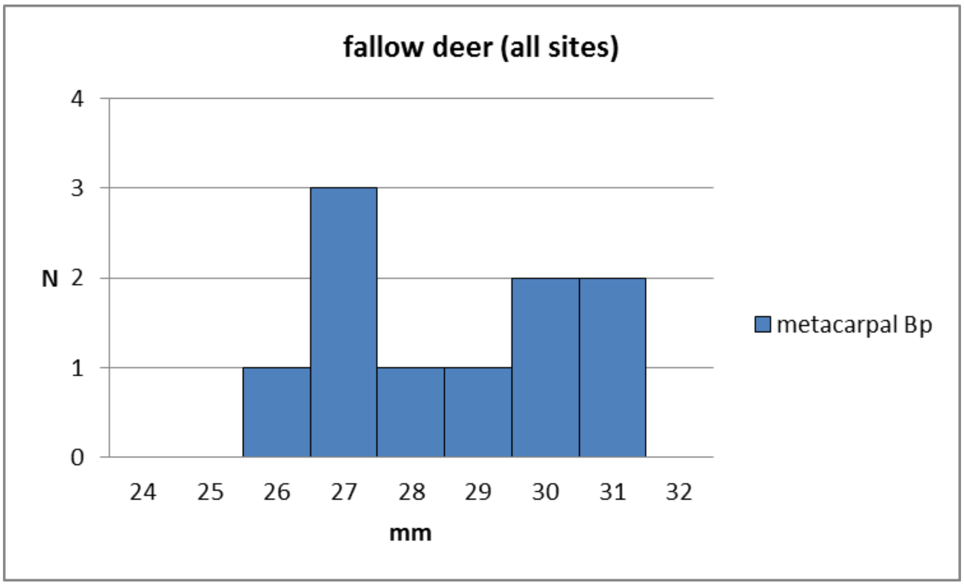

Figure 8.25 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: frequency distribution histogram for fallow deer proximal metacarpal (mean 28.2mm).

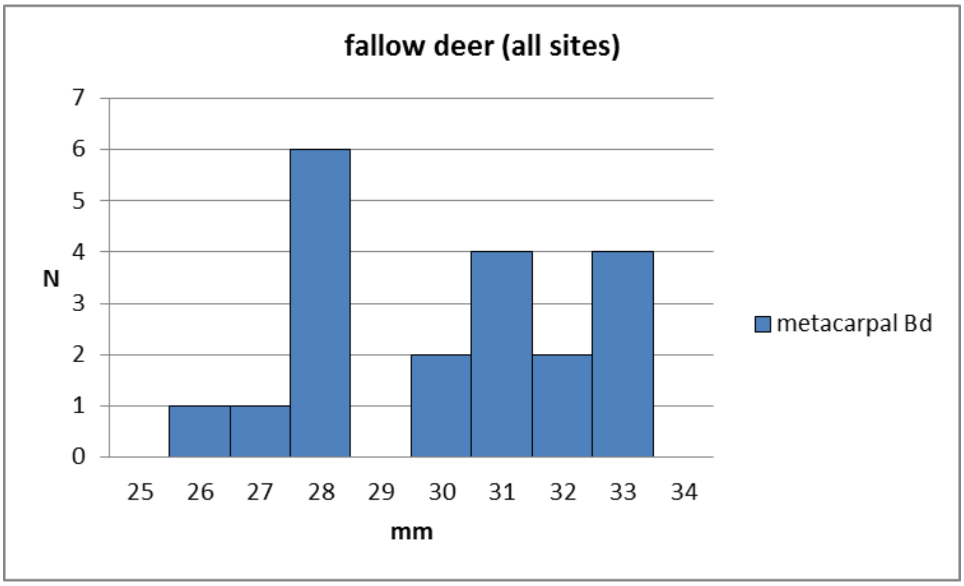

Figure 8.26 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: frequency distribution histogram for fallow deer distal metacarpal (mean 29.7mm).

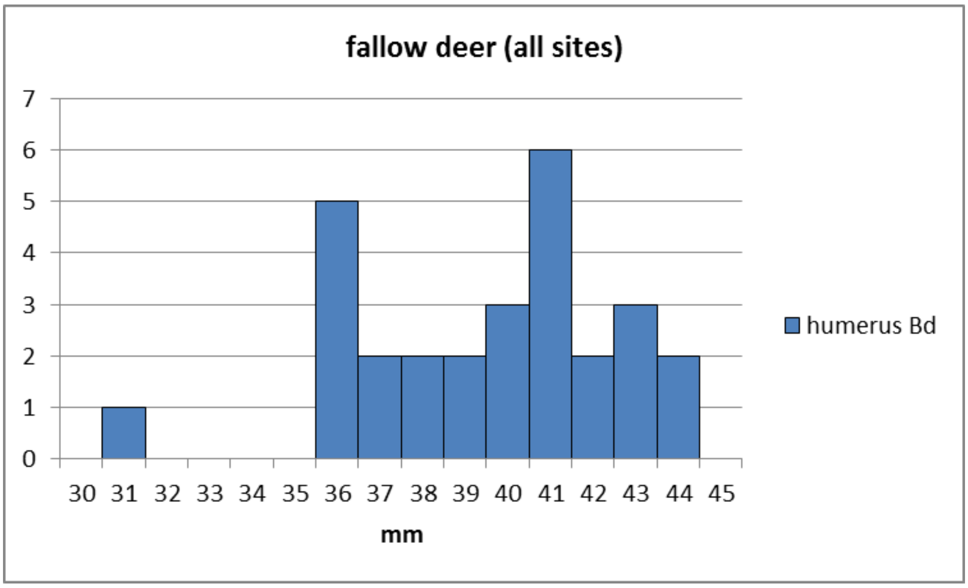

Figure 8.27 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: frequency distribution histogram for fallow deer distal humerus (mean 39.1 mm) (based on equal number of left and right elements, MNI 14).

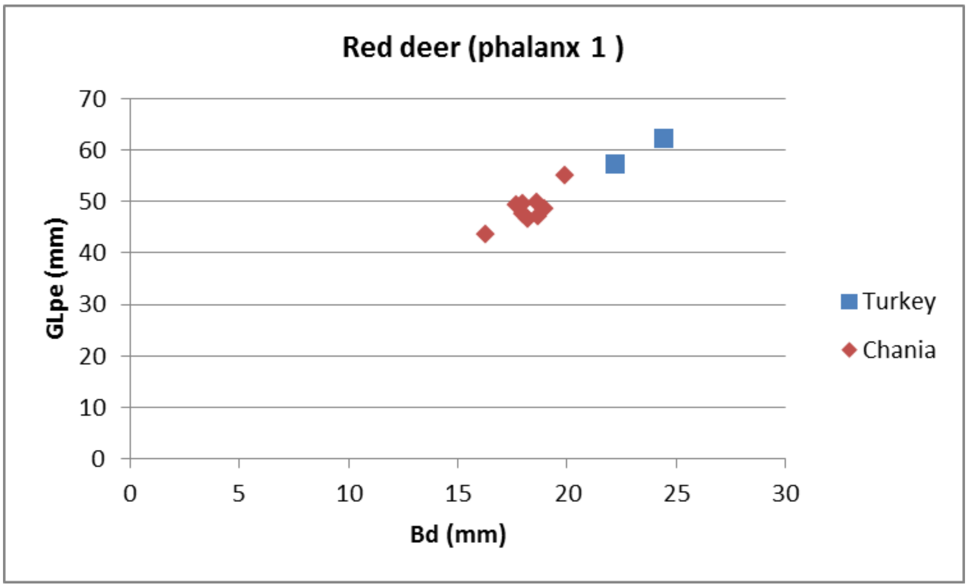

Figure 8.28 Comparison of the 1st phalanx metrical data from the Chania (Bronze Age) red deer with the red deer from Bademagaci Hoyuk, Turkey (Neolithic/Bronze Age).

8.2.2.4 Hunting or management?

As noted previously, the small quantity of deer and agrimia remains generally found on sites across Crete suggests a difference in the nature of contact compared to the human /domestic animal relationship (which results in more abundant remains). Generally in the case of deer and agrimia, this is assumed to be through hunting (see Chapter 6). The higher quantities of deer here could reflect a far greater emphasis on hunting deer 'in the wild' in this area of Crete; alternatively, the high quantities of deer remains may reflect a deliberate 'management' of deer herds, with hunting perhaps occurring in a performative manner. The question of identifying deer management in the zooarchaeological record is difficult to answer (Davis, 2003, is not optimistic that it is even possible), however, some attempt will be made here.

Environment

The natural environment in the wider Chania region would have been well suited for fallow deer and red deer populations, both suited to mixed deciduous woodland and open areas. Moody (1990) note that in prehistoric west Crete, although some areas of the high mountains may have been covered by oak, pine and fir forest, the low hills and coastal plains were rather a mosaic of approximately 50% woodland and 50% non-woodland. Until c.1500 B.C this would have been a mixture of mixed evergreen and deciduous woodland and garigue[69] , after which it changed to one of mixed woodland and steppe[70]. Fallow deer and red deer can 'associate happily', and when both are present in the same forest area their distribution is effected by the size of the trees (Batcheler 1960, based on the example of several British forests[71]).

Social organisation

Fallow deer, like red deer, are gregarious and form herds; however the size and composition of the herd varies with time of year. For part of the year (5 months minimum), the adult fallow bucks form bachelor groups and live apart from the doe herds (leaving the does in winter/early spring), which comprise adult females, yearlings and fawns; the two herds reunite for the rut (Chapman & Chapman 1975:157). Buck fawns leave the group as yearlings (c. between 18-20mths of age) and return as adults for the rut. Thus the largest groups of deer occur just before rut (August/September), and the smallest groups after birth of fawns (July).

Chapman and Chapman (1975) note that in a living park herd[72] most natural mortality appears to occur in the very young and the old; this may be different for wild herds, as deer dying of natural causes are much less likely to be found in the wild. The ratio of males to females in a herd varies with the time of year (as well as on type of herd being managed, see below), but there are generally fewer males than females. For example, in the case of the South Weald herd in the UK[73] , if allowance is made for fawns and yearlings, then less than 10% are bucks over 2 years of age; a similar figure is noted for other studies (Chapman & Chapman 1975).

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[69] Grey-green, often aromatic, undershrubs of permanently low stature.

[70] Herbaceous plants, grasses, bulbous or tuberous perennials and annuals.

[71] In Batcheler's (1960) study, red deer were significantly more numerous in forest stands of smaller median diameter than were fallow deer (the latter being most numerous in older forests).

[72] In Richmond, UK, and a similar picture is indicated in other examples.

[73] The sex ratio is between 44-60 males per 100 females in the South Weald herd.

Deer management

Modern examples of intensive fallow deer herd management (in Chapman & Chapman 1975) suggest that in a system of management for sport their number is restricted; an equal sex ratio is aimed for, and bucks of a desired quality are not shot before they have reached maturity. If fallow are managed for meat then a preponderance of does is required and heavy culling of yearlings results in greater productivity. The increase in weight of a fallow deer occurs in its first year and, although the animals eat as much, or more, in subsequent years, the increase in weight is less (Chapman & Chapman 1975:191). If the aim is to reduce or maintain a stable population, e.g. in the absence of natural predators, the females need to be culled if the size of the population is to be reduced; this will have a far greater effect than culling the same number of males (Chapman & Chapman 1975:185).

It is often the mortality profiles and sex ratios of fallow deer in zooarchaeological assemblages that are cited as evidence in discussions of hunting versus management. For example, in their analysis of the status of Mesopotamian fallow deer on Cyprus - introduced from c.10,000 BP -, Vigne, *et al.* (2003, 2011) suggest that at Shillourokambos fallow deer were never domesticated and were intensively hunted. Their conclusion is based on the kill-off profiles which suggest that all age classes were slaughtered, especially animals between 2 and 4 years (which they suggest are ‘young adults of relatively low yields’) and adults (Vigne, *et al.* 2003:244). They note that this is not very different from the natural distribution of ages in a living population without a large predator and suggests no selective strategy (*ibid.*). Furthermore, the equal distribution of male and female adults is also suggested as revealing no selective strategy. Based on these observations they state that ‘most of the deer (if not all) were obtained by hunting’ (Vigne*, et al.* 2003:245).

Davis (2003), in his analysis of fallow deer remains from Khirokitia on Cyprus, noted a greater number of females to males in one of the layers which he suggests might indicate the penning of more docile does nearer to the site, whereas the more aggressive males may have been released.

The data in this assemblage suggest that, although red and fallow deer of less than 1 year are represented, the majority of deer appear to be adult animals of more than 2 years, and predominantly of 3 - 4 years (as indicated in the toothwear and epiphyseal fusion data), and reflects a natural distribution of ages in a living herd[74] .

The age-at-death profile for deer is in contrast with that of the domestic species, for each of which (sheep, goat, pig and cattle) there is a significant proportion of young animals killed, e.g. less than 1 or 2 years, which may indicate that deer were not closely husbanded in the same way as the domestic species. However, the presence of all parts of deer body suggest the whole animal/carcass was present at the site, even if brought back from hunting further afield. This is in contrast to Vigne *et al*'s (2011:263) suggestion that at Shillourokambos, Cyprus, butchering of fallow deer took place on the hunting site with the head and limb extremities being left unused on the kill site.

The sex ratios for the deer of these assemblages indicate that, although does are represented, there is perhaps a higher representation of male animals. If taking into consideration that in a fallow herd structure bucks are fewer than does, then this emphasis on males is more pronounced.

In modern fallow deer herd management systems described above, Chapman & Chapman (1975) suggest that, in the absence of predators, to reduce or maintain a stable population of deer, killing a higher preponderance of females will have greater effect than killing the same number of males. Given the absence of natural predators of deer on Crete, if the Chania deer remains were the 'by-product' of maintaining a stable and healthy park herd[75] then a higher number of remains of females to males might be expected. In maintaining a deer herd primarily for meat, Chapman & Chapman (1975) observe that 'greater productivity' results from increased culling of yearlings as deer put on most of their weight in the first year; therefore, higher number of yearling to older deer would be expected in this model. In a herd maintained for sport, on the other hand, equal ratios of males and females are required but bucks are not killed before they reach maturity.

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[74] The highest number of deaths occurring in the very young and very old in a natural mortality profile of a park herd (Chapman & Chapman 1975).

[75] In the absence of natural predators, fallow deer numbers can dramatically increase, leading to death through disease and starvation.

The fallow deer remains from the Chania contexts represent a relatively equal number of does to bucks with perhaps a slightly higher number of bucks, an emphasis on mature animals between two and four years of age but also with a number of young males between one and two years. Perhaps unsurprisingly, this data does not fit any of the models for intensive fallow deer herd management outlined above, and perhaps indicates no 'deliberate selection strategy' for any one particular reason (to do with age or sex).

Until such time as evidence for actual deer parks are recognised in the Chania region, it is difficult to say for certain whether these data indicate that the Chania deer were part of a managed herd or were wild. It is possible that the significantly greater quantities of deer in the Chania assemblages indicate the deliberate maintenance of herds in this region, however they were seemingly not intensively managed for a single outcome (e.g. sport, meat) as described for modern deer herd management systems. It could perhaps be considered more likely that the broad age range of deer in the assemblage and the presence of deer of both sexes, and both species, represent encounters between hunters and deer taking place in the wild. Ultimately, however, this material does not necessarily reflect activities taking place on the site as a whole, nor live deer herd profiles and herd management strategies; rather, it represents the selection of animals, consumption choices and depositional practices appropriate for these specific contexts.

8.2.3 Agrimia

Due to the problems of identifying agrimi postcranial remains (see Chapter 6.4.3), here agrimi identifications are based solely on the large horncores (Figure 8.29; see Appendix B for data, and Appendix H for catalogue of horncores).

The identification of a domestic and wild population of goats based on the osteometric data is problematic, notably due to the marked sexual dimorphism observed in goats (as well as regional, nutritional, and age based variation; e.g. Zeder 2001), and a degree of overlap between osteometric ranges for domestic and wild goats, especially amongst females (*ibid*).[76] However, comparison of

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[76] Part of Zeder's study was based on modern samples, and she notes that a size reduction in wild goats has occurred over the last 10,000 years.

the measurement for the radius proximal width[77] in goats from Palatial period deposits at Knossos and elements identified as agrimia at Late Neolithic Phaistos (Figure 8.30), shows the majority of the Chania material to have a similar profile to the data from Knossos but with some larger specimens comparable to those identified (on morphological characteristics) as agrimia at Phaistos. However, further systematic research on the identification of agrimi postcranial remains in archaeological assemblages is needed before detailed discussion on the composition of agrimi populations in archaeological contexts is possible.

Based on identification of the horncores alone, the percentage of agrimia remains from the Chania sites (Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki) is comparable to a few other sites across Crete (see Figure 8.31). Perhaps most importantly, however, agrimi horncore deposits often consist of a set of complete or partially complete horncores attached to the frontal part of the skull (see Appendix H).

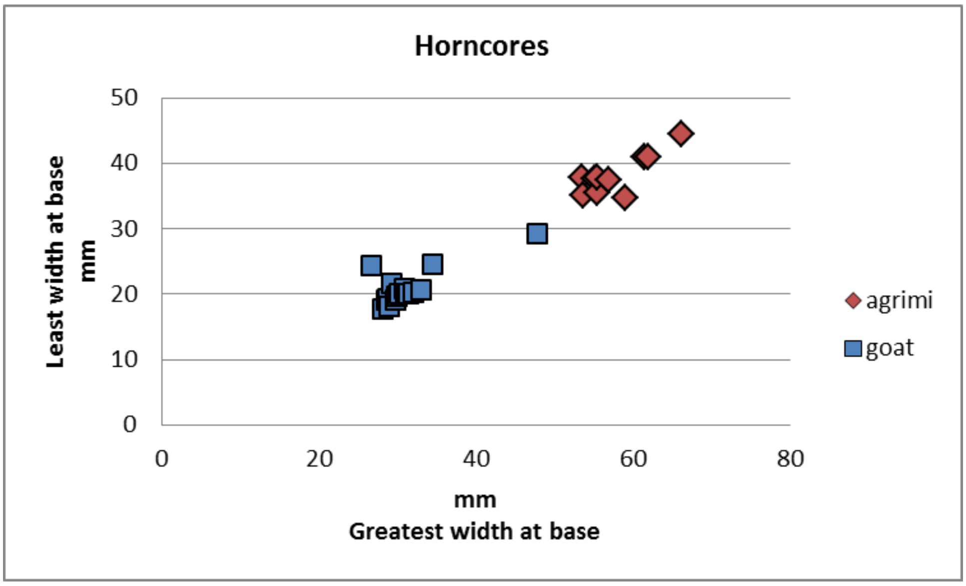

Figure 8.29 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: plotting of the greatest width of horncore base against the least width of horncore base (von den Driesch 1976 measurements 41 and 42) for agrimi and goat.

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[77] This is a measurement which was recorded in both the Knossos and Phaistos material.

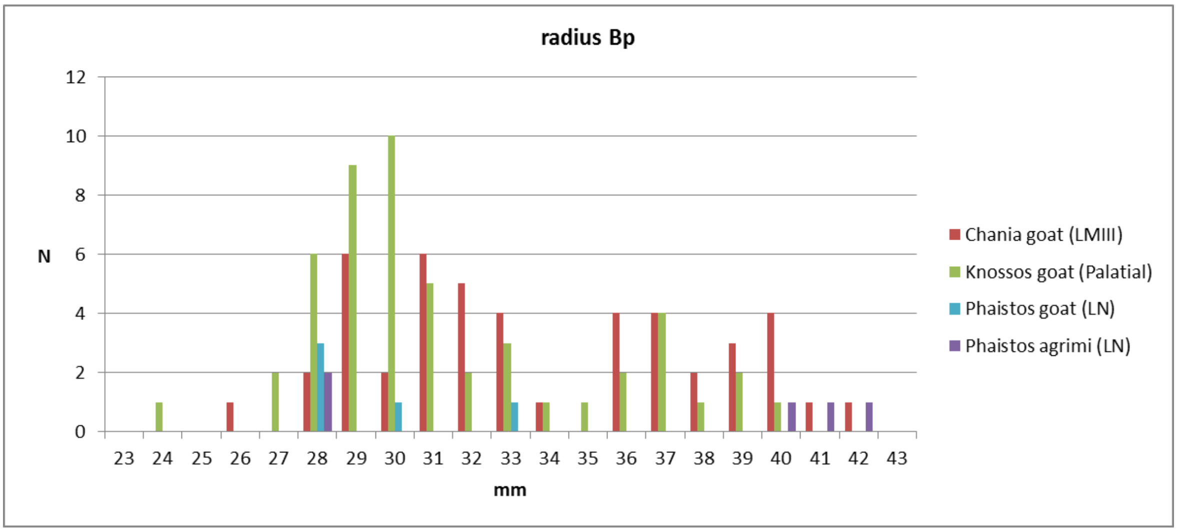

Figure 8.30 Comparison of the radius proximal width for goat at Chania, Knossos and Phaistos, and agrimi at Phaistos (Knossos data after Isaakidou 2004; Phaistos data after Wilkens 1996).

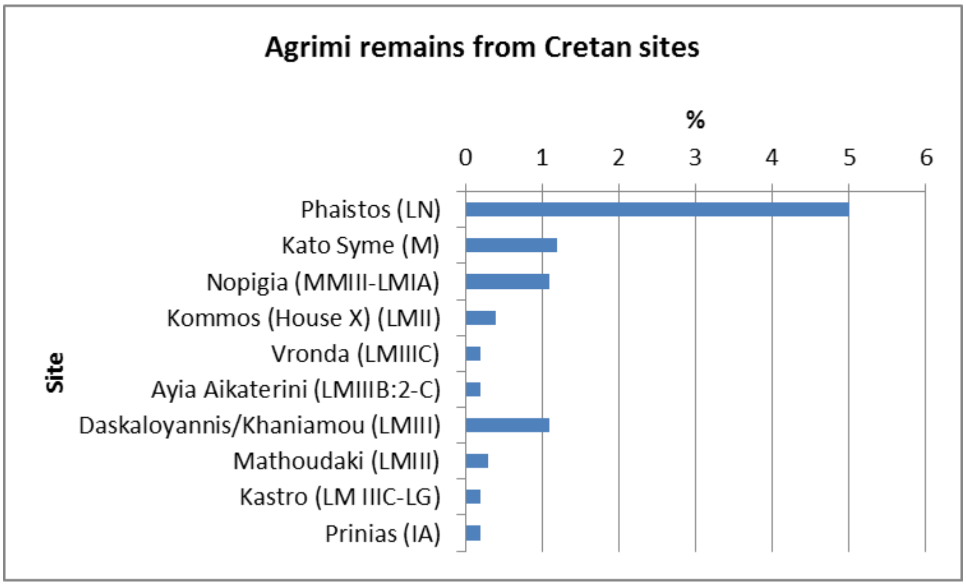

Figure 8.31 Percentage of agrimi remains from sites across Crete where NISP >100, based on data in Table 6.2 (LN=Late Neolithic, MM=Middle Minoan, LM=Late Minoan, LG=Late Geometric, IA=Iron Age).

8.2.4 Sheep and goat

As at most other sites across Crete, sheep and goat are the most frequently occurring species in the assemblages (Daskaloyannis/Khaniamou 49%, Ayia Aikaterini 58%, and Mathioudaki 63%). The material identifiable to sheep and goat is fairly evenly represented, with a slightly higher percentage of sheep to goats (Figure 8.32).

Of the sheep and goat pelves identifiable to male or female, both the goat and the sheep data indicate a higher number of females to males. However, including the data for pelves identifiable only as sheep/goat combined, suggests a more even male to female ratio (Figure 8.33, Table 8.9).

The age data for sheep and goat based on mandibular toothwear sequences (after Payne 1973, 1987) suggest that both sheep and goat were kept until adults, with a peak in culling of animals between four to six years of age (Figure 8.34, Figure 8.35).

There is variation, however, in the age profiles for sheep and for goat. The data for sheep indicate an emphasis on animals killed at less than one year or older than four years (4 - 10 years). For goats, however, a more gradual culling between one and four year occurs, with an increase between four and six years, but very few beyond six years. The emphasis on adult animals, particularly so for sheep, could indicate an interest in secondary products such as milk and wool[78]. The more regular culling of goats at a variety of ages, however, might indicate that these animals were perhaps more regularly killed for meat.

The epiphyseal fusion data for sheep/goat (Appendix C) also indicate an emphasis on older animals; in contrast to the toothwear data, however, there is no evidence for animals less than one year, which might suggest that these elements were subject to taphonomic attrition.

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[78] Isaakidou (2004) also notes an increase in survivorship of sheep beyond 6 years at Knossos during the Bronze Age (particularly in Late Minoan I) which she suggests is a product of the Palatial wool industry.

Site	**species**	**element**	**female**	**?female**	**male**	**?male**	**Grand Total**
Ayia Aikaterini	goat	pelvis	7	1	2	3	13
	sheep	pelvis	14	1	4	1	20
	sheep/goat	pelvis	10	3	8	6	27
Daskaloyannis/Khaniamou	sheep/goat	pelvis	3	1	2	5	11
Mathioudaki	sheep/goat	pelvis	3	0	1	1	5
Total			**37**	**6**	**17**	**16**	**76**

Table 8.9 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: representation of male and female elements for sheep and goat.

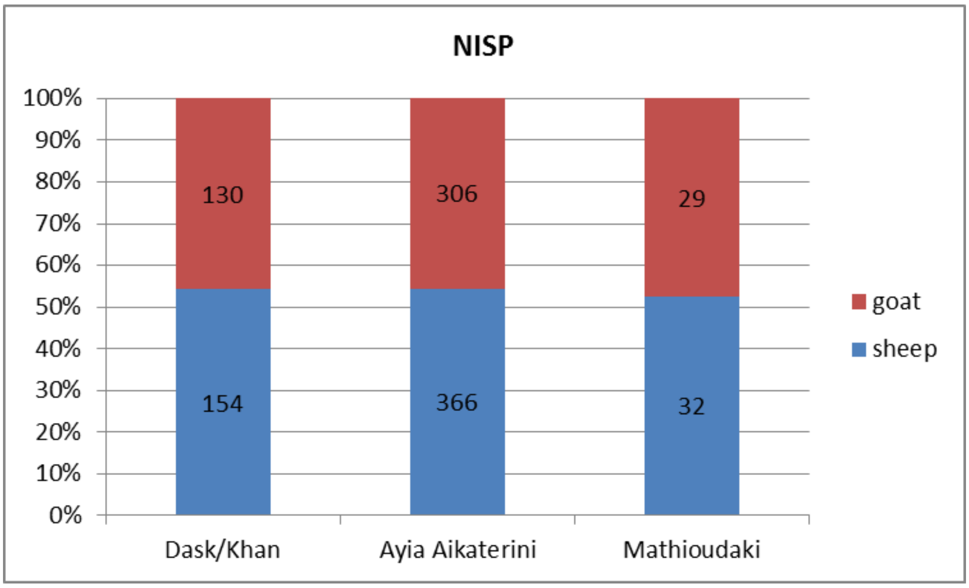

Figure 8.32 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: relative quantities, in numbers of specimens and percentages, of sheep and goat (NISP).

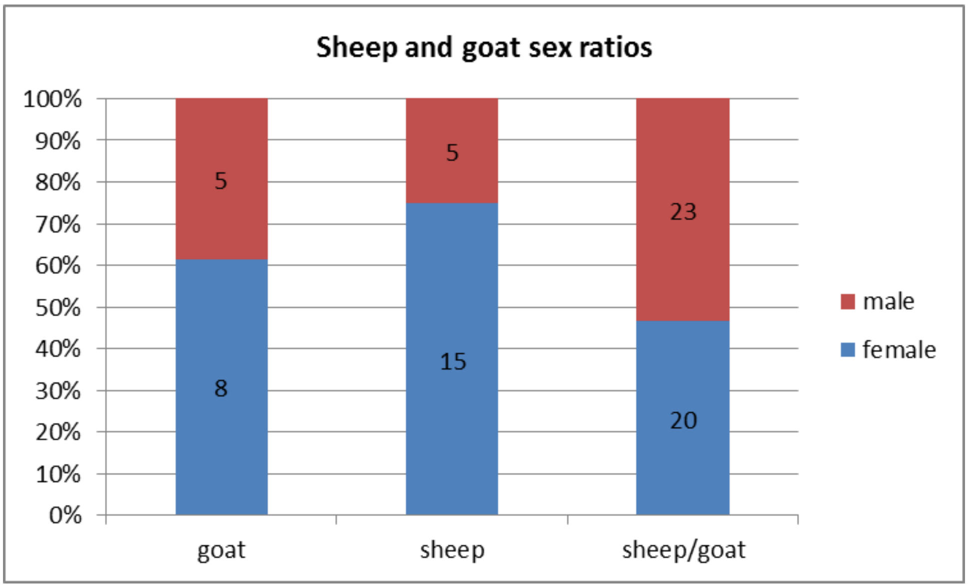

Figure 8.33 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: frequencies of male and female pelves for sheep and goat.

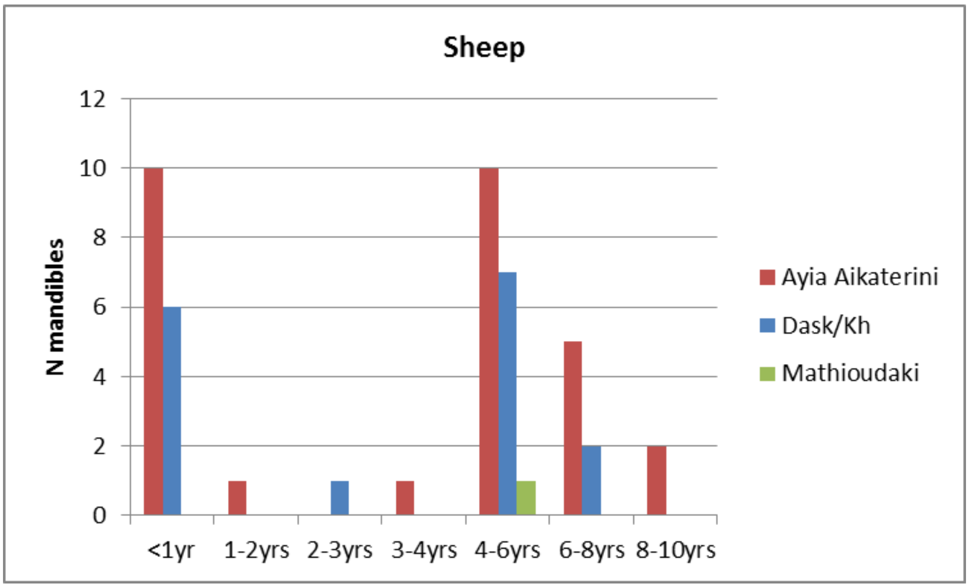

Figure 8.34 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: age data for sheep based on mandibular toothwear stages (after Payne 1973 and 1987).

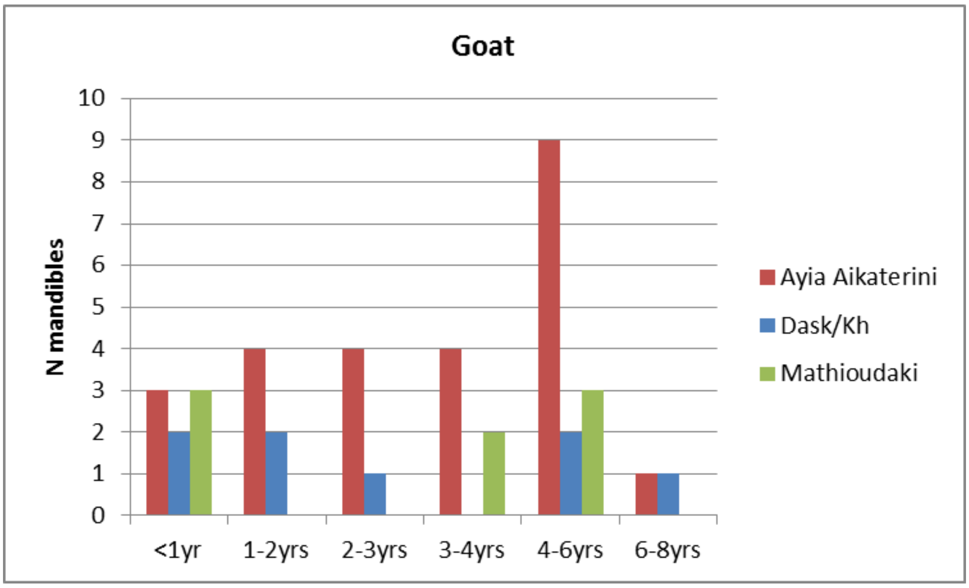

Figure 8.35 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: age data for goats based on mandibular toothwear stages (after Payne 1973 and 1987).

8.2.5 Pigs

Pigs are the second most frequently occurring species in the Daskaloyannis/Khaniamou, Ayia Aikaterini and Mathioudaki assemblages (19%, 20% and 17% respectively). This pattern is also the case for many other sites across Crete, with the exception of Middle and Late Neolithic Knossos, Late Neolithic Phaistos, and the Iron Age temples of Kommos and Prinias (Chapter 6, Table 6.3) at which cattle occur more frequently than pigs.

In general, of the elements attributable to male and female animals, the data indicate a higher quantity of male animals (Table 8.10). The toothwear data suggest that the majority of pigs were killed between one and two years of age (Figure 8.36). Although at the Daskaloyannis/Khaniamou site there is no pig toothwear data indicative of animals older than 27 months, the epiphyseal fusion data do suggest the presence of a small amount of older animals of 3.5yrs or more (see Appendix C). In general, the metrical data for pigs indicates relatively small animals within the lower end of the size range for domestic pigs identified at Bronze Age Knossos (see Appendix D.2), and thus perhaps suggests feral animals are not represented here.[79]

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[79] Isaakidou (2004) identified a population of feral pigs at Knossos.

Site	**species**	**element**	**female**	**?female**	**male**	**?male**	**Grand Total**
Ayia Aikaterini	pig	mandible	6	2	15	1	24
	pig	skull	3	1	5		9
Daskaloyannis/Khaniamou	pig	mandible	3		9	3	15
	pig	skull				1	1
Mathioudaki	pig	mandible			1		1
Total			**12**	**3**	**30**	**5**	**50**
Notes: loose teeth: female N-6, male N-23							

Table 8.10 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: representation of male and female elements for pigs (skull is maxillary portion with upper canine).

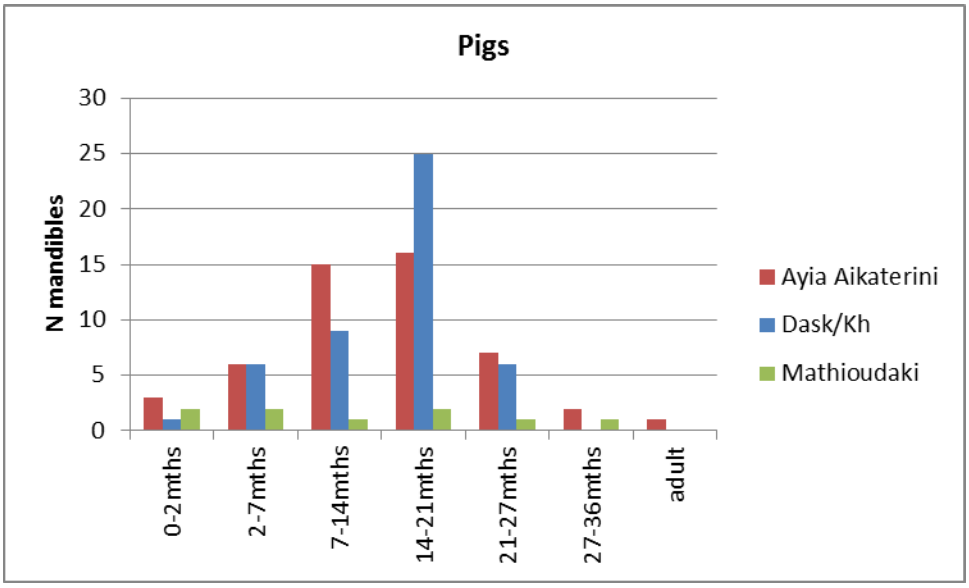

Figure 8.36 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: age data for pigs based on mandibular toothwear stages (after Grant 1987).

8.2.6 Cattle

Cattle are the third most commonly occurring species in the Mathioudaki assemblage and this also tends to be the case for many other sites across Crete (see Chapter 6, Table 6.3). In the Daskaloyannis/Khaniamou and Ayia Aikaterini assemblages, however, deer (fallow and red combined) represent a greater percentage of the assemblage than cattle.

Toothwear data for cattle (Figure 8.37; see also epiphyseal fusion Appendix C.2) indicate that, overall, the majority of cattle were killed as adult animals; however, a significant proportion of cattle were killed between 1.5 and 2.5 years (before reproductive age). The data for sexing the cattle remains are limited but where available indicate a fairly even representation of male to female animals, with the latter being slightly better represented than the former (Table 8.11). This is corroborated by the distribution histogram for the distal width of the metacarpal (a measurement that offers the best distinction between the sexes, cf. Davis, *et al.* 2012) which also indicates two groups (of animals older than 2 years[80]), with the female group, at the lower end of the spectrum, being better represented (Figure 8.38, see also Appendix D). In general, the size of the cattle from these assemblages is comparable to those at the smaller end of the spectrum in the Knossos palatial period data. There does not appear to be large-sized cattle comparable to those at Knossos identified by Isaakidou as used for traction and/or 'prestige' activities (see Appendix D.2; after Isaakidou 2004:240-241).

This pattern may indicate animals kept for a range of secondary products (breeding, milking, traction etc.), but also with an emphasis on young meat.

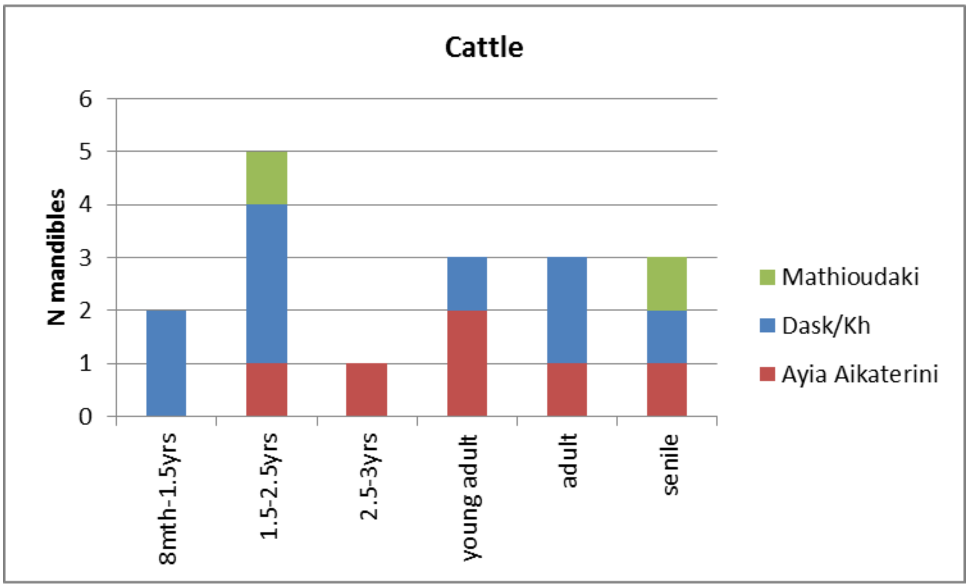

Figure 8.37 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: age data for cattle based on mandibular toothwear stages (after Grant 1987).

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[80] The distal metapodial is fused by 2 years of age.

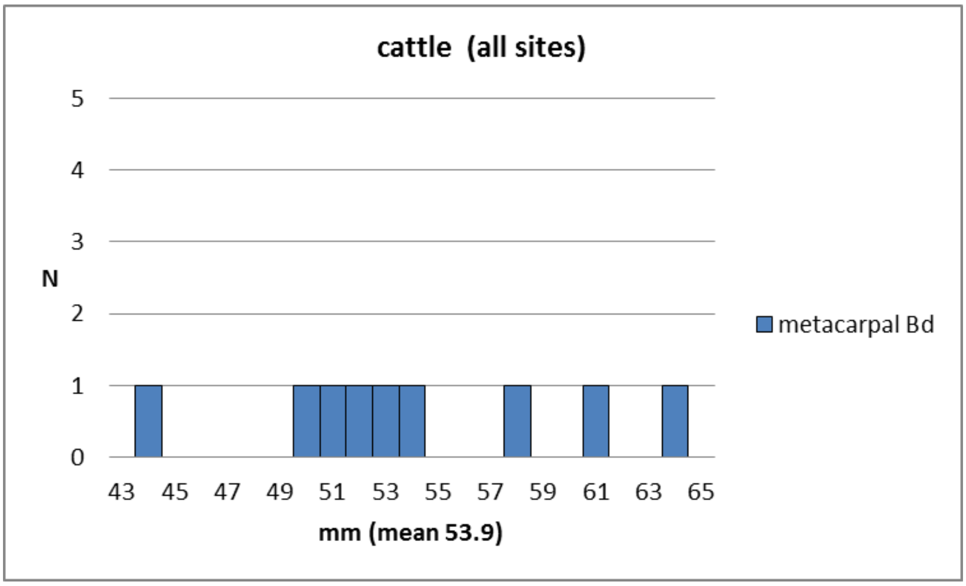

Figure 8.38 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: grouped frequency distribution histogram for cattle distal metacarpal.

Site	species	element	female	?female	male	?male	Grand Total
Ayia Aikaterini	cattle	pelvis	5	2	2	4	13
Total			**5**	**2**	**2**	**4**	**13**

Table 8.11 Ayia Aikaterini: representation of male and female elements for cattle.

8.2.7 Equids

Equid remains occur at each of the sites. The relatively high NISP (N=97) for equids at the Daskaloyannis/Khaniamou site is conflated by the presence of a partially complete individual (81 pieces including rib fragments and loose teeth; specimen numbers 686-703, see Table 8.12, discussed further below). The minimum number of individual (MNI) equids at each site is four at Daskaloyannis/Khaniamou, two at Ayia Aikaterini and one at Mathioudaki. Of the four individuals in the Daskaloyannis/Khaniamou assemblage, two came from the Pit M assemblage and two from Pit ?M assemblage. The majority of the equid remains from the Ayia Aikaterini assemblage came from LMIIIC layers of the Rubbish Area North although no articulations were noted (see Table 8.12).

All the equid postcranial elements with articular elements present were fused, indicating adult animals. The extremely worn state of the teeth of the partially complete skeleton in Pit M indicated an advanced age of 15-17 years based on the crown height measurement of the mandibular third molars (after Levine 1982). The second individual in Pit M appeared to be a somewhat younger age of 4-5years based on a crown height measurement of the mandibular second molar (*ibid.*). The remaining two individuals in the Daskaloyannis/Khaniamou assemblage are another horse of more than 3.5 years in age (based on the fused distal radius) and a donkey of more than 1.5 years based on the fused distal metacarpal (see Table 8.12).

Of the equid remains in the Ayia Aikaterini assemblage none of the late fusing diaphyses/epiphyses were present; a minimum age based on the latest fusing element present (distal humerus, distal metacarpal) is 1.5 years. Three lower incisors identified as *E. asinus* by Persson (noted in the assemblage) were in a much worn state, indicating an animal of 10-12 years (Levine 1982). One of the incisors had evidence for wear on the occlusal surface, creating a sharp downward slope (lingual-buccal) with striations on the worn surface.[81] This wear is considered too far forward in the mouth to be the result of bit contact, but may indicate a practice such as the rasping of teeth to remove sharp edges; the antiquity of such a practice, however, is not known (Robin Bendrey pers. comm.).

A fused distal tibia in the Mathioudaki assemblage indicates an individual of more than 3.5 years.

The only element available from which to determine sex is a single, possibly female, pelvis fragment from the Ayia Aikaterini assemblage. No canine teeth were present amongst teeth of the partially complete individual in Pit M, and the mandible was too fragmented to show signs of tooth sockets for canine teeth.

The presence of several complete elements enabled an approximate withers height to be calculated for three individuals (after von den Driesch & Boessneck

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[81] see Appendix I, Figure I.1.

1974; Table 8.13). In general, these are small pony-sized equids, the largest being the partially complete individual in Pit M at 13 hands (1.31m at the shoulders) and a second animal in Pit ?M at 11.4 hands (1.15m) in the Daskaloyannis/Khaniamou assemblage. An individual of 11 hands (1.11m) was present in the Ayia Aikaterini assemblage.

The equid metrics from these sites fall within the size range of animals identified as donkey at Lerna (*E. asinus* , Gevjall 1969, see Appendix D Table D.2.1) and seem to be smaller than equids on the Greek mainland generally (1.45m at Lerna, 1.20m at Lefkandi, 1.35/1.40m at Dendra, Cantuel, *et al.* 2010); interestingly, the horse from the tholos tomb deposit at Archanes-Phourni was also noted as being of small size (*ibid.*). In the Daskaloyannis/Khaniamou and Ayia Aikaterini assemblages the presence of the same elements demonstrating a distinct size difference (distal metacarpal Bd 34.8, Bd 35.0, vs. Bd 30.7, see Appendix D) suggest the presence of both horse (*E. caballus*) and donkey (*E. asinus*) (as also noted by Persson in Hallager & Hallager 2003:103, Hallager & Hallager 2000:108), both of which are perhaps smaller than their counterparts on the Greek mainland.

(Site)Feature	Spec. #	Element (N)	Side	Fused	Notes
(D/K) Pit M	688	humerus	L	distal	Partial articulation, mottled burning
	689	humerus	R	proximal, distal	
	698	mandible			
	696	metapodial			
	695	pelvis	R		
	686	radius	L	proximal, distal	
	687	radius	R	proximal, distal	
	694	scapula	R	proximal	
	690	ulna	L	proximal, distal	
	691	ulna	R	proximal	
	703	skull (occipital, parietal, zygomatic)			
	700	incisors (8)			
	701	mandibular molars (5)	L	15-17 years (M3s)	
	701	mandibular molars (6)	R		
	702	maxillary molars (4)	L		
	702	maxillary molars (4)	R		
	699	vertebrae (4)			
	697	ribs (35)			
	737	astragalus	R		
	150	humerus	R	distal	
	1000	metacarpal	R	proximal	
	2032	lateral metapodial			
	151	phalanx 1	L	proximal, distal	
	505	radius	R	distal	chopped
	795	tibia	L	distal	
	346	tooth (M2)	R	4-5 years	
	1132	(donkey) metacarpal			
(D/K) Pit ?M	378	humerus	L		gnawed
	392	radius	R	proximal, distal	
	398	scapula	R		cutmarks, gnawing
	397	(donkey) radius	R	distal shaft	
(D/K) Pit ND	128	phalanx 1	L	proximal, distal	
(D/K) Mb	2123	tooth			
(D/K) FLOORS	86	tooth (max. molar)	L		burnt dark brown
(AA) Rubbish Area North, 16-Pit E (LMIIIB:2)	1605	metacarpal	R	proximal	
(AA) Rubbish Area North, 1st layer (LMIIIC)	1999	phalanx 1	L	proximal, distal	
	2000	astragalus	R		
	2076	metacarpal	R	proximal, distal	
(AA) Rubbish Area North, 3rd layer (LMIIIC)	911	humerus	R	distal	chopped
	468	pelvis (?f)	L	proximal	chopped
	470	phalanx 1		proximal, distal	
	550	tooth (3) (lower incisors)		10-12 years	(*E. asinus*, Persson)
(AA)12-Pit D (LMIIIB:2)	2522	metacarpal		distal	
(M) Floor XVI	995	tibia	L	distal	
(M) Floor XVI	996	tooth (max. molar)	R		
(M)Trench 8, layer 1	464	tooth (mand. molar or premolar)	R		
(M)Trench 8, layer 1	465	tooth (decid. P2?)	L		
(M)Trench 7	227	phalanx 2		proximal, distal	
Notes: D/K=Daskaloyannis/Khaniamou, AA=Ayia Aikaterini, M=Mathioudaki. L=left, R=right					

Table 8.12 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: equid remains.

Spec. #	**Element**	**GL**	**Factor**	**Withers height**
(D/K) 392	radius	266.5	4.34	1.15m (11.4h)
(D/K) 687	radius	302	4.34	1.31m (13h)
(AA) 2076	metacarpal	173.5	6.41	1.11m (11h)
Lerna	metacarpal	226	6.41	1.45m (14.3h)
Notes: D/K=Daskaloyannis/Khaniamou, AA=Ayia Aikaterini,				
h=hands				

Table 8.13 Ayia Aikaterini, Daskaloyannis/Khaniamou: calculation of withers height for equids (after von den Driesch & Boessneck 1974, Lerna, after Gevjall 1969, see also Appendix D).

8.2.7.1 Equid burials?

The presence of at least one partially articulated equid in the Chania assemblages is highly significant in light of the evidence for ritual sacrifice and formal burial of horses in certain human funerary contexts in Mycenaean Greece. The most notable of such remains occur at the Mycenaean cemetery of Dendra, at which several pairs of horses (usually elderly male animals) appear to have been formally buried in shallow pits or on the bedrock, with possible evidence for their having been sacrificed and for accompanying toasting rituals (handle of a bronze knife amongst the ribs of one horse, and fragments of kylikes on their hind legs, Pappi & Isaakidou In press).

A further significant feature of the Dendra equid assemblage was the discovery of a seemingly structured deposit of donkey remains (piled up with care, *ibid.*). These elements came from all parts of the skeleton, were seemingly complete, with no evidence for their having been broken for marrow, or for butchery marks, or gnawing. The remains were derived from a minimum of four individuals, although did not comprise complete skeletons, and are not thought to represent the remains of food consumption (Pappi & Isaakidou In press). The analysts propose that these animals were originally buried complete and later exhumed and carefully re-deposited in a heap or shallow pit (*ibid.*). The ‘ritual’ treatment of donkey remains has not been noted yet elsewhere in the Aegean, and this deposit leads the analysts to propose a ‘symbolic’ significance accorded to donkeys (as well as horses) in Mycenaean society (*ibid.*).

The date of the Dendra equid burials is 1431-1132 cal. BC (Late Helladic IIIA-B) and forms part of a broader pattern of ritual burial/deposition of horse remains in Late Helladic III funerary contexts, albeit with a significant amount of variation in the ways in which this was manifest (Pappi & Isaakidou In press). Pappi and Isaakidou (In press) propose that the association of equids with high status individuals is clearly attested by their remains in elite burial contexts (as well as indications in iconographic and textual sources). Furthermore, they note that at Dendra elements associated with hunting and warfare formed part of the sacrificial deposit (e.g. armour, paired horses referring to chariots). They propose that the sacrifice and burial of such, especially the horses, emphasised a link with elite activities and individual hunter-warriors, and a demonstration of the wealth and power in having the resources to do so. Of particular interest is their observation that the seemingly ritual treatment of the equid remains (careful deposition of paired horse burials, secondary structured deposition of the donkey remains) for inclusion in a high status cemetery and seemingly independent of human burials suggests not only the symbolic importance of equids in Mycenaean society, but potentially the investment of these animals with personhood in their own right rather than merely the valuable possessions of high status individuals (see also Argent 2010).

The final part of Pappi & Isaakidou's (In press) discussion regarding the 'personhood' of horses raises some interesting issues. Their proposal that the ritual treatment of the horse burials, including rituals associated with human burial such as toasting, and their incorporation into a human cemetery perhaps indicates said 'personhood'. However, it is not the context of burial that attributes 'personhood', but rather an understanding of an individual animal, built up over a lifetime of 'trust and understanding, shared experiences and personal histories' (Argent 2010:169). If so, how do we then view horses and donkeys that were not seemingly afforded such a formal burial? Pappi & Isaakidou (In press) warn against interpreting horse remains, including complete horse skeletons, from settlement contexts as indicative of ritual practice, yet to extend the logic, does the absence of ritual treatment equate to an absence of 'personhood'?

The evidence from the Chania contexts, whilst potentially representing distinctive events, are hardly the formal, structured horse burials of Dendra. Nevertheless, there are perhaps some similar elements despite the significant degree of variability in the treatment of equid remains in this period generally. It is not clear whether the equid remains from the Chania assemblages of this study represented formal equid burials as such (it is perhaps unlikely they would have been missed during excavation). However, the fact that in Pit M of the Daskaloyannis/Khaniamou assemblage it is possible to partially re-articulate a significant number of elements, all in a seemingly similar taphonomic condition does suggest the burial of a complete animal at some stage.

The deposit of donkey bones at Dendra is also instructive here. Firstly, in that both horse and donkey remains were recorded in the same pit contexts at Chania. Also, and perhaps more significantly, in the apparent practice at Dendra of exhuming originally complete burials and subsequently re-depositing the remains, albeit it not necessarily all of them. Is it possible that a similar practice of burial, exhumation, and re-deposition may account for the partial completeness of the equid skeletons in the Chania assemblages, particularly those in Pit M ? The advanced age of the partially complete individual in Pit M is comparable to those at Dendra; the lack of butchery on this individual (in contrast to some of the other Chania equid material) is also comparable to Dendra.

So whilst deposition of equid remains in formal burials or in settlement debris might not necessarily represent two contrasting attitudes to horses, rather two ends of a continuous spectrum, there are some crucial questions to ask: where does equid ‘personhood’ lie? Is the recognition of personhood in horses part of a broader Bronze Age understanding of horses (Armstrong-Oma 2013)? Or was ‘personhood’ applicable to some horses and not to others? In which case, monolithic understandings of broad categories such as ‘animal’ and even ‘horse’ are rendered somewhat vague if the ontological status of animals is based on individual qualities. These questions equally apply to other species – if personhood was attributed to horses, was it then to other species as well?

The presence of a partially complete equid individual in this assemblage is significant, not only in light of the issues raised above but also in its contribution to understanding the data in relation to the themes of this study. Pappi & Isaakidou (In press) suggest that the burial of horses along with items associated with hunting and warfare emphasised a link with elite activities and individual hunter-warriors (see also Hamilakis 1996b for a similar argument for the deposition of hunting dogs in burial contexts). As discussed in previous chapters (4 and 5) these practices formed part of a broader Mycenaean elite identity with which elements of Chania society in the Late Bronze Age appeared to demonstrate some affiliation. It is possible then that in the Chania assemblage the equid ‘re-burial’ contributes further to this pattern.

8.2.8 Dogs

The presence of dogs is attested with remains occurring at each of the sites in relatively low quantities, albeit from all parts of the body. There was no apparent evidence for articulating elements from any of the sites, and relatively few complete bones (only metatarsals), suggesting that these remains do not represent formal dog burials or deposits (see Day 1984, Hamilakis 1996b, Wilkens 2003).

Of the mandibles with teeth present (Daskaloyannis/Khaniamou N=3, Ayia Aikaterini N=3) none of them were very worn, indicating that these were not elderly animals. The metrical data (Appendix D Table D.2.2) suggests that the Chania dogs were larger than the dogs from Galatas (Hamilakis 1996) but smaller than those from Lerna (Gevjall 1969) and perhaps Phaistos (Wilkens 1996) although the data are few in the case of the latter. Unfortunately there were no complete elements that allowed for a withers height to be calculated.

Butchery marks were observed on dog elements and these will be discussed further below (8.3). Canid gnawing marks recorded on the assemblage also provides indirect evidence for the presence of dogs; this feature will be discussed further in the following chapter.

8.2.9 Other species

Other wild species that occur in the assemblage, although in very low quantities, are hare, badger, and marten, and these species occur in assemblages elsewhere across Crete (see Chapter 6, Table 6.4). None of these bones were complete and no butchery marks were noted.

Of interest is the identification of a dolphin vertebra in the Ayia Aikaterini assemblage (Appendix I Figure I.2). Dolphin remains are not yet reported from other zooarchaeological assemblages in Crete, there are however depictions of dolphins in various media from sites across Crete (see Vanschoonwinkel 1996:395-396).

A number of fragments of human bone were also incorporated into the assemblage (Table 8.14). These remains consisted of small fragments from a variety of deposits. This material did not appear to represent formal inhumations (see discussion of burials in the Chania region in Chapter 4). They may have been incorporated into the assemblage through the mixing of material disturbed from earlier burials; or, alternatively, may hint at practices that are different from those resulting in formalised inhumations in tombs, which may have involved the circulation of human remains.

Site	**Feature**	**Human Bone**	**Total**
Ayia Aikaterini	22-Pit B (Rubbish Area North)	1 pelvis fragment, 1 ulna fragment	2
	16-Pit E (Rubbish Area North)	1 femur fragment, 2 tibia fragments, 1 vertebra fragment, 1 neonatal femur	5
	13-Pit F (LMIIIC)	1 neonatal femur, 1 neonatal radius, 1 neonatal tibia	3
	Space O, Patio? (LMIIIC)	1 neonatal tibia	1
Daskaloyannis/ Khaniamou	Floors	1 possible skull fragment, 1 upper 1st incisor	2
	Pit M	2 skull fragments, 1 radius fragment, 1 femur fragment	4
Total			17

Table 8.14 Ayia Aikaterini, Daskaloyannis/Khaniamou: summary of human bone remains.

8.3 Were the animals consumed?

In this section I consider whether the zooarchaeological material is the remains of food consumption practices. The data that will be discussed below are the representation of skeletal elements in the assemblages and evidence for butchery and burning.

8.3.1 Skeletal element representation

Skeletal element representation in the assemblage has been presented as organised into different groups relating to areas of the animal body: Head, Upper limbs, and Lower limbs (Figure 8.39). This has been done for the purpose of categorising the animal body in terms of the different consumption options for each group (e.g. primarily muscle meat from the Upper limbs, soft meats such as brain and tongue from the Head, and bone marrow from the Lower limbs, particularly the metapodia), not in order to attribute modernist notions of value and waste to the different skeletal groups. In general, the spine and ribs group will not be discussed as these elements have only been identified to size category rather than to species (see 8.1.4).

Based on these groups, the skeletal element data are presented for the main species, with the data for sheep and goat combined and the data for fallow and red deer combined (Figure 8.42 - Figure 8.45; the skeletal element data for all the identified species are presented separately in tables in Appendix B.1). These data show that parts from the whole animal body (of the most frequently occurring species) are present, but in general the Upper limbs group contains the most frequently occurring material. However, as these elements tend to be less dense than the lower limbs, they are also vulnerable to increased fragmentation and thus a greater NISP count; therefore, the data have also been presented as a minimum number of elements (MNE) per group. As expected, the Head group is reduced in the MNE counts; the Upper limbs group, however, still contains the most frequently occurring elements, and this pattern appears to be the case for each of the sites (with the exception of cattle at Daskaloyannis/Khaniamou and Ayia Aikaterini). Furthermore, the pattern of skeletal element representation for deer (red and fallow were combined due to few data for red deer) appears to be similar to that for the domestic species, indicating that either live animals or whole carcasses were present and subsequently butchered at the site. This is in contrast to Vigne, *et al.*'s (2011:263) suggestion that at Shillourokambos, Cyprus, (and Kalythies, Rhodes, Halstead & Jones 1987) butchering of fallow deer took place on the hunting site, where the largest carcasses were only 'partially exploited', the head and limb extremities being left unused on the kill site.

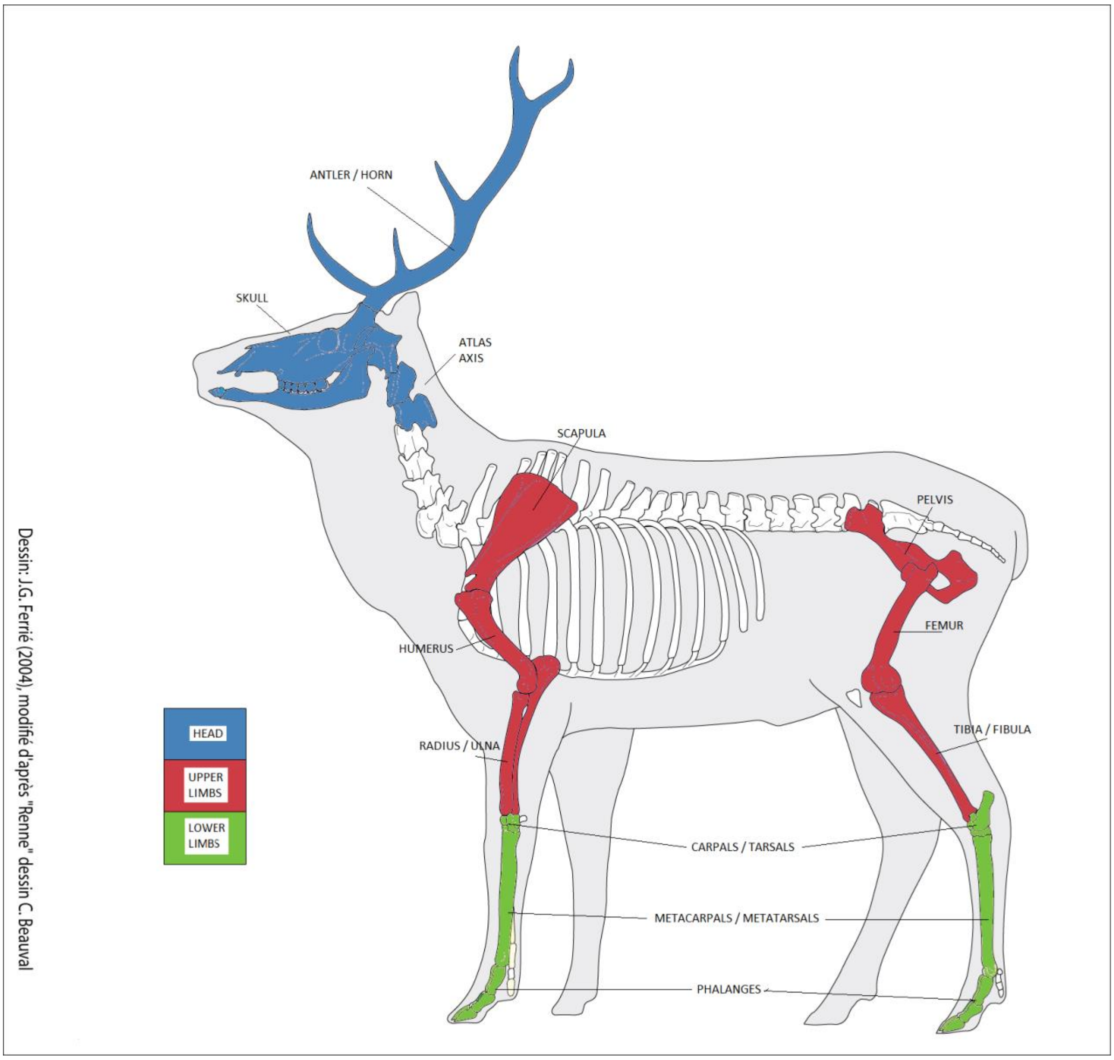

Figure 8.39 Schematic representation of skeletal element groups.

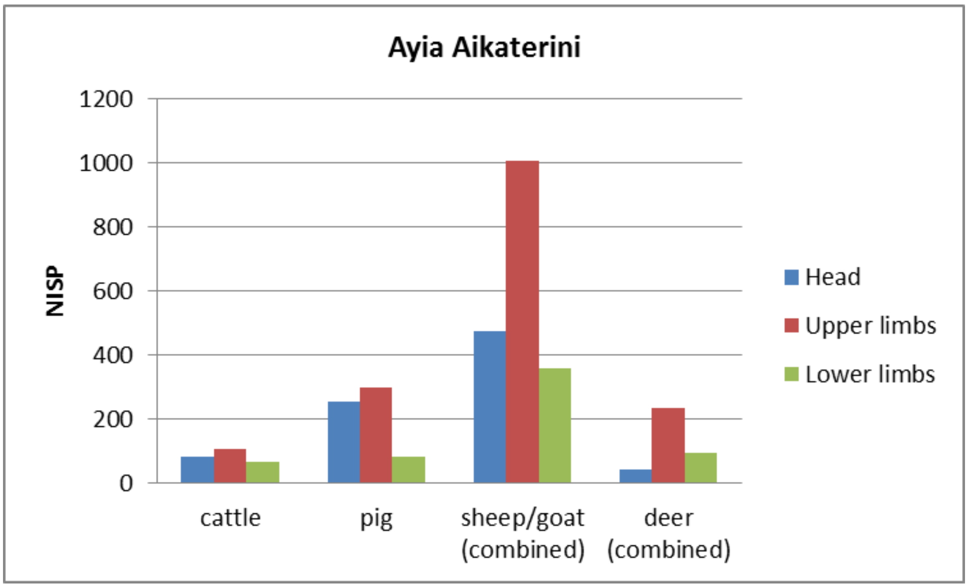

Figure 8.40 Ayia Aikaterini: skeletal element representation for the main species (NISP).

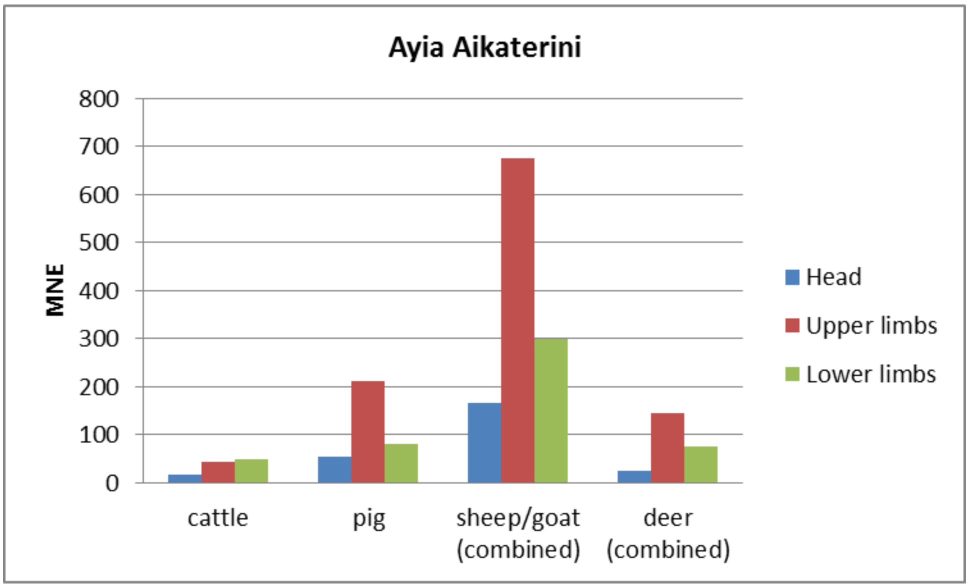

Figure 8.41 Ayia Aikaterini: skeletal element representation for the main species, Minimum Number of Elements (MNE).

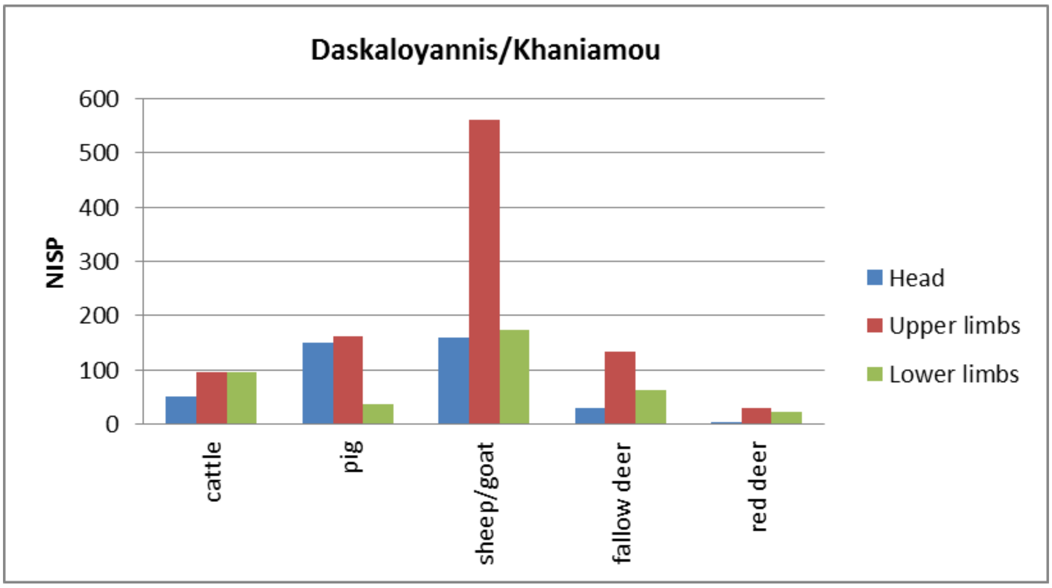

Figure 8.42 Daskaloyannis/Khaniamou: skeletal element representation for the main species (NISP).

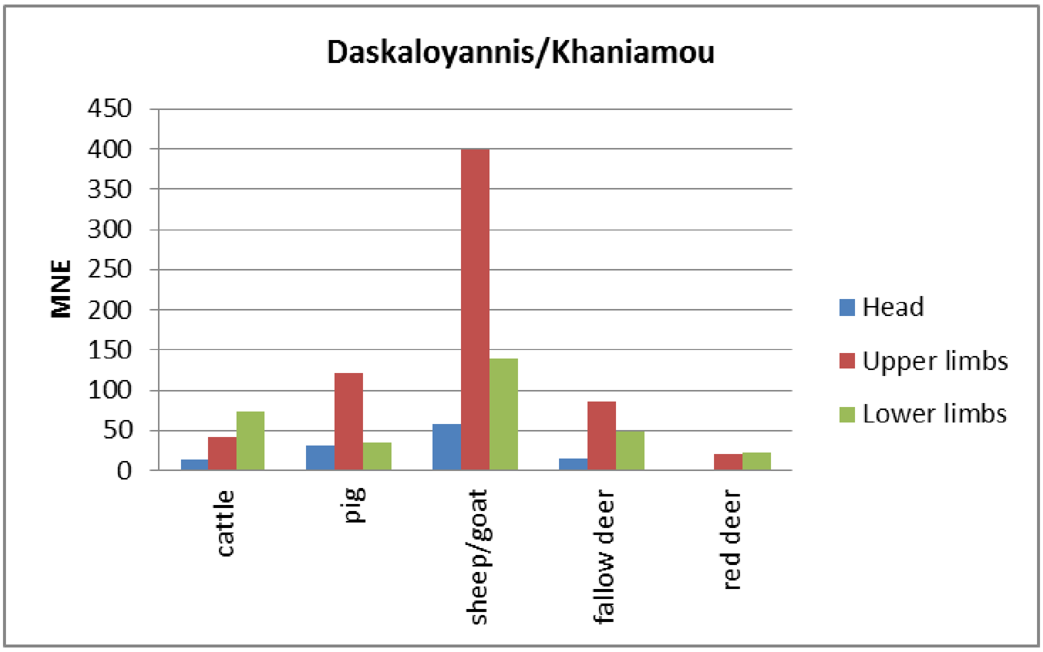

Figure 8.43 Daskaloyannis/Khaniamou: skeletal element representation for the main species, Minimum Number of Elements (MNE).

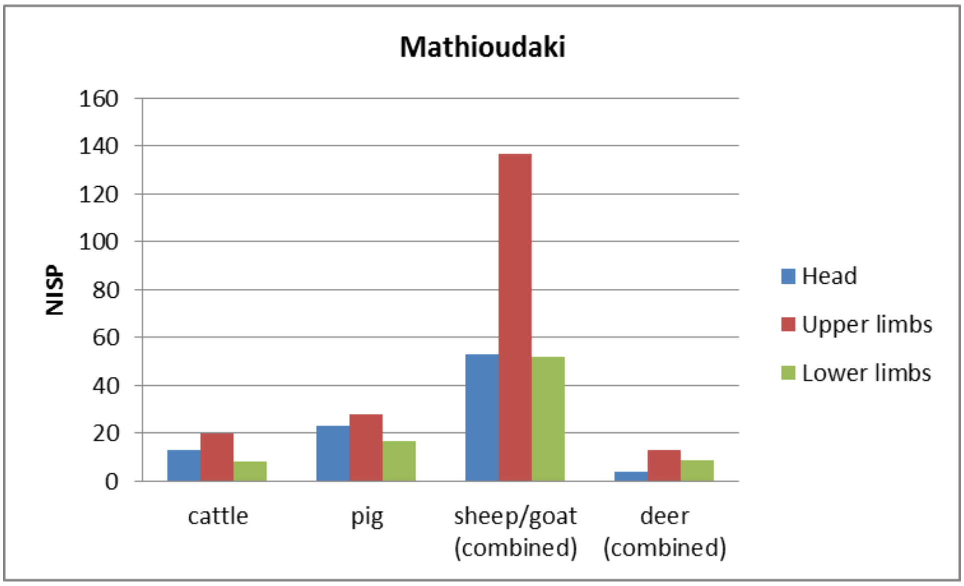

Figure 8.44 Mathioudaki: skeletal element representation for the main species (NISP).

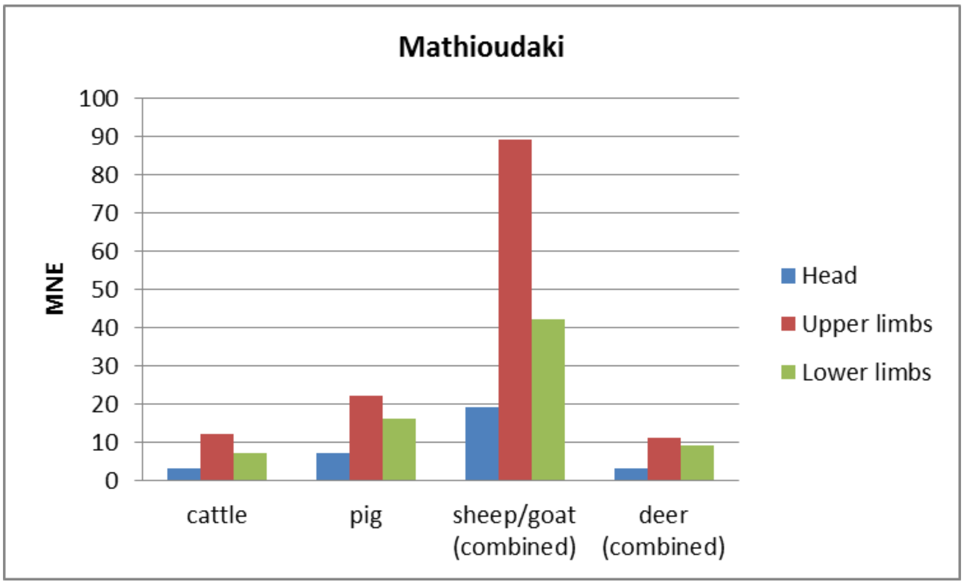

Figure 8.45 Mathioudaki: skeletal element representation for the main species, Minimum Number of Elements (MNE).

8.3.2 Butchery

In general, the majority of butchery marks consist of fine cutmarks and heavier chopmarks, with cutmarks occurring more frequently than chopmarks at each of the sites, and as comparable percentages of the NISP at each site (see Figure 8.46 and Table 8.15). The quantity of butchery marks per species (as a percentage of the NISP, where the NISP is greater than 100 fragments) at each site suggests that the relative percentage of butchery marks for each species is similar at each site (the data for Mathioudaki are too few here; Figure 8.47,

Table 8.15). Interestingly, however, at the Ayia Aikaterini site, deer remains appear to have the greatest percentage of butchery marks (discussed further below).

The heavier chopmarks occur more frequently than cutmarks (as a percentage of the NISP) on cattle remains at Ayia Aikaterini (Figure 8.48), and on cattle and pig remains at Daskaloyannis/Khaniamou (Figure 8.49), this is perhaps due to the larger and heavier carcass size of these animals. Deer remains, on the other hand, have a higher frequency of cutmarks than chopmarks (as a percentage of the NISP), and is the case at each site.

Site	**Species**	**NISP**	**Chopmarks N**	**Cutmarks N**	**Total**	**Chopmarks % NISP per species**	**Cutmarks % NISP per species**	**Total % NISP per species**
Ayia Aikaterini	cattle	259	28	19	47	10.8	7.3	18.1
	pig	629	51	68	119	8.1	10.8	18.9
	goat	306	16	49	65	5.2	16.0	21.2
	sheep	366	27	50	77	7.4	13.7	21.0
	sheep/goat	1181	47	60	107	4.0	5.1	9.1
	deer (comb.)	373	28	57	85	7.5	15.3	22.8
	other	62	7	6	13			
	Total	*3176*	*203*	*309*	*513*	*6.4*	*9.7*	16.2
Daskaloyannis / Khaniamou	cattle	244	20	19	39	8.2	7.8	16.0
	pig	349	32	31	63	9.2	8.9	18.1
	goat	130	11	16	27	8.5	12.3	20.8
	sheep	154	15	24	39	9.7	15.6	25.3
	sheep/goat	618	34	66	100	5.5	10.7	16.2
	deer (comb.)	300	29	37	66	9.7	12.3	22.0
	other	140*	9	3	12			
	Total	*1935*	*150*	*196*	*346*	*7.8*	*10.1*	*17.9*
Mathioudaki	cattle	41	2	2	4			
	pig	68	5	9	14			
	goat	29	5	4	9			
	sheep	32	6	4	10			
	sheep/goat	181	5	4	9	2.8	2.2	5.0
	deer (comb.)	27	1	9	10			
	other	10	1	1	2			
	Total	*388*	*25*	*33*	*58*	*6.4*	*8.5*	*14.9*
* 81 frags from 1 individual								

Table 8.15 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: data for the representation of butchery marks at each site and butchery marks as a percentage of NISP per species (where NISP>100).

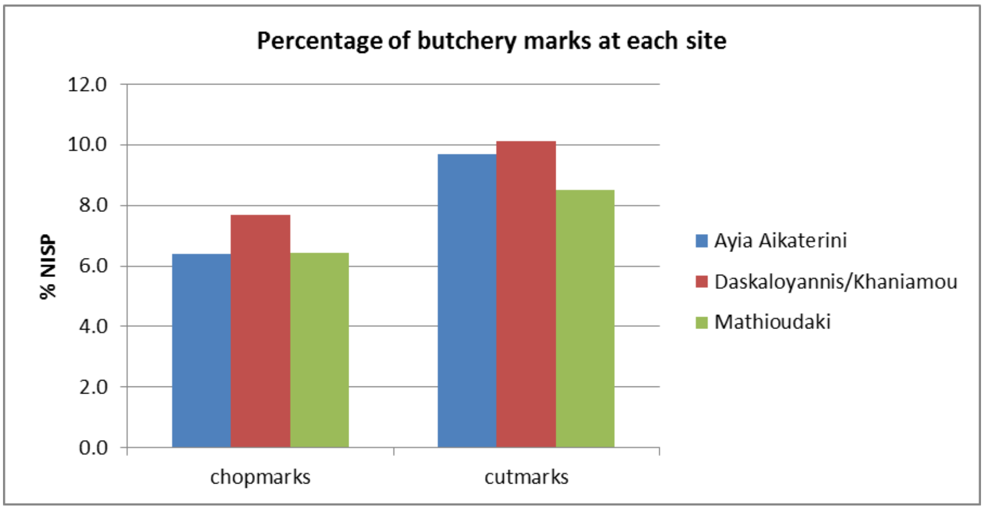

Figure 8.46 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: comparison of cutmarks and chopmarks as a percentage of NISP (for all species combined) occurring at each site.

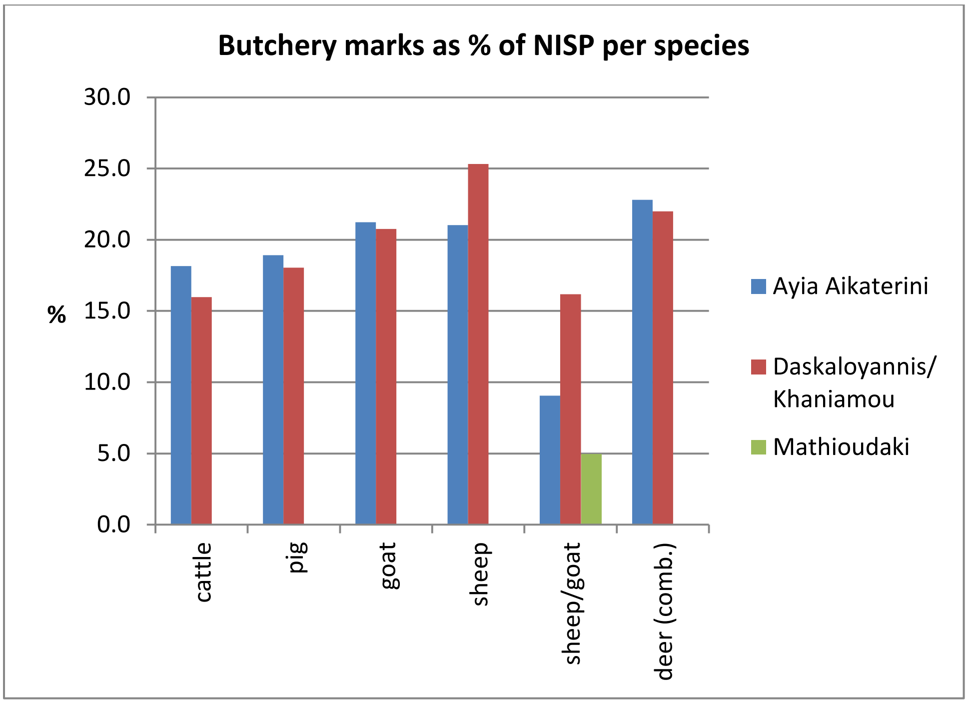

Figure 8.47 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: representation of butchery marks as a percentage of NISP per species where NISP>100.

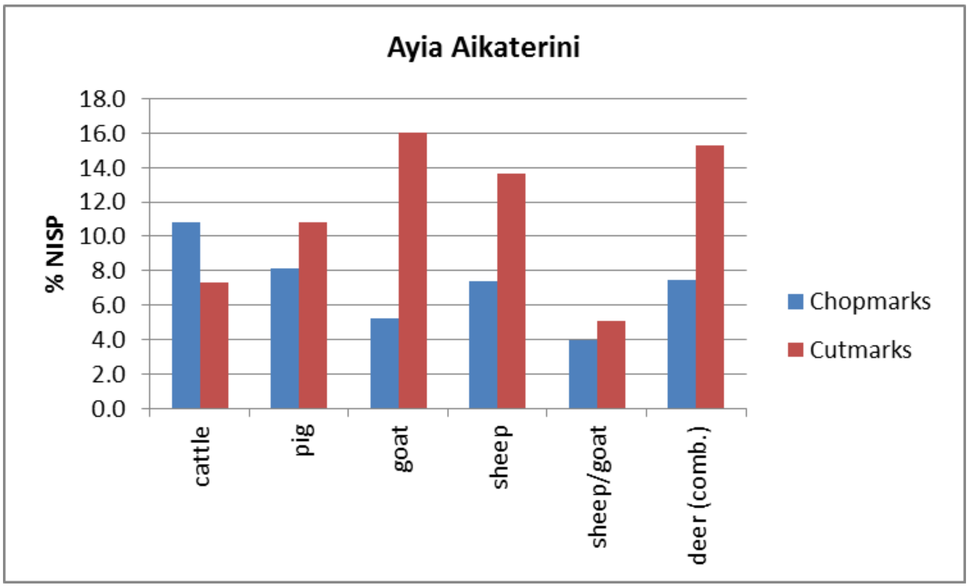

Figure 8.48 Ayia Aikaterini: comparison of chopmarks and cutmarks per species as a percentage of NISP (where NISP >100).

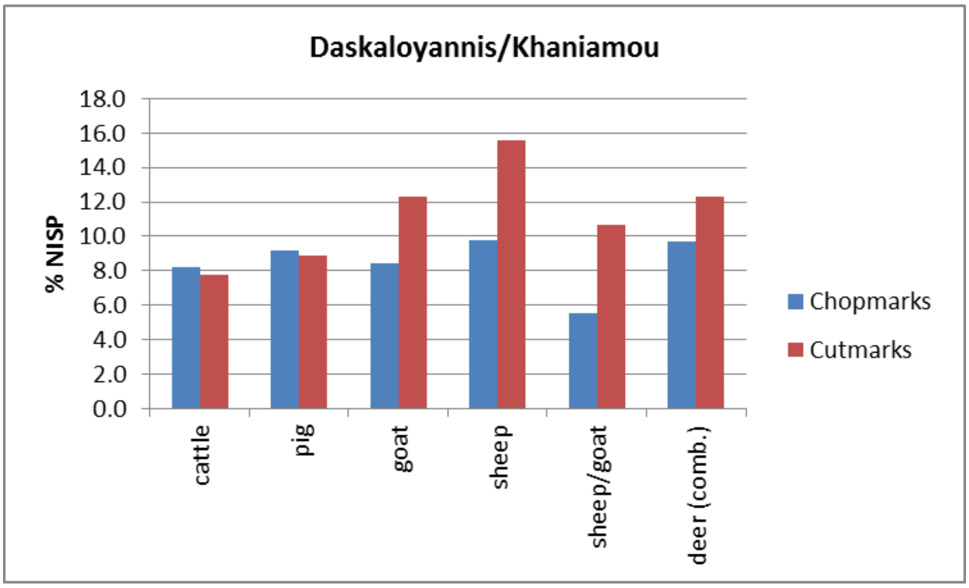

Figure 8.49 Daskaloyannis/Khaniamou: comparison of chopmarks and cutmarks per species as a percentage of NISP (where NISP >100).

The butchery marks are predominantly indicative of carcass dismemberment, and the filleting of meat (see Figure 8.50, Table 8.16). Dismemberment cutmarks are identified as those located on and around the epiphyses (e.g. Figure 8.51), and filleting marks are positioned on the diaphyses, often at an oblique angle (e.g. Figure 8.52). Both dismemberment and filleting marks occur predominantly on the main meat bearing elements. These practices have been identified based on the criteria outlined by Binford (1981).

Other butchery marks (Figure 8.50, Table 8.16 and Appendix E) suggest practices such as skinning and removal of horn, identified as cutmarks located around the base of horncores and antlers and around the limb extremities such as metapodia and phalanges (e.g. Figure 8.53); the breaking of larger bones for marrow extraction (e.g. Figure 8.54); the possible reduction of large elements to a smaller size, particularly scapulae (described here as ‘portioning’ e.g. Figure 8.56); butchery marks on the skull suggesting access to the brain, or those suggesting removal of the ear (only on pigs, Figure 8.58); and chopmarks on the mandibles which may suggest consumption of the tongue (Figure 8.59). In a number of cases, cutmarks occur on the axis and atlas (e.g. Figure 8.55, Figure 8.57) perhaps indicating throat cutting and / or removal of the head (see Figure 8.60 - Figure 8.67, Chapter 9, Table 9.7). In many cases, there were examples where marks from more than one practice occurred, or in which the marks were ambiguous (denoted as '/' =. 'and/or'- in the tables in Appendix E).

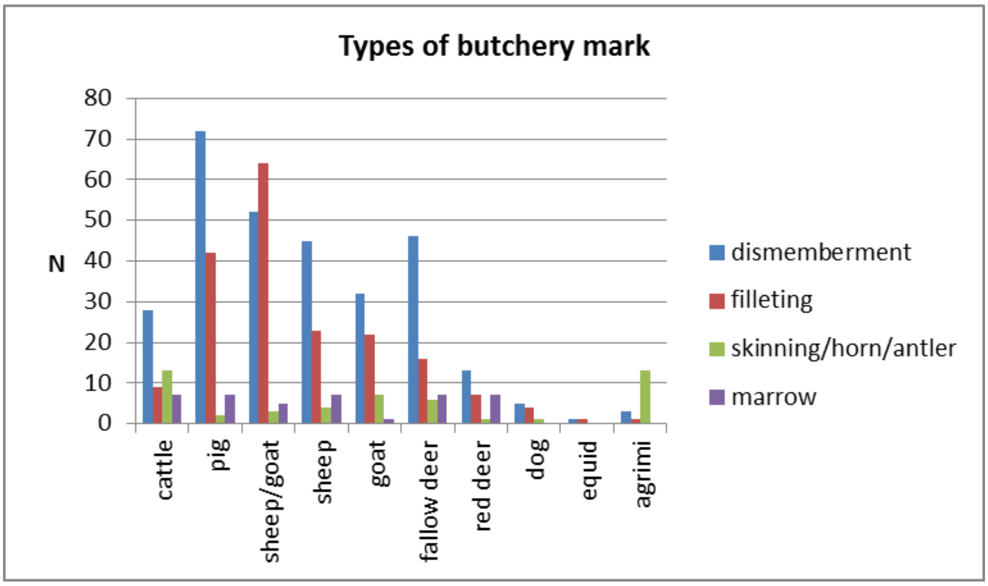

Figure 8.50 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: representation of the most frequently occurring butchery marks per species.

Species	type	skull (removal of horn/antler)	scapula	pelvis	humerus	femur	radius	tibia	ulna	calcaneus	astragalus	metacarpal	metatarsal	phalanx 1	phalanx 2	metacarpal 3	Grand Total
cattle	skinning	5										2		3	3		13
	dismemberment		3	7	3	6	2		3	1	3						28
	filleting			2	1	1	2	2		1							9
	marrow					2	1	3					1				7
pig	skinning													1		1	2
	dismemberment		5	18	22	2	6		12	3	4						72
	filleting		12	4	11	2	4	6	2	1							42
	marrow				3	1		3									7
sheep/goat	skinning											1	1	1			3
	dismemberment		9	15	11	8		2	5	1			1				52
	filleting		8	5	9	9	26	6					1				64
	marrow						2	3									5
sheep	skinning	2										1	1				4
	dismemberment		2	6	18	1	5	1	4	2	2	1	3				45
	filleting			1	3		16	3									23
	marrow						3	3				1					7
goat	skinning	4										2	1				7
	dismemberment		1	1	18		4		2	1	3		2				32
	filleting		1	5	6		10										22
	marrow												1				1
fallow deer	skinning	5											1				6
	dismemberment		2	5	17	1	6	4	3	5	2		1				46
	filleting		3	1	2	3	4	2	1								16
	marrow				1		1	2				1	2				7
red deer	skinning												1				1
	dismemberment		1		2	2	1	1	3	1	2						13
	filleting		1	2		1	1	2									7
	marrow						2	1				1	3				7
agrimi	skinning	13															13
*large goat,	dismemberment*				1	1	1										3
poss. agrimi	filleting*						1										1
	marrow																
equid	skinning																
	dismemberment			1													1
	filleting		1														1
	marrow?				1		1										2
dog	skinning	1															1
	dismemberment			2		1	1										4
	filleting			2			1	1									4
	marrow																

Table 8.16 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: summary of the most frequently occurring butchery marks per species (see Appendix E for more detail).

At each of the sites, the most frequently occurring cutmarks are those indicative of dismemberment of the carcass and the filleting of meat from the bones, with the former being more frequent than the latter (this may be due more to the fact that dismemberment cutmarks tend to be positioned on more robust areas of bone), and is the case for the majority of the most frequently occurring species (sheep, goat, pig, deer; see Appendix E).

Chopmarks, in general, tended to be more ambiguous and in many cases consisted of a blow to the bone shaft, particularly on the tibia and radius (especially sheep/goat), (see Appendix E). The cause of these marks is unclear and may indicate a more heavy handed method of filleting meat, an attempt to access bone marrow, or possibly, especially in the case of the tibia and radius, a means of removing the less meaty, lower limb elements. In a number of cases, repeated heavy chopmarks and evidence for bone breakage suggest the extraction of marrow. Of interest are the several cases on a number of species (see Figure 8.60- Figure 8.67, and Appendix E) in which the scapula has been chopped, approximately in half, transversely. I have termed this feature ‘portioning’ as it may indicate a ‘pot-sizing’ technique of reducing these larger elements to a more appropriate size (Figure 8.56).

There are marks suggesting rudimentary working of the bone, and chopmarks on antlers and horncores perhaps indicative of an intention to work these elements. Of interest is the tentative evidence for the creation of agrimi horn ‘frontlets’ in which the two horncores are intact and remain attached to the frontal bone with chopmarks occurring on the frontal and parietal bones. These aspects will be discussed in more detail in the following chapter (9).

A schematic representation of the positioning of the various types of cutmarks per species is presented below (Figure 8.60- Figure 8.67, Table 8.17, detailed description of the butchery data is given in Appendix E).

On cattle post-cranial remains (Figure 8.60), butchery marks were indicative of dismemberment of the carcass, including the possible reduction of some elements such as the scapula into smaller ‘portion’ sizes; the filleting of meat from the bones; and the extraction of marrow, particularly on the main meat bearing elements (also metapodia in the case of marrow extraction). Butchery marks on the skull, such as chopmarks on the premaxilla and mandible may indicate consumption of elements such as the tongue (or skinning). Other cutmarks placed on the skull, particularly around the base of horncores, may be evidence for the removal of the horn sheath and / or skinning, as are, in the case of the latter, cutmarks around the distal elements such as metapodia and phalanges.

Butchery marks on pig elements (Figure 8.62) were also predominantly indicative of dismemberment of the carcass and the filleting of meat from the bones, as well as the possible reduction of some elements into smaller portion sizes, and the extraction of marrow, particularly so on the main meat bearing elements. Butchery marks occurring on the skull (longitudinal chops through the frontal, lateral chops through temporal or occipital) suggest the breaking of the skull perhaps in order to get access to the brain. A high number of chopmarks occur on the mandible (chops to, often right through, the lateral side) and may indicate consumption of the tongue and / or marrow (Figure 8.59). Another interesting butchery feature that was noted to occur occasionally on pig skulls (only at Ayia Aikaterini) is cut or chopmarks to the temporal bone (Figure 8.58); it is suggested here that this may have been in order to remove the ear. In a number of cases (N=3), fine transverse cutmarks on the ventral side of the atlas vertebra were noted, evidence perhaps for a practice such as cutting the throat (Figure 8.55). Other butchery marks noted on axis and atlas vertebrae were a transverse chopmark on the dorsal side of an atlas, and a longitudinal cutmark on the ventral surface of an atlas.

The butchery data for sheep and goat (including sheep/goat combined; Figure 8.61, Figure 8.63) is again characterised by dismemberment of the carcass and the filleting of meat, with some evidence for the ‘portioning’ of larger elements, and for marrow extraction. Butchery marks on the skull suggest breaking the skull to access the brain, and cutmarks also occur on the mandible, suggesting consumption of the tongue and / or skinning. Other cutmarks on the skull, e.g. around the base of horncores, suggest removal of the horn sheath and/or skinning, and skinning cutmarks also occur on the distal ends of the lower limb elements. A transverse cutmark on the ventral side of an atlas vertebra (sheep/goat) could be evidence for throat cutting. Transverse cutmarks were also noted on the dorsal side of two other atlas vertebrae, and an axis vertebra was chopped through longitudinally (chopmarks were noted on two other axis).

Of the goat postcranial data, four elements with evidence for butchery were noted as being possible agrimia based on their large size. The butchery evidence on these elements consisted of dismemberment marks on a femur, humerus, and radius, and filleting marks on another radius. A number (N=13) of skull elements with butchery marks recorded were positively identified as agrimi. These consisted predominantly of cutmarks on the skull at the base of the horncore, indicative of skinning and /or removal of the horn sheath, as well as the possible creation of agrimia skull 'frontlets' mentioned above (to be discussed in more detail in Chapter 9.4).

The butchery data for fallow and red deer (Figure 8.64, Figure 8.66) also shows evidence for carcass dismemberment (Figure 8.51), the 'portioning' of some elements such as the scapula into smaller sizes (Figure 8.56), the filleting of meat from the bones, particularly on the upper limb elements (Figure 8.52), and for extraction of marrow (on both upper limbs, Figure 8.54, and metapodia). Cutmarks indicative of skinning are seen on the skull around the antler pedicles and on the distal elements such as metapodia and phalanges (Figure 8.53). Butchery marks, predominantly chopmarks (six chop marks, two cutmarks), were also noted on axis and atlas vertebrae. There was no apparent evidence for transverse cutmarks on the ventral surface of the atlas, as noted for pigs and sheep/goat.

Butchery marks were also noted on dog remains (Figure 8.65). These consisted of a cutmark on a mandible suggesting skinning, dismemberment marks on the pelvis, humerus and radius, and filleting marks on a pelvis, radius and tibia. A dog atlas vertebra showed a number of transverse cutmarks on the ventral surface, perhaps indicating throat cutting (Figure 8.57).

A number of the equid remains also bore evidence for butchery (Figure 8.67). On a pelvis fragment cutmarks around the acetabulum suggest dismemberment, longitudinal cutmarks on a scapula suggest the filleting of meat, and chopmarks to a radius and a humerus might suggest the extraction of marrow from these elements.

These data serve to indicate that a seemingly consistent butchery method was used across the range of species, with deer (and possibly agrimia) seemingly being butchered in broadly the same manner as the domestic species. Dogs and horses also show evidence for butchery, although the data are few, including cutmarks indicative of filleting of meat. Some species-specific variation does occur, however, such as the possible evidence for the removal of pigs' ears (for human or dog consumption?), and also perhaps size-based variation such as the breaking of cattle and deer metapodia for marrow extraction (see Appendix E). In a number of cases, cutmark evidence on the ventral surface of the atlas vertebrae of sheep/goat, pigs and dog, suggest the killing of animals by cutting the throat. Interestingly, these transverse cutmarks were not noted on deer atlas vertebrae, perhaps suggesting deer were not killed in this manner; the data are too few for a firm conclusion, but it might point to their having been killed in the hunt.

The above data suggest a fairly 'intensive' use of the animal body. Potential consumption practices might include the filleting of the muscle flesh, 'portioning' or 'pot-sizing' of larger elements, the extraction of marrow from the larger bones, and the possible use of parts such as the brain and tongue. Other practices associated with the animal body are also indicated, such as skinning and the removal of horn, the working of bone and antler, and perhaps even the creation of agrimi skull 'frontlets' (these practices will be considered in more detail in the following chapter). The butchery data also suggest evidence for throat cutting as a method of killing animals. I propose that overall this material suggests a non-wasteful approach to animal consumption (as suggested by Halstead 2007), rather than dietary stress as is often assumed when evidence for practices such as marrow extraction occurs (e.g. Milner & Miracle 2002:3). However, these are only the practices centred on the animal body that have left a trace on the skeletal remains; it is likely that many others would have taken place (using internal organs for example) that are not visible in this data.

Figure 8.51 Fallow deer humerus, dismemberment cut marks.

Figure 8.52 Fallow deer femur, filleting cutmarks.

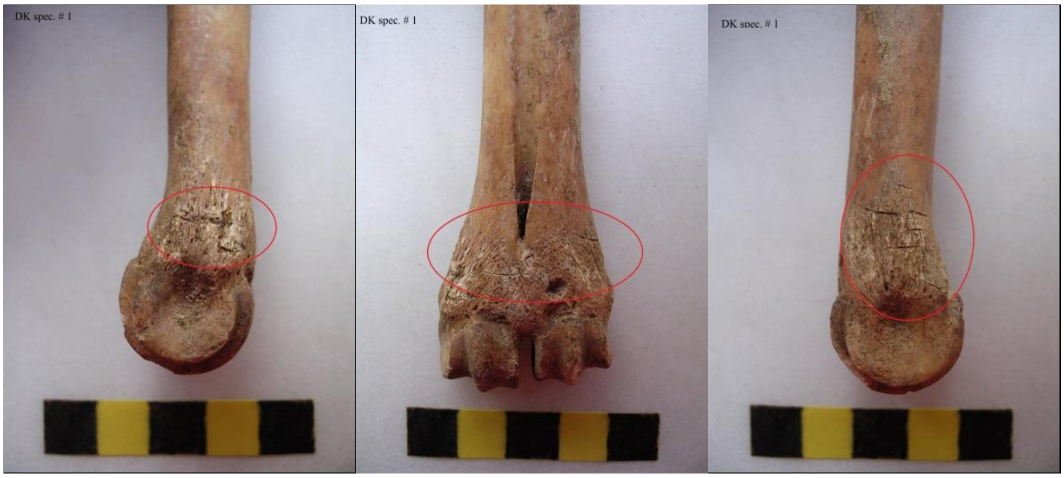

Figure 8.53 Fallow deer metatarsal, skinning cutmarks (medial, anterior, lateral view, respectively).

Figure 8.54 Fallow deer tibiae, marrow extraction?

Figure 8.56 Fallow deer scapula, ‘portioning’?

Figure 8.55 Pig atlas vertebra, transverse cutmarks on ventral surface, throat cutting?

Figure 8.57 Dog atlas vertebra, transverse cutmarks on ventral surface, throat cutting?

Figure 8.58 Pig skull, chopped, removal of ear?

Figure 8.59 Pig mandible, chopped through, consumption of tongue and/or marrow?

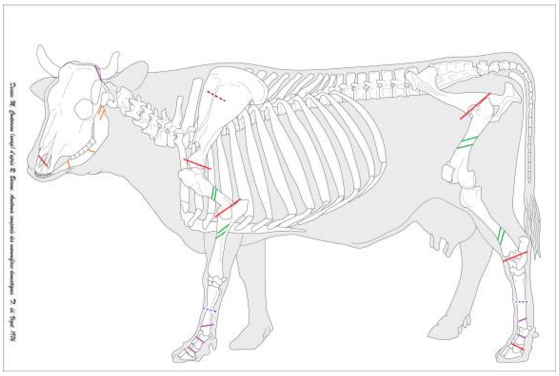

Figure 8.60 Schematic representation of location of butchery marks on cattle.

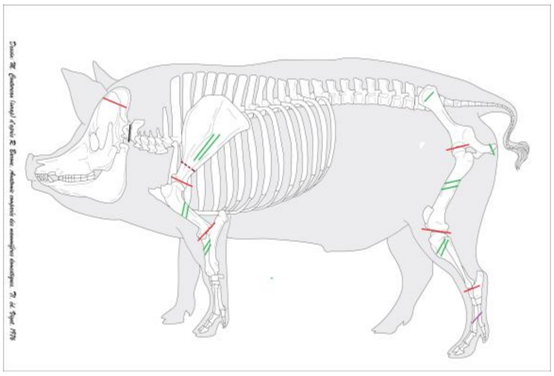

Figure 8.62 Schematic representation of location of butchery marks on pigs.

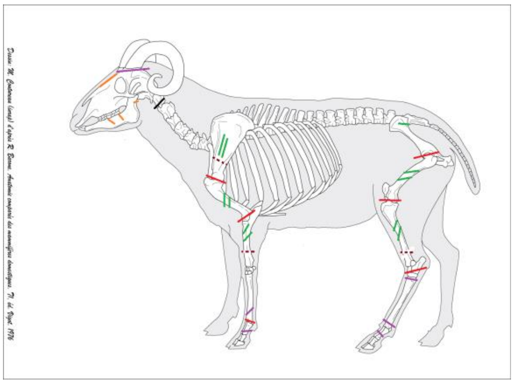

Figure 8.61 Schematic representation of location of butchery marks on sheep.

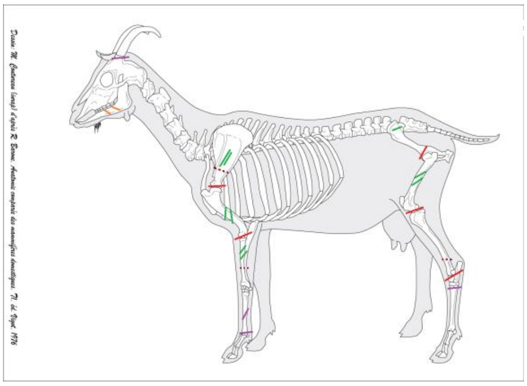

Figure 8.63 Schematic representation of location of butchery marks on goats.

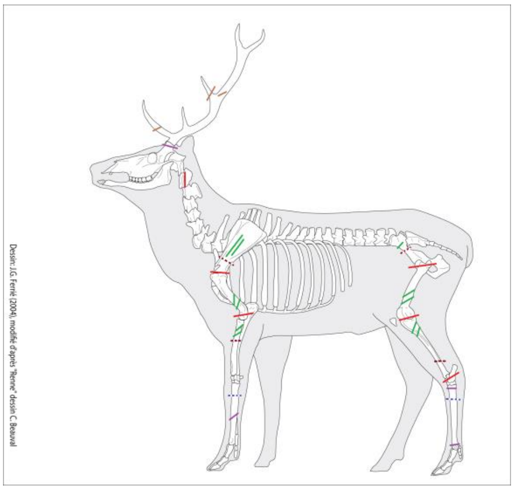

Figure 8.64 Schematic representation of location of butchery marks on fallow deer.

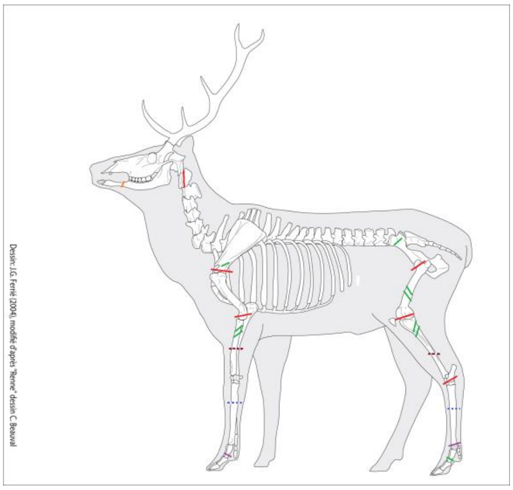

Figure 8.66 Schematic representation of location of butchery marks on red deer.

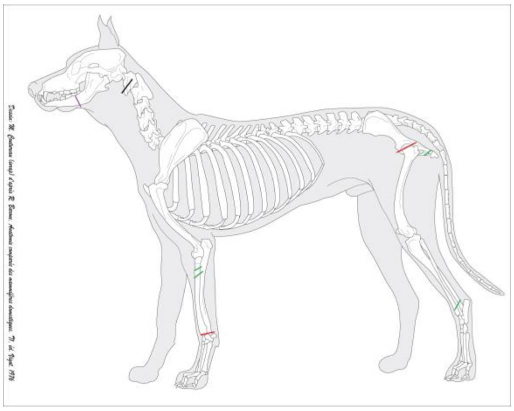

Figure 8.65 Schematic representation of location of butchery marks on dogs.

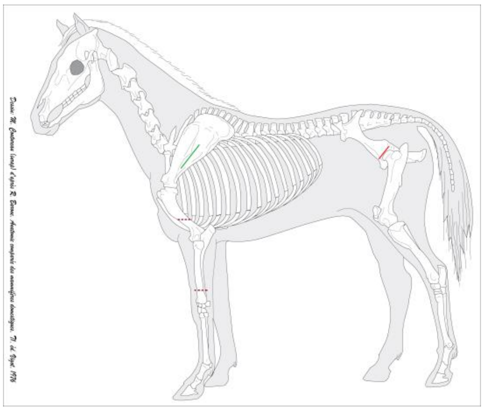

Figure 8.67 Schematic representation of location of butchery marks on equids.

╱	╱	╱	- - - -	- - - -	╱	╱	╱
dismemberment	filleting	skinning	marrow	portioning	skull	working	Throat cutting?

Table 8.17 Legend for butchery marks on schematic representations

8.3.3 Burning

The evidence for burning on the animal bone material in relation to food preparation techniques is less clear; in general, the quantity of burnt fragments is low, but occurs in greatest quantities at the Daskaloyannis/Khaniamou site (see Table 8.18).

Site	NISP	NISP Burnt	% Burnt
Ayia Aikaterini	3176	15	1
Daskaloyannis/Khaniamou	1935	116	6
Mathioudaki	388	15	4

Table 8.18 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: number and percentage of burnt fragments at each site.

The burnt material, for the most part, is categorised into three broad patterns of burning. Some material consists of bone that had been *totally* burnt (e.g. the total exterior and interior of the bone was burnt) resulting in a brown discolouration, or black or grey / white discoloration caused by burning at high temperatures. This latter pattern may have been caused by such practices as throwing /depositing bones directly into a fire (as in burnt animal sacrifice, Isaakidou*, et al.* 2002, Hamilakis & Konsolaki 2004) or by a more widespread destruction by fire. The second pattern observed, was localised *patches* of burning, brown in colour and accompanied by flaking of the bone surface. In some cases these patches of burning were noted to occur on the midshaft areas of long bones, usually broken, and it is proposed that these represent burning associated with softening of the bone and/or marrow for marrow extraction. The third pattern of burning is characterised by small *spots* of light burning causing a localised dark brown discolouration but no obvious damage to the bone surface. It appears as though this pattern could have been caused by animal bone material coming into contact with hot raked out embers of the fires/cooking installations at the time of deposition.

At the Daskaloyannis/Khaniamou site some bones were recorded as having possible *surface* burning, these bones are characterised by total discolouration but of the very outer surface of the cortical bone only. It is not known whether this pattern is caused by a very light or superficial burning, or a discoloration caused by some taphonomic factor other than burning.

These burning patterns and practices are perhaps further corroborated if presented in relation to the elements (all species combined) affected by burning (Figure 8.68; 'surface burning' is not presented here due to its uncertainty as actual burning). For example, the totally burnt fragments are seemingly of an indiscriminate a range of elements across the body, the patch type burning occurs on a limited range of the large limb elements, potentially consistent with a practice of marrow extraction, and the spot pattern also occurs on a wider range of elements, again perhaps affecting bones indiscriminately (burning patterns associated with particular feature types will be discussed in the following chapter).

Comparing the quantities of burnt fragments of each species as a percentage of the NISP (all sites combined for maximum data, Figure 8.69), suggests that the relative percentage of burnt fragments are similar across the range of species (with the exception of one possible burnt equid tooth).

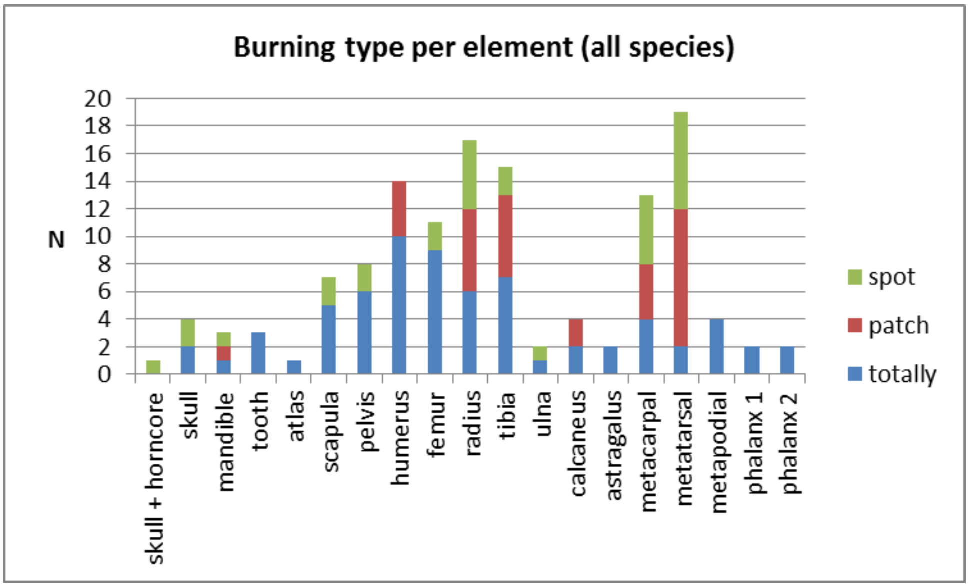

Figure 8.68 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: number of fragments per 'burning type' per element (all species combined, see Appendix F for data).

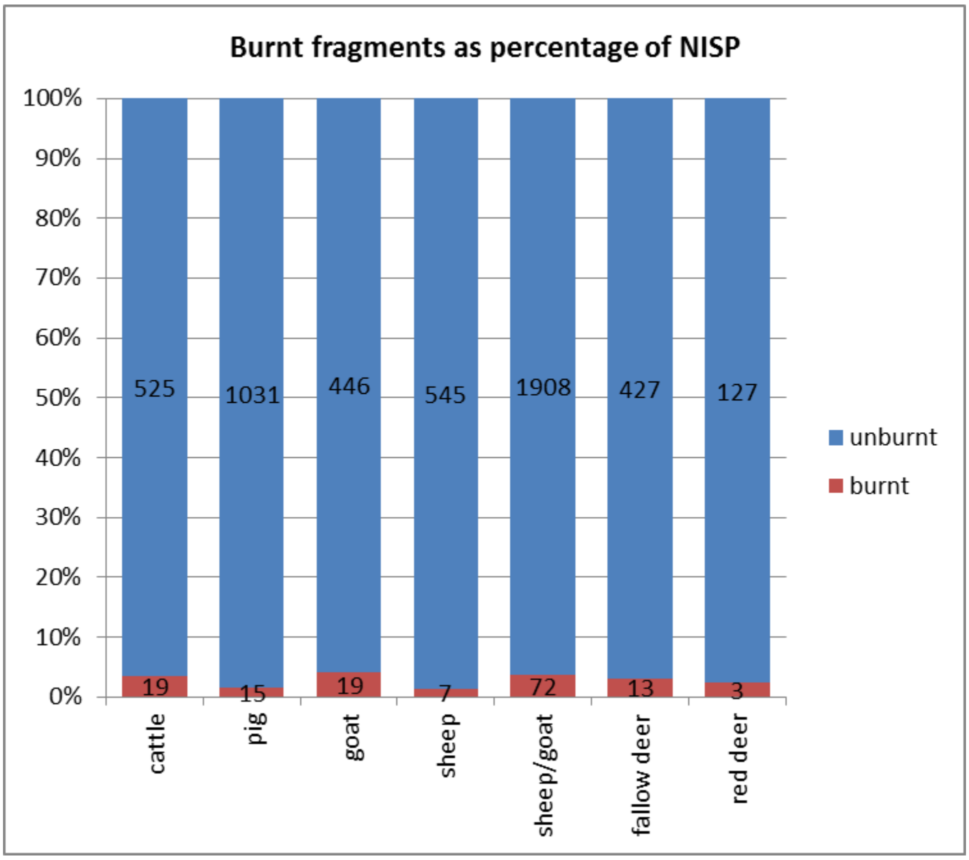

Figure 8.69 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: number of burnt fragments as a percentage of the NISP per species (all sites combined).

Although the data are relatively few, comparing the different burning types per species indicates that of the burnt fragments, a higher percentage of totally burnt bones occur amongst the domestic species, whereas the deer remains tend to be characterised by the small patches and spot patterns of burning (Figure 8.70, Table 8.19). Thus, burning affects a wider range of sheep, goat, cattle and pig elements, whereas for deer a narrower range of mainly large limb elements are affected, possibly linked to marrow extraction (Figure 8.71 - Figure 8.74; see Appendix F for data).

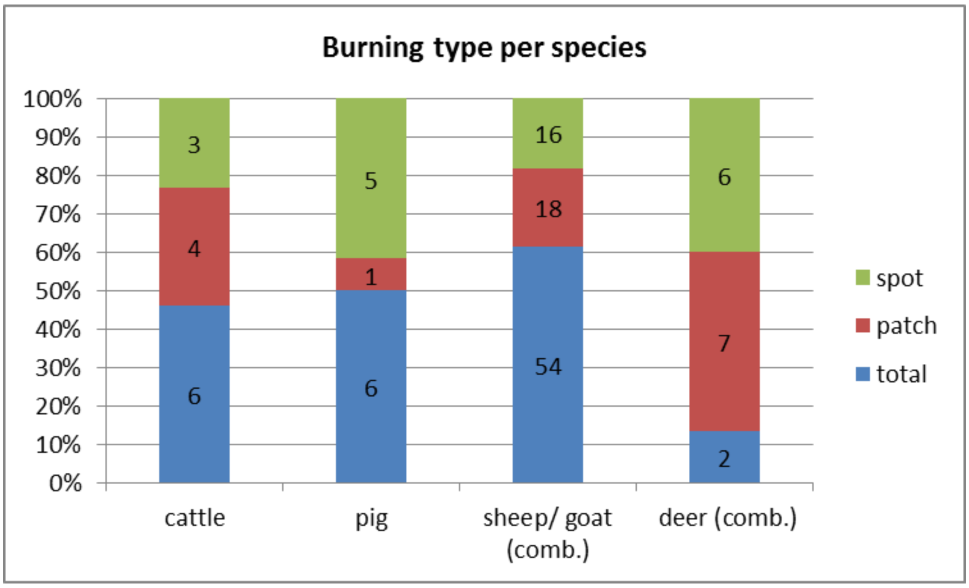

Figure 8.70 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: number and percentage of the most frequently occurring 'burning types' per species (most frequently occurring).

Species/ burning type	cattle	pig	goat	sheep	sheep/ goat	equid	fallow deer	red deer	Total
total	6	6	7*	4	43	1	2		69
patch	4	1	5	3	10		5	2	30
spot	3	5	5		11		5	1	30
surface	6	3	1		7				17
Total	19	15	18	7	71	1	12	3	146
* 1 possible agrimi									

Table 8.19 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: quantities of burnt fragments per ‘burning type’ per species.

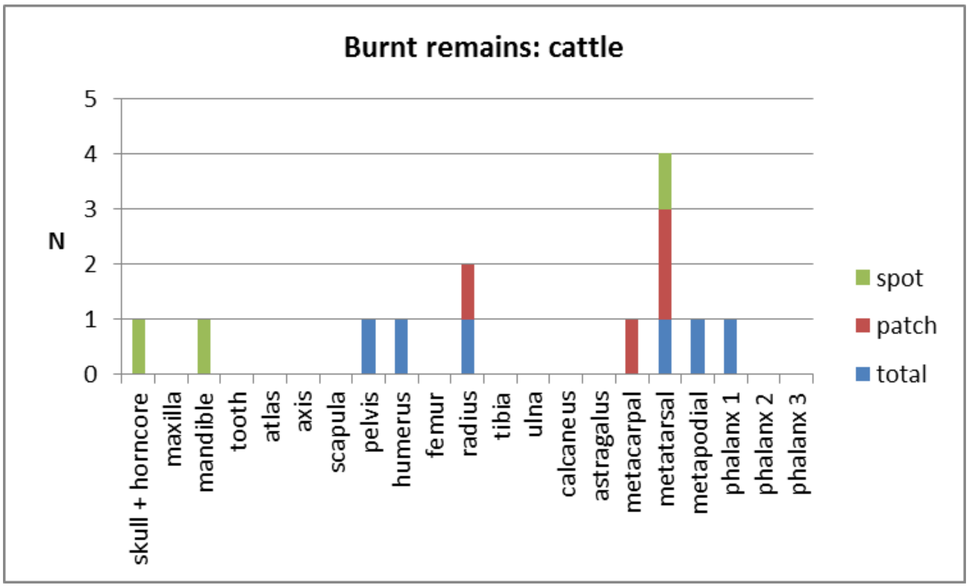

Figure 8.71 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: frequency of ‘burning types’ affecting cattle remains.

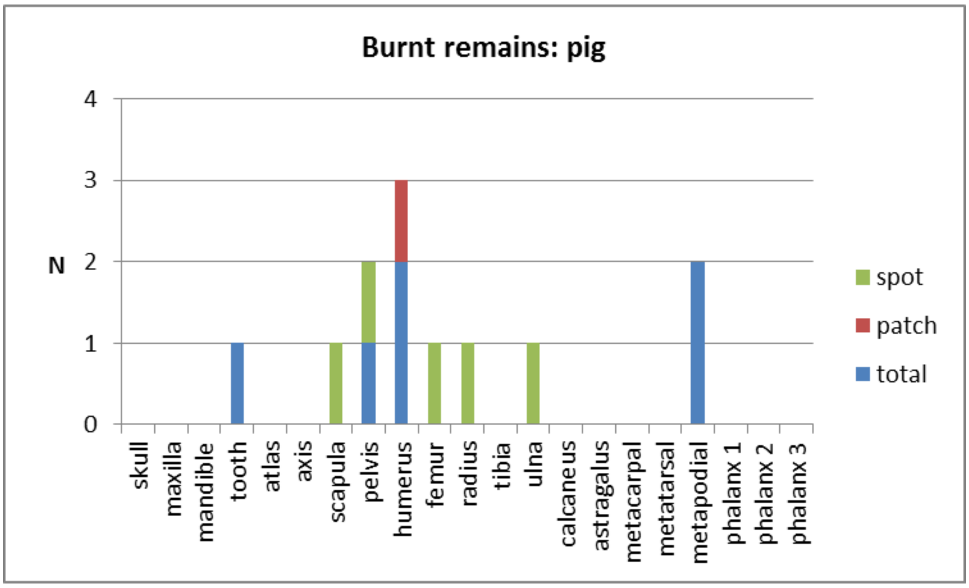

Figure 8.72 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: frequency of ‘burning types’ affecting pig remains.

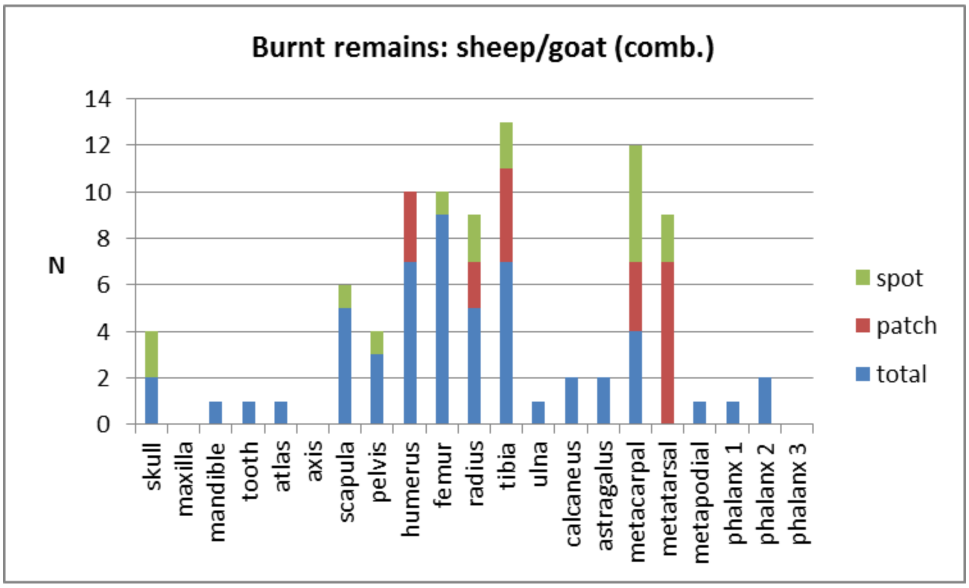

Figure 8.73 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: frequency of ‘burning types’ affecting sheep/goat remains (all sheep and goat combined).

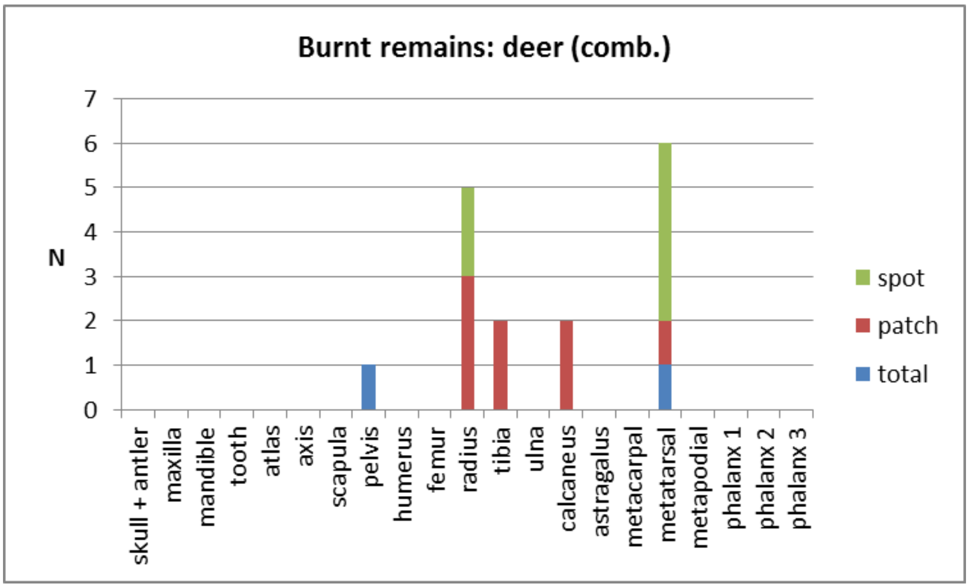

Figure 8.74 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: frequency of 'burning types' affecting deer remains (fallow and red combined).

In terms of consumption methods, there does not appear to be the pattern of burning usually associated with the roasting of meat (ends of elements burnt black due to direct contact with fire, with the midshaft un-burnt due to the covering of meat). Therefore, other possibilities could be the boiling of portions in large pots, cooking in ovens or perhaps fire pits, or spit roasting in a manner in which the bones are not in direct contact with fire. Material culture evidence for cooking practices in the Ayia Aikaterini assemblage[82] consist of large tripod cooking pots and a rudimentary spit stand, as well as hearths/ovens/fire areas, and could perhaps support each of the possibilities raised above. Analysis of burning patterns by feature type will be discussed in the following chapter.

8.3.4 Summary

To summarise, both the element representation and butchery data suggest that most of the species have evidence for butchery, including deer, and that the majority of the material is likely the remains of food consumption practices. The element representation indicates that the main meat bearing elements of the animal body predominate in the assemblages, and the

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[82] This type of data is not available for the other two sites.

butchery data suggest that butchery marks indicative of carcass dismemberment and the filleting of meat occur most frequently. However, as was noted above, the majority of the animal body is present in the assemblage and has been made use of for consumption, as well as for other practices such as the use of skins, horn and antler. Dog and equid remains also showed evidence for having been butchered, with butchery marks seemingly occurring in a similar manner to those of the other species. The butchery data are few for dogs and horses however, which would suggest that these species were not routinely considered for consumption (see Snyder & Klippel 2003).

The above analysis has suggested that the zooarchaeological assemblage represents the remains of food consumption events. The incorporation of species such as deer into the assemblage, however, especially in such quantities, is unusual; yet the similar pattern of skeletal element representation and butchery processing to domestic species indicates that the deer too were consumed. The following chapter discusses the spatial distribution of these data across the sites, in order to investigate context-specific variation in these practices.

8.4 Conclusion

The majority of the zooarchaeological material of this study comes from specific contexts of consumption and deposition (discussed in detail in the following chapter), and as such one should be wary of basing detailed interpretations of animal husbandry practices from such material. That said, however, a number of remarks might be made regarding the social nature of human-animal interaction in or around Chania in the Late Bronze Age.

In Aegean archaeology and more broadly, often zooarchaeological analyses discuss the age profiles of the domestic species in order to suggest that animals were raised for a particular product, depending on the age at death of the majority of animals (per species), and to a lesser extent, the sex ratios. In many cases, however, often the evidence suggests that during the Aegean Bronze Age small scale mixed farming was generally practiced (e.g. see Halstead 1996), with some significant exceptions, such as the specialised wool industry of the Late Bronze Age ‘Palaces’.

The zooarchaeological data for the main domestic species in the Chania assemblages, on the basis of age profiles, indicate that a significant quantity of sheep were kept until adults, even old adults, for which one might draw the conclusion that these animals were kept to provide wool (spindle whorls and loomweights were recovered from Ayia Aikaterini, Hallager & Hallager 2000, 2003) as well as perhaps milk, and for breeding. It is also possible that mutton meat was desirable. Equally, there was a significant proportion of animals killed at one year or less which may have been bound up with the previous ‘strategies’, and also provided lamb meat. Fewer goats were seemingly kept as older animals, and may have been killed for consumption at a variety of ages, although they would also have provided milk and hair. The cattle remains for these assemblages show that a high percentage of animals were killed before a suitable age for reproduction or for traction, which may indicate the deliberate selection of young cattle for consumption, but also the raising of some cattle into adulthood, suitable for breeding and perhaps traction. Likewise with pigs, the majority were killed before two years presumably for consumption, with a few older animals which may have been used for breeding.

The evidence for equids indicates that these animals, in particular, may have lived long lives (the data above suggest an animal of 17 years). As equids are relatively rare animals in Aegean Bronze Age contexts, this may have been a particularly nurtured and valued relationship. The variation in the treatment (including the eating) of equid remains, however, suggests that it was also a complex and multifaceted one.

The presence of dogs and the evidence for dog gnawing on bones indicate that dogs were part of the human/animal community in Bronze Age Chania (discussed further in Chapter 10). It is highly likely that these animals would have worked with humans in herding and hunting practices, activities in which a high degree of interspecies cooperation and communication would have been necessary. As with equids, however, in the Aegean Bronze Age treatment of dog remains varies (from formal burial to evidence for their having been consumed), and it is of interest that in the Chania data there is no clear evidence for particularly aged individuals.

The longevity of some of these animals (of a variety species) would have allowed for a relationship to have been built up between (some) human(s) and (some) animal(s) over many years. This relationship would have been one of reciprocity (e.g. of care for materials or assistance), and perhaps one that allowed for the mutual, interspecies, recognition of individuals. Whilst this is often assumed for animals such as horses and dogs that this may also have been the case for the 'farmyard' species is indicated in the Linear B textual references to individual oxen by name and/or description[83]. Anecdotal evidence shows that herd animals will respond to the voice of individuals they know but not to those they do not (see Ivarsdotter 2004). Whilst it is more readily accepted that a finely tuned method of communication takes place in the training of cattle and equids (and human) for traction, riding, or as pack animals and so on, Ivarsdotter notes that this can be also the case in the herding of animals – keeping them together, protecting them from danger, taking them to grass and water,

> *'[w]hatever the grazing procedure, viable communication between human beings and animals has been essential'* (Ivarsdotter 2004:146).

Identification of older animals in zooarchaeological assemblages have often been interpreted as providers of 'secondary products'. What is rarely mentioned, however, in conjunction with these 'secondary product providers', is that the act of milking (including persuading the cow/sheep/goat to let down her milk), the plucking of wool, assistance in birthing perhaps, the harnessing of an animal for traction, and so on, require a sustained close physical connection (intimacy?) between human and animal, as well as cooperation and a significant level of mutual trust. That is not to say that any one of these participants at any time could not act outside of these expectations, break the 'codes of conduct', yet by and large for these interactions to be (mutually) successful a certain degree of cooperation is essential.

However, this is perhaps not a relationship enacted by all members of society, but, presumably, predominantly those in 'animal husbandry' roles (broadly defined). For example, we do not know whether animals would have been born and raised within Chania at this time; this is perhaps unlikely, given the relatively 'urban' status of the settlement during this period, and this is perhaps corroborated by the fact that there are no foetal /neonatal animals in

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[83] Chadwick 1973,1976, Enegren 2004.

these assemblages (the youngest, based on toothwear are, in sheep 2-6 months, in pigs 0-2 months, and in cattle 8-18 months). Animals could have been herded in the surrounding area, such as the fertile plain around Chania which is suitable for cattle, or higher up in the foothills and mountains which are also suitable for sheep and goats, and in woodland areas suitable for pigs (Moody 1990). However, in west Crete the Late Minoan III was seemingly a period of settlement nucleation in fewer, larger sites (such as Chania, Moody 1990), and animals at this time may have been 'husbanded' on the outskirts of Chania rather than at smaller settlements in the 'hinterland'. To what extent, thus, would the embodied presence of animals have been a feature of daily life in the urban core of Late Bronze Age Chania? Or could it be that increased and intensified sights, sounds and smells of animals would have been an additional distinctive marker of specific significant events, events that resulted in animal consumption?

In the case of deer, the question of hunting or management was discussed above. The data suggest that animals of both sexes, of a range of ages, and of two different species (fallow and red) were present. It was concluded that if deer were managed, as with the domestic species, they were not seemingly intensively done so for any one particular outcome (meat, sport etc.). It was suggested that it was perhaps more likely that deer were hunted in the wild; however, the data are not conclusive. It is almost certain that agrimia were hunted in the wild in the highest mountainous regions. In general, if hunting in the wild was the case, then in this scenario the human-animal relationship might be characterised not by long term cooperation and trust as described for the domestic species, but rather a more fleeting relationship between individuals based on 'chance' encounters (see Chapter 3), although particular individuals may have been sought after. The human–deer relationship is discussed in more detail in Chapter 10.

At a time of settlement nucleation in fewer larger, coastal sites, hunting would have taken the hunter outside of the 'domestic' environment and taken place over a wide-ranging, less familiar and potentially treacherous terrain. The data above suggest that whole deer (and agrimia?) were brought into the town for consumption; whether they were brought in as carcasses or driven in 'on the hoof', however, is not known, although the spectacle, particularly so in the case of the latter, would have been striking.

The nature of these consumption episodes are discussed in detail in the following chapter.

Chapter 9: The animals in contexts

9.1 Introduction: identifying contexts

A significant component of this study is the investigation of human-animal social practices on a more 'context-specific' basis; as such, variation in activities with animals / animal bodies that may have resulted in differential practices of deposition will be explored. As a potential means for doing so, rather than treating the zooarchaeological material as a site-wide homogenous assemblage, specific archaeological feature-types (e.g. pits, floors etc.) at each site have been utilised as units of investigation. The zooarchaeological data for each site, therefore, has been grouped into 'feature types' (although the data for the individual features within each group are presented separately in Appendix A). The main feature types identified for units of analysis at each of the sites are indicated in Table 9.1 below, however individual contexts within these feature groups will be further defined where necessary.

All the faunal material discussed in this thesis is dated to the Late Minoan III period. The material from the Ayia Aikaterini site comes from the Late Minoan IIIB:2 and Late Minoan IIIC sub-phases; as shown in Chapter 8.2.1 the pattern of species representation between the two phases is similar albeit in lower quantities in the Late Minoan IIIC phase. Less is known regarding the sub-phasing of the Late Minoan III material from the Daskaloyannis/Khaniamou and Mathioudaki assemblages and will therefore be defined as Late Minoan III only (although the date of some specific features are known and will be discussed where appropriate). At each of the sites, the pattern of species representation is similar (see Chapter 8.2.1).

Each site has been excavated by different excavation teams, at different times, with different recording methods, and there is significant variation in the availability of published information on site stratigraphy (although it is thought that excavation and collection methods would not have varied greatly). There is, thus, some variation between sites in the extent to which individual contexts can be distinguished (Table 9.1). The presence of pits can be identified as a consistent and comparable feature of each site; the material identified as coming from contexts other than pits can be grouped within a feature type to varying levels of detail at each site. The Ayia Aikaterini data can be grouped into assemblages from pit features, internal rooms, external yards/spaces and rubbish areas; the data from the Daskaloyannis/Khaniamou sites can be grouped into pit assemblages and floor assemblages; and the material from the Mathioudaki site comes from pits (A, B), a room (room A, LMIII levels), floor deposits, and unknown deposits that are probably levelling and accumulation deposits (Table 9.1). These groups will constitute the main features for comparison on an intra-site and inter-site basis, with individual contexts highlighted where necessary.

Ayia Aikaterini	**Daskaloyannis/ Khaniamou**	**Mathioudaki**
Rubbish Area North:	Pit M	Pit A
22-pit B (LMIIIB:2)	Pit ?M	Pit B
16-pit E (LMIIIB:2)	Pit ND	Room A
central dump (LMIIIB:2)	Other pits	Floors
southern dump (LMIIIB:2)	Floors	unknown
layers 1-4 (LMIIIC)		
Other pits		
Internal rooms		
External spaces (LMIII C)		

Table 9.1 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: range of different ‘feature types’.

9.2 Species representation and spatial patterning: where do the animals go?

The following data indicate the quantity of zooarchaeological material and the range of species present in the different broadly defined feature types at each of the sites. In some cases the data for small assemblages from comparable feature types (e.g. floors, pits, etc.) have been amalgamated in order to facilitate comparisons; however the data for individual features will be presented where necessary (the full range of data is provided in Appendix A).

Figure 9.1- Figure 9.3 (below) indicate that the quantities of zooarchaeological material coming from different features types varies across the site, with the majority of animal bone remains coming from a range of pits.

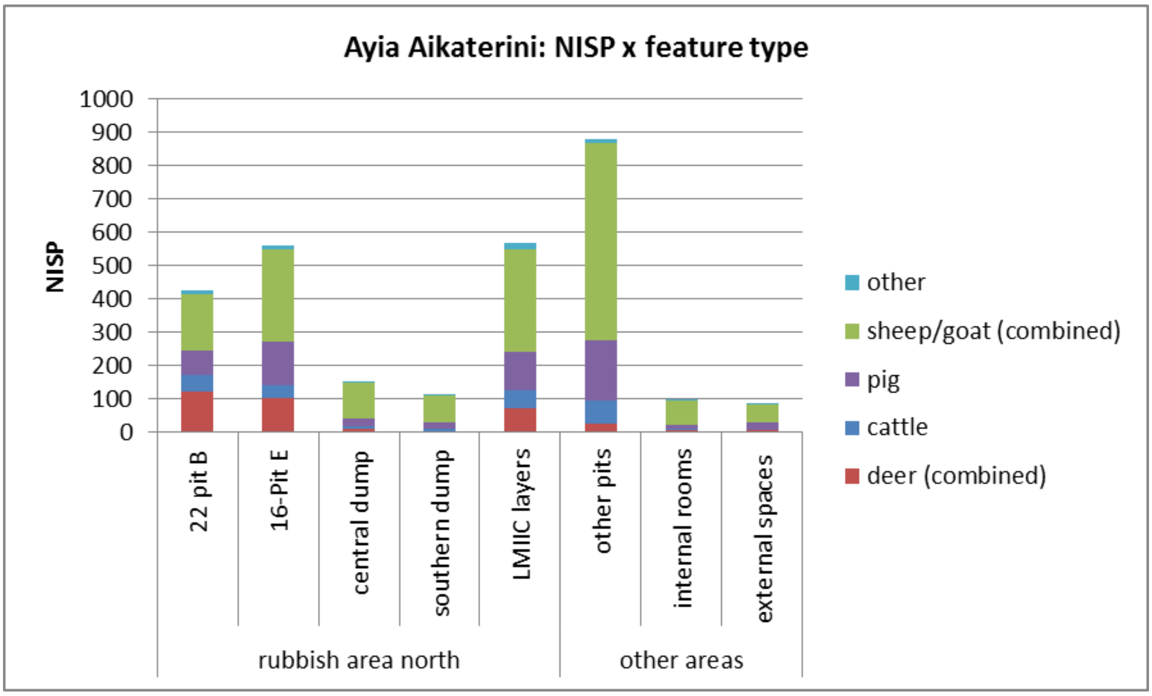

Figure 9.1 Ayia Aikaterini: quantities of zooarchaeological material from each feature group.

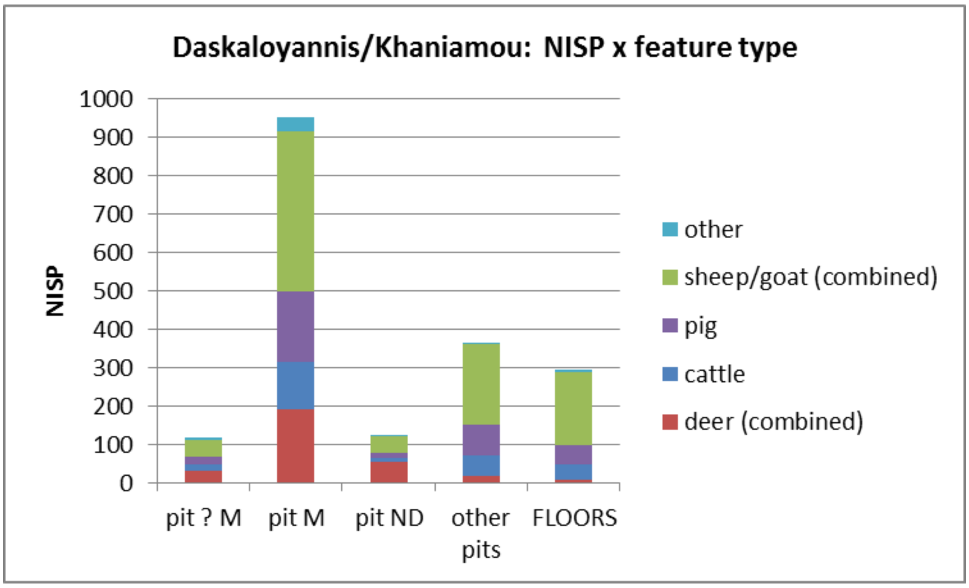

Figure 9.2 Daskaloyannis/Khaniamou: quantities of zooarchaeological material from each feature group (N.B. the partially articulated equid in pit M has been counted as MNI 1 here).

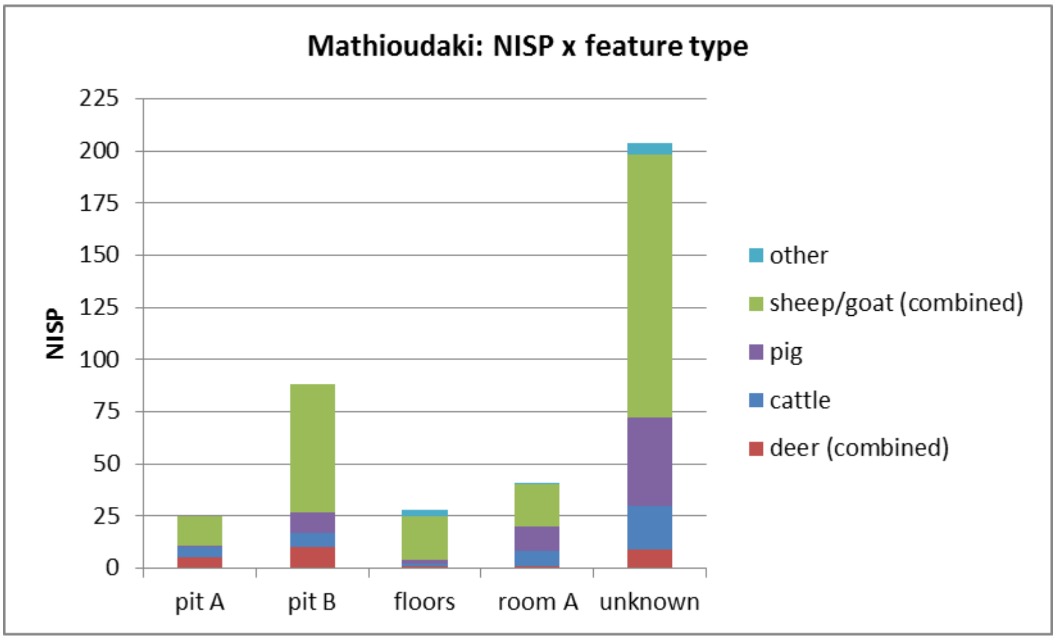

Figure 9.3 Mathioudaki: quantities of zooarchaeological material from each feature group.

9.2.1 ‘Deer pits’

Analysis of the relative percentage of the assemblage that the various species comprise in the different feature types indicates varying patterns of deposition, especially in the case of the deer remains (Figure 9.4 - Figure 9.6, Table 9.2). Deer, predominantly fallow deer, are the most frequently occurring of the wild species, and are present in a greater range of features across the sites than other wild species; however, it is clear that at each site their remains are concentrated in particular features (in which they often outnumber cattle and sometimes pigs; Figure 9.4 - Figure 9.6, Table 9.3 for MNI, Appendix A for data).

At Ayia Aikaterini deer remains are predominantly found in the Rubbish Area North (Figure 9.4), an area of pits and dump deposits thought to have been used predominantly for rubbish disposal (see Chapter 7.2.3). However, within this area it can be seen that the majority of deer remains come from two main pit features: 22-Pit B and 16-Pit E, in which they constitute 29% and 18% of the NISP respectively. This represents a minimum number of seven fallow deer and three red deer (three deer unidentified to species) in 22-Pit B, and seven fallow deer and two red deer (four deer unidentified to species) in 16-Pit E (Table 9.3). 22-Pit B also contained the dolphin vertebra (Table 9.2). Deer remains also constitute 13% (of the NISP) of the Late Minoan IIIC layers in the Rubbish Area North, which represents a minimum of three fallow deer, two red deer and two deer not identified to species (Figure 9.4, see Appendix A for data).

At Daskaloyannis/Khaniamou, deer remains are concentrated in three pit features: Pit M (in which they constitute 20% of the NISP), Pit ?M (25% of the NISP) and Pit ND in which they are the most frequently occurring species (42% of the NISP). In contrast, deer remains constitute only 5% (of the NISP) in all other 20 pits combined and 3% in all floor deposits (Figure 9.5). This represents six fallow deer and five red deer (two deer unidentified to species) in Pit M, three fallow deer and one red deer (one deer unidentified to species) in Pit ?M, and four fallow deer and two red deer in Pit ND (Table 9.3). Pit M also contains the greatest quantity of agrimia remains (N=17, MNI 5; Table 9.2, Table 9.3), and the partially articulated horse (‘burial’?, see Chapter 8.2.7).

At Mathioudaki, deer remains are also more frequent in pit deposits (the data are relatively few however): in Pit A deer remains are 20% of the NISP (MNI one fallow, one red), in Pit B deer remains are 11% of the NISP (MNI two fallow one red, Table 9.3), compared to floors, rooms, and other deposits of unknown function (4% NISP; Figure 9.6).

Agrimi skull and horncore remains appear to be deposited almost exclusively in pit features (see Table 9.4, below). At Daskaloyannis/Khaniamou these are predominantly Pits M, ?M and ND as well as two other pits. At Ayia Aikaterini, agrimi skull and horncores and also several large size goat post-cranial remains were recovered from deposits in the Rubbish Area North, and horncore fragments also came from other pits elsewhere on the site. A few large goat post-cranial remains were recovered from some of the external spaces.

Any other wild species (e.g. hare, badger, marten) occur in very low quantities across the range of features (Table 9.2).

In the pit features containing large quantities of deer, sheep/goat are generally still the most frequently occurring species (with the exception of Pit ND), although often as a lesser percentage of the assemblage than in other features. The remains of cattle and sometimes pig, however, are generally outnumbered by deer remains (Figure 9.4 - Figure 9.6). Dog remains come mainly from pit contexts and, at Ayia Aikaterini, the ‘Rubbish Area North’.

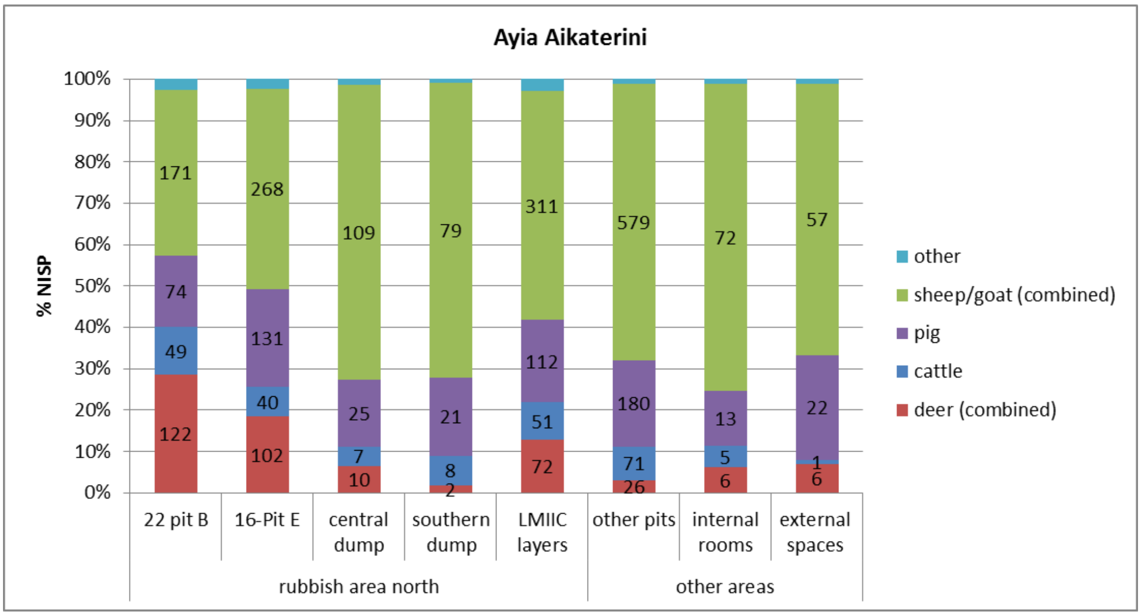

Figure 9.4 Ayia Aikaterini: NISP and percentage of species in different feature types across the site (see Appendix A for data and Table 9.2 for data for ‘other’ species).

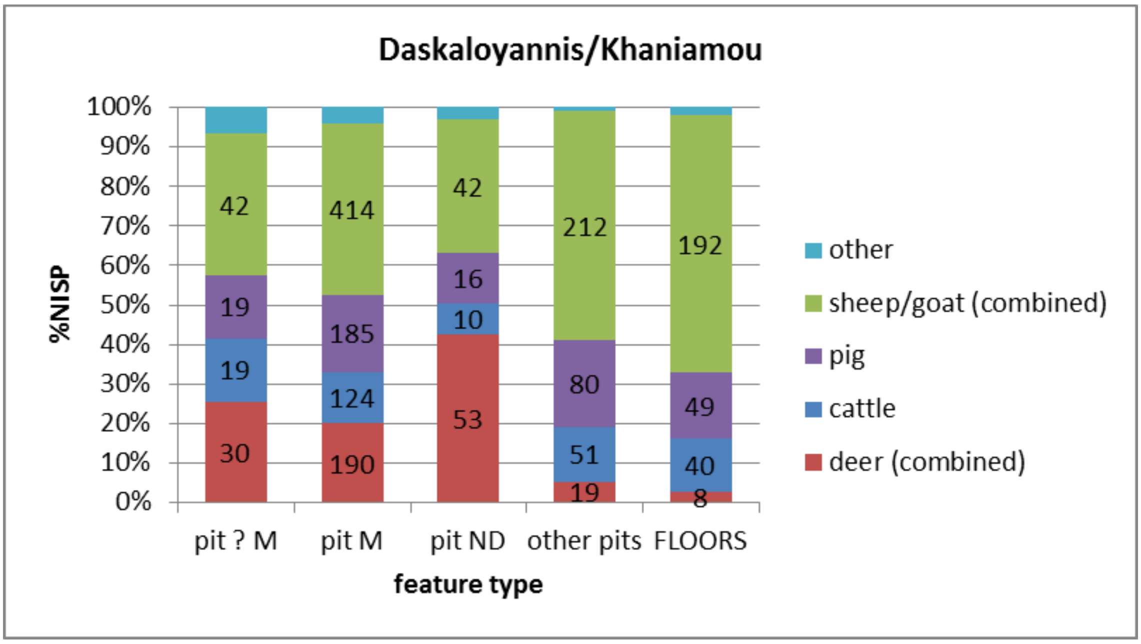

Figure 9.5 Daskaloyannis/Khaniamou: NISP and percentage of species occurring in different feature types across the site (see Appendix A for data and Table 9.2 for data for ‘other’ species).

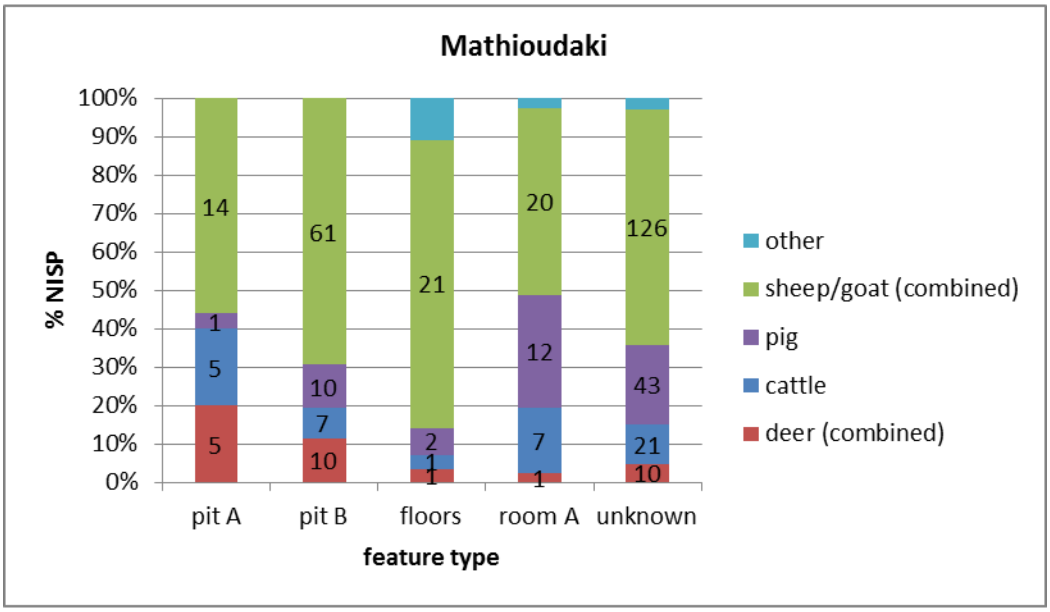

Figure 9.6 Mathioudaki: NISP and percentage of species occurring in different feature types across the site (see Appendix A for data and Table 9.2 for data for 'other' species).

Site	Feature type	equid	dog	agrimi	hare	marten	badger	dolphin	bird	fish	human
Ayia Aikaterini	RAN 16-Pit E	1	5	1		1					5
	RAN 22-Pit B		6		2			1			2
	RAN central dump		2								
	RAN southern dump		1								
	RAN LMIIIC layers	9	4								
	other pits	1	1	4	1						3
	internal rooms				2		1		1		
	external spaces										1
Daskaloyannis /Khaniamou	pit M	90*	6	17						1	4
	pit ?M	4	3	1							
	pit ND	1	1	2							
	other pits	1	1	2							
	FLOORS	1							2	1	2
Mathioudaki	floors	2	1								
	room A				1						
	unknown	3	1	1	1						
Total		*113*	*32*	*28*	*7*	*1*	*1*	*1*	*3*	*2*	*17*

* 81 from 1 individual

Table 9.2 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: quantities (NISP) of less frequently occurring species present in different feature types.

MNI	Ayia Aikaterini (Rubbish Area North)		Daskaloyannis/Khaniamou			Mathioudaki	
	16-Pit E	22-pit B	Pit M	Pit ?M	Pit ND	Pit A	Pit B
cattle	1	2	5	2	2	1	2
pig	10	4	10	4	2	1	1
goat	4	5	7	3	1	1	1
sheep	5	8	12	1	2		1
sheep/goat	8	6	15	3	3	2	4
equid	1		2	2			
dog	1	1	2	1	1		
deer	4	3	2	1			
fallow deer	7	7	6	3	4	1	2
red deer	2	3	5	1	2	1	1
agrimi	1		5	1	1		
Total	*44*	*39*	*71*	*22*	*18*	*7*	12

Table 9.3 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: species occurring in the main pit features expressed as MNI.

Site	feature	agrimi			*goat				Total
		skull	skull + horncore	horncore	femur	humerus	metacarpal	radius	
Ayia Aikaterini	Rubbish Area North, 16-Pit E (LMIIIB:2)			1		1		1	3
	Rubbish Area North,1st layer (LMIIIC)			2	1		1		4
	Rubbish Area North, 3rd layer (LMIIIC)	1							1
	Other pits: 11-Pit E (LMIIIB:2)			1					1
	Other pits: 11-Pit F (LMIIIB:2)			2					2
	Other pits: 12-Pit D (LMIIIB:2)			1					1
	External spaces: courtyard F, pits D/E (LMIIIC)					1			1
	External spaces: space O, Patio? (LMIIIC)							2	2
	External spaces: space P(LMIIIC)							1	1
	Sub-total	*1*		*7*	*1*	*2*	*1*	*4*	*16*
Daskaloyannis/ Khaniamou	Pit ? M		1						1
	Pit M		7	10					17
	Pit ND		2						2
	Other pits: Pit Ma			1					1
	Other pits: Pit IΘ		1						1
	Sub-total		*11*	*11*					*22*
Mathioudaki	unknown			1					1
	Grand total	1	11	19	1	2	1	4	39

* noted to be of large size

Table 9.4 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: agrimi remains and possible agrimi remains.

9.2.2 Ayia Aikaterini feature types

9.2.2.1 ‘Other pits’

At the Ayia Aikaterini site the ‘other pits’ groups consists of eight pits (five LMIIIB:2, three LMIIIC) in the Courtyard area of the site, with assemblage quantities ranging from a minimum of five to maximum of 192 fragments (NISP). A further four pits are located in the ‘Southern Area’ of the site (three LMIIIB:2, one LMIIIC) with assemblage quantities (NISP) ranging from a minimum of six to a maximum of 385 fragments (see Figure 9.7 and Appendix A for data). The assemblages from these ‘other pits’ are dominated by the remains of the domestic species, particularly sheep/goat, with deer remains contributing only 3% of the NISP of all the pits combined.

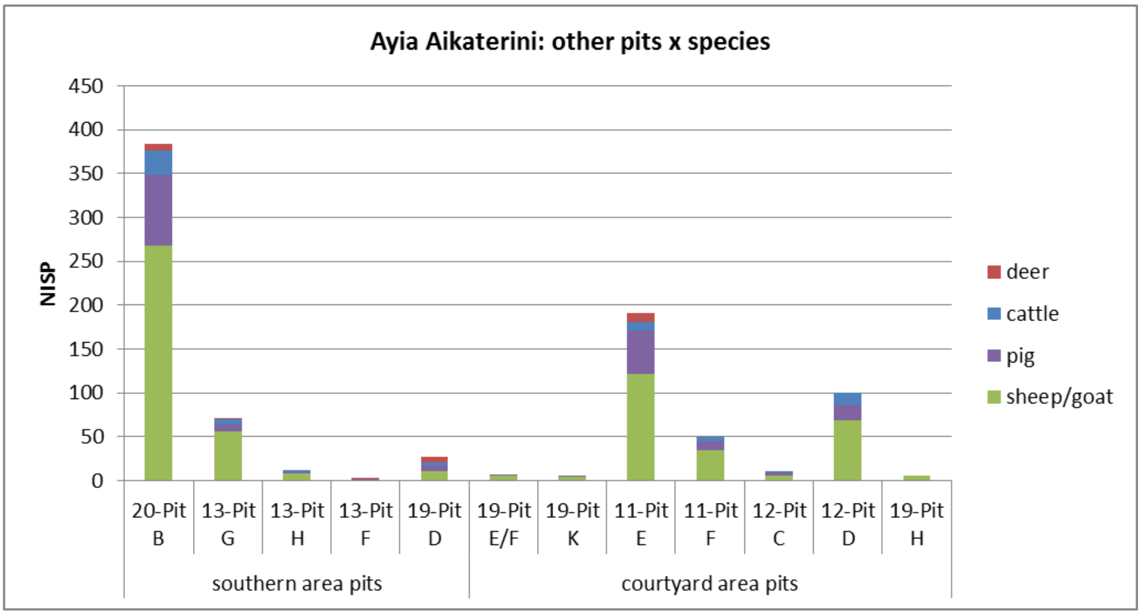

Figure 9.7 Ayia Aikaterini: species representation in other pits across the site.

9.2.2.2 ‘Internal rooms’

The ‘internal rooms’ group is represented by small assemblages recovered from eight rooms within the buildings (four LMIIIB:2, four LMIIIC) ranging from a minimum of six to maximum of 19 fragments (NISP). Only included here, however, is the zooarchaeological material associated with floor deposits; excluded from analysis is the material associated with construction, such as deriving from walls or levelling deposits. This is based on the assumption that material associated with floor deposits might relate in some way to practices contemporary with and taking place in the rooms, whereas material associated with constructions (especially levelling deposits) may represent mixed deposits incorporating material derived from elsewhere on the site. The assemblages from these rooms are predominated by the domestic species, particularly sheep and goat (Table 9.5).

Internal rooms (bones, NISP, associated with floor deposits)	**cattle**	**pig**	**goat**	**sheep**	**sheep/goat**	**deer**	**fallow deer**	**red deer**	**hare**	**Total**
B1.Room A	2			1	4					7
B2.Room A	2		2	2	9		1	1		17
Room E		5		2	6					13
Room I (pit)				2	6					8
Room K				2	4					6
Room K/H		3	1	5	6	1	2		1	19
Room O		4	5	1	7	1				18
Room U	1	1		1	6					9
Total	5	13	8	16	48	2	3	1	1	97

Table 9.5 Ayia Aikaterini: assemblages from internal rooms associated with floor deposits.

9.2.2.3 'External spaces'

Only a very small quantity (NISP 87) of material came from external spaces, such as the courtyard and 'patio' (Hallager & Hallager 2000). This material was predominantly the remains of the domestic species, with only six fragments identified as deer remains (four fallow, two deer; see Appendix A for data).

9.2.3 Daskaloyannis/Khaniamou feature types

9.2.3.1 ‘Other pits’

The ‘other pits’ group at the Daskaloyannis/Khaniamou site consist of 20 pits with small quantities of zooarchaeological material ranging from a minimum of three fragments (NISP) to a maximum of 73 fragments (NISP). Within this group two pits contained relatively high quantities of deer remains (Pit Ma: 6, Pit KO: 9), although overall the assemblages from these pits are small (NISP 19 and 36 respectively, see Appendix A). The remaining pits are characterised by small quantities of zooarchaeological material, predominantly of the domestic species, particularly sheep/goat (Figure 9.8).

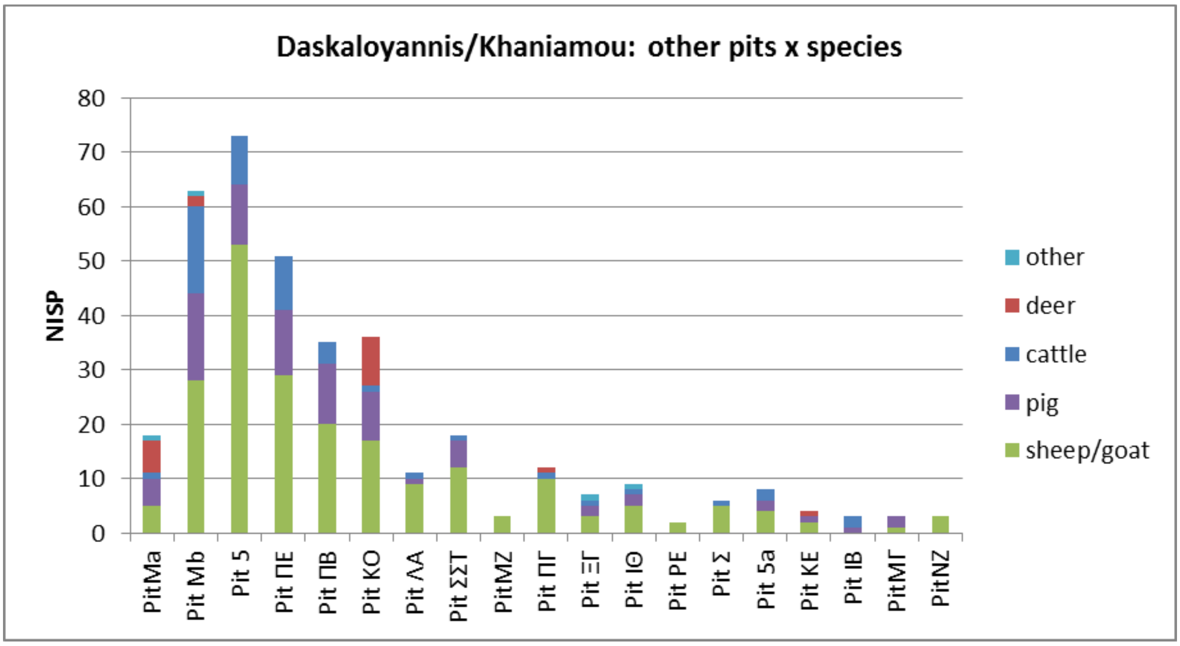

Figure 9.8 Daskaloyannis/Khaniamou: species representation in other pits across the site (see Appendix A for data).

9.2.3.2 ‘Floors’

The unit of analysis described as ‘Floors’ from the Daskaloyannis/Khaniamou site is harder to subdivide. Within this category, 17 contexts have been identified as representing specifically floor remnants[84] (see Appendix A); however it is not known how these floor remnants relate to each other, e.g. a number of different remnants of a single larger floor, or floor remnants of different phases (although all are thought to be broadly of Late Minoan III date). The zooarchaeological assemblages from these floor remnants consist of small assemblages ranging from two to 21 fragments (NISP) and are represented by predominantly domestic species, especially sheep/goat (combined) and pigs (49% and 20% of the NISP respectively). Only two fragments of fallow deer (a femur fragment and a tibia fragment) were recovered from these floor remnants.

Within this group, one floor remnant (floor 20) excavated within the Khaniamou plot is of Late Minoan IIIA2 date and corresponds to the second Late Minoan III phase floor of the large external courtyard (Andreadaki-Vlasaki 1997; see Chapter 7.3.3). All the zooarchaeological remains (Table 9.6) from this floor are from the domestic species, predominantly sheep/goat (81% of the NISP).

As also described in Chapter 7.3, a small open area in the southeast corner of the external courtyard, described as a ‘niche’, is thought to have contained the remains of ‘special ceremonies’ and rituals centred on the nearby monumental platform, of which feasting was thought to have been a part (Andreadaki-Vlasaki 2002). Analysis of the zooarchaeological remains from the Late Minoan I hearth in this area by D. Mylona (n.d-c) indicated that the bones appeared to be food remains; young pig remains were the most common (MNI 6), but also two mature female sheep, some young ovicaprids, goats (only the hind legs), and cattle (MNI 3). A mature male dog had been deposited whole. Two fallow deer bones (radius, tibia) were also recorded as well as two agrimi horncores, and a bird bone. Animal bones from the same area of Late Minoan IIIA2 date, constitute a small assemblage, with only the remains of domestic species present (Table 9.6). Sheep/goat remains are most common (with goat outnumbering sheep) and a slightly higher number of pigs and cattle than from floor 20.

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[84] Based on information in excavation notebooks and on context labels; other assemblages within this group are described as coming from areas of the trench or associated with walls etc.

Species	Courtyard floor (20)	Courtyard 'niche'	other floors	Total
cattle	2	3	35	40
pig	1	5	43	49
goat		6	15	21
sheep		2	30	32
sheep/goat	17	9	113	139
equid			1	1
deer			1	1
fallow deer			7	7
bird			2	2
fish			1	1
human	1			1
? human			1	1
Total	21	25	249	295

Table 9.6 Daskaloyannis/Khaniamou: the Late Minoan III period zooarchaeological remains from the courtyard floor (20), the courtyard 'niche' (Trench ΣT), and the remaining floors and areas.

The features from the Mathioudaki site were not subdivided further than as has been described above.

9.3 Fragmenting the animal body: patterns of consumption

9.3.1 Element representation in different feature types

Analysis of element representation per species in each feature type indicates that elements from the 'Head', 'Upper limbs' and 'Lower limbs' groups (as defined in Chapter 8.3.1) are present in most feature types (except perhaps in cases where the data are too few; see Appendix B.2 for data). Furthermore, comparison of the element data (excluding loose teeth) per species from one of the large 'deer pits', from other pits (without deer), and from floor/room deposits at both Daskolayannis/Khaniamou and Ayia Aikaterini indicates that the relative proportions of the different element groups per species do not differ greatly between each feature type, especially between the different pit assemblages, except perhaps that skull fragments occur more frequently in the pit deposits (however this is likely a preservation condition; see Figure 9.9 - Figure 9.14, the Mathioudaki data is presented in the Appendix B.2, but shows a similar pattern).

These data might suggest that, in contrast to the variation in species present in the different feature types, the relative proportions of the different skeletal groups for each species did not vary much between the feature types. There was no apparent selective disposal of specific elements in any one particular feature or feature type, suggesting that butchery and consumption may have happened in relatively close proximity to one another (resulting in disposal of the remains from both practices in the same feature) and / or that elements from all parts of the body were selected for consumption; and this appeared to be consistent across the range of features. It is possible that skull fragments occur less frequently in the floor deposits at Ayia Aikaterini (see Figure 9.11) which could possibly be interpreted as indicating joints of meat (for example) rather than whole carcasses were present there; however these data are few and could be the result of a less protected post-depositional environment than pit contexts, causing greater fragmentation resulting in fewer identifiable fragments (however this does not appear to be the case for floor assemblages from Daskaloyannis/Khaniamou).

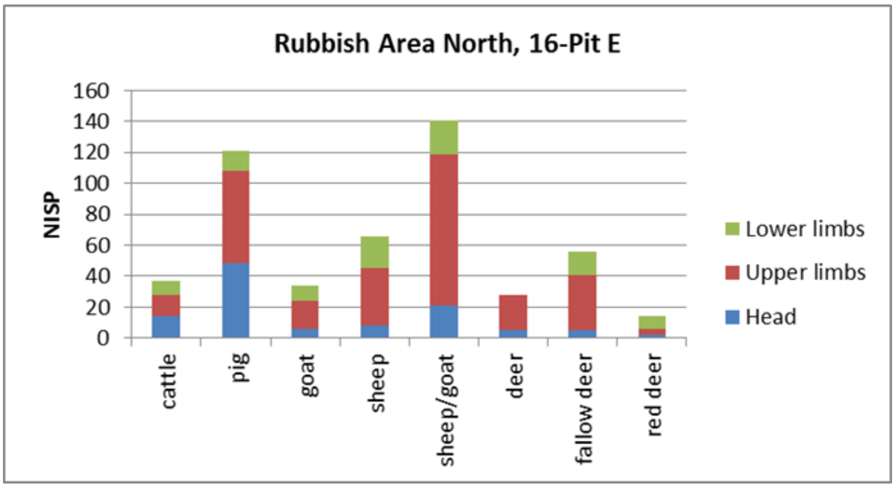

Figure 9.9 Ayia Aikaterini: skeletal element data per species in 16-Pit E (‘deer pit’), Rubbish Area North (LMIIIB:2).

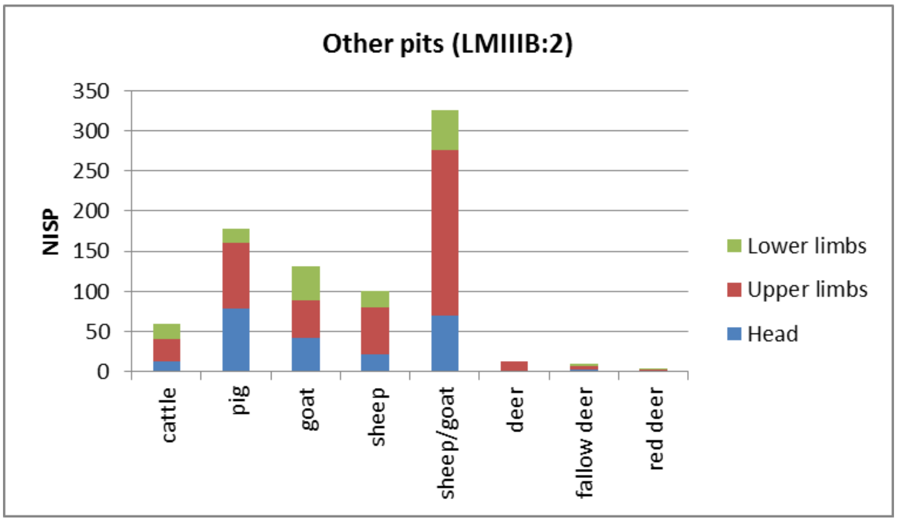

Figure 9.10 Ayia Aikaterini: skeletal element data per species in the other pits (LMIIIB:2).

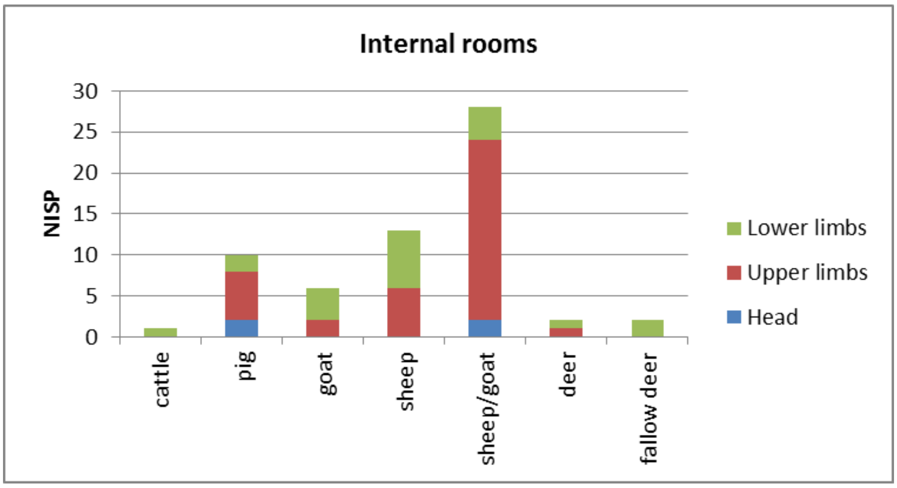

Figure 9.11 Ayia Aikaterini: skeletal element data per species associated with floor deposits in the Internal rooms (LMIIIB:2 + LMIIIC).

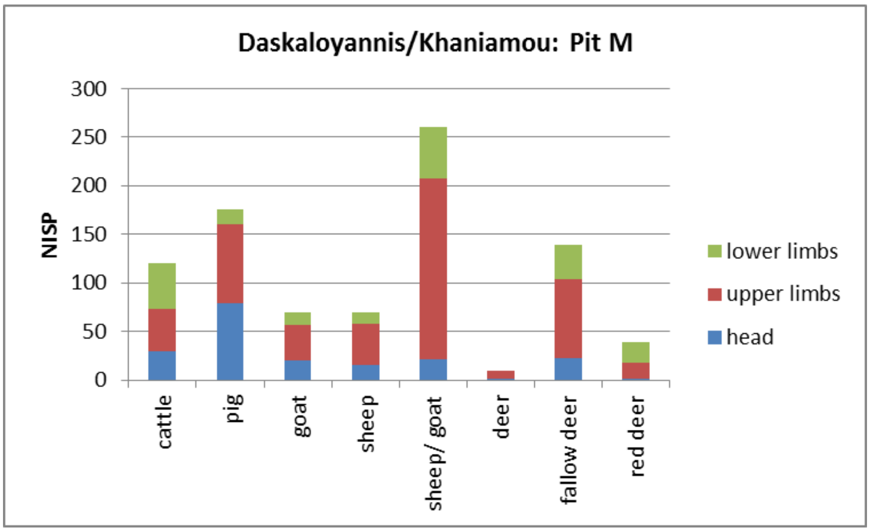

Figure 9.12 Daskaloyannis/Khaniamou: skeletal element data per species in Pit M ('deer pit').

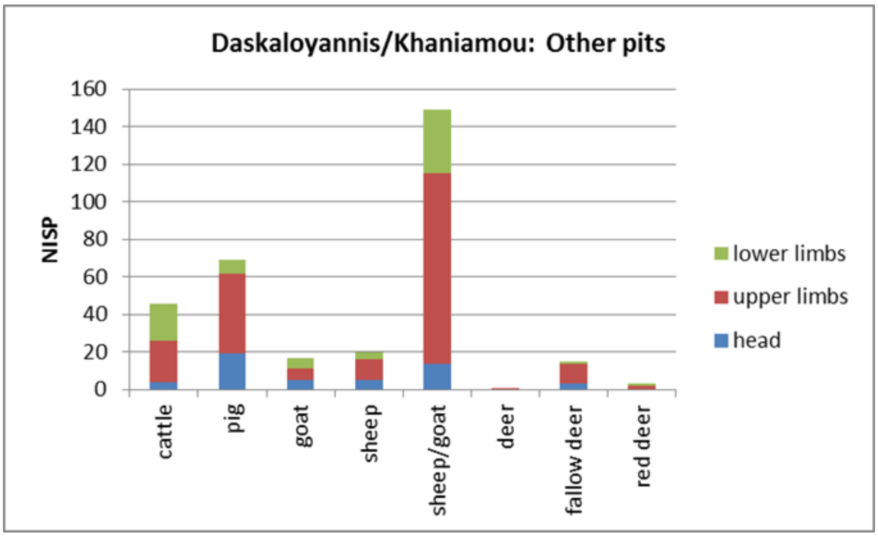

Figure 9.13 Daskaloyannis/Khaniamou: skeletal element data per species in other pits.

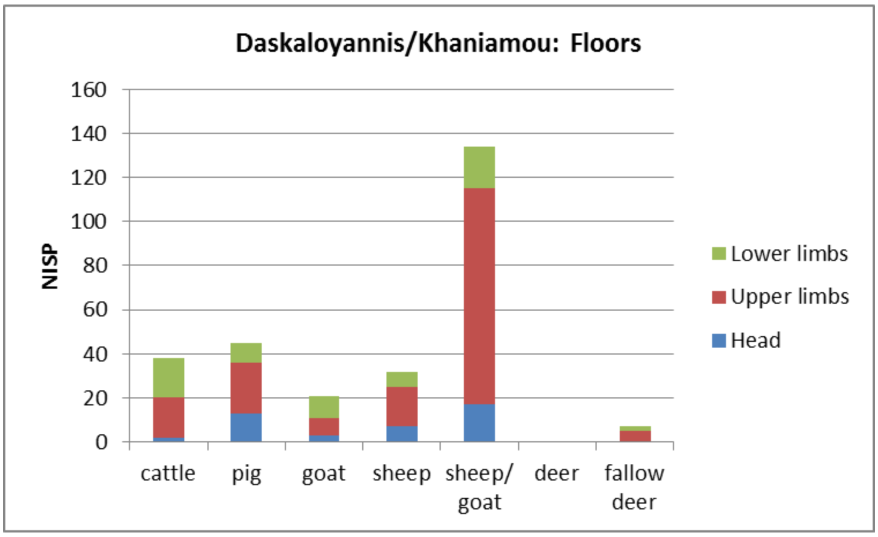

Figure 9.14 Daskaloyannis/Khaniamou: skeletal element data per species in floor deposits.

9.3.2 Butchery methods in different feature types

A comparison of the most frequently occurring butchery marks[85] between the different feature types at each of the sites (see Appendix E.3 for data) suggests that dismemberment and filleting cutmarks are the most frequently occurring in each feature type at each site (Figure 9.15 - Figure 9.17). At Ayia Aikaterini and Daskaloyannis/Khaniamou evidence for marrow extraction appears to occur as a slightly higher proportion of the assemblages coming from 'other pits' (i.e. the pits without high quantities of deer). However, overall the differences are not great.

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[85] Chopmarks and cutmarks here indicate carcass dismemberment, meat filleting, skinning, and the removal of horn or antler (see Chapter 8.3.2); for ease of quantification, figures exclude cases in which more than one type of mark was present on a bone.

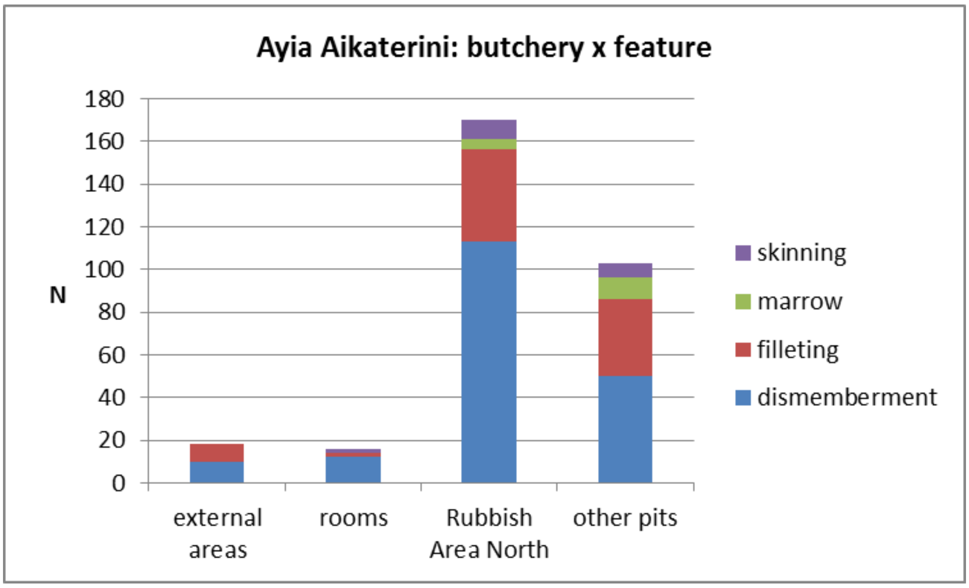

Figure 9.15 Ayia Aikaterini: representation of most frequently occurring butchery marks per feature.

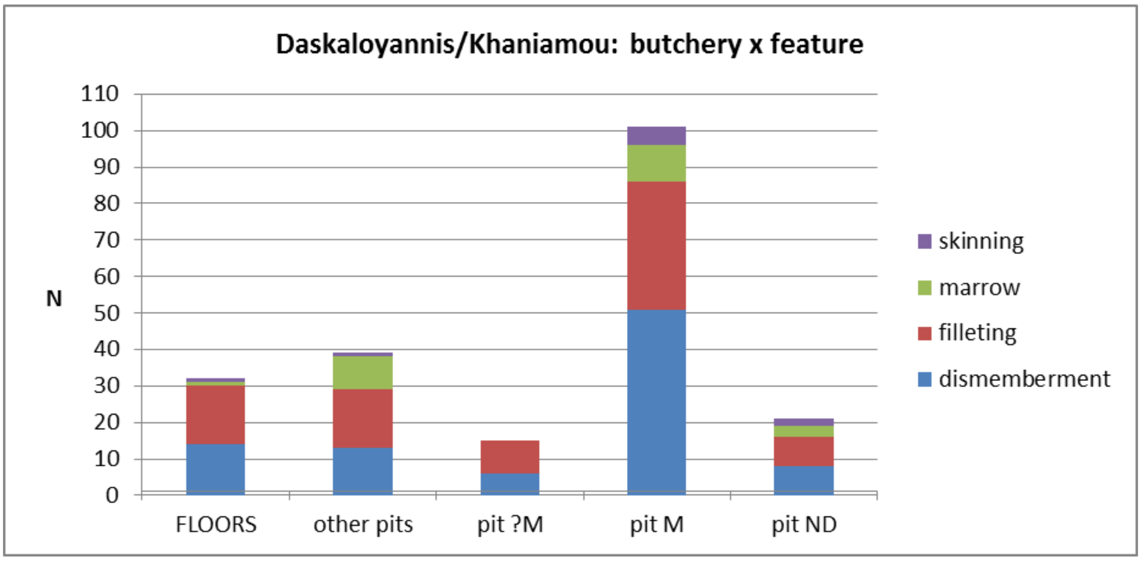

Figure 9.16 Daskaloyannis/Khaniamou: representation of most frequently occurring butchery marks per feature.

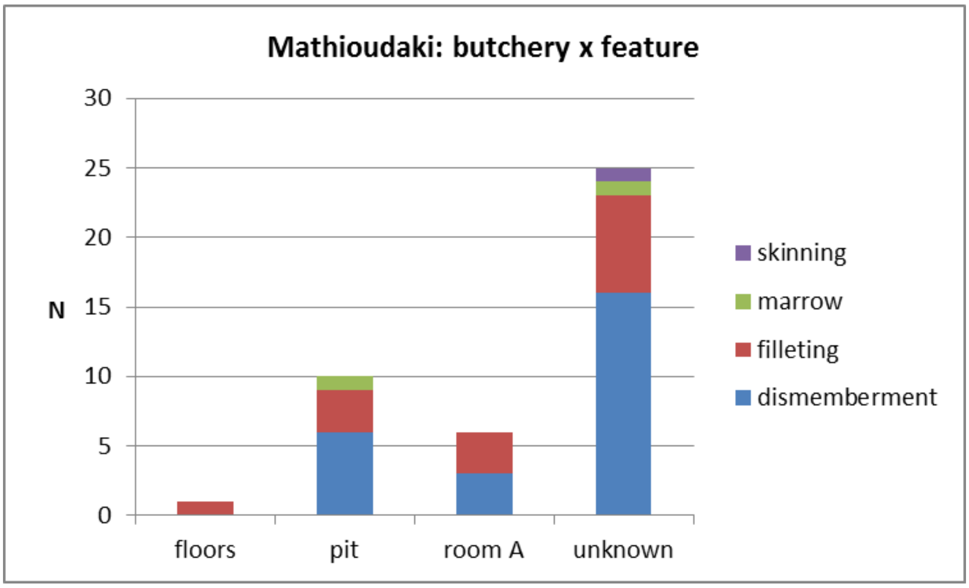

Figure 9.17 Mathioudaki: representation of most frequently occurring butchery marks per feature.

Of the less frequently occurring butchery marks (see Appendix E for data), a number of cases of cutmarks and chopmarks occur on the skull and neck vertebrae (axis and atlas), perhaps suggesting practices such as throat cutting (transverse cutmarks on ventral surface) and /or dismemberment of the head and neck area (see Chapter 8.3.2). This type of butchery marks are present on a number of species (see Table 9.7 below, and Chapter 8.3.2) and occur in a range of feature types.

At Ayia Aikaterini they occur in all the context types of the Rubbish Area North (16-Pit E, 22-Pit B, central and southern dumps, and the Late Minoan III layers), as well as from two ‘other pits’ on the site (20-Pit B, 13-Pit G). Of this material, four cases were noted on fallow deer and deer remains (atlas and axis vertebrae) in 16-Pit E and 22-Pit B; also in 22-Pit B cutmarks were noted on a dog atlas vertebra. The other cases were observed on sheep/goat and pig atlas and axis vertebrae. This type of butchery was also noted at Daskaloyannis/Khaniamou in the Pit M assemblage, in which it was observed on two fallow deer atlas vertebrae and a pig atlas vertebra and skull fragments; and in Pit Mb where it was noted on a sheep/goat axis vertebra. At Mathioudaki two possible cases were observed, on red deer and pig skull fragments.

Site	**Axis/atlas butchery**	**chop**	**cut**	**description**
Ayia Aikaterini	*Rubbish Area North,16-Pit E*			
	pig atlas	1		transverse chop through from dorsal surface
	pig atlas		1	transverse cutmarks cranial end ventral surface
	deer atlas		**1**	longitudinal cut cranial edge of dorsal surface
	fallow deer atlas		**1**	small cutmarks cranial edge dorsal surface
	Rubbish Area North, 22-Pit B			
	dog atlas	1	1	transverse cumarks across ventral surface, small chop marks on dorsal cranial edge
	fallow deer atlas	**1**		possible chop down through axis from dorsal surface; ariculates with axis and skull, no marks observed on these
	deer axis	**1**		longitudinal chops to right side cranial articulation
	Rubbish Area North, LMIIIC layers			
	pig atlas		1	transverse cutmarks across ventral surface
	sheep/goat axis	1		
	deer atlas	**1**		chop downwards longitudinally on ventral side from cranial to caudal
	Rubbish Area North, central dump			
	sheep/goat atlas		1	transverse cut on dorsal surface
	Rubbish Area North, southern dump		1	
	sheep/goat atlas		1	cutmarks on ventral surface
	20-Pit B			
	pig atlas		1	transverse cutmarks across ventral surface
	13-Pit G			
	sheep/goat atlas		1	transverse cut on dorsal surface
	Subtotal	*6*	*10*	
Daskaloyannis/ Khaniamou	*Pit M*	3	1	
	fallow deer atlas	**1**		longitudinal chop to ventral surface
	fallow deer atlas	**1**		longitudinal chop through side
	pig skull	1		chop through left side occipital
	pig atlas		1	longitudinal cut on ventral surface
	Pit Mb			
	sheep/goat axis	1		chopped through longitudinally
	Subtotal	*4*	*1*	
Mathioudaki	red deer atlas	**1**		chopped through longitudinally
	pig skull		1	transverse cutmarks on processus jugularis
	Subtotal	*1*	*1*	
	Grand Total	11	12	

Table 9.7 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: butchery marks associated with head and neck elements.

Possible evidence for reducing larger elements to smaller portion sizes ('portioning', see Chapter 8.3.2) was noted on goat (scapula) and pig (tibia) remains in the Rubbish Area North at Ayia Aikaterini (16-Pit E and Late Minoan III layers, respectively), and also on a pig tibia in 20-Pit B. At Daskaloyannis/Khaniamou this feature was noted on sheep/goat and pig scapulae in Pits ?M, ND, and Mb; and in Pit M on sheep/goat and fallow deer (N=2) scapulae and cattle and fallow deer (N=1) pelves. It was also noted on a sheep/goat scapula and pelvis from Floor deposits at Daskaloyannis/Khaniamou, and a sheep/goat scapula at Mathioudaki.

Chopmarks on the skull possibly indicative of access to the brain was noted on sheep/goat and pig skull fragments at both Mathioudaki and Daskaloyannis/Khaniamou (Pit M, Pit 5). However, chopmarks noted on pig skull fragments (usually parietal or temporal bones), that might indicate the removal of the ear, were only noted on material from Ayia Aikaterini in 16-Pit E (Rubbish Area North) and 20-pit B.

Butchery marks suggesting the removal of skins, horn, and antler, as well any evidence for bone/antler working will be discussed in section 9.4, below.

9.3.3 Articulations in the 'deer pits'

The following tables (Table 9.8 - Table 9.10) present the data for articulating elements recorded in the assemblage. Conjoining elements were noted for most of the species and the majority of articulations were recorded in Pits M, ?M and ND at Daskaloyannis/Khaniamou, in the Rubbish Area North (22-Pit B especially) at Ayia Aikaterini, and slightly higher in pits than other deposits at Mathioudaki. In general, the presence of articulating elements suggests a fairly rapid deposition of the material, the bones still being connected by ligamentous tissue and articular cartilage prior to its decay (Lyman 1994).

Anatomically, the mammal limb is described as divided into three segments (see Figure 9.18 below): the *stylopodium* (humerus in the forelimb and femur in the hindlimb), followed by the *zygopodium* (radius and ulna in the forelimb, tibia and fibula in the hindlimb), and the *autopodium* (carpals, metacarpals and phalanges in the forelimb and tarsals, metatarsals and phalanges in the hindlimb).

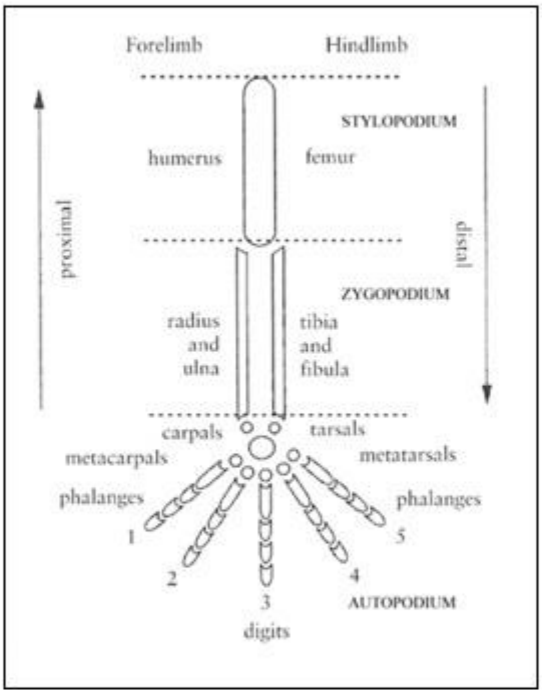

Figure 9.18 Figurative depiction of limb segments (after O'Connor 2000).

The data for articulating elements in the assemblages of this study suggest they could be considered in two groups: firstly, those closely connected articulating elements *within* a segment (e.g. the radius and ulna, groups of carpals/tarsals and so on), and secondly, articulations that occurred *between* segments (e.g. the humerus and radius, the femur and pelvis).

Articulations *within* a segment can perhaps be considered as indicative of rapid burial (e.g. prior to decay of the connective tissues), especially articulations between the phalanges which are considered to be among the first elements to disarticulate (Lyman 1994:145). These may indicate pieces that had been disposed of after consumption (e.g. radius/ulna portions) and pieces perhaps discarded (after butchery or after cooking?) as not bearing much meat and are unsuitable for marrow extraction (e.g. carpals/tarsals).

Articulations *between* segments on the other hand, as well as indicating rapid burial could also represent the deposition of larger limb sections and thus perhaps larger portions of meat. Cross-referencing the butchery data with the articulations between humeri and radii (an articulation *between* segments) for each species produced an interesting result (see Table 9.8 - Table 9.10 below). Within features Pit M, ?M, and ND at Daskaloyannis/Khaniamou, and 22-Pit B and Late Minoan IIIC layers (3rd layer) in the Rubbish Area North at Ayia Aikaterini, of the articulating humeri and radii/ulnae recorded (nine examples), none showed any obvious traces of dismemberment of the joint between the humerus and radius/ulna (e.g. Binford 1981, code Hd-1, Hd-2), generally one of the most frequently occurring types of butchery mark in the assemblage (see Chapter 8.3.2 and Appendix E). However, in most cases these pieces did show cutmark evidence for the filleting of meat, and in two of the deer examples the possible breaking for marrow extraction (see Figure 9.19 below). From Pit ND a fallow deer pelvis and femur fragment were also found to articulate but showed no dismemberment butchery although they did show cutmarks indicative of filleting. This suggests that these remains may indicate that large limb sections, with no evidence of them having been dismembered at the articulating joints but with cutmarks indicative of the filleting of meat, may be evidence for the consumption and deposition of large joints of meat in these particular features. What is more, this pattern (of articulation with butchery data) occurs most frequently on fallow deer remains (four examples) than on any other individual species (one red deer, one cattle, two pig, one goat, two sheep/goat; see Table 9.8 - Table 9.10 below).

Another large pit feature, 20-Pit B at Ayia Aikaterini, - but one *not* containing high quantities of deer[86] - also produced some groups of articulating humeri, radii and ulnae (three examples, see Table 9.8); in these cases, however, there was clear evidence of the humerus/radius joint having been dismembered (see Figure 9.20 below). This was also the case at Mathioudaki (Table 9.10). This evidence could suggest these joints may have been separated into smaller portion sizes for consumption (hence the dismemberment cutmarks), with rapid disposal after consumption accounting for the possibility to refit these elements.

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[86] see Appendix A

Ayia Aikaterini	**Species**	**Element**	**Butchery**
Rubbish Area North, 22-Pit B	pig	humerus + radius + ulna	No evidence for dismemberment, evidence for filleting
	pig	radius + ulna	
	pig	tibia + astragalus	
	goat	scapula : scapula (pair?)	
	goat	tibia + astragalus	
	sheep	metatarsal + phalanx 1	
	fallow deer	axis + atlas + skull?	
	fallow deer	humerus: humerus + radius (pair?)	No evidence for dismemberment, evidence for filleting, possibly breaking humerus for marrow
	fallow deer	humerus + radius	No evidence for dismemberment, evidence for filleting, breaking radius for marrow
	fallow deer	radius + ulna	
	fallow deer	tibia + astragalus	
	red deer	calcaneus + astragalus	
	red deer	phalanx 1 : phalanx 1 (pair?)	
Rubbish Area North,16-Pit E	pig	mt3 + mt4	
	sheep	metatarsal + phalanx 1	
	sheep	phalanx 1 + phalanx 2	
	fallow deer	metacarpal + phalanx 1 : phalanx 1 (pair?)	
Rubbish Area North, LMIII layers	cattle	metatarsal + phalanx 1	
	pig	mc3 + mc4	
	goat	humerus + radius	No evidence for dismemberment
	goat	humerus + radius	
	sheep	humerus + radius	No evidence for dismemberment, evidence for filleting
	sheep	radius + ulna	
	sheep	radius + ulna	
	sheep	radius + ulna	
	equid	metacarpal + phalanx 1	
	fallow deer	radius + ulna	
	deer	skull + atlas	
20-Pit B	pig	humerus + radius + ulna	Evidence for dismemberment
	pig	humerus + radius + ulna	Evidence for dismemberment
	goat	humerus + radius + ulna	Evidence for dismemberment
Room K/H (in 2nd floor)	fallow deer	phalanx 2 + phalanx 3	
Room O (constructions, the walls)	pig	phalanx 1 + phalanx 2	
Room O (constructions, the walls)	red deer	radius + ulna	
Space A-D, accumulated deposit	deer	calcaneus : calcaneus (pair?)	
Space P, Related deposits	cattle	phalanx 3 : phalanx 3 (pair?)	

Table 9.8 Ayia Aikaterini: articulating elements.

Daskaloyannis/Khaniamou	Species	Element	Butchery
Pit M	cattle	humerus + radius + ulna	No evidence for dismemberment
	cattle	metacarpal + phalanx 1	
	cattle	phalanx 2 + phalanx 3	
	cattle	tibia + astragalus + calcaneus + tarsal	
	goat	radius + ulna	
	goat	radius + ulna	
	goat	tibia + astragalus	
	pig	humerus + radius	No evidence for dismemberment
	pig	radius + ulna	
	fallow deer	humerus + ulna	No evidence for dismemberment, possible evidence for filleting
	fallow deer	tibia + astragalus	
	red deer	astragalus + calcaneus	
	red deer	astragalus + calcaneus	
	red deer	astragalus + calcaneus	
	red deer	humerus + ulna	No evidence for dismemberment (possibly chopped through ulna
Pit ?M	cattle	phalanx 1 + phalanx 2	
	sheep	radius + ulna	
Pit ND	cattle	phalanx 1 + phalanx 2	
	pig	radius + ulna	
	sheep	radius + ulna	
	fallow deer	pelvis + femur	No evidence for dismemberment, evidence for filleting
Pit NZ	sheep/goat	radius + ulna	
Floors	cattle	radius + ulna	
	goat	metacarpal + phalanx 1	
	sheep/goat	radius + ulna	
	sheep/goat	radius + ulna	

Table 9.9 Daskaloyannis/Khaniamou: articulating elements.

Mathioudaki	Species	Element	Butchery
Room A	pig	humerus + ulna	dismemberment
	pig	phalanx 1 + phalanx 2	
Pit A	red deer	atlas + axis	atlas chopped through longitudinally
Pit B	sheep	radius + ulna	marrow extraction?
Unknown	goat	humerus + radius	dismemberment + filleting
	goat	tibia + astragalus	dismemberment
	sheep	radius + ulna	dismemberment
	sheep	tibia + astragalus	marrow extraction?
	sheep	metacarpal + phalanx 1	

Table 9.10 Mathioudaki: articulating elements.

Figure 9.19 Ayia Aikaterini: articulating fallow deer humerus and radius; 22-Pit B.

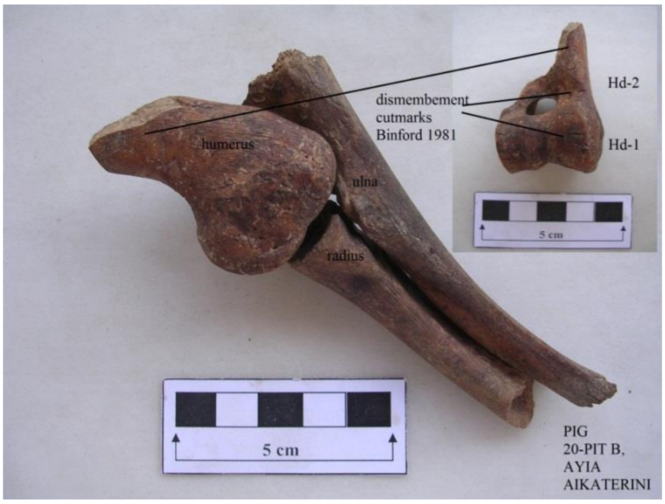

Figure 9.20 Ayia Aikaterini: articulating pig humerus, radius, ulna; 20-Pit B.

9.3.4 Patterns of burning

As indicated in Table 9.11 (below), only a small quantity of burnt fragments, from a range of features, was recorded at Ayia Aikaterini. At Mathioudaki, although the quantity of burnt material is not great, the majority of burnt fragments come from Pit B and are *totally* burnt (e.g. the total exterior and interior of the bone was burnt at high temperatures resulting in brown, black, or grey / white discoloration, see Chapter 8.3.3). The majority of burnt material, however, comes from the Daskaloyannis/Khaniamou site.

The burnt material at the Daskaloyannis/Khaniamou site comes predominantly from Pits M, ?M, ND and Floor deposits, in the latter of which burnt fragments represent 21% (based on NISP; see Table 9.11 and Table 9.12 below). The majority (81%, N=51) of the burnt fragments from the 'floors' come from the Khaniamou part of the site, that is the area corresponding to the large external courtyard rather than the building (see Chapter 7.3). Of the burnt material from floors, 44% comes from Floor 20 and the courtyard 'niche', which in themselves burnt material constitutes 66.7% and 56% (of the NISP) respectively.

There is, however, a distinct difference in the burning patterns between the pit deposits and floors deposits at Daskaloyannis/Khaniamou. Of the burnt material in the pit deposits, the majority (79%) is *spot* or *patches* of burning. The burnt material from floor deposits is predominantly fragments that had been *totally* burnt to a high temperature (57%). Bones that had been recorded as having *surface* burning also came mainly from floor deposits, and taking *totally* and *surface* burnt fragments together, constitute 82% of the burnt material from the floor deposits (Table 9.11, Appendix F.2).

As noted in Chapter 8, it is possible that the *totally* burnt fragments may have been the result of having been thrown directly into a fire (as in animal sacrifice) or through a more widespread destruction by fire. It is proposed that the *patch* pattern of burning may be related to softening the bone and/or marrow to facilitate marrow extraction, and the *spot* pattern of burning could be caused by deposition of the bones at the same time as, and mixed up with, the still hot raked out embers of the fires/cooking installations, and could indicate a fairly rapid deposition. These latter two burning patterns may be related to consumption practices, directly in the case of marrow extraction, and indirectly through combination of materials (bones and fire embers) in the case of *spot* burning. If this is the case, it provides further evidence that the material contained within the pits is related to consumption events.

Comparison of the burnt material from the courtyard floor 20 and the courtyard ‘niche’ area (see 9.2.3.2 above) at Daskaloyannis/Khaniamou indicates that, although the quantity is relatively small, the majority of material from floor 20 was *totally* burnt (e.g. 10 of 14 fragments, NISP), whereas from the ‘niche’ area half (N=7) are affected by *spot* burning with the remainder being *totally* (N=5) or *surface* (N=2) burnt (based on NISP, see Appendix F.2). This might support the hypothesis that the practices occurring in the ‘niche’ area of the courtyard were related to animal consumption, the totally burnt fragments, however, may hint at burnt animal sacrifice activities (or episodes of more widespread destruction by fire, this would need to be compared with evidence from other archaeological material). Dimitra Mylona (Mylona n.d-c) recorded 9.2% (N=14) of the Late Minoan I material in this ‘niche’ area as being burnt. The fact that the majority of the *totally* burnt remains came from floor 20 could represent an episode of widespread fire destruction (again this would need to be correllated with evidence from other archaeological material), or, alternatively, could potentially represent the scattered remains of animal sacrifice events. If this latter suggestion is the case, then it should be noted these remains are of the domestic species (as is also the case for the burnt remains coming from the ‘niche’ and from other floor deposits, see Appendix F.2). However, there was seemingly no deliberate selection for a specific element or side (although the data are few).

Site	feature type	total	patch	spot	surface	Grand Total
Ayia Aikaterini	Rubbish Area North,16-Pit E		2	1		3
	Rubbish Area North, 22-Pit B		1			1
	Rubbish Area North,1st layer	1				1
	Rubbish Area North, 3rd layer	4	1			5
	Other pits (11-Pit E, 20-Pit B)	1	1			2
	Internal rooms* (Room K/H)	1				1
	External areas	2				2
	Sub-total	*9*	*5*	*1*		*15*
Daskaloyannis / Khaniamou	Pit M	6	12	6		24
	Pit ? M	1	3	2		6
	Pit ND		1	9		10
	Other pits (5, KO, Ma, Mb,ΣΣΤ)	3	6	3	1	13
	FLOORS	36	2	9	16	63
	Sub-total	*46*	*24*	*29*	*17*	*116*
Mathioudaki	Pit B	10	1			11
	unknown	3	1			4
	Sub-total	*13*	*2*			*15*
	Grand total	71	32	30	17	150
*floor deposits only						

Table 9.11 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: types of burning.

Feature	N* burnt	NISP	% burnt
? M	6	118	5.1
M	24	1031	2.3
ND	10	125	8.0
FLOORS (total)	63	295	21.4
(floor 20)	*14*	*21*	*66.7*
('niche')	*14*	*25*	*56.0*
(other)	*35*	*249*	*14.1*
Other pits	13	366	3.6
* NISP			

Table 9.12 Daskaloyannis/Khaniamou: percentage of burnt fragments in each feature type.

9.3.5 Bone fragmentation in different feature types

During the recording process note was made of the approximate size of each fragment to within one of four categories: ‘0-3cms, 3-6cms, 6-9cms and 9+cms’ (see Chapter 8.1.4).

At Ayia Aikaterini 22-Pit B and 16-Pit E and at Daskaloyannis/Khaniamou Pit M, Pit ?M, and Pit ND (the ‘deer pits’) contain assemblages made up of larger fragment sizes than most other features (Figure 9.21 - Figure 9.23). In these pits, 50-70% of the fragments recorded to size fall within the 6-9cm and 9+cm categories. In contrast, in the remaining features these larger fragment sizes constitute less than 50% of the assemblages. At Mathioudaki the fragment size is generally smaller across the site, but there appears to be larger fragments from the pits than from floor and room deposits.

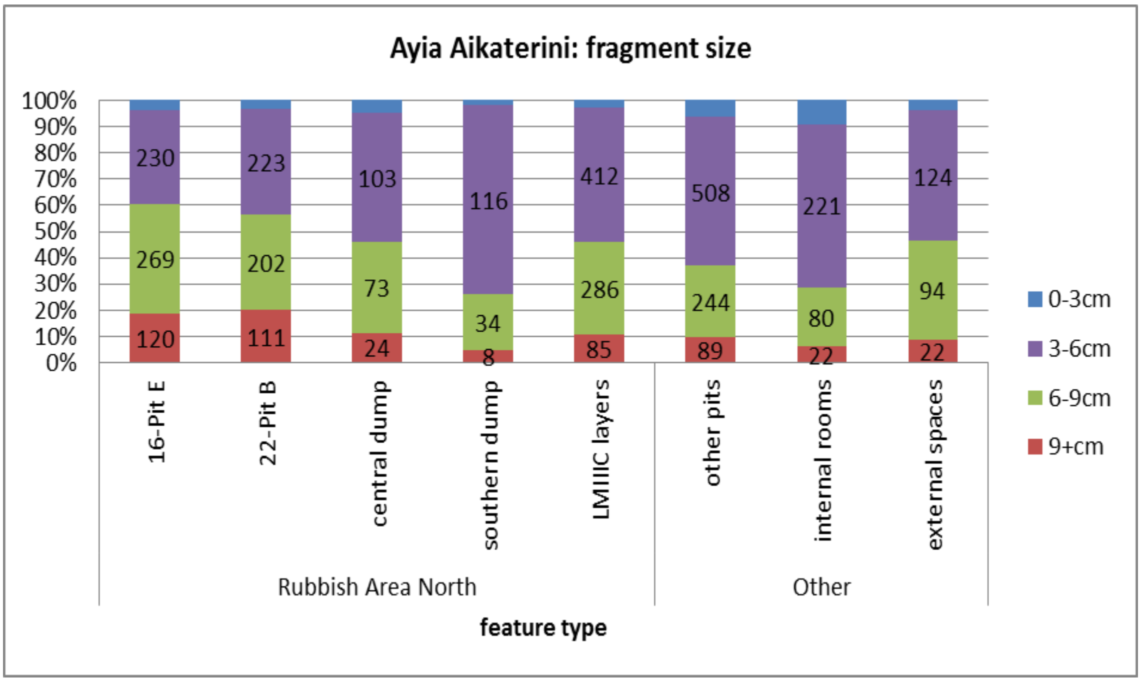

Figure 9.21 Ayia Aikaterini: relative fragment size per feature type.

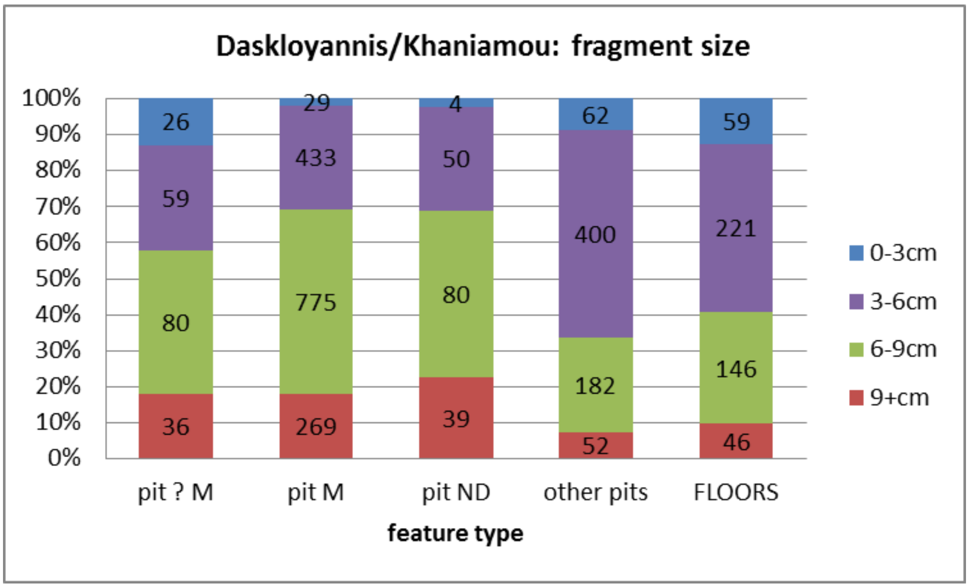

Figure 9.22 Daskaloyannis/Khaniamou: relative fragment size per feature type.

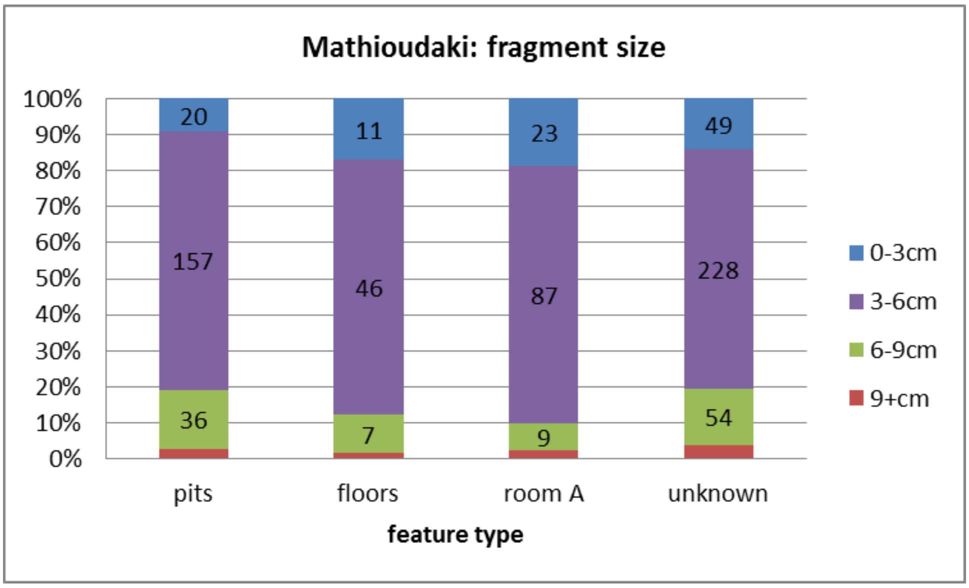

Figure 9.23 Mathioudaki: relative fragment size per feature type.

The following figures (Figure 9.24 - Figure 9.26) represent the ‘unidentifiable’ material per feature type at each site. These pieces did not have enough identifiable features to attribute them to species and thus also suggests a higher degree of fragmentation. As can be seen from the figures below, and as might be expected, this data reflects the fragment size data in that material coming from the 'deer pits' (16-pit E, 22-Pit B, Pit M, Pit ?M, Pit ND) had a higher percentage of identifiable (NISP) fragments to unidentifiable fragments.

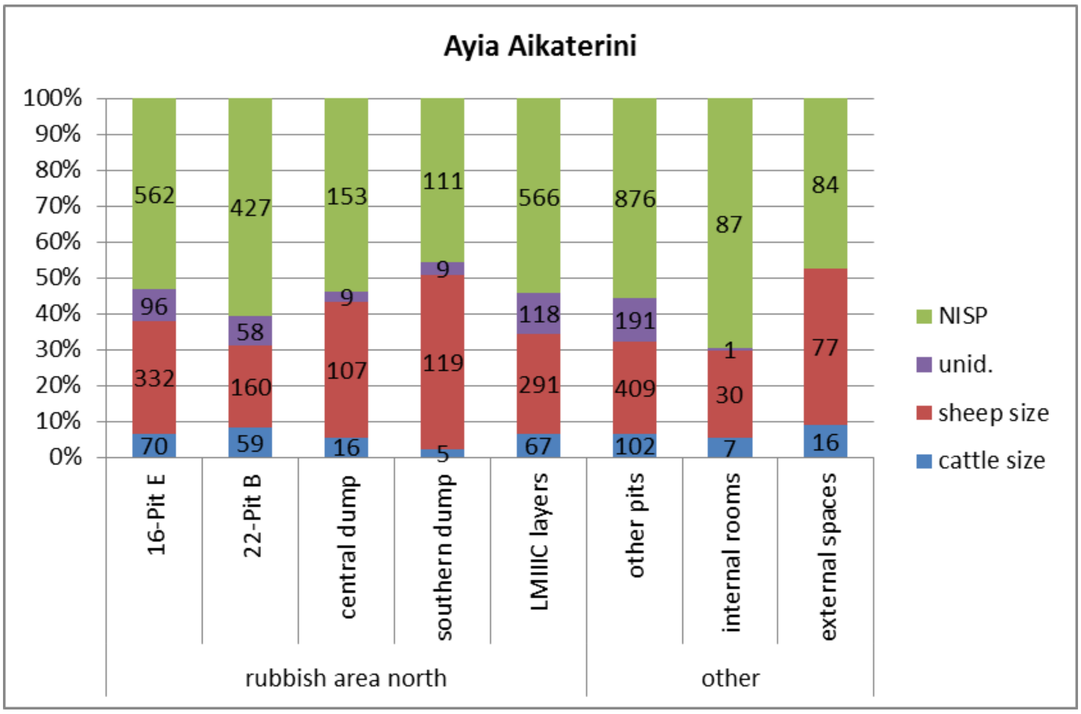

Figure 9.24 Ayia Aikaterini: material unidentified to species and NISP per feature type.

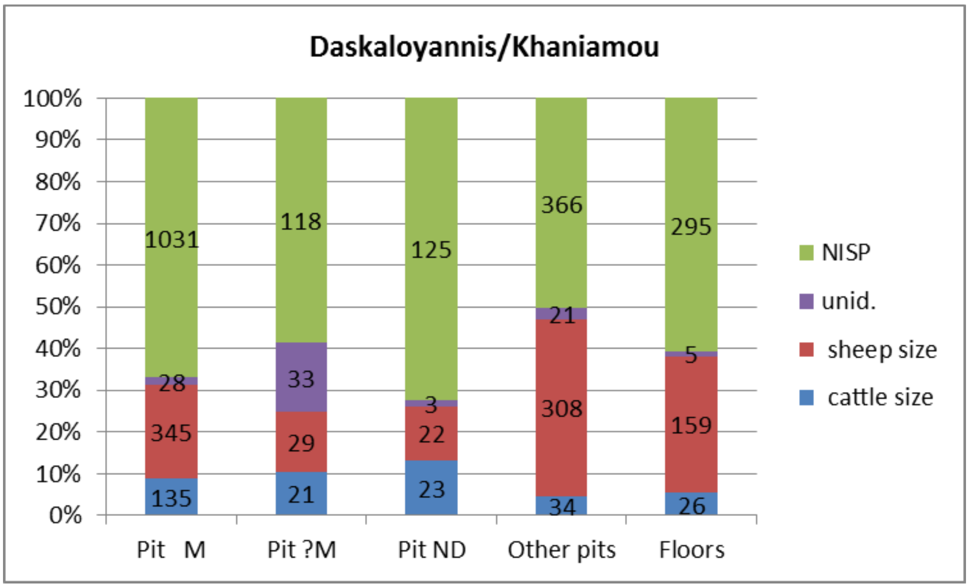

Figure 9.25 Daskaloyannis/Khaniamou: material unidentified to species and NISP per feature type.

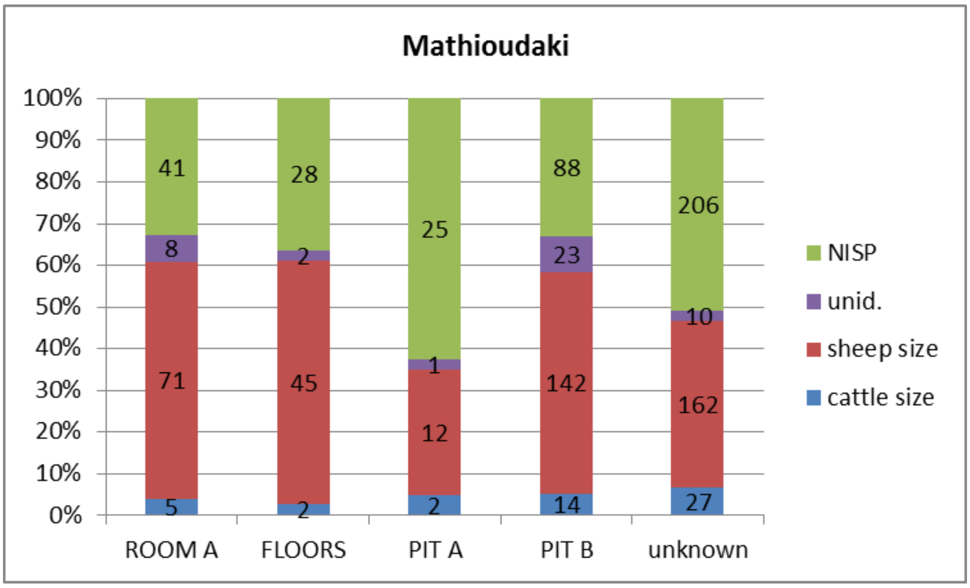

Figure 9.26 Mathioudaki: material unidentified to species and NISP per feature type.

Analysis of fragment size between the features according to species (Figure 9.27 - Figure 9.29) indicates that the larger fragment sizes correspond to the larger species and smaller fragment sizes with the smaller species, and this is the case both for the 'deer pits' (Ayia Aikaterini 22-Pit B and 16-Pit E, Daskaloyannis/Khaniamou Pit M, Pit ?M, Pit ND) and for other features. At Ayia Aikaterini, a slightly higher percentage of smaller fragments (e.g. 0-6cms) occur across the range of species outside of 22-Pit B and 16-Pit E, whereas at Daskaloyannis/Khaniamou, outside of Pits M, ?M, and ND, it is predominantly sheep/goat and pig that are characterised by the smaller fragment size, although in any case the differences are not great. These data suggest that fragment size is linked to general species size, but also to context of deposition. Thus it might be concluded that the material in features 22-Pit B and 16-Pit E (Ayia Aikaterini) and Pits M, ?M, and ND (Daskaloyannis/Khaniamou) was less intensively fragmented during consumption and/or was less vulnerable to post-discard attrition (such as trampling, etc.) resulting in a slightly larger fragment size for all the species.

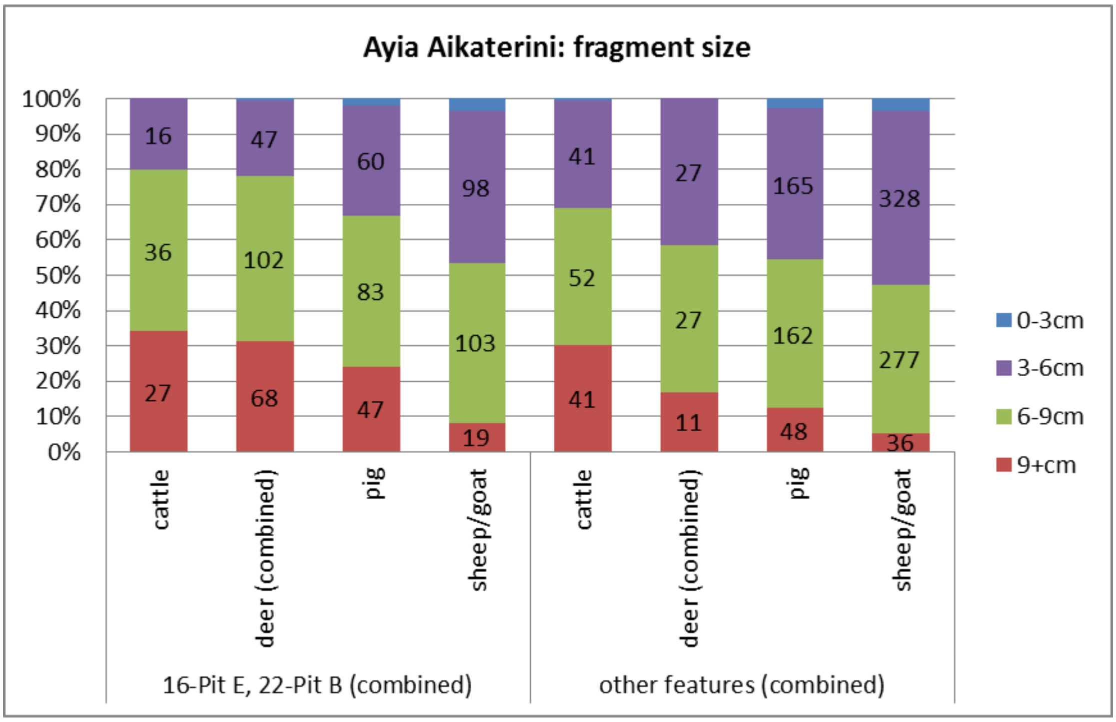

Figure 9.27 Ayia Aikaterini: fragment size per species in different feature types.

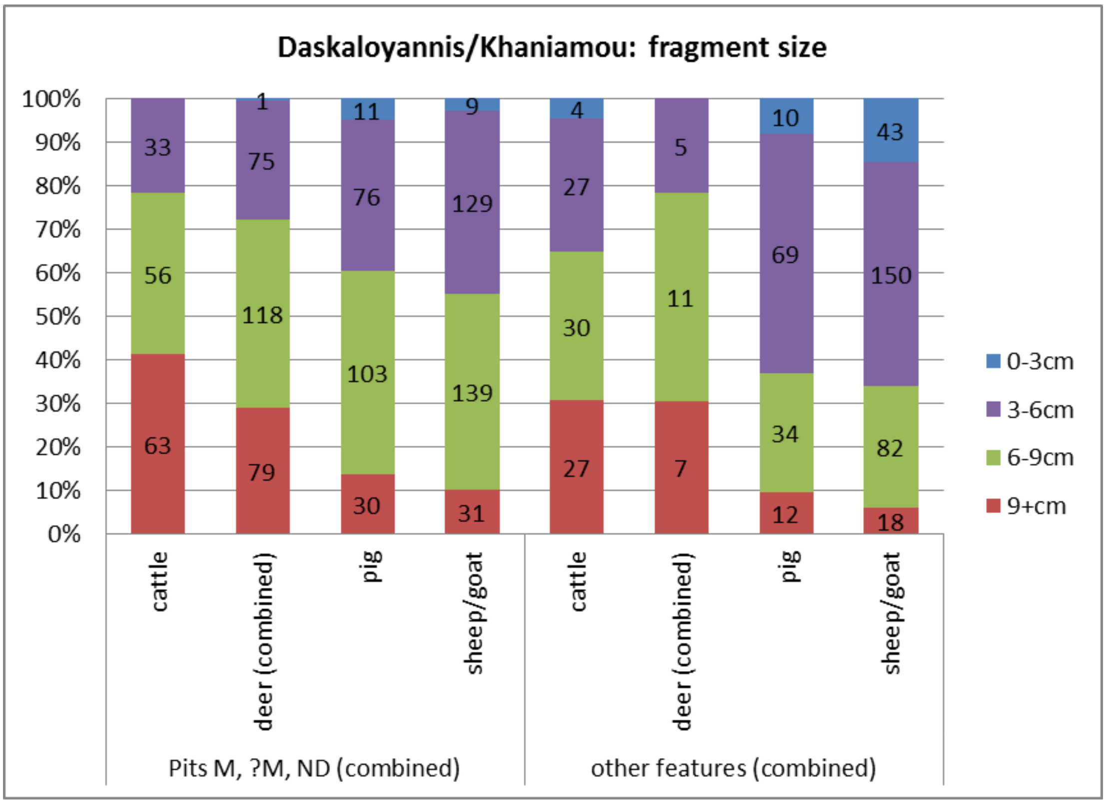

Figure 9.28 Daskaloyannis/Khaniamou: fragment size per species in different feature types.

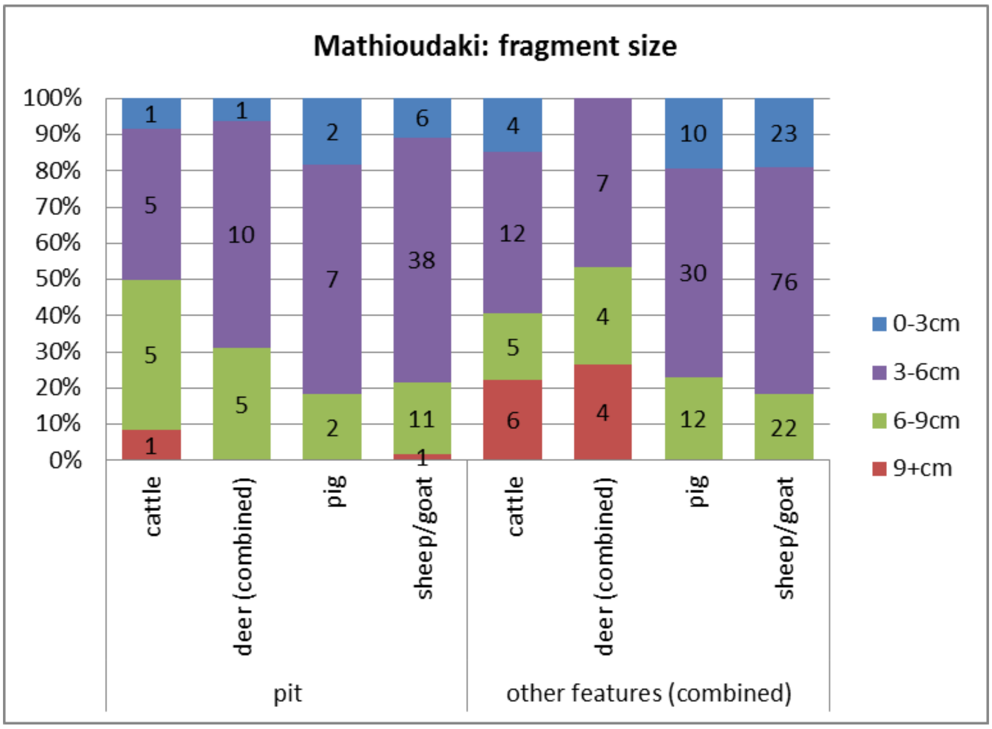

Figure 9.29 Mathioudaki: fragment size per species in different feature types.

9.3.6 Weathering and gnawing in different feature types

Table 9.13 presents the quantities and percentages of material affected by weathering and canid gnawing activity. In general, a greater percentage of material is affected by gnawing than by weathering processes, the latter in particular being minimal, and this is the case for each of the sites. This minimal evidence for weathering damage suggests that the majority of the material was buried fairly rapidly, rather than being left exposed to the elements for any extended period of time.

Comparison of the amount of gnawing present in each feature type (as a percentage of the total assemblage from each feature type, Figure 9.30 - Figure 9.32) indicates that the highest percentage of gnawed material at Daskaloyannis/Khaniamou occurs in Pits M, ?M and ND (‘deer pits’), and at Ayia Aikaterini occurs in the Rubbish Area North in 22-Pit B and 16-Pit E (‘deer pits’), and the central dump. Analysis of the gnawing data for the main species in these features, however, indicates that gnawing affected the remains of the main species to a similar degree, and deer remains were not affected to any significantly greater or lesser extent (Figure 9.33, Table 9.14; gnawing was not observed on agrimi remains). Could the greater percentage of gnawed remains, in general, in these pits suggest a greater concern with feeding dogs at the events associated with these features? This gnawed material still ended up in the pits however, thus suggesting a concern of the human participants with gathering up the remains, including the material given to dogs, and depositing them in the pits. Conversely, at Mathioudaki the highest percentage of gnawed material comes from floor deposits and contexts of unknown function.

Site	**Feature**	**N**	**N WEA**	**N GN**	**% WEA**	**% GN**
Ayia Aikaterini	Rubbish Area North, 22-Pit B	704	1	38	0.1	5.4
	Rubbish Area North,16-Pit E	1062	2	46	0.2	4.3
	Rubbish Area North, central dump	295	0	12	0.0	4.1
	Rubbish Area North, southern dump	244	0	2	0.0	0.8
	Rubbish Area North, LMIIIC layers	1046	0	27	0.0	2.6
	External areas	181	0	1	0.0	0.6
	Internal rooms	238	2	0	0.8	0.0
	Other Pits	1577	4	26	0.3	1.6
	Sub-total	*5347*	*9*	*152*	*0.2*	*2.8*
Daskaloyannis/ Khaniamou	Pit ? M	201	1	19	0.5	9.5
	Pit M	1541	19	129	1.2	8.4
	Pit ND	173	0	20	0.0	11.6
	Other pits	729	16	45	2.2	6.2
	Floors	485	11	31	2.3	6.4
	Sub-total	*3129*	*47*	*244*	*1.5*	*7.8*
Mathioudaki	Room A	125	0	6		4.8
	Floors	78	0	5		6.4
	Pit A	40	0	2		5.0
	Pit B	267	3	9	1.1	3.4
	unknown	405	1	27	0.2	6.7
	Sub-total	*915*	*4*	*49*	*0.4*	*5.4*
Grand Total		9391	60	445	0.6	4.7

Table 9.13 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: number and percentage of fragments subject to weathering (WEA) and canid gnawing (GN).

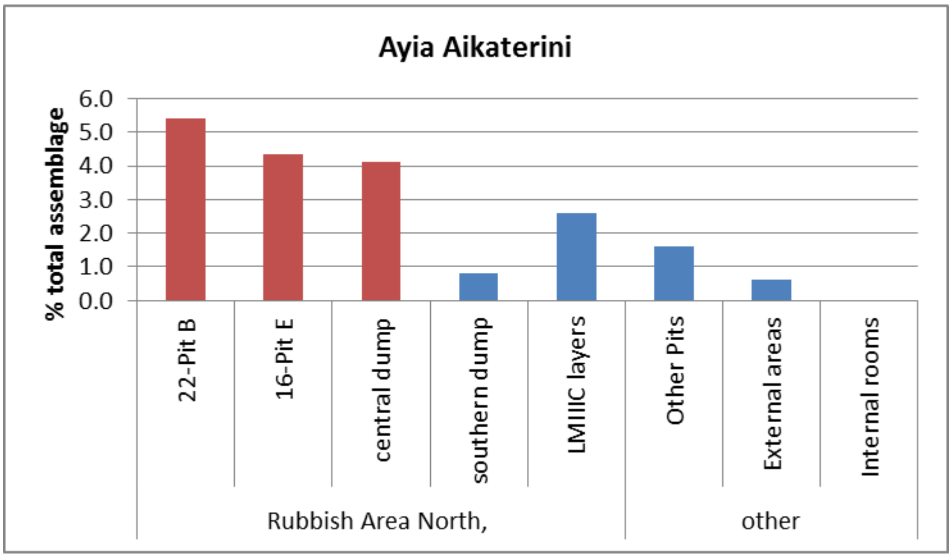

Figure 9.30 Ayia Aikaterini: percentage of gnawing on the total assemblage from each feature type (see Table 9.13 for data).

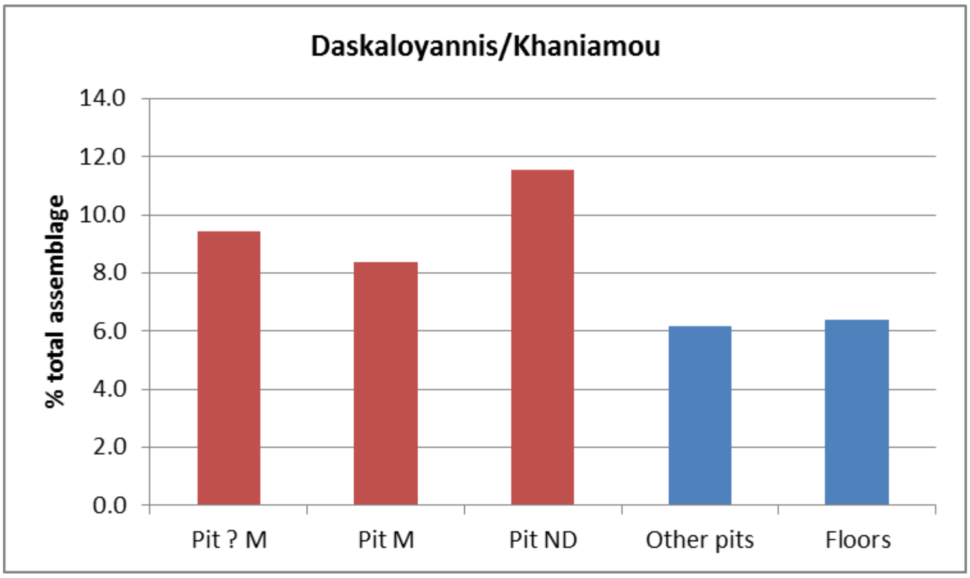

Figure 9.31 Daskaloyannis/Khaniamou: percentage of gnawing on the total assemblage from each feature type (see Table 9.13 for data).

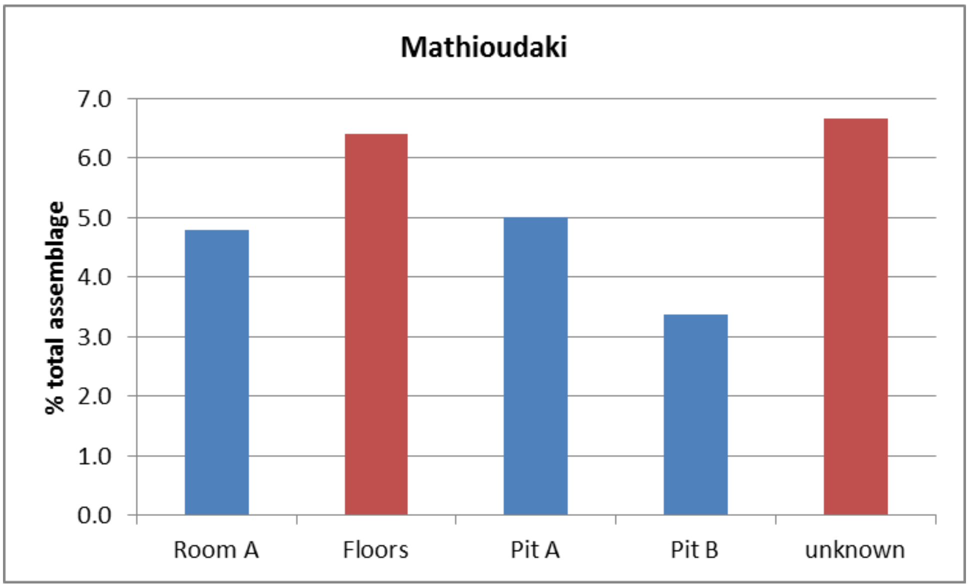

Figure 9.32 Mathioudaki: percentage of gnawing on the total assemblage from each feature type (see Table 9.13 for data).

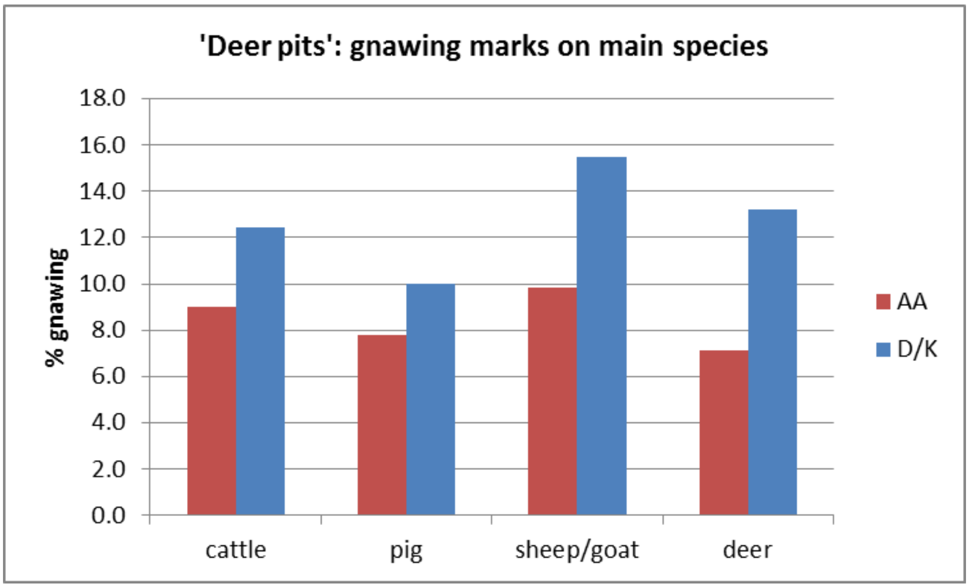

Figure 9.33 Ayia Aikaterini (AA), Daskaloyannis/Khaniamou (D/K): gnawing marks (as a percentage of NISP) on the most frequently occurring species in the 'deer pits' (AA: 22-Pit B, 16-Pit E; D/K: Pits M, ?M, ND).

Site/ features	**species**	**NISP**	**N GN**	**% GN**
Ayia Aikaterini Pits 22-Pit B, 16- Pit E (combined)	cattle	89	8	9.0
	pig	205	16	7.8
	sheep/goat	447	44	9.8
	deer	224	16	7.1
Daskaloyannis/ Khaniamou Pits M, ?M, ND (combined)	cattle	153	19	12.4
	pig	220	22	10.0
	sheep/goat	498	77	15.5
	deer	273	36	13.2

Table 9.14 Ayia Aikaterini, Daskaloyannis/Khaniamou: NISP, number (N GN) and percentage (of NISP) of gnawed remains for the most frequently occurring species in the ‘deer pits’.

9.3.7 Discussion: context specific similarities and differences

The above analysis has revealed a number of interesting trends regarding treatment and deposition of animal remains; at Ayia Aikaterini and Daskaloyannis/Khaniamou a number of comparable practices can be determined (less so at Mathioudaki). Firstly, the majority of animal remains come from pit contexts; fourteen pit assemblages[87] at Ayia Aikaterini (65% of total NISP), twenty-three from Daskaloyannis/Khaniamou (85% of total NISP), and two from Mathioudaki (29% of total NISP) were analysed in this study.

At Ayia Aikaterini the pits were located at various places across the site, less is known about the precise location of the features at the Daskaloyannis/Khaniamou and Mathioudaki sites. At each site, the pits varied in the quantity of animal bone material they contained; the assemblages from both Ayia Aikaterini and Daskaloyannis/Khaniamou sites were characterised by numerous pits containing small quantities of animal bone material and several large pits containing significant quantities of animal bone material. For the most part, the animal bone remains in the small pit assemblages were of the domestic species, predominantly sheep/goat, followed by pig, then cattle, and occasionally small quantities of deer remains. The butchery marks observed on these remains, indicated that they were the remains of food consumption, but

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[87] Predominantly (N=10) of the LMIIIB:2 phase

there was very little evidence for burning. The overall fragment size of these assemblages was smaller than from the larger pit assemblages.

The larger pit assemblages at Ayia Aikaterini (with the exception of one, 20-Pit B) and Daskaloyannis/Khaniamou also contain the remains of the domestic species, but are distinctive in that they contain significantly high quantities of deer remains (ranging from 18% - 42% of the NISP in each pit), in this study these pits have been termed ‘deer pits’.

At Ayia Aikaterini these ‘deer pits’ (16-Pit E and 22-Pit B) are located in the area of the site described as the ‘Rubbish Area North’ characterised by these pits and two areas of ‘dump’ deposits. The dump deposits did not appear to contain the same high quantities of deer as the pits. The Late Minoan IIIC deposits in this area (described as ‘layers’ by the excavators) also contain relatively high quantities of deer, although less so than the pits. A further large pit (20-Pit B) located in a different area of the site (southeast area) also contained a large quantity of animal bone material; however, there were very few deer remains in this pit. During excavation of ‘deer pit’ 16-Pit E four levels were identified but were considered by the excavators to be contemporary, based on the similarity of the contents; the animal bones from these four levels were combined (prior to this study, see Chapter 7). ‘Deer pit’ 22-Pit B appeared to have two main layers and it is possible that the pit represents two deposition sequences. A sherd join between 16-Pit E and 22-Pit B is thought to indicate contemporaneity between these pits, and a similarity in the deposits and design of these two pits (e.g. large and orientated northwest-southeast) is noted by the excavators. The Late Minoan IIIC layers were divided into four strata, but were also considered to be contemporaneous (see Chapter 7).

Less is known about the stratigraphic sequences of the ‘deer pits’ at Daskaloyannis/Khaniamou (Pit M, Pit?M, and Pit ND); during the cleaning of the animal bone material, however, it was noted that they all appeared to be coated in a similar, rather homogenous grey, ashy type material, suggesting they were all recovered from the same deposit (and subject to the same taphonomic conditions). In general, very little animal bone from any of the pit deposits is damaged by the effects of weathering, suggesting fairly rapid disposal and sealing of the material after deposition. The *spot* pattern of burning noted on the remains from the Daskaloyannis/Khaniamou ‘deer pits’ has been suggested as being caused by the animal bone fragments getting mixed up with and coming into contact with the still hot embers of fires and/or cooking installations during deposition; this too suggests a fairly rapid sequence of consumption and deposition.

These data suggest that although the quantities of animal bone in the individual 'deer pits' are greater than in the individual other smaller pits, it appears as though the 'deer pits' are not the result of gradual, long-term accumulation and 'rubbish disposal' at the sites. Rather, we might perhaps be seeing relatively short-term but large-scale events, involving significant quantities of material, a distinctive feature of which was the presence of deer. The numerous smaller pits, then, might represent a more regular, small-scale level of meat consumption characterised by the consumption of, predominantly, sheep/goat, pig and cattle. However, that meat consumption was not likely to have been an overly commonplace practice, accounts for the small quantities of animal bone remains.

The butchery evidence on the animal bone from all the pits, including the deer, suggests that they were the remains of consumption. However, whilst the presence of large quantities of 'unusual' animals (deer) is a distinctive feature of some pits, other practices remain somewhat consistent between *all* pits; for example the element representation in the 'deer pits' and the 'other pits' is similar, and the methods and range of butchery techniques also appears to be similar between the two pit groups. The suggestion is, whilst the presence of certain animals may have marked particular events as distinctive, the treatment of their remains in terms of consumption practices seems similar in most pits (with a significant exception, see below). In general, the element and butchery data suggest a fairly extensive use of the animal body for consumption. There is evidence for the filleting of meat from the bones, as well as breaking the bones to get access to the material within (e.g. marrow, brain, tongue etc.), and evidence also for areas such as the skull as well as the main meat bearing elements being used. The larger fragment size of bones in the 'deer pits' might indicate that bones were less intensively fragmented at the point of consumption at these events than others. There did appear to be one significant practice of difference, however. In the 'deer pits' it appears as though there is evidence for consuming some meat as large joints, perhaps emphasising an abundance of meat in these cases. This practice applied to a range of species (red deer, cattle, pig, goat, sheep/goat), but was noted to occur most frequently on fallow deer remains.

The presence of elements from all parts of the body in most of the pits suggests, not only that extensive use of the animal body for consumption occurred, but also that butchery, consumption and deposition were most likely happening in close proximity (e.g. there was no obvious evidence for elements having been butchered and discarded elsewhere). This suggests that butchery, and perhaps even killing of the animal, was not divorced from contexts of consumption. Was the killing, fragmentation, and transformation of the animal / animal body the shared experience of a wider group (at least as observers, if not practitioners)? Was it part of the 'event'?

An interesting phenomenon also associated with the 'deer pits' is the slightly higher percentage of dog gnawing occurring on material in these features. This material was still deposited within the pits however, suggesting the material had been gathered up after it had been given to dogs and deposited along with the other debris. It is possible then that this material indicates a greater concern with feeding dogs and/or an increased presence of dogs as co-consumers at these events.

The animal bone material from other features at the sites (floors, rooms, external spaces, dumps) also appear to be consumption remains; however, as animal bone did not occur as frequently in these feature types, it is considered that deposition in pits was the predominant practice.

9.4 Modification and dispersal: the use of antler and horn

The consumption of animals as food was not the only practice associated with the animal body. There is evidence too for the removal of skins and for the 'modification' of antler and agrimia horn/horncores and skulls, elements which may have been perceived as synecdochic of the animals.

9.4.1 Deer: antler and skins?

In this study, the hypothesis was that some antler has been removed from the contexts of deposition for use elsewhere, potentially for transformation into tools or objects. This was based on the initial observation that, considering the high percentage of deer remains, the overall quantity of antler appeared to be fairly low (Table 9.15 summarises the quantities of antler from each site). 86% of the antler was recovered from the 'deer pits', the remaining fragments coming from elsewhere in the Rubbish Area North at Ayia Aikaterini (Central dump and Late Minoan IIIC layers) and in another pit (Pit Ma) at Daskaloyannis/Khaniamou.

Site	feature	fallow deer		red deer	deer	Total
		antler	skull + antler	antler	antler	
Ayia Aikaterini	Rubbish Area North,16-Pit E			1	2	3
	Rubbish Area North, central dump				1	1
	Rubbish Area North, LMIIIC layers				1	1
	Subtotal			*1*	*4*	*5*
Daskaloyannis / Khaniamou	Pit ? M	2				2
	Pit M	11	4	1	1	17
	Pit ND		1		1	2
	Other pits (Pit Ma)		2			2
	Subtotal	*13*	*7*	*1*	*2*	*23*
	Grand total	13	7	2	6	28

Table 9.15 Ayia Aikaterini, Daskaloyannis/Khaniamou: summary of antler finds per feature (see Appendix G for figures).

As a crude estimate, comparison of the number of skull-plus-antler fragments of animals of two years or more (antler of 1-2 year-olds is only a single unbranched spike) with the minimum number of potential males based on the postcranial remains does suggest antler may be under-represented (see Table 9.16). For example, based on postcranial remains, a minimum number of twelve fallow deer are represented at Daskaloyannis/Khaniamou and a minimum number of eleven fallow deer at Ayia Aikaterini[88]. At both sites the sexing data based on the morphology of the pelvis suggests an equal ratio of males and females (three of each at Ayia Aikaterini and two of each at

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[88] The majority of postcranial data suggest adults of more than 2 years, see chapter 8

Daskaloyannis/Khaniamou). If males and females were equally represented in the assemblage, then it is potentially five to six males at each site. This is possibly increased if taking the osteometric data into account which seemed to indicate a higher frequency of males to females (see Chapter 8.2.2). However, there is only a minimum number of two male fallow skulls-plus-antler (of animals 2 years+) both at Daskaloyannis/Khaniamou (the Ayia Aikaterini report indicates one skull-plus-antler may have been present in 22-Pit B, but was not observed in this study, see below). Although overall the remains are much fewer, the same pattern occurs for red deer. Of course it might be that in some cases only partial deer carcasses or joints of meat might be represented, however the presence of skull, neck vertebrae and limb extremities does indicate that whole deer were certainly also present.

MNI	**Ayia Aikaterini**		**Daskaloyannis/ Khaniamou**	
	fallow	red	fallow	red
Antler + skull (2+ yrs.)			2	
Tooth wear (2+ yrs.)	4	1	4	
Postcranial elements	11	4	12	5
Sex (pelvis)	3 M : 3 F	1 M	2 M : 2 F	1M (skull)

Table 9.16 Ayia Aikaterini, Daskaloyannis/Khaniamou: minimum number of individual deer estimated from various data sets.

Whilst the crude estimate above could be said to perhaps corroborate the initial assumption in the hypothesis, it is not, however, that straightforward. Firstly, the majority of remains (postcranial and antler) are from fallow deer (see Table 9.15), yet it is widely acknowledged that fallow deer antler is not suitable for working (the compacta being too thin) and, in general, worked fallow antler is rarely found[89]. Secondly, not only was antler potentially removed from these contexts it was also *brought in* to these contexts, as evidenced by the presence of a number of cast antlers (four fallow and one red at Daskaloyannis/Khaniamou). Numerous smaller fragments of antler were recovered without the base, so it is not known whether these were still

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[89] See discussion on ZOOARCH jiscmail list, ‘Fallow deer antler for craftwork’, May 2006.

attached to the animal, or whether they represent cast antler. However, the majority are of fallow antler (N=6, red N=1) and mainly have characteristics of the third ‘head’ of antler (i.e. three year olds, see Appendix G).

It would, therefore, be too simplistic to deduce that antler was removed from the contexts for working; equally, that the contexts are the remains of antler tool/object manufacture is also unlikely. That said, however, there was an interest in ‘transforming’ this material in some way as indicated by several examples of antler (red and fallow) which does bear evidence for having been chopped, sawn or modified in some way (Table 9.17, and Appendix G). Two large pieces of cast fallow antler show evidence of chops to the beam and tines (Figure 9.34), and possible removal of a tine from one of them. Another piece of probably red deer antler had been sawn in two places to create a small segment (Figure 9.36).

The Ayia Aikaterini reports also mention two cases of antler having been worked (not seen in this analysis). The first describes “One of the Cervus fragments was part of the frontal bone of the skull with the antler base and a tooled (carved and sawn) wreath of roses” (Hallager & Hallager 2003:44), recovered from 22-pit B, in the Rubbish Area North[90]. The second piece, recovered from the Late Minoan IIIC layers, is described as an almost complete deer antler that is sawn off and possibly polished at the end (Hallager & Hallager 2000:108, Plate 33d). From observation of the plate it can be seen that this was a fallow deer antler. The fact that these antler pieces were included in the ‘Small Finds’ section of the reports suggests that they were removed from the general animal bone assemblage and thus not seen in this analysis. Of the other bone finds reported from the Ayia Aikaterini site (the finds from the other sites are not published) apart from the piece of sawn antler (above), none of the other animal-derived tools were noted as being of antler.

At the Mathioudaki site Mylona recorded a red deer antler that bore traces of working. She describes it as having been sawn on one end and chopped on the other, with some copper stains on its surface. She suggests that the object represents some antler tool making activity on site (Mylona n.d-a). No antler

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[90] It is possible that this was not a worked piece but is the antler coronet that is being described.

was observed in the Late Minoan III contexts from Mathioudaki recorded in this study.

The other type of modification related to deer skulls are a number of cases in which fallow deer skull fragments, often with the antler (or part of it) still attached, that have chopmarks (in one case cutmarks) around the skull pedicle. At Daskaloyannis/Khaniamou three (of five) and at Ayia Aikaterini one (of two) yearling skull fragments (with 'spike' still attached) and two (of two) fragments of skull-plus-antler of animals of two years or more at Daskaloyannis/Khaniamou had chopmarks to the skull pedicle below the base of the antler, there was no evidence in these cases for the antler being completely removed. It is possible that these cases might be related to the removal of the skin rather than the antler (see Binford 1981), a practice also indicated by cutmarks around the limb extremities. It is of interest, however, that the butchery marks on the skull tend to be represented by heavy chopmarks, often only in one area (e.g. Figure 9.35), rather than repeated cutmarks as is the case on the limb extremities (see Chapter 8, Figure 8.53).

Site	**feature / description**	**deer**	**fallow deer**		**practice?**	**age**
		antler	antler	skull + antler		
Ayia Aikaterini	*Rubbish Area North, 16-Pit E*					
	(AA1510) chop to lateral pedicle	1			skinning?	yearling
Daskaloyannis/ Khaniamou	*Pit M*					
	(D263) chop to lateral pedicle			1	skinning?	yearling
	(D676) chop to posterior pedicle			1	skinning?	yearling
	(D609) chops around pedicle			1	skinning?	2yrs +
	(D931) cut to lateral pedicle			1	skinning?	2yrs +
	(D780) chop to beam + removal of trez tine?		1 (cast)		working?	2yrs +
	(D781) chops to brow tine		1 (cast)		working?	2yrs +
	(D613) sawn antler section	1			working	adult
	Pit ND					
	(D32) chop to lateral pedicle			1	skinning?	yearling
	Grand Total	2	2	5		

Table 9.17 Ayia Aikaterini, Daskaloyannis/Khaniamou: summary of modified skull/antler per feature (see Appendix G for figures).

Figure 9.34 Cast antler (fallow) with chopmarks to brow tine (outlined in red).

Figure 9.35 Yearling antler 'spike' and skull pedicle with chopmarks (outlined in red).

Figure 9.36 Antler (probably red deer), sawn in two places to create 'segment'.

9.4.2 Agrimia and horn

The presence of agrimia is clearly attested by their distinctive horncores, of which a significant number were recorded in these assemblages (see Table 9.18). 74% come from the 'deer pits', with the remainder being recorded from a number of other pits at each site (three at Ayia Aikaterini and two at Daskaloyannis/Khaniamou, one from an unknown context at Mathioudaki). This material ranged from fragments of individual horncores to pairs of almost complete horncores attached to skull fragments (see Appendix H). Many were noted as having butchery marks, generally chopmarks, and could be considered to indicate at least four possible practices (see Table 9.19). Firstly, chopmarks were recorded on the base of the horncore and may be associated with the removal of the horn sheath (MacGregor 1985). Secondly, chopmarks were noted on the skull frontal below the base of the horncore and might be more indicative of the removal of the skin (Binford 1981). It is of interest, however, in the majority of these cases that these marks often consist of a single chop mark in only one area, rather than several cutmarks encircling the horncore or base as might be expected in removal of the skin or horn. Conversely, skinning cutmarks on a cattle skull plus horncore fragment did show evidence for several cutmarks around the base of the horn core (Table 9.20 below).

Thirdly, some horncores were noted to have been sawn through (transversely) and might indicate sections of horn/horncore removed for working (Figure 9.37). Lastly, and perhaps most interestingly, were a number of cases in which pairs of horncores were still attached to the skull, which itself had been chopped through the cranium and/or frontal part of the skull (these are described here as horn ‘frontlets’, Figure 9.38)[91]; in these cases skinning and/or horn removal butchery marks were seemingly not present. It is possible that there may have been more of these paired horn ‘frontlets’ that did not survive intact if the number of single horncores plus skull fragments are remains of such. The horn ‘frontlets’ were only observed in the Daskaloyannis/Khaniamou assemblage. All of the modified agrimia horncores from Daskaloyannis/Khaniamou were in the ‘deer pits’ (Pit M, Pit ?M and Pit ND).

It should be noted that chopmarks on horncores of domestic goat and sheep were also observed (Table 9.20) as well as cutmarks around cattle horncore base (probably skinning) however, the horn ‘frontlets’ were only of agrimia horns.

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[91] See Spec. # D31, D833, and D1011 in Appendix H.

Site	feature	agrimi			Total
		horncore	skull + horncore	skull	
Ayia Aikaterini	Rubbish Area North,16-Pit E	1			1
	Rubbish Area North, LMIIIC layers	2		1	3
	Other pits (11-Pit E, 1; 11-Pit F, 2; 12-Pit D, 1)	4			4
	Subtotal	*7*		*1*	*8*
Daskaloyannis / Khaniamou	Pit ? M		1		1
	Pit M	10	7		17
	Pit ND		2		2
	Other pits (Pits Mα, IΘ)	1	1		2
	Subtotal	*11*	*11*		*22*
Mathioudaki	unknown	1			1
	Grand total	19	11	1	31

Table 9.18 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: summary of agrimi horncores per feature (see Appendix H for figures).

Site	feature/description	horncore	skull + horncore	skull	practice?
Ayia Aikaterini	*Rubbish Area North, LMIIIC layers*				
	(AA481) chop to lateral frontal at base of horncore			1	skinning/removal of horn
	(AA2087) sawn through base of horn core	1(sawn)			removal of horn /working
	11-Pit F				
	(AA2728) chop to skull below base of horncore, posterior	1			skinning/removal of horn
	(AA2790) chop to lateral horncore base and sawn through top	1 (sawn)			skinning/removal of horn/working
	Subtotal	*3*		*1*	
Daskaloyannis/ Khaniamou	*Pit ? M*				
	(D434) possible chop to skull below base of lateral horncore		1		possible horn 'frontlet'?
	Pit M				
	(D266) chop to anterior horncore	1			removal of horn
	(D608) chop to lateral horncore base		1		skinning/removal of horn
	(D675) chop to lateral horncore base		1		skinning/removal of horn
	(D785) chop to medial horncore base	1			skinning/removal of horn
	(D832) possible chop to skull below lateral horncore base		1?		skinning/removal of horn
	(D833) Pair of horncores. Transverse chop through left side parietal		1		horn 'frontlet'?
	(D1011) Pair of horncores. Chop to both lateral sides below base of horncore		1		horn 'frontlet'?
	Pit ND				
	(D31) Pair of hornscores. Chop through leftside frontal, transverse chop through left side parietal		1		horn 'frontlet'?
	Subtotal	*2*	*7*		
Mathioudaki	(M241) chop to posterior horncore base	1			skinning/removal of horn
	Grand Total	6	7	1	

Table 9.19 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: summary of modified agrimi horncore per feature (see Appendix H for figures).

Site	species/element	chop	cut	none
Ayia Aikaterini	*cattle*			
	horncore	1	3	4
	goat			
	horncore	4		23
	skull + horncore			2
	sheep			
	horncore	2		4
Daskaloyannis/ Khaniamou	*cattle*			
	horncore			2
	skull + horncore			2
	goat			
	horncore	4		9
	skull + horncore	1		4
	sheep			
	horncore			1
	skull + horncore	1		
	sheep/goat			
	horncore	1		
Mathioudaki	*goat*			
	horncore	1		2
	sheep			
	horncore			1
	Grand Total	15	3	53

Table 9.20 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: summary of cattle, goat and sheep horncore data.

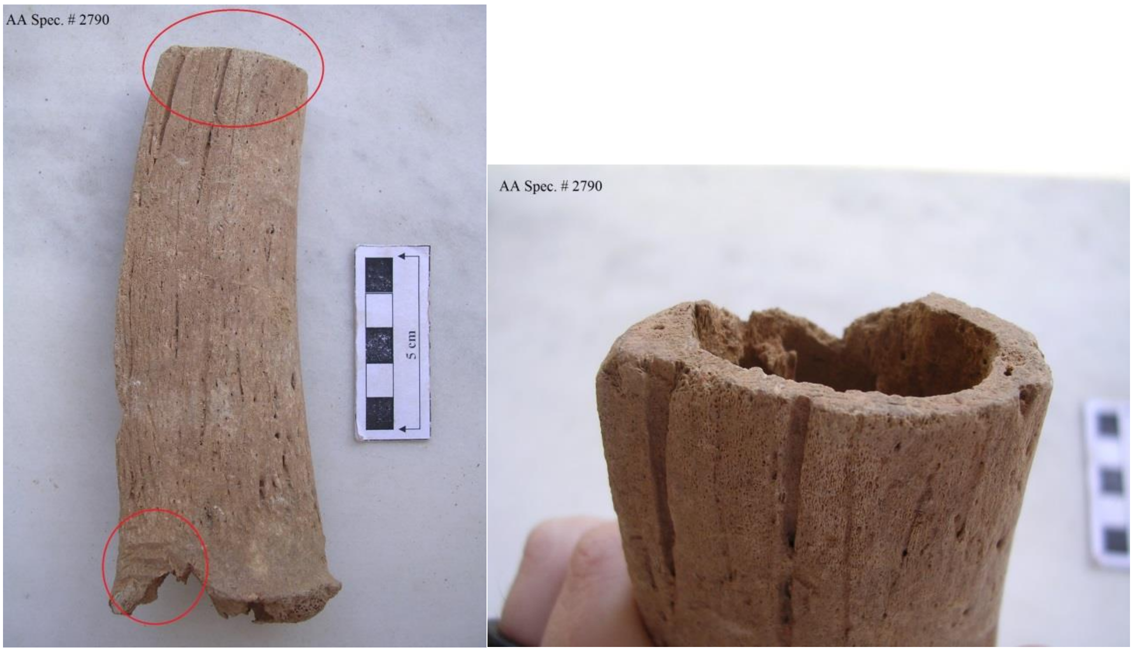

Figure 9.37 Agrimi horncore with chopmarks to base and sawn top (outlined in red); detail of sawn top (right).

Figure 9.38 Agrimi horncore and skull frontal ‘horn frontlet’, anterior and lateral views. Skull chopped through frontal and parietal (outlined in red).

9.5 Conclusion

The above zooarchaeological analysis has shown that there is some significant context-specific variation in the animal bone assemblages from these sites. This is mainly linked to the wild species: agrimia and, particularly, deer. The remains of these animals were predominantly associated with specific features, namely large pits (‘deer pits’). These pits contained significant quantities of material, the butchery and burning evidence on the animal bone from which suggest they were the remains of consumption events. The stratigraphy and taphonomy data from these pits suggest that the large quantities of material were the result of short-term but large-scale events such as feasts, rather than gradual accumulation over long-periods of time. These events were characterised by the presence and consumption of deer and possibly agrimia, and the manner of consumption may have placed an emphasis on an abundance of meat, particularly of deer. It is possible that a further feature of these events was a greater presence of dogs and of dogs ‘feasting’ alongside people.

The small assemblages from numerous other ‘rubbish’ pits, characterised by a predominance of domestic species suggest these may have been the remains of more ‘ordinary’ consumption practices. However, in general, it appears that a certain level of consistency in the extensive use made of the animal body and in butchery techniques was practiced between both types of pit feature, which included the processes of butchery, fragmentation, consumption and deposition happening within a relatively close proximity.

The animal body was not only used as food, however, and evidence for the modification and deposition of agrimia horncores and deer antler, including cast antler brought into these contexts, suggests these elements were of importance. Whilst there is no evidence here for the manufacture of tools or objects from antler directly, there is evidence for some level of modification in terms of chopmarks made to antler and small pieces removed. Agrimia horn may have been removed from the horncore prior to deposition, and there is evidence for deposition of horncore pairs still attached to the skull frontal which itself has been modified (e.g. cut from the skull in the form of ‘frontlets’). These distinctive items may have held synecdochic properties, however their deposition in the ‘deer pits’ suggest their role was linked to the ‘feasts’.

In the following chapter (10) these aspects will be discussed in combination with the evidence from each of the preceding chapters in order to examine the ‘cycle of engagement’ hypothesis as a sequence of human-animal relationships, and ultimately the role it may have played in the social dynamics of Late Bronze Age west Crete (Chapter 11).

Chapter 10: Human-animal intersections: the ‘cycle of engagement’ hypothesis as a sequence of human-animal relationships

10.1 Introduction

It is proposed that ‘human’- ‘animal’ interaction in Bronze Age west Crete was based on an ‘intertwining of lives’, human and animal (after Marvin 2010b). The aim of this study has been to investigate the nature of human interaction with wild animals, namely red and fallow deer and agrimia, and the social significance of such in the context of Late Bronze Age west Crete. As a means for doing so, a framework for analysis was devised based on what was perceived to be a connected sequence of human-animal interactions: a ‘cycle of engagement’. It is proposed that at each of these human-animal intersections lies a potential for a heightened physical and sensory engagement (Chapter 3). The aim of this chapter will be to discuss the ‘cycle of engagement’ hypothesis in light of the zooarchaeological analysis.

10.2 Mutual awareness: the living animals

10.2.1 Deer-human interactions

What is not known regarding the red and fallow deer on Crete is whether they lived free-roaming ‘in the wild’ or rather were managed herds in deer parks akin to those characteristic of medieval north-western Europe. Zooarchaeologists investigating this question with respect to fallow deer (*Dama mesopotamica*) on Cyprus have used the age and sex profiles of the deer in the assemblage as evidence for management or hunting (Chapter 8.2.2). However, with this approach you first have to decide on the profile you would *expect* to see, which itself rests on basic assumptions, e.g. which animals at which time (often using the logic of formalist, optimisation economics). Whilst this aspect was discussed in Chapter 8.2.2.4, a definitive answer to the question of whether deer were hunted in the wild or managed in parks is not conclusive (see also Davis 2003).

There are other possibilities, however, that should be taken into account (but are not detectable in these data): for example, selection of deer of particular age and/or sex may have been variable on a context specific basis, equally deer could have been individually selected based on other qualities such as coat pattern, or character. It is also possible that the majority of the deer were 'wild' but a few may have been kept in a similar manner to domestic animals, perhaps for specific purposes or roles.

What is also not clear from this zooarchaeological data is the manner of death. Were the animals killed as part of a hunt, or captured and killed as part of a sacrificial ritual (as has been suggested of the iconographic evidence, Chapter 5)? The zooarchaeological data from Pylos indicates that red deer remains were apparently incorporated in rituals of burnt animal sacrifice, although whether their killing was part of these rituals is not known. Iconographic depictions have also been interpreted as showing deer in sacrifice as well as hunt contexts (Chapter 5). The burning data from these assemblages, however, do not indicate that deer bones were intensively burnt in this case (see Chapter 8.3.3); although that does not mean that a ritualised or sacrificial manner of death did not occur. In the Chania assemblages although there was cutmark evidence on sheep/goat, pig, and dog atlas vertebrae, possibly indicating throat cutting (transverse cutmarks on ventral surface, Chapter 8) this was not observed on the atlas vertebrae of deer (although it is possible that cuts were not deep enough to mark the bone). Hunting iconography, however, depicts hunters with spears, and bow and arrows, and arrowheads have been found at Ayia Aikaterini (Hallager & Hallager 2003). In either scenario the final kill would have been an intense corporeal and sensory experience, of close proximity and conjunction of human and animal bodies; what is not clear is the extent to which this was a structured and ritualised procedure.

So whilst the zooarchaeological data are not conclusive in terms of an 'either / or' question of whether deer were managed or hunted in the wild, it might be more productive to investigate the spectrum of potential human - deer relationships on a continuum from wild, through managed, to tame, and to consider the potential nature of human-deer interaction in each of these states.

If the majority of deer lived free-ranging in the wild, then we might consider the human- deer relationship as, in the case of physical encounter (or one form of it), enacted through the hunt. In such a scenario, as discussed in Chapter 3, the intensifying or ‘peaking’ of the senses necessary to bring about such an encounter creates a sense of personal and emotional connectivity, however fleeting, between hunter and animal. Although the animal may be resistant, both hunter and animal are tied in a mutual experience characterised by acute sensory awareness of one another, a choreography of mutually modified behaviour. How this relationship is enacted, however, depends to some extent on the individual personalities and experiences of both hunter and deer (i.e. the distance a deer will flee depends on the character of the individual deer, Prior 1987). With wild fallow bucks, the oldest ones are reputed to show the greatest ‘mistrust’: the behaviour of deer is influenced by experience (Chapman & Chapman 1975:152). The relationship, however, is characterised by unpredictability.

In a managed park herd there will be significant differences in the nature of the relationship. As noted in Chapter 8.2.2.4, close observation and management of the herd structure (e.g. ratio of males to females) and care (e.g. supplemental feeding) would have to be taken to maintain the herd in a stable and healthy state. Such practices would foster not only an intimate knowledge of but also participation in the rhythms of the deer life-cycle; it is likely that individual deer would be known and likewise individual humans could be recognised (by scent and possibly by sight) by the deer. Talking quietly to deer is known to have a calming effect, and imitating various noises deer make will attract them (Prior 1987). However, whilst deer can become habituated to human presence, they respond to the type of behaviour, ‘body language’, and the context of its encounter. For example, deer are more likely to flee if you engage them in direct eye contact, than if eye contact is avoided and attention not seemingly paid them. Equally, a deer comfortable with the presence of a particular person in a particular location (e.g. at a regular feeding place), would flee from the same person if encountered in an area in which it was not used to human presence.[92]

The difference between hunting in such a context and hunting in ‘the wild’ is a difference in the nature of engagement with the landscape, and in the different

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[92] As described by deer farmers and hunters.

relationship with deer. Whilst it might be considered that some level of unfamiliarity and unpredictability is removed, (i.e. in a park the extent to which an animal can remain hidden or flee is possibly more limited), it is worth remembering here Marvin's (2000a, 2003) suggestion that through the heightened emotional and sensory experience of hunting, the ordinary and familiar landscape becomes transcended, intensified through the potential for drama it offers, becoming thus a 'site of encounter'. Furthermore, whilst managing a park deer herd may bring about a more regular level of interaction between human and deer, it does not necessarily mean a less challenging hunting encounter. On the contrary, deer which are not 'afraid' of humans can be more dangerous - potentially lethal - especially during the rut (Prior 1987), and thus still necessitates an intensity of physical and sensory engagement, on both the part of the hunter and the deer.

A significant outcome that might potentially result from these different hunting scenarios is the manner of killing the animal and its incorporation into the settlement context. Arguably, it could be assumed that hunting 'in the wild' would take place further from the settlement, potentially over a wider-ranging and more unpredictable landscape than a park context which might be located closer to the settlement. It might be considered then that the greater physical distance from the settlement in the case of the former would perhaps mean that deer would be killed as part of the hunt and brought back to the settlement as a carcass. If a park herd is closer to the settlement, it is possible that the deer may have been captured as part of the hunt but not necessarily killed. Prior (1987) notes (of English Medieval deer parks) that trained dogs were used to catch park deer and hold them down without injury until they could be restrained. In such a scenario, hunting may have been enacted in a more performative manner as a means of engaging with the live animal which could be continued with a ritualised death through sacrifice.[93]

The possibility that some deer may have been tame should also be considered, and both fallow and red deer can be tamed although usually only if hand-reared (especially in the case of fallow deer, Jarman 1976, Prior 1987). The human-deer relationship in such a case would be completely different, with some aspects akin to 'mothering' in the case of hand-rearing, however

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[93] Palmer (2012) proposes that the Linear B *Cr* series tablets from Pylos record live deer from specific places sent to the palace.

capturing and hand-rearing neonates can also result in dangerous or flighty wild animals (Mills*, et al.* 2010). Developing a relationship with deer in such a context would create a situation in which deer and people are habituated to each other's physical (and sensory) presence and contact. Could this potentially result with animals which allow themselves to be handled, or even wear collars and participate in processions as portrayed in the Ayia Triada fresco? In relation to the Ayia Triada fresco in which deer are seemingly part of a procession which also feature musicians (Shank 2008), it is interesting to note Prior's assertion that in some contexts (in his case 19th century England) 'certain individuals practiced the lost art of moving deer with the aid of music' and quotes:

> *"I met on the road…a herd of about twenty fallow bucks following a bagpipe and violin, which while the music played, went forward. When it ceased they all stood still…" (*1987:76*)*

10.3 Connected bodies

Consumption taking place after hunting is portrayed in the iconographic depictions which link hunt scenes with those showing preparations for a feast, and feasting succeeding animal sacrifice (as described in Chapter 5). Consumption of deer, and perhaps agrimia, in large-scale events, or feasts, is also indicated in the zooarchaeological data of this study (Chapter 9). The hypothesis proposed here, however, is that the eating of deer and agrimia meat was not simply the incorporation of a nutritious food item (albeit itself a significant substance), but the consumption of animals with perceived qualities, characteristics, and histories, embodying particular environments and temporalities (Chapter 3), and, as also noted by Gittens (2013), not something that happened without care or meaning. The zooarchaeological data of this study reveal some of the 'intimacies' of consumption in the transformation of the animal-as-lived-with to the animal-as-consumed and to the animal-as-embodied.

In the Late Bronze Age Aegean, the consumption of animals was not a commonplace activity and thus always a significant event (the diet being predominantly plant-based, Papathanasiou 2006, Halstead 2007, Isaakidou

2007). Through the detailed analysis of the zooarchaeological material from Chania, some observations can be made regarding human – animal interaction in contexts of consumption.

10.3.1 Care-ful consumption

As shown in Chapters 8 and 9, the archaeological data from Chania indicates that the majority of animal bone material was associated with food consumption and was deposited in pit contexts. At two of the sites in this study (Ayia Aikaterini, Daskaloyannis/Khaniamou) the pits could be grouped into two types based on the nature of their contents. One group is characterised by numerous pits of small size containing low quantities of animal bones, the other consists of large pits with significant quantities of animal bones characterised by an unusually high quantity of deer (predominantly fallow but also red), as well as the more 'usual' domestic animals. It was proposed in Chapter 9 that these two pit groups represent, respectively, 'ordinary' consumption activities and large-scale 'feasting' events.

At Ayia Aikaterini these possible 'feasting' pits (Rubbish Area North) contained a higher percentage of decorated pottery than elsewhere on the site, a greater proportion of open-shaped vessels and pithoi, with the exception of the small decorated stirrup jar, and almost all of the Handmade Burnished Ware and Grey Ware (a southern Italian style) found at the site, and many more stone tools, bronzes and figurines than average (Hallager 2001). Furthermore, in this area the proportion of obsidian, raw material (e.g. rock crystal, steatite) and tools for textile manufacture (e.g. loomweights, spindle whorls etc.) was lower (*ibid.*).

The zooarchaeological analysis indicates that extensive use is made of the animal body, it is not taken for granted, not wasted. This appears to be the case for both small-scale 'ordinary' consumption and for large-scale events, such as feasts (contrary to the often assumed definitions of feasts as being characterised by economically wasteful practices). That said, however, it does appear as though practices emphasising an abundance of meat were associated with the consumption of deer (i.e. larger portions). This suggests that despite the nature of the context or consumption event, animals are not seen as objectified and readily exploitable commodities: even if ‘conspicuous consumption’ is intended, care is taken not to waste the animal body.

Furthermore, it appears as though the practices of (killing?) butchery, consumption and deposition of remains happen in a relatively close proximity. This suggests that the killing (possibly), fragmentation, and transformation of the animal / body was an immediate experience, one perhaps shared amongst a wider group (at least as observers, if not practitioners), and would have comprised a significant part of the ‘event’. The consumption of multiple large animals, such as deer, would almost certainly have been shared and consumed amongst the wider community and extended social groups (e.g. Halstead 2007); the deposition of significant quantities of consumption material in large pits suggests these were communal consumption events (rather than food being dispersed for consumption elsewhere). Of interest in this respect is the suggestion that at Ayia Aikaterini, at least in the Late Minoan IIIC, the most convincing evidence for cooking comes from outdoor spaces such as courtyards and/or large communal areas (Hallager & Hallager 2000).

Perhaps most importantly, however, in relation to the Chania material is the evidence that it is the presence of particular animals that defines the event: in this case, large-scale ‘feasting’ events were distinguished through the consumption of deer, the presence of the specific animal is key in marking the event. As noted above, this was not simply the consumption of a specific meat type, but the consumption and incorporation of a set of relationships, experiences, and stories, both human and animal.

10.3.2 ‘Fantastic combinations’[94]

The embodiment of particular animal qualities was not only enacted through consumption of the animal-as-food, however, but was perhaps further manifest in the deliberate presence of antler and agrimia horn in these contexts, and for a concern with their physical alteration in some way (chopping, removal of small pieces, if not tool making *per-se*). The presence of agrimi horn pairs and skull frontal segments[95] (and possibly antler and frontal skull segments, see

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[94] As described in the Corpus of Minoan and Mycenaean Seals.

[95] An agrimi horn still attached to the skull was also recorded recently at Karphi and Mylona proposes that a heightened interest in horn-cores and antler occurs in the Late

Chapter 9) may have been used as ‘frontlets’ that could have been combined with the human body to create a human-animal hybrid and/or in order to transform the human body through the use of their animal ‘effects’ (see Conneller 2004, and Chapter 2.4.2, Chapter 3.5).

Of interest with respect to the human-animal hybrid, is the interpretation in Late Bronze Age iconography of the ‘Minoan genius’, a figure with a combination of human and animal physical characteristics (although not goat), primarily associated with the hunting and sacrifice of animals, and often depicted with deer (see Chapter 5.4). Equally, interesting in this respect is the small number of seals (stylistically dated to Late Minoan I) depicting a ‘fantastic combination’ of deer head (palmated antler indicates fallow deer) and human arms (and possibly elements that look like intestines?; Figure 10.1) .

Figure 10.1 ‘Fantastic combinations’ (Corpus of Minoan and Mycenaean Seals, volume: II,7 nos:169-171).

In the Chania contexts, that interaction with antler and horncores were associated with, and may have formed part of, the consumption event is indicated by their deposition together with consumption remains in the same contexts.[96] It is possible that the significance of these elements may lie in their synecdochic potential, the (most characteristic) ‘part’ representing the ‘whole’. As Marvin (2011) observes in present day contexts, hunting trophies act metonymically: on one level to the specific animal to which it refers, on

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Minoan IIIC period (Mylona in Wallace 2012), although no increase from the LMIIIB:2 to LMIIIC was noted in this assemblage.

[96] Some elements, such as skin and horn sheath, may have been removed for use in other contexts. That deer and agrimia skins and horn were utilised in the LBA Aegean is indicated in the Linear B scripts.

another to the particular hunt out of which it was produced, but at a more complex level as a vestige of the relationship formed during the hunting process. Furthermore, these items may have referred to the blurring of human-animal corporeal boundaries perhaps necessary for a successful hunt, the each acting as an incomplete copy of the other (e.g. Willerslev 2004).

10.3.3 Dogs as co-consumers

In the context of human-animal sociality a significant relationship that needs discussion is the combined interaction of human and dog (and both with the hunted animal). Many Late Bronze Age Aegean depictions (in frescoes, on sealstones, and larnakes) show a hunter hunting with one or more or dogs (see Chapter 5), in Linear B texts the word ‘huntsman’ is related to the word ‘dog’, and Hamilakis (1996b) suggests that the presence of dogs in high status Mycenaean burials refers to the ideological role of hunting in Mycenaean society.

There is evidence in the Chania assemblages for the presence of dogs, both in the physical remains of the dogs themselves (although not seemingly as formal deposits or burials, see Chapter 8.2.8) and in the evidence for canid gnawing on some of the other animal bone material. Whilst it is not possible to determine whether the dogs represented in these assemblages were, in fact, hunting dogs (it was not possible to calculate stature for example), it is perhaps safe to assume (in light of the history of the human and dog species) that some people and these dogs would most certainly have worked closely together in some tasks (such as hunting, also shepherding etc.). Equally, capturing deer, both in the wild and in a park context would, in all likelihood, have required the help of dogs. Thus in terms of a (multi-species) sensory experience, hunting would have been a conjunction of human, dog, deer or agrimi bodies, and the sounds of human, dog, deer/agrimi voices: a ‘peaking of senses’ in each species as each, acutely aware of the other, responds to the behaviour of the others.

The evidence for canid gnawing also hints at some aspects of the human-dog relationship and on the nature of communal consumption. As discussed in Chapter 9.3.6, although the overall percentage of canid gnawing is relatively low, it occurs on a higher percentage of the material from the pits associated with large-scale consumption, or ‘feasts’ (the ‘deer pits’), although seemingly the deer remains were affected to a similar extent as the most frequently occurring domestic species in this respect (no gnawing was observed on agrimia remains in these features). This could imply that either a larger number of dogs were also present at these events, or that there was a greater concern with feeding dogs at the events associated with these features. Either way, dogs could be seen to be a significant presence as co-consumers at these events, and would have contributed to the sensory and embodied experience of (multi-species) communal consumption.

The story doesn’t end there however; a number of dog elements from these same features also bore evidence for butchery (throat cutting (?), skinning, dismemberment, filleting; Appendix E). Who the intended consumers were in this case is not known, possibly humans (as has been proposed in other cases, see Snyder & Klippel 2003, Isaakidou 2004), or other dogs? It is possible that consumption of these animals, perhaps particularly if associated with hunting, may have been seen as transferring perceived qualities and characteristics embodied in the animal to the consumer (e.g. Moreno-García 2004). It is of interest in this respect that the dogs in these assemblages did not appear to be elderly animals, but were perhaps in the ‘prime of life’.

Returning to the gnawed material, the fact that it was present in the pits is a significant point: it implies that care was taken to gather up the remnants of the events, including the dogs’ material, and deposit them in the appropriate pits. The implications of such are, firstly, that it corroborates that dogs were part of the consumption event (not given food which they took away elsewhere or after the event), and secondly, that gathering up the material, including that given to the dogs, and depositing it was a significant act.

10.3.4 Deposition

There is a further significant point that needs to be included in relation to the deposition of specific animal remains in relation to these features, namely the deposition of partially articulated horses and donkeys. The details of these deposits were presented in Chapter 8.2.7 and discussed in relation to the equid burials at Dendra. Two main points of interest in relation to the Chania material were raised in this discussion, firstly that Pappi & Isaakidou (In press) propose that the Dendra horses were seen as having 'personhood', secondly, that exhumation and re-deposition of equid burials was a meaningful practice.

The first point is valuable in Pappi & Isaakidou's recognition of these horses as individuals in their own right, rather than simply as status symbols.[97] The elderly age of the equids in the Chania assemblages suggests that a long-term relationship, built over a life-time of interaction would have developed between these animals and perhaps particular people. The possibility that these animals may at some stage have originally been afforded a formal burial was raised in Chapter 8.2.7.1. That the remains of these animals were present ('resurrected'?) in these 'feast' contexts (although there is no evidence for their having been consumed in these cases) would have added further meaning to the events. Again, Hamilakis' notion of a 'sensorial assemblage', as the co-presence of diverse entities (material and sensorial), is of interest here, particularly the proposal that these can be brought together and constituted for specific performative events before being later dispersed (2014:127). Of particular relevance here is Pappi & Isaakidou's observation that at Dendra, elements associated with hunting and warfare formed part of the sacrificial deposit, and they propose that the sacrifice and burial of the horses emphasised a link with elite activities and individual hunter-warriors. At Prinias in central Crete, Wilkens notes that in burial contexts a seemingly 'great importance' is placed on the 'horse-dog association' and is proposed as being linked to hunting (2003:86). Whether the horses in the contexts studied here were linked to hunting practices is not known (it was noted in Chapter 8.2.7 that they were rather small in stature), however the significant fact remains that in this context engagement with the materiality of horse bodies took place.

10.4 A 'cycle of engagement'

The 'cycle of engagement' hypothesis has been a useful tool as a starting point for thinking about the connectedness of practices associated with human-

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[97] I have avoided the use of 'personhood' in this study as I am of the opinion that animals are important in their own right based on their own qualities and characteristics, not in their capacity to be 'like humans', although it is recognised that not all persons are necessarily human (e.g. Fowler 2004, Knight 2005).

animal interaction, rather than treating them as isolated, disconnected events. Conversely, however, it is in itself an oversimplification of the myriad of relationships and practices that would also have been associated with the ones defined in this model, particularly regarding the (long-term) nature of the relationship with the living animal. Equally, the final practice in the 'cycle of engagement' hypothesis, 'the dispersal of synecdochic animal remains (antler and horn) into the wider community', whilst most likely did occur in the past, was not strongly evident in the data of this study. The data here suggested that, rather than antler and horn being removed from these contexts for use elsewhere, in fact the material was deposited here and other material (antler at least) was also brought into these contexts for deposition. Whilst this is contrary to the initial supposition, it still remains a significant point of interest in relation to the nature of the events, perhaps even more so. These events may have been partly characterised not only through the consumption of particular animals but also through the manipulation of and connection with other (non-edible) animal body parts, possibly for use in conjunction with the human body. This is of particular interest with respect to practices such as hunting and animal sacrifice as it raises the possibility for mutability of the human-animal boundary in these contexts (as also shown in the depictions of the 'genius' and the 'fantastic combinations').

That items of animal origin were manufactured and dispersed through the wider community is more than likely, but will require further research. A highly significant example of the value in doing such is indicated in studies of items such as boar's tusk helmets (e.g. Morris 1990) and the indications in the Linear B archives that agrimi horn was used in the manufacture of hunting bows (Chadwick 1976). The significance of less seemingly 'symbolic' items of animal origin would be worthy of research in this respect (e.g. Isaakidou 2003).

Nonetheless, this analysis has shown that engagement with wild animals was a significant event, and one that was manifest in a number of different associated stages. The significance of such in the wider context of Late Bronze Age Crete is discussed in the following, concluding chapter.

Chapter 11: Conclusions: the social role of hunting and wild animals in Late Bronze Age Crete

11.1 Introduction

This thesis opened with the statement that animals were part of past societies. Yet they were part of past societies as active agents; the aim of this thesis has been to explore such a statement in the context of Late Bronze Age Crete, particularly in Chania, west Crete. More specifically, the focus has been on the role of wild animals and the practice of hunting in this context. Equally, the potential for social interaction in these areas (both human-human and human-animal) has been a focus of exploration.

Thus, the predominant areas of investigation were:

- the nature of human interaction with wild animals in Late Bronze Age Crete, including how concepts of ‘wild’ and ‘domestic’ might have been perceived and enacted
- the evidence for the ‘social’ role played by wild animals in Late Bronze Age Crete, both the part wild animals play in human social interactions, as well as the sociality between humans and wild animals

and

- the role human-(wild)animal interaction plays in the socio-political context of Late Bronze Age west Crete.

11.2 ‘Wild’ and ‘domestic’ in Late Bronze Age Crete

The concepts of ‘wild’ and ‘domestic’ are mutable categories and contextually defined. It is has been demonstrated here that this was no less the case in Late Bronze Age Crete. In fact, the complexity of the ‘wild’ and ‘domestic’ status is exemplified in this context, being a situation in which all Holocene large mammals, including the traditionally defined ‘wild’ species (e.g. deer), were deliberately introduced onto the island. In practice, in all likelihood this would have involved humans and deer travelling together in boats over the course of a long sea journey (potentially from the Near East to Crete in the case of fallow deer and from mainland Greece in the case of red deer). Whether deer were then released into the wider landscape to become ‘wild’, e.g. for hunting purposes as has been suggested (Jarman 1996), or managed in herds close to the main early settlements (e.g. at Knossos, Isaakidou 2004) is inconclusive, although some management in order to establish the early introductions as viable breeding populations would most likely have been necessary.

It was not possible to definitively answer the question of whether the Chania deer were ‘wild’ or ‘managed’. However, it was felt that it was perhaps more relevant to explore the potential for sociality in human - deer relationships in ‘wild’, ‘managed’, and ‘tame’ contexts. Interestingly, each of these situations existing simultaneously was suggested for deer studied in certain Mayan zooarchaeological assemblages (White, *et al*. 2004). Furthermore, depictions of deer in the Aegean Late Bronze Age iconographic repertoire also represent deer fleeing in hunt contexts (Pylos fresco), seemingly standing in ‘naturalistic’ poses in herd contexts (Tiryns fresco), and possibly wearing collars and processing with humans in, what has been interpreted as, ‘cultic’ contexts (Ayia Triada fresco).

The case for the agrimi is no less complex. Often perceived as the ‘wild’ animal ‘*par excellence*’ of Crete, the agrimi is frequently depicted in mountainous landscapes and in hunt scenes in Late Bronze Age iconography. Genetic studies suggesting agrimia are feral animals derived from the early domestic goat herds, or were originally introduced as wild animals (and subsequently interbred with the domestic stock), have both been proposed. Whatever its ‘original’ status, however, by the time of the Late Bronze Age it would most likely have been *perceived* as a wild animal. Its natural environment high in the most inaccessible areas of the mountainous regions of Crete would certainly have provided a certain amount of geographical/physical distance from the main settlements. It is of significance that agrimi horns, their most distinctive physical feature, and one which distinguishes it from domestic goats, are often seemingly deliberately deposited.

The identification of feral populations of other domestic species (e.g. pigs at Knossos), and the suggestion that Late Bronze Age depictions of bull-leaping may have been linked to performative elements of bull-hunting, indicate that the case was equally complex within the 'domestic' category too.

Thus in Late Bronze Age Crete, the 'wild'/'domestic' status of a species is not necessarily clearly defined, static, or mutually exclusive. Nor is it necessarily a quality inherent within an animal[98]. Rather it is a condition constructed through the nature of the (human-animal) relationships involved and the context of encounter, being variable on an inter-species and intra-species basis.

Significantly, however, the deliberate introduction of 'wild' as well as domestic species onto Crete, and the development of feral populations (also possibly a deliberate act), suggests that there was indeed a desire for an alternative (or additional) mode of human-animal interaction to that in a domestic context, perhaps seen as a means for engaging with animals in their places and on their terms.

11.3 The 'social' role of wild animals in Late Bronze Age Crete

It is proposed in this study that the interaction between humans and domestic animals would have necessitated a relationship predominantly based on mutual cooperation, and characterised by a familiarity of interaction through the regular, routine care of husbandry practice. In contrast, the hunting encounter is, comparatively, short-term, characterised by unpredictability, and necessitates an intensity of (mutual) physical and sensory awareness. The intensity of this engagement is often described as contributing to a sense of relationship between hunter and hunted; a fleeting one however, and probably an unwilling one in the case of the latter. Furthermore, in order for hunting to be successful there has to be an element of empathy – an attempt to see the world through another's eyes, or felt through another's bodily actions.

Of interest here is the evidence for manipulation of synechdochic elements of the animal body, namely the modified fallow and red deer antler and agrimia horncore 'frontlets'. It is possible that one way of viewing these elements may have been in combination with the human body, as a means of

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[98] It is recognised that some species are considered less suitable for domestication based on certain behavioural aspects.

transforming/extending the body and enabling a ‘mimetic empathy’ (after Willerslev 2004). Of interest in this respect are the ‘Minoan Genii’ and ‘fantastic combinations’ (of antler and human arms), both iconographic representations (albeit from earlier periods[99]) of the potential mutability of human/animal corporeal boundaries, and linked to hunt contexts.

That hunting was also a context in which (interspecies) individuals could be recognised and engaged with, was proposed in this thesis. This would have been further increased in the case of managed deer herds (see previous chapter), and perhaps epitomised in depictions such as the Ayia Triada fresco with individually coloured fallow deer, possibly wearing collars, processing along with humans.

Whilst it is not possible to tell from the zooarchaeological data whether the deer arrived at the contexts of their consumption as live animals or as carcasses, it is highly likely that their arrival (in whatever form) was a significant event.

11.4 The significance of the human-(wild)animal interaction to the socio-political context of Late Bronze Age west Crete

I have shown here that in Chania deer were a distinctive marker of consumption events on a significant scale; the deposition of the remains of which in large pits was seemingly an important part of the event. Hallager (2001) suggests that the high quantities of deer remains in the Rubbish Area North deposits, at Ayia Aikaterini, could be indicative of and associated with an, as yet unidentified, shrine in the area. Analysis of the deer remains in this study did not indicate any evidence for them having been part of burnt animal sacrifices (as at Pylos), nor was there any apparent evidence for the deliberate selection of any one particular element or side of the body (as in later animal sacrifice contexts). There was evidence for their having been consumed in feasting contexts, however, and that these may have been feasts linked to a shrine or deity could well be possible.

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[99] Late Minoan I

There was also evidence for deer having been provided in larger portions than other species in these consumption contexts, thus associating deer with an abundance of meat. It is evident that the quantity of animals (of several species) consumed in these feasting contexts would have necessitated the sharing of food amongst a wider community than perhaps usual. These consumption events were a multispecies affair, however, and dogs may have been a significant embodied presence as co-consumers at these events. There is also the possibility that interaction with the materiality of equid remains (through reburial or consumption, for example) may have occurred (as well as with agrimi horns and deer antler).

We can imagine these events as ones which would have involved the killing of numerous animals of different kinds, perhaps including ‘companion’ species such as dogs, as well as unfamiliar animals such as deer and agrimia, and which were defined by the highly sensory and even emotional impact of witnessing or participating in the transformation of ‘animal-as-lived-with’ to ‘animal-as-food’. These events were characterised by the use of distinctive eating and drinking vessels, an abundance of meat, perhaps intoxication, and the deliberate destruction of feasting vessels; events which would have featured the embodied presence of ‘others’ as co-consumers (strangers maybe, and dogs), as well as processions (perhaps with animals), music, and dancing. Would there have been a moment when elements of the animal body (e.g. agrimi horn ‘frontlets’ and deer antler) were combined with the human body, perhaps in reference to the hunting process, a ‘vestige’ of the relationship formed?

Afterwards, the gathering up of hundreds of fragments of vessels (deliberately fragmented?), animal bones, shells, rhyta, figurines[100], charcoal and ashy remains from cooking installations[101] and their placing in deep pits, would have served as a further conspicuous reminder of the events and experiences that had taken place, operating perhaps as a closing performative phase. As noted of feasts by Hamilakis ‘such events would have acquired a unique theatricality, which would have called for specific formalised and ritualised behaviour’ (2008:8).

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[100] (Hallager 2001, Hallager & Hallager 2003)

[101] As well as organic material not preserved in the archaeological record.

Events such as these would have been arenas in which individual and community identity were formed and embodied, authority naturalised or legitimated, and social memory created (and manipulated). There is evidence that these distinctive consumption practices, starting in Chania (in Late Minoan IIIB:2- Late Minoan IIIC early) may have continued at Chamalevri (Late Minoan IIIB-C transition - middle Late Minoan IIIC) and Thronos/Kephala (Late Minoan IIIC early – Protogeometric). As such, it seems likely that these large scale consumption and deposition events, perhaps organised by the local 'elites', played a key role in the development and maintenance of the west Cretan regional identity[102] . That they might have served as contexts for intra-regional competition within west Crete is also possible. These events appear to have acquired a performative or ritualised element and there may have been a link with 'cultic' practices.

The presence of large quantities of deer (of two different species) and agrimia is, as yet, distinctive of this region, and speaks of a more frequent hunting in 'the wild', and/or a more sustained maintenance of deer herds in the area. The latter, in itself, should be considered as the deliberate creation of a *possibility* for human-deer encounter, and likewise of a *potential* for hunting- or hunting performance- perhaps culminating in a ritualised death through sacrifice.

Based on the prominence of hunting themes in high status iconography it has been argued that hunting was an important ideological resource for mainland Mycenaean elites. Expressions of affiliation with mainland Mycenaean elite ideologies appeared to have played a key role in a distinctive Chaniote regional identity, and it is tempting to propose that the apparent emphasis on 'hunting' deer in the Chania assemblages, might have been a further manifestation of such, at least initially.

However, there are some significant differences. Firstly, despite the prominence of fallow deer in mainland Mycenaean iconography, their physical remains are relatively scarce[103]. It might be that in the case of the mainland Mycenaean 'palace' sites, the aim was a demonstration of interaction with these animals despite, or perhaps because of, their relativity scarcity in the

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[102] These same sites (amongst others such as Phaistos) are also prominent in a particularly west and west –central Cretan pattern of settlement in the Late Minoan IIIB-Late Minoan IIIC periods (Chapter 4).

[103] See also the suggestion in Chapter 5 that depictions of fallow deer often suggest a certain degree of metaphorical distance from everyday/familiar contexts.

local landscape. This would also have served to demonstrate a knowledge of and participation in such distant geographical realms as the Near East (the native habitat of fallow deer at this time), that was a perhaps part of a wider shared elite symbolism at this time. On the other hand on Crete (a suitable bounded environment without natural predators), it is likely that fallow deer populations were present in the landscape throughout the Bronze Age.

Secondly, the Cretan incorporation of mainland 'Mycenaean' elements was not a case of passive wholesale adoption; it was rather selective and adapted, and fused with local traditions in innovative ways. The incorporation of agrimia in these assemblages– one of the most prominent symbols of Cretan Late Bronze Age hunting iconography– may be another such manifestation.

What is of most importance here, however, is the real material evidence in this study that hunting, whether in the wild (as was almost certainly the case with agrimia) or in a more performative manner, was fundamentally an embodied inter-action - a relationship - with a sentient (potentially dangerous) being of another species. This heightened physical and sensory experience, taking place in a 'heterotopic domain' -a place outside a place (Foucault 1986)-, in which 'anything may happen and the hunter become the game' (Schnapp 1989:72), is what imbues such encounters with potency, and is thus perhaps why such 'domains' were deliberately created in Late Bronze Age Crete.

11.5 Humans and animals, going forward

What I have attempted to do through this thesis is to consider the implications of investigating the human-animal relationship in the past as one between beings of equally affective presence in the world. In the study of Late Bronze Age Crete I have tried to reintroduce animals as living, sentient bodies that would have been active agents in society. In archaeology, it is now time to start investigating the social aspects of all human-animal relationships. I do not suggest that this should happen at the expense of economic elements or symbolic roles, but rather that economic strategies and symbolic behaviour were only part of the broad, complex, and multifaceted, inter-species inter-actions, with multiple outcomes.

Trying to investigate the 'social' nature of human-animal relationships in archaeology might seem something of a 'tall-order'; no doubt this was also the case when investigating human-human social relationships was first proposed. However, as part of a growing body of work (in human-animal studies and non-anthropocentric zooarchaeologies), this thesis has attempted to show that asking the appropriate questions could provide new perspectives on human-animal relationships in the past, thus contributing to a richer understanding of past societies in general. This thesis has also shown that the context of Late Bronze Age Crete has significant potential in this respect.

Future work should include detailed analysis of deer and agrimi remains from a wider range of geographic and temporal contexts across Crete and, crucially, greater inter-researcher integration of zooarchaeological results, to build up a more detailed picture of their place in prehistory.

Equally, valuable in this respect would be microscopic as well as macroscopic analysis, as the *Dama International* project[104] (using genetic and isotope analysis) is beginning to show, with regard to the origins and spread of fallow deer. Furthermore, it is possible that techniques such as tooth microwear analysis may be able to shed additional light on the status of deer as wild, managed or tame, based on variations in diet types (e.g. Rivals*, et al.* 2011).

I would also like to see further work on objects of animal origin conducted as part of a biographical approach in which the agency of the animal from which they derived is taken into account. A limitation of this thesis is that detailed research on horn and antler items in Late Bronze Age Crete was not possible (see previous Chapter).

Ultimately, however, detailed contextual zooarchaeological analysis needs to become routine and better integrated into archaeological accounts, that is to say human-animal stories need to become part of the broader narrative.

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[104] An international and transdisciplinary research project led by Dr Naomi Sykes (University of Nottingham, UK) on the history and distribution of European fallow deer as a reflection of past human population movement, trade and ideology.

Appendices

Appendix A: Animal bone material per feature type at each site

Ayia Aikaterini	**Rubbish Area North**												
	LMIIIB:2									**LMIIIC**			
Species	16-Pit E	22-Pit B, upper layer	22-Pit B, lower layer	central dump, upper layer	central dump, middle layer	central dump, lower layer	southern dump, upper layer	southern dump, middle layer	southern dump, lower layer	1st layer	3rd layer	4th layer	Grand Total
cattle	40	28	21	4	3		1	4	3	14	34	3	155
pig	131	37	37	7	10	8	2	9	10	28	64	20	363
goat	36*	9	15	2	4	3	1	2	3	19*	20	14	128
sheep	66	23	26	7	8	9		3	5	10	25	24	206
sheep/goat	166	64	34	33	18	25	5	14	46	61	90	48	604
equid	1									3	6		10
dog	5	3	3	2					1	1	3		18
agrimi	1									2	1		4
deer	28	9	17	6	2				1	5	14	1	83
fallow deer	56	33	41	1		1				8	19	7	166
red deer	18	12	10						1	4	12	2	59
hare		2											2
marten	1												1
?dolphin		1											1
human	5	1	1										7
Sub-total ids	*554*	*222*	*205*	*62*	*45*	*46*	*9*	*32*	*70*	*155*	*288*	*119*	*1807*
c size	70	33	26	2	9	5		3	2	19	37	16	222
s size	343	91	69	47	22	38	16	18	85	89	115	88	1021
sm size												2	2
unid	96	34	24	1	1	7			9	7	84	27	290
Grand Total	1062	380	324	112	77	96	25	53	166	270	524	252	3342

Table A.1 Ayia Aikaterini: animal bones per feature in the Rubbish Area North (including unidentified material).

Ayia Aikaterini	**Other Pits**												
	Courtyard Area								**Southern Area**				
	LMIIIB:2					**LMIIIC**			**LMIIIB:2**			**LMIIIC**	
Species	11-Pit E	11-Pit F	12-Pit C	12-Pit D	19-Pit H	19-Pit E/F	19-Pit K	19-Pit D	20-Pit B	13-Pit G	13-Pit H	13-Pit F	Grand Total
cattle	10	5	1	14				4	28	6	3		71
pig	49	10	4	18		2	1	6	80	8	1	1	180
goat	32	12	1	15			1	4	56	9	1	1	132
sheep	15	3		16	2	1	1		54	6			98
sheep/goat	75	17	4	37	4	3	2	7	158	35	7		349
equid				1									1
dog									1				1
agrimi	1	2		1									4
deer	7							2	2			1	12
fallow deer	2							4	5				11
red deer	1								1	1			3
hare		1											1
human												3	3
Sub-total ids	*192*	*50*	*10*	*102*	*6*	*6*	*5*	*27*	*385*	*65*	*12*	*6*	*866*
c size	25	4	1	11			1	1	50	7		2	102
s size	76	31	3	65		1	1	3	169	59	6	2	416
sm size	1								1				2
unid	80		3		1			1	106				191
Grand Total	374	85	17	178	7	8	7	32	711	131	18	10	1577

Table A.2 Ayia Aikaterini: animal bone per feature in the ‘other pits’ group (including unidentified material).

Ayia Aikaterini	**Internal Rooms**								
	LMIIIB:2				**LMIIIC**				
Species	B1.Room A	Room E	Room K	Room U	Room I (pit)	Room K/H	Room O	B2.Room A	Grand Total
cattle	2			1				2	5
pig		5		1		3	4		13
goat						1	5	2	8
sheep	1	2	2	1	2	5	1	2	16
sheep/goat	4	6	4	6	6	6	7	9	48
deer						1	1		2
fallow deer						2		1	3
red deer								1	1
hare						1			1
Sub-total ids	*7*	*13*	*6*	*9*	*8*	*19*	*18*	*17*	*97*
c size	1		3			3	2		
s size	4	25	11	11	7	37	21	13	
sm size	1								
unid	2								
Sub-total unid	*8*	*25*	*14*	*11*	*7*	*40*	*23*	*13*	*141*
Grand Total	**15**	**38**	**20**	**20**	**15**	**59**	**41**	**30**	**238**

Table A.3 Ayia Aikaterini: animal bone from internal rooms (including unidentified material).

Ayia Aikaterini	**External Areas (LMIIIC)**			
Species	Courtyard F	Space O, Patio?	Space S	Grand Total
cattle		1		1
pig	5	14	3	22
goat		2	1	3
*goat	1	2		3
sheep	1	2	2	5
sheep/goat	3	38	5	46
deer		3	1	4
fallow deer		2		2
human		1		1
Sub-total ids	*10*	*65*	*12*	*87*
c size	4	11	1	16
s size	15	53	9	77
sm size			1	1
unid				
Grand Total	**29**	**129**	**23**	181
* large, possible agrimi				

Table A.4 Ayia Aikaterini: animal bone from external areas (all of LMIIIC period) (including unidentified material).

Daskaloyannis/Khaniamou

Species	**Pit M**	**Pit ? M**	**Pit ND**	**Pit Ma**	**Pit Mb**	**Pit 5**	**Pit ΠΕ**	**Pit ΠΒ**	**Pit ΚΟ**	**Pit ΛΑ**	**Pit ΣΣΤ**	**Pit ΜΖ**	**Pit ΠΓ**	**Pit ΞΓ**	**Pit ΙΘ**	**Pit ΡΕ**	**Pit Σ**	**Pit 5a**	**Pit ΚΕ**	**Pit ΙΒ**	**Pit ΜΓ**	**Pit ΝΖ**	**Pit ΚΘΙ**	**Pits Ma-ΚΘΙ (sub-total)**	**Floor 20**	**Courtyard 'niche'**	**other floors**	**Floors (sub-total)**	**Grand Total**
cattle	124	19	10	1	16	9	10	4	1	1	1		1	1	1		1	2		2				*51*	2	3	35	40	244
pig	185	19	16	5	16	11	12	11	9	1	5			2	2			2	1	1	2			*80*	1	5	43	49	349
goat	71	14	5	1	3	3	1	3	3		3						1	1						*19*		6	15	21	130
sheep	74	8	14		3	8	1		5		2		1	2			2	1			1			*26*		2	30	32	154
sheep/goat	269	20	23	5	22	42	27	17	9	9	7	3	9	1	5	2	2	2	2			3		*167*	17	9	113	139	618
equid	90*	4	1		1																			*1*			1	1	97
dog	6	3	1											1										*1*					11
agrimi	17	1	2	1											1									*2*					22
deer	10	3	1		1																			*1*			1	1	16
fallow deer	139	25	41	4					9				1						1					*15*			7	7	227
red deer	41	2	11	2	1																			*3*					57
bird																											2	2	2
fish	1																										1	1	2
human	4																								1			1	5
? human																											1	1	1
Sub-total ids	*1031*	*118*	*125*	*19*	*63*	*73*	*51*	*35*	*36*	*11*	*18*	*3*	*12*	*7*	*9*	*2*	*6*	*8*	*4*	*3*	*3*	*3*		*366*	*21*	*25*	*249*	*295*	*1935*
c size	135	21	23	2		4	3	5	2	10	1			1			4			1			1	*34*	1		25	26	239
s size	345	29	22	9	42	38	58	55	10	18	10	22	12	6	3	8	2	1	4	2	3	3	2	*308*	13	2	144	159	863
sm size	2																												2
unid	28	33	3	4	12			2		1						2								*21*	2		3	5	90
Grand Total	1541	201	173	34	117	115	112	97	48	40	29	25	24	14	12	12	12	9	8	6	6	6	3	*729*	37	27	421	485	3129

*81 frags from 1 individual

Table A.5 Daskaloyannis/Khaniamou: animal bone from all features (including unidentified material).

Mathioudaki						
Species	**Pit A**	**Pit B**	**Floors**	**Room A**	**unknown**	**Grand Total**
cattle	5	7	1	7	21	41
pig	1	10	2	12	43	68
goat	2	7	3	2	15	29
sheep		9	1	4	18	32
sheep/goat	12	45	17	14	93	181
equid			2		3	5
dog			1		1	2
agrimi					1	1
deer					1	1
fallow deer	3	7	1	1	6	18
red deer	2	3			3	8
hare				1	1	2
Sub-total ids	*25*	*88*	*28*	*41*	*206*	*388*
c size	2	14	2	5	27	50
s size	12	142	45	71	162	432
sm size			1			1
unid	1	23	2	8	10	44
Grand Total	40	267	78	125	405	915

Table A.6 Mathioudaki: animal bone from all features (including unidentified material).

Appendix B: Skeletal element data

B.1 Skeletal element data per site (NISP and MNE)

Ayia Aikaterini (NISP)

Group	Element	cattle	pig	*goat	sheep	sheep/goat	equid	dog	agrimi	deer	fallow deer	red deer	hare	marten	badger	Grand Total
Head	antler									2		1				3
	horncore	8		28	6	4			6							52
	skull + antler									2						2
	skull + horncore			2												2
	skull	14	57	8	9	23			1	3						115
	maxilla	7	48			18				1		4				78
	mandible	22	99	36	43	102		4		1	10	3	2		1	323
	tooth	28	41	1		167	3**				1	2				243
	atlas	3	7	1	1	9		1		2	5					29
	axis	1				17				2	1					21
	Sub-total	*83*	*252*	*76*	*59*	*340*	*3*	*5*	*7*	*13*	*17*	*10*	*2*		*1*	*868*
Upper limbs	scapula	17	37	19	12	106		1		12	15	2	1			222
	pelvis	18	39	16	22	66	1	3		15	10	3				193
	humerus	13	59	46	45	85	1	1		4	27	2				283
	femur	26	36	1	4	116		2		27	5	6	3	1		227
	radius	12	32	31	49	118		1		7	29	8				287
	tibia	9	60	21	59	163		1		20	22	7	2			364
	ulna	9	32	2	8	15		1		6	5	3			1	82
	fibula		2													2
	Sub-total	*104*	*297*	*136*	*199*	*669*	*2*	*10*		*91*	*113*	*31*	*6*	*1*	*1*	*1660*
Lower limbs	calcaneus	3	18	8	10	19				5	6	8				77
	astragalus	2	7	12	9	4	1				4	2				41
	carpal	2				1										3
	tarsal	3										1				4
	metacarpal	11	20	37	33	63	3	1			20	4				192
	metatarsal	20	14	25	29	59		2			28	3				180
	metapodial	3	9			5		1			1					19
	phalanx 1	7	7	12	24	3	2				3	6				64
	phalanx 2	10	2	1	2						1					16
	phalanx 3	5	3		1						2					11
	Sub-total	*66*	*80*	*95*	*108*	*154*	*6*	*4*		*5*	*65*	*24*				*607*
Spine/ribs	c vert									1						1
	t vert									3						3
	l vert	5														5
	vert					10										10
	sacrum					3										4
	ribs	1				5										5
	Grand Total	**259**	**629**	**307**	**366**	**1181**	**11**	**19**	**7**	**113**	**195**	**65**	**8**	**1**	**2**	**3163**
	Notes: * 2 humerii, 1 femur, 4 radii, 1 metacarpal = large size poss agrimi. ** Donkey. Pig 15 mc3, 5 mc4, 7 mt3, 7mt4															

Table B.1.1 Ayia Aikaterini: skeletal element data based on NISP.

Ayia Aikaterini (MNE)

Group	Element	cattle	pig	*goat	sheep	sheep/goat	equid	dog	agrimi	deer	fallow deer	red deer	Grand total
Head	antler												
	horncore	3		17	6				6				32
	skull + antler									2			2
	skull + horncore			2									2
	skull	2	1	1	1	1			1				7
	maxilla												
	mandible	8	49	31	40	45		3		1	9	3	189
	atlas	3	5	1	1	6		1		2	4		23
	axis	1				14				2	1		18
	Sub-total	*17*	*55*	*52*	*48*	*66*		*4*	*7*	*7*	*14*	*3*	273
Upper limbs	scapula	7	31	18	11	51		1		8	14	2	143
	pelvis	9	23	15	12	28	1	3		5	9	2	107
	humerus	6	46	44	42	56	1	1		1	20	1	218
	femur	9	24	1	4	55		1		13	4	2	113
	radius	5	26	24	31	82		1		4	15	4	192
	tibia	4	35	21	57	100		1		10	15	4	247
	ulna	5	26	2	8	13		1		4	5	3	67
	fibula		2										2
	Sub-total	*45*	*213*	*125*	*165*	*385*	*2*	*9*		*45*	*82*	*18*	1089
Lower limbs	calcaneus	3	18	8	10	18				4	6	8	75
	astragalus	2	7	12	9	4	1				4	2	41
	carpal	2				1							3
	tarsal	2										1	3
	metacarpal	5	20	32	30	42	2	1			13	3	148
	metatarsal	11	14	21	25	41		2			20	1	135
	metapodial	3	9			5		1			1		19
	phalanx 1	7	7	12	24	3	2				3	6	64
	phalanx 2	10	2	1	2						1		16
	phalanx 3	5	3		1						2		11
	Sub-total	*50*	*80*	*86*	*101*	*114*	*5*	*4*		*4*	*50*	*21*	515
	Grand total	**112**	**348**	**264**	**314**	**564**	**7**	**17**	**7**	**56**	**146**	**42**	**1877**

Notes: * 2 humerii, 1 femur, 3 radii, 1 metacarpal = large size, poss agrimi. Pig 15 mc3, 5 mc4, 7 mt3, 7 mt4

Table B.1.2 Ayia Aikaterini: skeletal element data based on MNE.

Daskaloyannis/Khaniamou (NISP)

Group	**Element**	**cattle**	**pig**	**goat**	**sheep**	**sheep/ goat**	**equid**	**dog**	**agrimi**	**deer**	**fallow deer**	**red deer**	**Grand Total**
Head	antler									2	12	1	15
	horncore	2		13	1	4			11				31
	skull + antler										7		7
	skull + horncore	2		5	1				11				19
	skull	11	44	4	5	17	3	1				1	86
	maxilla		1								1		2
	mandible	24	80	10	22	33	1	3			7		180
	tooth row	1				1							2
	tooth	10	24	4	10	28	30			1		2	109
	atlas	2	1			1					2		6
	axis					1		1			2		4
	Sub-total	*52*	*150*	*36*	*39*	*85*	*34*	*5*	*22*	*3*	*31*	*4*	*461*
Upper limbs	scapula	3	27	5	3	73	2			4	14	5	136
	pelvis	12	18			49	1			3	30	7	120
	humerus	21	33	21	19	54	6	2			18	4	178
	femur	12	23		2	55				3	25	2	122
	radius	17	15	18	20	72	5*			1	16	5	169
	tibia	23	22	14	41	93	1	2		2	27	5	230
	ulna	7	25	3	4	16	2				3	1	61
	Sub-total	*95*	*163*	*61*	*89*	*412*	*17*	*4*		*13*	*133*	*29*	1016
Lower limbs	calcaneus	12	6	4	2	2					6	4	36
	astragalus	12	1	2	3		1				3	4	26
	tarsal	1				1						1	3
	metacarpal	19	6	14	10	57	2*	2			16	2	128
	metatarsal	25	10	9	8	50					35	8	145
	metapodial	3	9			1	2				2	1	18
	phalanx 1	13	2	3	3	4	2					4	31
	phalanx 2	6	1	1									8
	phalanx 3	4	1			1							6
	Sub-total	*95*	*36*	*33*	*26*	*116*	*7*	*2*			*62*	*24*	401
Spine/ribs	c vert	1											1
	t vert	1				1							2
	vert						4						4
	rib					4	35						39
	Sub-total	*2*				*5*	*39*						46
	Grand Total	**244**	**349**	**130**	**154**	**618**	**97**	**11**	**22**	**16**	**226**	**57**	**1924**

Notes: * 1 donkey

Table B.1.3 Daskaloyannis/Khaniamou: skeletal element data based on NISP.

Daskaloyannis/Khaniamou (MNE)

Group	**Element**	**cattle**	**pig**	**goat**	**sheep**	**sheep /goat**	**equid**	**dog**	**agrimi**	**deer**	**fallow deer**	**red deer**	**Grand total**
Head	antler												
	horncore	2		10	1	2			6				21
	skull + antler										7		7
	skull + horncore			5	1				7				13
	skull	1	1	1	1	1	1					1	7
	maxilla												
	mandible	9	28	10	15	10	1	3			4		80
	atlas	2	1								2		5
	axis		1			1		1			2		5
	Sub-total	*14*	*31*	*26*	*18*	*14*	*2*	*4*	*13*		*15*	*1*	*138*
Upper limbs	scapula	2	22	5	3	41	1			2	13	5	94
	pelvis	4	11			21	1			1	16	3	57
	humerus	8	32	19	19	44	4	1			13	3	143
	femur	3	16		2	24				1	11	1	58
	radius	8	9	14	13	47	5			1	11	3	111
	tibia	12	16	14	41	73	1	2		2	20	4	185
	ulna	5	16	3	4	13	2				3	1	47
	Sub-total	*42*	*122*	*55*	*82*	*263*	*14*	*3*		*7*	*87*	*20*	695
Lower limbs	calcaneus	10	6	4	2	2					6	4	34
	astragalus	12	1	2	3		1				3	4	26
	tarsal	1											1
	metacarpal	12	6	13	10	37	2	2			13	2	97
	metatarsal	15	9	9	7	38					25	7	110
	metapodial		9			1					2	1	13
	phalanx 1	13	2	3	3	4	2					4	31
	phalanx 2	6	1	1									8
	phalanx 3	4	1			1							6
	Sub-total	*73*	*35*	*32*	*25*	*83*	*5*	*2*			*49*	*22*	326
	Grand total	**129**	**188**	**113**	**125**	**360**	**21**	**9**	**13**	**7**	**151**	**43**	**1159**

Table B.1.4 Daskaloyannis/Khaniamou: skeletal element data based on MNE.

Mathioudaki (NISP)

Group	Element	cattle	pig	goat	sheep	sheep/ goat	equid	dog	agrimi	deer	fallow deer	red deer	hare	Grand Total
Head	horncore			3	1				1					5
	skull	1	11		1	5		1						19
	mandible	5	9	5	3	12					1			35
	tooth row					1								1
	tooth	7	3	2	4	13	3				1			33
	atlas					1						1		2
	axis					1						1		2
	hyoid					1								1
	Sub-total	*13*	*23*	*10*	*9*	*34*	*3*	*1*	*1*		*2*	*2*		*98*
Upper limbs	scapula	2	4			20						2		28
	pelvis	3	2			15					1			21
	humerus	1	7	4	3	11					4	2	1	33
	femur	4	1		1	10				1	1			18
	radius	2	4	6	5	19		1			1	1		39
	tibia	6	1	2	2	31	1					1	1	45
	ulna	2	8		3	4								17
	fibula		1											1
	patella					1								1
	Sub-total	*20*	*28*	*12*	*14*	*111*	*1*	*1*		*1*	*7*	*6*	*2*	*203*
Lower limbs	calcaneus	1	1	2	2	6					4			16
	astragalus		1	1	3						3			8
	metacarpal			2	2	13								17
	metatarsal	3		2	1	10								16
	metapodial	1	7			1								9
	phalanx 1	1	5		1	4					2			13
	phalanx 2	1	3				1							5
	phalanx 3	1				2								3
	Sub-total	*8*	*17*	*7*	*9*	*36*	*1*				*9*			*87*
	Grand Total	**41**	**68**	**29**	**32**	**181**	**5**	**2**	**1**	**1**	**18**	**8**	**2**	**388**

Table B.1.5 Mathioudaki: skeletal element data based on NISP.

Mathioudaki (MNE)

Group	**Element**	**cattle**	**pig**	**goat**	**sheep**	**sheep/ goat**	**equid**	**dog**	**agrimi**	**deer**	**fallow deer**	**red deer**	**hare**	**Grand total**
Head	horncore			3	1				1					5
	skull	1	1		1	1		1						
	mandible	2	6	3	2	7					1			21
	tooth row													
	tooth													
	atlas											1		1
	axis					1						1		2
	sub-total	*3*	*7*	*6*	*4*	*9*		*1*	*1*		*1*	*2*		*34*
Upper limbs	scapula	2	3			12						2		19
	pelvis	2	2			7					1			12
	humerus	1	6	4	3	10					3	2	1	30
	femur	2	1		1	7				1				12
	radius	1	4	4	5	10		1			1	1		27
	tibia	2	1	2	2	16	1					1		25
	ulna	2	5		3	2								12
	patella					1								1
	sub-total	*12*	*22*	*10*	*14*	*65*	*1*	*1*		*1*	*5*	*6*	*1*	*138*
Lower limbs	calcaneus	1	1	2	2	6					4			16
	astragalus		1	1	3						3			8
	metacarpal			2	2	6								10
	metatarsal	2		2	1	7								12
	metapodial	1	5			1								7
	phalanx 1	1	5		1	4					2			13
	phalanx 2	1	3				1							5
	phalanx 3	1				2								3
	fibula		1											1
	sub-total	*7*	*16*	*7*	*9*	*26*	*1*				*9*			*75*
	Grand Total	**22**	**45**	**23**	**27**	**100**	**2**	**2**	**1**	**1**	**15**	**8**	**1**	**247**

Table B.1.6 Mathioudaki: skeletal element data based on MNE.

B.2 Skeletal element data per feature type for each site (NISP)

Ayia Aikaterini: Rubbish Area North, 22-Pit B (NISP)

Group	Element	cattle	pig	goat	sheep	sheep/ goat	dog	deer	fallow deer	red deer	hare	?dolphin	human	Total
Head	horncore	1			2	4								7
	skull	2	10	1	1	3		1						18
	maxilla		2			1								3
	mandible	5	10	1	4	5	1		2	1				29
	tooth	6	2			4			1					13
	atlas						1		4					5
	axis					3		1	1					5
	Subtotal	*14*	*24*	*2*	*7*	*20*	*2*	*2*	*8*	*1*				*80*
Upper limbs	scapula	3	3	3	4	15		4	6	2	1			41
	pelvis	3	7	2	3	6		3	2	1			1	28
	humerus	5	8	7	10	6			9	1				46
	femur	6	6			9	2	11		2				36
	radius	2	3	3	4	14			11	1				38
	tibia	4	8	1	8	13		4	8	5	1			52
	ulna	4	7			1			1	1			1	15
	Subtotal	*27*	*42*	*16*	*29*	*64*	*2*	*22*	*37*	*13*	*2*		*2*	*256*
Lower limbs	calcaneus	1	3		2			1		2				9
	astragalus		1	2					3	1				7
	metacarpal	2		1	6	6			7	2				24
	metatarsal	3		2	3	8			16					32
	metapodial		4				2		2					8
	phalanx 1	2		1	2				1	3				9
	Subtotal	*8*	*8*	*6*	*13*	*14*	*2*	*1*	*29*	*8*				*89*
Other	vert							1				1		2
	Grand Total	49	74	24	49	98	6	26	74	22	2	1	2	427

Table B.2.1 Ayia Aikaterini: skeletal element data per species in Rubbish Area North, 22-Pit B (based on NISP).

Ayia Aikaterini: Rubbish Area North, 16-Pit E (NISP)

Group	Element	cattle	pig	goat	sheep	sheep/ goat	equid	dog	agrimi	deer	fallow deer	red deer	marten	human	Total
Head	antler									2		1			3
	horncore	1			1				1						3
	skull	3	7		2	3									15
	maxilla	3	13			4				1		1			22
	mandible	6	24	6	5	13		1			4	2			61
	tooth	3	10			25						2			40
	atlas	1	4							1	1				7
	axis					1				1					2
	Subtotal	*17*	*58*	*6*	*8*	*46*		*1*	*1*	*5*	*5*	*6*			*153*
Upper limbs	scapula	5	12	4	2	19		1		3	5				51
	pelvis	3	11	4	8	9		1		2	2				40
	humerus	1	11	5*	11	16					9				53
	femur	1	4		2	11				4	3	2	1	2	30
	radius	3	6	4*	6	16		1		3	6	1			46
	tibia	1	6	3	8	24				8	10	1		2	63
	ulna		8			3				3	1				15
	fibula		2												2
	Subtotal	*14*	*60*	*20*	*37*	*98*		*3*		*23*	*36*	*4*	*1*	*4*	*300*
Lower limbs	calcaneus	1	3		2	3					4	2			15
	astragalus	1			3										4
	carpal					1									1
	tarsal	1										1			2
	metacarpal			5	4	9	1				6	1			26
	metatarsal	3		4	6	8					3	3			27
	metapodial		5					1							6
	phalanx 1		4	1	4	1					2	1			13
	phalanx 2	2			2										4
	phalanx 3	1	1												2
	Subtotal	*9*	*13*	*10*	*21*	*22*	*1*	*1*			*15*	*8*			*100*
	vert													1	1
	Grand Total	40	131	36	66	166	1	5	1	28	56	18	1	5	554
	Notes: * 1 large, agrimi?														

Table B.2.2 Ayia Aikaterini: skeletal element data per species in Rubbish Area North, 16-Pit E (based on NISP).

Ayia Aikaterini: Rubbish Area North, central and southern dumps (NISP)

Group	**Element**	**cattle**	**pig**	**goat**	**sheep**	**sheep/ goat**	**dog**	**deer**	**fallow deer**	**red deer**	**Total**
Head	antler							1			1
	horncore				1						1
	skull	1	3		1	1					6
	maxilla		5								5
	mandible		3	1	6	10	1				21
	tooth	2	2			24					28
	atlas					5					5
	axis					4					4
	Subtotal	*3*	*13*	*1*	*8*	*44*	*1*	*1*			*71*
Upper limbs	scapula	1	4	2	1	5			1		14
	pelvis	1	2		1	8		2			14
	humerus	1	5	3	3	12			1		25
	femur	1	2		1	23		1			28
	radius	1	1	1	6	9		3			21
	tibia		7	2	2	20	1	1			33
	ulna				1		1				2
	Subtotal	*5*	*21*	*8*	*15*	*77*	*2*	*7*	*2*		*137*
Lower limbs	calcaneus		2	2		3		1		1	9
	astragalus		2	2	1	2					7
	carpal	1									1
	tarsal	1									1
	metacarpal			2	3	8					13
	metatarsal	1			2	7					10
	metapodial	2	7								9
	phalanx 1	1			3						4
	phalanx 2	1	1								2
	Subtotal	*7*	*12*	*6*	*9*	*20*	*1*			*1*	*56*
	Grand Total	15	46	15	32	141	3	9	2	1	264

Table B.2.3 Ayia Aikaterini: skeletal element data per species in Rubbish Area North, central and southern dumps (based on NISP).

Ayia Aikaterini: Rubbish Area North, LMIIIC layers (NISP)

Group	Element	cattle	pig	goat	sheep	sheep/	equid	dog	agrimi	deer	fallow	red deer	Total
Head	antler									1			1
	horncore	1		6					2				9
	skull	3	8		3	4			1	1			20
	premaxilla	1				1							2
	maxilla	2	11			3						2	18
	mandible	6	16	8	8	17		1			2		58
	tooth	4	3			22	3						32
	atlas	2	1	1	1	2				1			8
	axis	1				5							6
	Subtotal	*20*	*39*	*15*	*12*	*54*	*3*	*1*	*3*	*3*	*2*	*2*	*154*
Upper limbs	scapula	2	5	1	1	19				3	2		33
	pelvis	4	6	3	2	15	1	1		4	5	2	43
	humerus	1	12	15	7	15	1	1		1	3	1	57
	femur	8	9	1*		14				2	1	2	37
	radius	1	4	4	12	25					7	4	57
	tibia		14	2	6	27				4	2	1	56
	ulna	2	5		4	2					1		14
	Subtotal	*18*	*55*	*26*	*32*	*117*	*2*	*2*		*14*	*21*	*10*	*297*
Lower limbs	calcaneus		3		2	4					1	3	13
	astragalus	1	1	2	2	2	1				1		10
	tarsal	1											1
	metacarpal	2		5*	5	11	1				4	1	29
	metatarsal	7		3	4	10					4		28
	metapodial		13			1		1					15
	phalanx 1	2	1	2	2		2					2	11
	phalanx 3										1		1
	Subtotal	*13*	*18*	*12*	*15*	*28*	*4*	*1*			*11*	*6*	*108*
	Grand Total	51	112	53	59	199	9	4	3	17**	34	18	558
	Notes: * 1 large, agrimi?, ** plus 3 vertebrae												

Table B.2.4 Ayia Aikaterini: skeletal element data per species in Rubbish Area North, Late Minoan IIIC layers (based on NISP).

Ayia Aikaterini: LMIIIB:2 pits (excl. 20-pit B)(NISP)

Group	**element**	**cattle**	**pig**	**goat**	**sheep**	**sheep/ goat**	**equid**	**agrimi**	**deer**	**fallow deer**	**red deer**	**hare**	**Total**
Head	skull + horncore			1									1
	horncore	4		11	2			4					21
	skull	2	11	3	1	6							23
	maxilla		4			2							6
	mandible	3	22	7	5	27				1		1	66
	tooth	6	9			39							54
	atlas		1			1							2
	axis					1							1
	Sub-total	*15*	*47*	*22*	*8*	*76*		*4*		*1*		*1*	*174*
Upper limbs	scapula	2	5	1	2	16							26
	pelvis	3	3	2	5	6							19
	humerus	1	7	6	5	11							30
	femur	2	5			10			5				22
	radius	2	5	9	7	14							37
	tibia	1	7	10	8	24							50
	ulna		2		1	1			2		1		7
	Sub-total	*11*	*34*	*28*	*28*	*82*			*7*		*1*		*191*
Lower limbs	calcaneus		3	4		2							9
	astragalus		2	1							1		4
	metacarpal	5	3	7	1	10	1						27
	metatarsal	2		7	5	9				1			24
	metapodial	1	1										2
	phalanx 1	1		1									2
	phalanx 2	3											3
	phalanx 3	1											1
	Sub-total	*13*	*9*	*20*	*6*	*21*	*1*			*1*	*1*		*72*
	Grand Total	39	90	70	42	179	1	4	7	2	2	1	437

Table B.2.5 Ayia Aikaterini: skeletal element data per species in other Late Minoan IIIB:2 pits, excluding 20-Pit B (based on NISP).

Ayia Aikaterini: 20-Pit B LMIIIB:2 (NISP)

Group	**element**	**cattle**	**pig**	**goat**	**sheep**	**sheep/ goat**	**dog**	**deer**	**fallow deer**	**red deer**	**Total**
Head	horncore	1		8							9
	skull	3	9	3	1	3					19
	maxilla		5			4					9
	premaxilla		2								2
	mandible		16	9	12	21			1		59
	tooth	3	3	1		12					19
	atlas		1								1
	Sub-total	*7*	*36*	*21*	*13*	*40*			*1*		*118*
Upper limbs	scapula		3	2	2	15					22
	pelvis	3	3	2	3	7	1	1			20
	humerus	2	5	5	6	10			2		30
	femur	3	4			20					27
	radius	3	4	4	6	18		1		1	37
	tibia	2	11	1	11	28			1		54
	ulna	2	7	1							10
	Sub-total	*15*	*37*	*15*	*28*	*98*	*1*	*2*	*3*	*1*	*200*
Lower limbs	astragalus		1	3							4
	calcaneus	1	1		1	1					4
	carpal	1									1
	metacarpal		2	7	5	9					23
	metatarsal	2		7	4	8			1		22
	metapodial		2			1					3
	phalanx 1	1		3	2	1					7
	phalanx 2	1									1
	phalanx 3		1		1						2
	Sub-total	*6*	*7*	*20*	*13*	*20*			*1*		*67*
	Grand Total	28	80	56	54	158	1	2	5	1	385

Table B.2.6 Ayia Aikaterini: skeletal element data per species in LMIIIB:2 pit 20-Pit B

Ayia Aikaterini: LMIIIC pits (NISP)

Group	**element**	**cattle**	**pig**	**goat**	**sheep**	**sheep/ goat**	**deer**	**fallow deer**	**human**	**Total**
Head	skull		2	1			1			4
	maxilla		1							1
	mandible	1	2	1						4
	tooth	1								1
	axis					1				1
	Sub-total	*2*	*5*	*2*		*1*	*1*			*11*
Upper limbs	scapula			2		2				4
	pelvis		2				1			3
	humerus		1			2				3
	femur	1	1			2				4
	radius					1		3		4
	tibia				1	2	1	1		5
	ulna		1			1				2
	Sub-total	*1*	*5*	*2*	*1*	*10*	*2*	*4*		*25*
Lower limbs	metacarpal			2	1					3
	metatarsal	1				1				2
	Sub-total	*1*		*2*	*1*	*1*				*5*
Other	LB								3	3
	Grand Total	4	10	6	2	12	3	4	3	44

Table B.2.7 Ayia Aikaterini: skeletal element data per species in other Late Minoan IIIC pits (based on NISP).

Ayia Aikaterini: internal rooms (NISP)

Group	**Element**	**cattle**	**pig**	**goat**	**sheep**	**sheep/ goat**	**deer**	**fallow deer**	**red deer**	**hare**	**Total**
Head	skull		1								1
	maxilla		1			1			1		3
	mandible					1				1	2
	tooth		3			13					16
	atlas					1					1
	axis					1					1
	Subtotal		*5*			*17*			*1*	*1*	*24*
Upper limbs	scapula	1	2	1		2					6
	pelvis					4					4
	humerus		1	2		1					4
	femur	2				5	1				8
	radius		2		3	3					8
	tibia	1	1		4	7					13
	ulna					3		1			4
	Subtotal	*4*	*6*	*3*	*7*	*25*	*1*	*1*			*47*
Lower limbs	calcaneus			2		2	1				5
	astragalus			1							1
	metacarpal			1	2	1					4
	metatarsal	1			2	2					5
	metapodial		1			1					2
	phalanx 1				5						5
	phalanx 2			1				1			2
	phalanx 3		1					1			2
	Subtotal	*1*	*2*	*5*	*9*	*6*	*1*	*2*			*26*
	Grand Total	5	13	8	16	48	2	3	1	1	97

Table B.2.8 Ayia Aikaterini: skeletal element data per species in internal rooms (based on NISP).

Ayia Aikaterini: external areas (NISP)

Group	**Element**	**cattle**	**pig**	**goat**	**sheep**	**sheep/goat**	**deer**	**fallow deer**	**human**	**Total**
Head	skull		1			1				2
	maxilla		2			1				3
	mandible		4			3				7
	tooth		2			6				8
	Subtotal		*9*			*11*				*20*
Upper limbs	scapula	1	1			5				7
	pelvis		1			6		1		8
	humerus		2	1*	2	2	3			10
	femur		1			3				4
	radius		4	2**		6		1		13
	tibia		2		1	4	1		1	9
	ulna			1						1
	Subtotal	*1*	*11*	*4*	*3*	*26*	*4*	*2*	*1*	*52*
Lower limbs	calcaneus				1	2				3
	metacarpal				1	2				3
	metatarsal					3				3
	metapodial		1			2				3
	phalanx 1			2						2
	mc3		1							1
	Subtotal		*2*	*2*	*2*	*9*				*15*
	Grand Total	1	22	6	5	46	4	2	1	87

Notes: * large, possible agrimi?

Table B.2.9 Ayia Aikaterini: skeletal element data per species in external spaces (Late Minoan IIIC) (based on NISP).

Daskaloyannis/Khaniamou: Pit M (NISP)

Group	**Element**	**cattle**	**pig**	**goat**	**sheep**	**sheep/ goat**	**equid**	**dog**	**agrimi**	**deer**	**fallow deer**	**red deer**	**fish**	**human**	**Total**
Head	antler									1	11	1			13
	horncore	2		10		1			10						23
	skull + antler										4				4
	skull + horncore	1		2					7						10
	skull	11	31	1	3	4	3							2	55
	maxilla										1				1
	mandible	15	47	7	12	16	1	2			3				103
	tooth	4	9	1	4	9	28					2			57
	atlas	1	1								2				4
	axis							1			2				3
	Subtotal	*34*	*88*	*21*	*19*	*30*	*32*	*3*	*17*	*1*	*23*	*3*		*2*	*273*
Upper limbs	scapula	2	13	3	1	41	1			1	9	3			74
	pelvis	7	10			20	1			2	23	6			69
	humerus	6	21	12	8	18	5	2			8	2			82
	femur	5	9			27				3	13	2		1	60
	radius	11	6	9	12	33	3			1	11	2		1	89
	tibia	9	13	10	20	42	1	1		2	14	1			113
	ulna	3	9	3	2	5	2				3	1			28
	Subtotal	*43*	*81*	*37*	*43*	*186*	*13*	*3*		*9*	*81*	*17*		*2*	*515*
Lower limbs	calcaneus	6	4	1		1					3	4			19
	astragalus	2	1	1	2		1				3	4			14
	tarsal	1										1			2
	metacarpal	11	3	5	5	29	2				10	2			67
	metatarsal	15	3	5	4	23					18	7			75
	metapodial		5				2				1	1			9
	phalanx 1	7		1	1		1					2			12
	phalanx 2	2													2
	phalanx 3	3													3
	Subtotal	*47*	*16*	*13*	*12*	*53*	*6*				*35*	*21*			*203*
Other	(blank)												1		1
	rib						35								35
	vert						4								4
	Grand Total	124	185	71	74	269	90	6	17	10	139	41	1	4	1031

Table B.2.10 Daskaloyannis/Khaniamou: skeletal element data per species in Pit M (based on NISP).

Daskaloyannis/Khaniamou: Pit ?M (NISP)

Group	**Element**	**cattle**	**pig**	**goat**	**sheep**	**sheep/ goat**	**equid**	**dog**	**agrimi**	**deer**	**fallow deer**	**red deer**	**Total**
Head	antler										2		2
	horncore			1									1
	skull + horncore	1		1	1				1				4
	skull		2	1				1					4
	mandible	4	7			2					3		16
	tooth					1							1
	Subtotal	*5*	*9*	*3*	*1*	*3*		*1*	*1*		*5*		*28*
Upper limbs	scapula		1			4	1			2	1		9
	pelvis		2							1	1		4
	humerus	2	4	5	1		1				4		17
	femur		2			1					2		5
	radius	2		3	2	1	2				2	2	14
	tibia	2			1	3		1			2		9
	ulna	1			1	2							4
	Subtotal	*7*	*9*	*8*	*5*	*11*	*4*	*1*		*3*	*12*	*2*	*62*
Lower limbs	calcaneus	1		1							2		4
	astragalus	2											2
	metacarpal		1	2	2	1		1			1		8
	metatarsal	2				4					5		11
	phalanx 1	1				1							2
	phalanx 2	1											1
	Subtotal	*7*	*1*	*3*	*2*	*6*		*1*			*8*		*28*
	Grand Total	19	19	14	8	20	4	3	1	3	25	2	118

Table B.2.11 Daskaloyannis/Khaniamou: skeletal element data per species in Pit ?M (based on NISP).

Daskaloyannis/Khaniamou: Pit ND (NISP)

Group	**Element**	**cattle**	**pig**	**goat**	**sheep**	**sheep/ goat**	**equid**	**dog**	**agrimi**	**deer**	**fallow deer**	**red deer**	**Total**
Head	antler									1			1
	skull + antler										1		1
	skull + horncore			1					2				3
	skull		4			2						1	7
	mandible	1	2	1	1	1							6
	Subtotal	*1*	*6*	*2*	*1*	*3*			*2*	*1*	*1*	*1*	*18*
Upper limbs	scapula		1	1	1	3					2	2	10
	pelvis					1					5	1	7
	humerus	1		1	3	3					3	2	13
	femur	1	2		1	1					4		9
	radius		1		3	3					2		9
	tibia	3	1		3	5					8	3	23
	ulna		2		1								3
	Subtotal	*5*	*7*	*2*	*12*	*16*					*24*	*8*	*74*
Lower limbs	calcaneus		1								1		2
	metacarpal			1	1	3		1			3		9
	metatarsal	1	2			1					12		16
	phalanx 1	1					1					2	4
	phalanx 2	1											1
	Subtotal	*3*	*3*	*1*	*1*	*4*	*1*	*1*			*16*	*2*	*32*
	c vert	1											1
	Grand Total	10	16	5	14	23	1	1	2	1	41	11	125

Table B.2.12 Daskaloyannis/Khaniamou: skeletal element data per species in Pit ND (based on NISP).

Daskaloyannis/Khaniamou: other pits (NISP)

Group	**Element**	**cattle**	**pig**	**goat**	**sheep**	**sheep/ goat**	**equid**	**dog**	**agrimi**	**deer**	**fallow deer**	**red deer**	**Total**
Head	horncore			2	1	1			1				5
	skull + antler										2		2
	skull + horncore			1					1				2
	skull		3		1	6							10
	maxilla		1										1
	mandible	2	15	2	3	5		1			1		29
	tooth row	1				1							2
	tooth	4	11	2	6	14	1						38
	atlas	1											1
	axis					1							1
	Subtotal	*8*	*30*	*7*	*11*	*28*	*1*	*1*	*2*		*3*		*91*
Upper limbs	scapula	1	9		1	16				1	1		29
	pelvis	2	1			16					1		20
	humerus	7	6	1	1	20					3		38
	femur	4	6			14					3		27
	radius	2	5	4	2	13					1	1	28
	tibia	5	6	1	7	18					2	1	40
	ulna	1	10			4							15
	Subtotal	*22*	*43*	*6*	*11*	*101*				*1*	*11*	*2*	*197*
Lower limbs	calcaneus	3	1	1	1								6
	astragalus	5											5
	metacarpal	4	2	2		15					1		24
	metatarsal	2	2	1	2	14						1	22
	metapodial	1	2			1							4
	phalanx 1	2		1	1	3							7
	phalanx 2	2		1									3
	phalanx 3	1				1							2
	Subtotal	*20*	*7*	*6*	*4*	*34*					*1*	*1*	*73*
Other	rib					4							4
	t vert	1											1
	Grand Total	51	80	19	26	167	1	1	2	1	15	3	366

Table B.2.13 Daskaloyannis/Khaniamou: skeletal element data per species in other pits (based on NISP).

Daskaloyannis/Khaniamou:courtyard 'niche' (NISP)							
Group	**Element**	**cattle**	**pig**	**goat**	**sheep**	**sheep/ goat**	**Total**
Head	skull			1		1	2
	mandible				1	1	2
	tooth		1	1			2
	Subtotal		*1*	*2*	*1*	*2*	*6*
Upper limbs	scapula		1	1		1	3
	pelvis	1	1			1	3
	humerus	1					1
	femur					1	1
	radius			1		1	2
	tibia			1		1	2
	Subtotal	*2*	*2*	*3*		*5*	*12*
Lower limbs	calcaneus			1	1		2
	metacarpal	1				1	2
	metatarsal					1	1
	phalanx 1		1				1
	phalanx 3		1				1
	Subtotal	*1*	*2*	*1*	*1*	*2*	*7*
	Grand Total	3	5	6	2	9	25

Table B.2.14 Daskaloyannis/Khaniamou: skeletal element data per species in the courtyard ‘niche’ (based on NISP).

Daskaloyannis/Khaniamou: floor 20 (NISP)						
Group	**Element**	**cattle**	**pig**	**sheep/ goat**	**human**	**Total**
Head	skull			3		3
	tooth			1	1	2
	Subtotal			*4*	*1*	*5*
Upper limbs	scapula			1		1
	pelvis		1			1
	humerus			1		1
	femur			5		5
	radius			3		3
	tibia	1		2		3
	Subtotal	*1*	*1*	*12*		*14*
Lower limbs	calcaneus			1		1
	astragalus	1				1
	Subtotal	*1*		*1*		*2*
	Grand Total	2	1	17	1	21

Table B.2.15 Daskaloyannis/Khaniamou: skeletal element data per species in floor 20 (based on NISP).

Daskaloyannis/Khaniamou: other floors (NISP)

Group	**Element**	**cattle**	**pig**	**goat**	**sheep**	**sheep/ goat**	**equid**	**deer**	**fallow deer**	**bird**	**fish**	**human**	**Total**
Head	horncore					2							2
	skull		4	1	1	1						1	8
	mandible	2	9		5	8							24
	tooth	2	3			3	1	1					10
	atlas					1							1
	Subtotal	*4*	*16*	*1*	*6*	*15*	*1*	*1*				*1*	*45*
Upper limbs	scapula		2			7			1				10
	pelvis	2	3			11							16
	humerus	4	2	2	6	12							26
	femur	2	4		1	6			3	1			17
	radius	2	3	1	1	18							25
	tibia	3	2	2	10	22			1				40
	ulna	2	4			5							11
	Subtotal	*15*	*20*	*5*	*18*	*81*			*5*	*1*			*145*
Lower limbs	calcaneus	2											2
	astragalus	2		1	1								4
	tarsal					1							1
	metacarpal	3		4	2	8			1				18
	metatarsal	5	3	3	2	7							20
	metapodial	2	2						1				5
	phalanx 1	2	1	1	1								5
	phalanx 2		1										1
	Subtotal	*16*	*7*	*9*	*6*	*16*			*2*				*56*
Other	(blank)										1		1
	LB									1			1
	t vert					1							1
	Grand Total	35	43	15	30	113	1	1	7	2	1	1	249

Table B.2.16 Daskaloyannis/Khaniamou: skeletal element data per species in other floors (based on NISP).

Mathioudaki: Pits A + B (NISP)

Group	**Element**	**cattle**	**pig**	**goat**	**sheep**	**sheep /goat**	**fallow deer**	**red deer**	**Total**
Head	horncore			2					2
	skull		1			3			4
	mandible	4	1	3	2	4	1		15
	tooth			1	1	3	1		6
	atlas					1		1	2
	axis							1	1
	Subtotal	*4*	*2*	*6*	*3*	*11*	*2*	*2*	*30*
Upper limbs	scapula		2			10		1	13
	pelvis	1	1			8	1		11
	humerus		2	1		2	2		7
	femur	3				1	1		5
	radius	2	1	1	2	2		1	9
	tibia	1			1	6		1	9
	ulna		1		1	3			5
	patella					1			1
	Subtotal	*7*	*7*	*2*	*4*	*33*	*4*	*3*	*60*
Lower limbs	calcaneus			1	1	2	2		6
	astragalus				1		1		2
	metacarpal					3			3
	metatarsal					6			6
	metapodial	1	1						2
	phalanx 1		1			1	1		3
	phalanx 3					1			1
	Subtotal	*1*	*2*	*1*	*2*	*13*	*4*		*23*
	Grand Total	12	11	9	9	57	10	6	113

Table B.2.17 Mathioudaki: skeletal element data per species in Pit A and B (combined)(based on NISP).

Mathioudaki: floors + Room A (NISP)

Group	**Element**	**cattle**	**pig**	**goat**	**sheep**	**sheep /goat**	**equid**	**dog**	**fallow deer**	**hare**	**Total**
Head	skull		3			1		1			5
	mandible		1		1	2					4
	tooth	3	1			4	1				9
	Subtotal	3	5		1	7	1	1			18
Upper limbs	scapula					1					1
	pelvis	1				1					2
	humerus		1		1	3					5
	femur					1					1
	radius		1	2	1	5					9
	tibia	2	1			7	1			1	12
	ulna		3								3
	Subtotal	*3*	*6*	*2*	*2*	*18*	*1*			*1*	*33*
Lower limbs	calcaneus			1	1	1			1		4
	astragalus				1				1		2
	metacarpal					2					2
	metatarsal	2		2		1					5
	metapodial		2								2
	phalanx 1					1					1
	phalanx 2		1								1
	Subtotal	*2*	*3*	*3*	*2*	*5*			*2*		*17*
Other	hyoid					1					1
	Grand Total	8	14	5	5	31	2	1	2	1	69

Table B.2.18 Mathioudaki: skeletal element data per species in Room A and floor deposits (combined)(based on NISP).

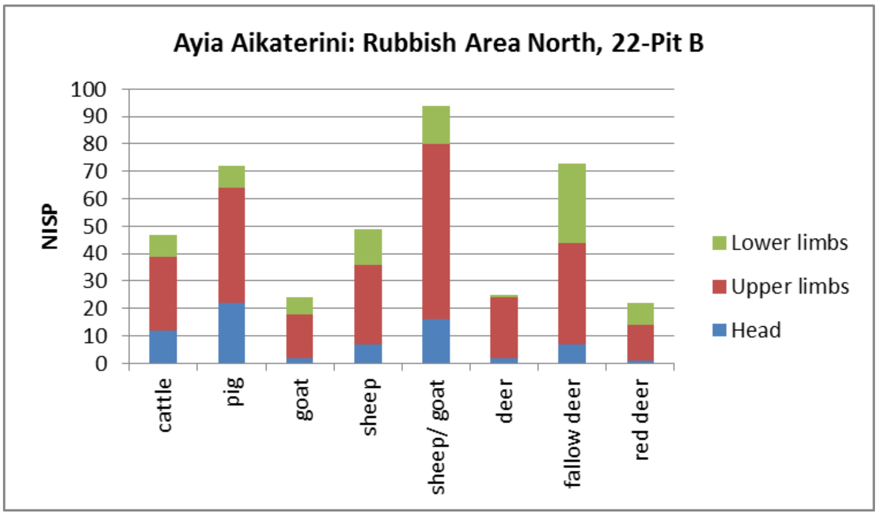


Figure B.2.1 Ayia Aikaterini: skeletal element representation data per species in 22-Pit B, Rubbish Area North (based on NISP).

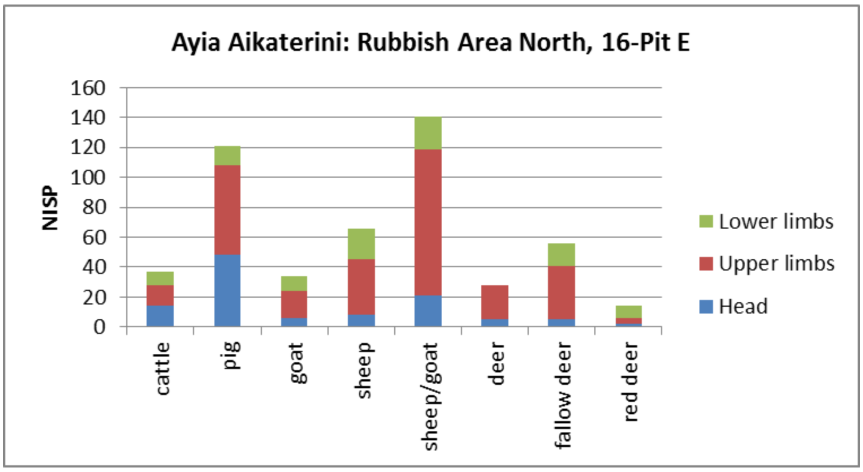


Figure B.2.2 Ayia Aikaterini: skeletal element representation data per species in 16-Pit-E, Rubbish Area North (based on NISP).

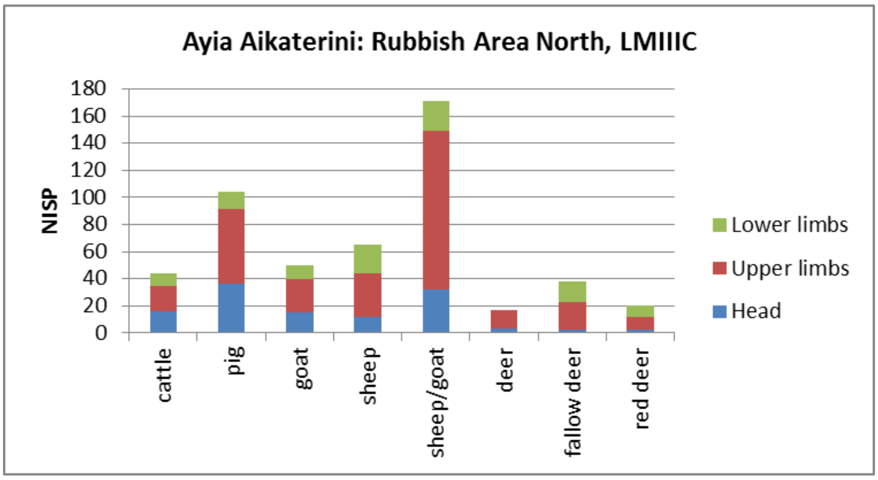


Figure B.2.3 Ayia Aikaterini: skeletal element representation data per species in Late Minoan IIIC layers, Rubbish Area North (based on NISP).

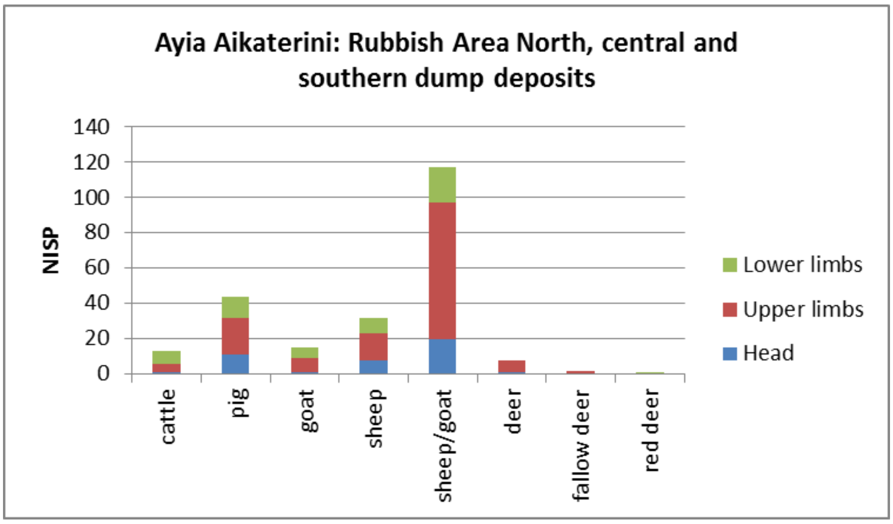


Figure B.2.4 Ayia Aikaterini: skeletal element representation data per species in central and southern dump deposits, Rubbish Area North (based on NISP).

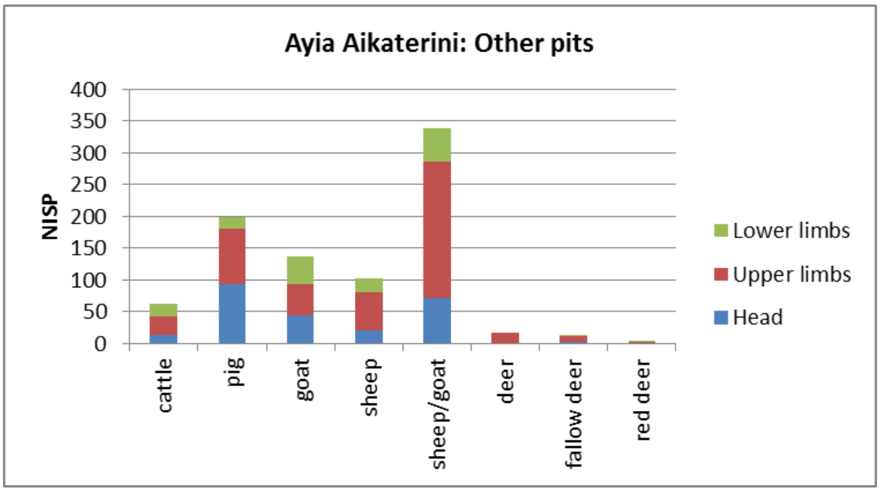


Figure B.2.5 Ayia Aikaterini: skeletal element representation data per species in other pits (based on NISP).

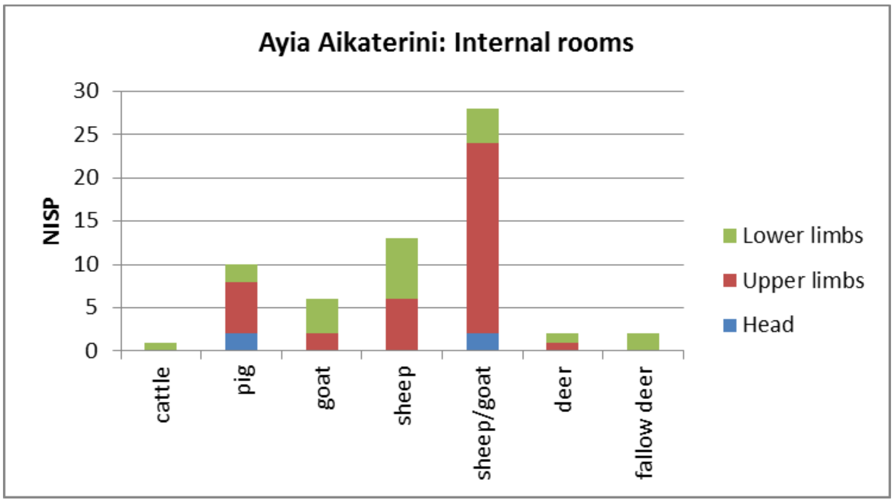


Figure B.2.6 Ayia Aikaterini: skeletal element representation data per species in internal rooms (based on NISP).

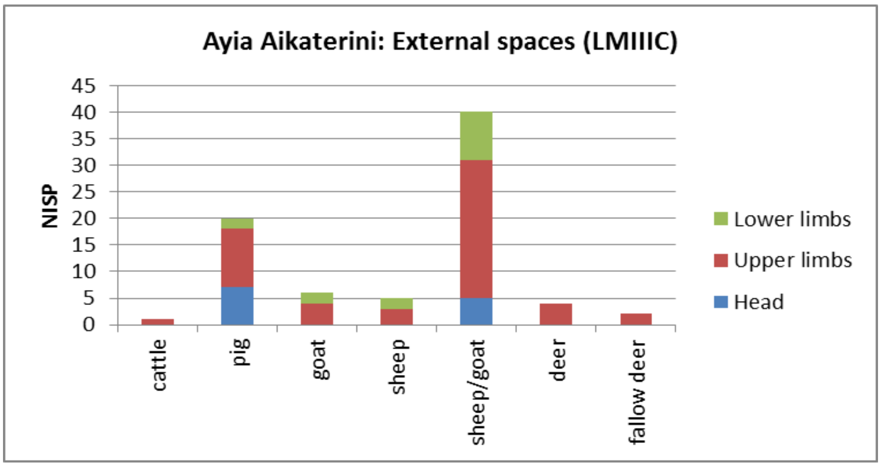


Figure B.2.7 Ayia Aikaterini: skeletal element representation data per species in external spaces (based on NISP).

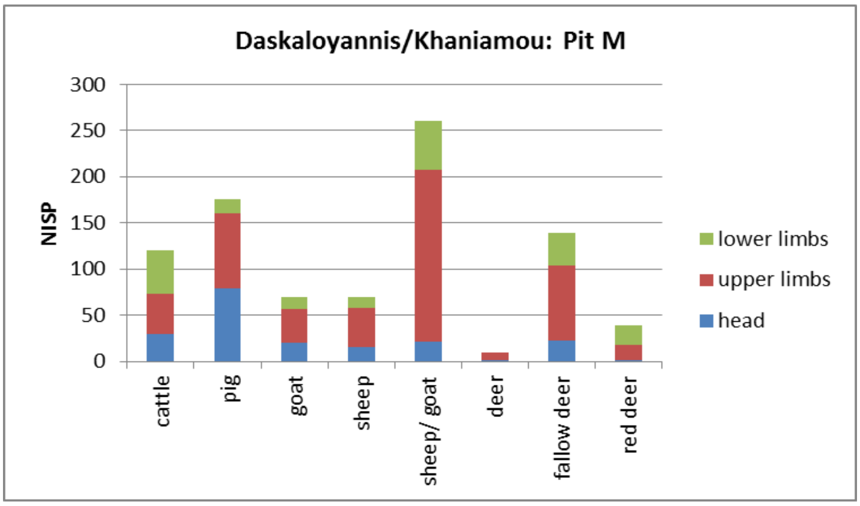


Figure B.2.8 Daskaolyannis/Khaniamou: skeletal element representation data per species in Pit M (based on NISP).

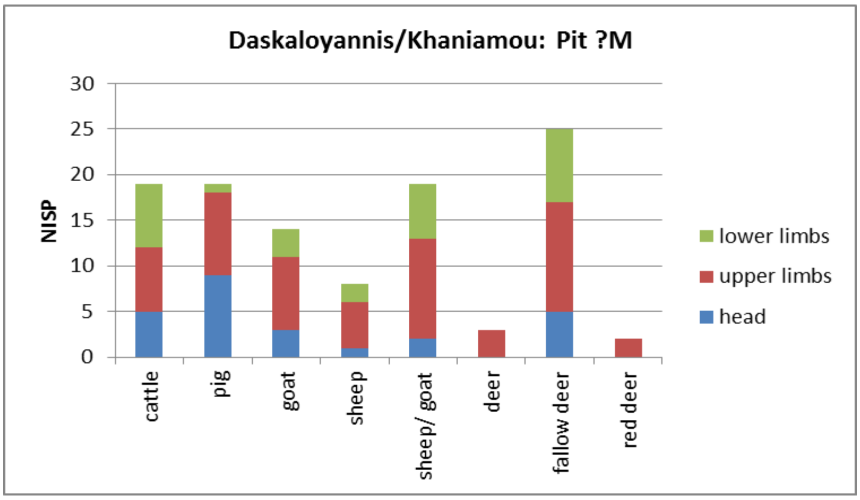


Figure B.2.9 Daskaolyannis/Khaniamou: skeletal element representation data per species in Pit ? M (based on NISP).

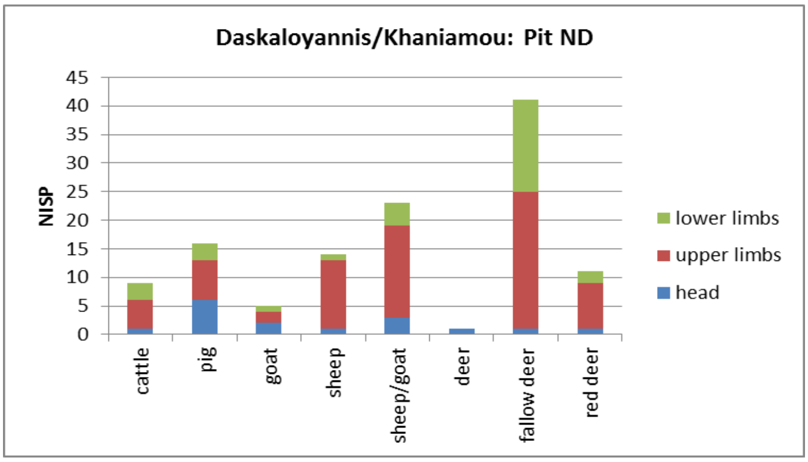


Figure B.2.10 Daskaolyannis/Khaniamou: skeletal element representation data per species in Pit ND (based on NISP).

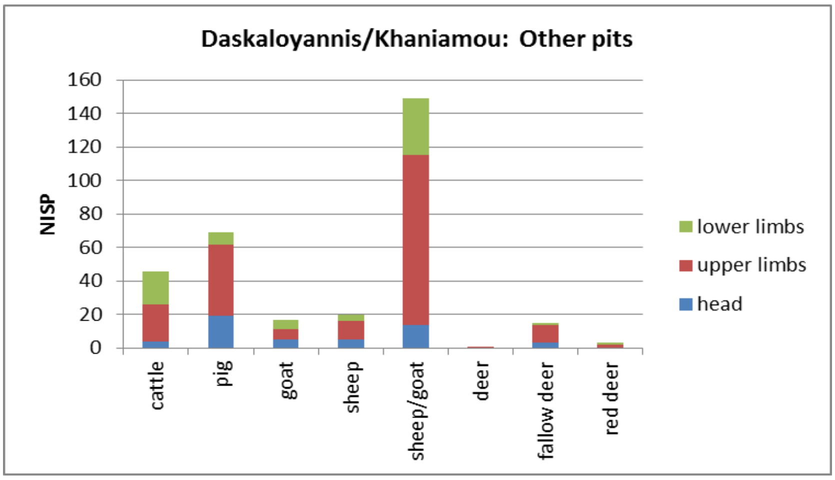


Figure B.2.11 Daskaolyannis/Khaniamou: skeletal element representation data per species in other pits (based on NISP).

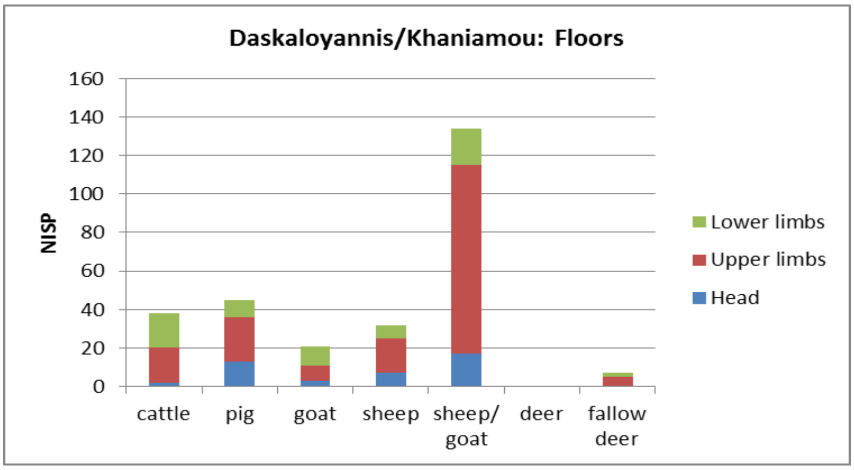


Figure B.2.12 Daskaolyannis/Khaniamou: skeletal element representation data per species in Floor deposits (based on NISP).

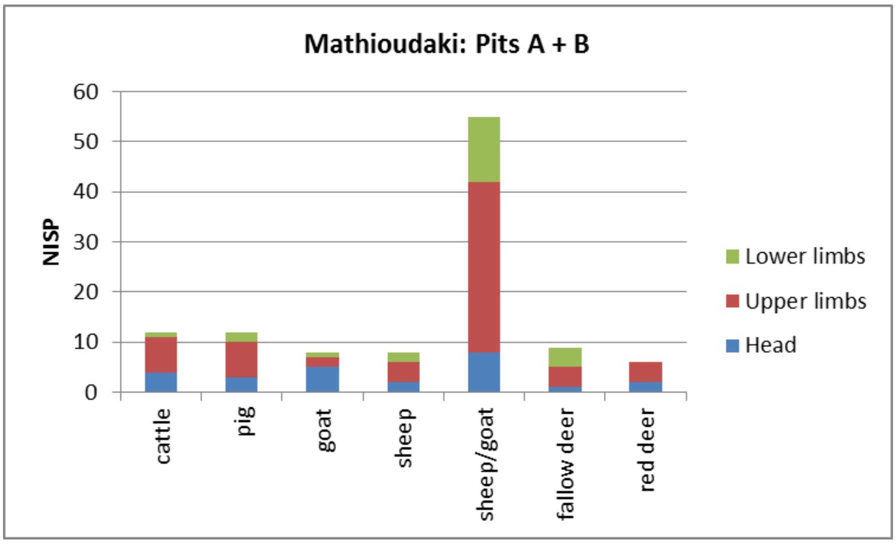


Figure B.2.13 Mathioudaki: skeletal element representation per species in Pits A and B (based on NISP).

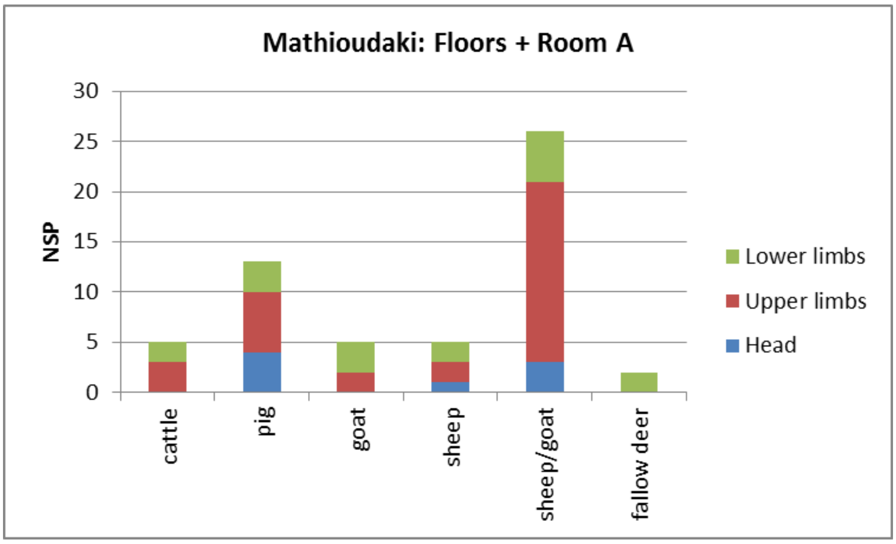


Figure B.2.14 Mathioudaki: skeletal element representation per species in Room A and Floor deposits (based on NISP).

Appendix C: Epiphyseal fusion data

C.1 Epiphyseal fusion data for deer (all sites combined)

Fallow deer (all sites)	**fused**	**fusing**	**unfused**	**%fused**
proximal metacarpal	8	0	0	
proximal metatarsal	21	0	0	
before birth	*29*	*0*	*0*	*100*
proximal radius	13	0	0	
0-1yr	*13*	*0*	*0*	*100*
distal scapula	22	0	0	
distal humerus	33	0	0	
pelvis	23	1	1	
distal metacarpal	18	0	2	
distal metatarsal	15	0	2	
distal tibia	30	1	2	
1-2 yrs	*141*	*2*	*7*	*94*
proximal ulna	2	0	2	
2-3yrs	*2*	*0*	*2*	*50*
distal radius	18	1	2	
distal ulna	0	0	0	
distal femur	10	0	1	
proximal femur	6	0	0	
proximal tibia	2	0	0	
3-4yrs	*36*	*1*	*3*	*90*
proximal humerus	2		1	
5yrs +	*2*		*1*	*67*

Table C.1.1 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: epiphyseal fusion data for fallow deer (age stages after Carden & Hayden 2006).

Red deer (all sites)	**fused**	**fusing**	**unfused**	**%fused**
proximal metapodia	8	0	0	
Before birth				*100*
proximal radius	4	0	0	
scapula	5	0	0	
distal humerus	5	0	0	
0-1yr	*22*	*0*	*0*	*100*
distal tibia	6	0	1	
distal metapodia	3	0	1	
proximal phalanges	10	0	0	
1-2yrs	*19*	*0*	*2*	*90*
proximal ulna	1	0	0	
proximal humerus	0	0	0	
calcaneus	7	0	2	
distal radius	4	0	0	
distal ulna	0	0	0	
proximal femur	1	0	0	
proximal tibia	3	0	0	
distal femur	2	1	0	
2-3yrs	*18*	*1*	*3*	*82*

Table C.1.2 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: epiphyseal fusion data for red deer (age stages after Heinrich 1991).

C.2 Epiphyseal fusion data main domestic species per site

Ayia Aikaterini				
sheep/goat (LMIIIB:2)	**fused**	**fusing**	**unfused**	**%fused**
scapula	25	2	2	
distal humerus	67	7	1	
proximal radius	47		6	
<1yrs	*139*	*9*	*9*	*88*
proximal phalanges	26		2	
distal metapodia	42		6	
distal tibia	73	4	10	
1.5-2yrs	*141*	*4*	*18*	*86*
ulna	4		2	
proximal femur	10	3	11	
calcaneus	13		6	
distal radius	20	1	11	
2.5-3yrs	*47*	*4*	*30*	*58*
proximal humerus	5	1	3	
distal femur	13	1	11	
proximal tibia	4		7	
3-3.5yrs	*22*	*2*	*21*	*49*

Table C.2.1 Ayia Aikaterini: epiphyseal fusion data for sheep/goat from LMIIIB:2 phases (age stages after Silver 1969).

Ayia Aikaterini				
sheep/goat (LMIIIC)	**fused**	**fusing**	**unfused**	**%fused**
scapula	7		3	
distal humerus	28	2	3	
proximal radius	19			
<1yrs	*54*	*2*	*6*	*87*
proximal phalanges	10		2	
distal metapodia	12		6	
distal tibia	18		3	
1.5-2yrs	*40*		*11*	*78*
ulna	5			
proximal femur	2	1	1	
calcaneus	7		5	
distal radius	9		4	
2.5-3yrs	*23*	*1*	*10*	*68*
proximal humerus	3			
distal femur	3		4	
proximal tibia	3		2	
3-3.5yrs	*9*		*6*	*60*

Table C.2.2 Ayia Aikaterini: epiphyseal fusion data for sheep/goat from LMIIIC phases (age stages after Silver 1969).

Ayia Aikaterini				
pig (LMIIIB:2)	**fused**	**fusing**	**unfused**	**%fused**
scapula	6		8	
distal humerus	18	2	2	
proximal radius	16			
proximal phalanx 2			1	
1yr	*40*	*2*	*11*	*75*
proximal phalanx 1	3	1	1	
distal metapodia	12	2	2	
distal tibia	8	2	5	
calcaneus	4	2	6	
2-2.5yrs	*27*	*7*	*14*	*56*
ulna	1		6	
proximal humerus	2		5	
distal radius			3	
proximal femur			3	
distal femur	1		10	
proximal tibia			5	
3-3.5yrs	*4*		*32*	*11*

Table C.2.3 Ayia Aikaterini: Epiphyseal fusion data for pig from LMIIIB:2 phases (age stages after Silver 1969).

Ayia Aikaterini				
pig (LMIIIC)	**fused**	**fusing**	**unfused**	**%fused**
scapula				
distal humerus	8	1	2	
proximal radius	3			
proximal phalanx 2	1			
1yr	*12*	*1*	*2*	*80*
proximal phalanx 1	1		1	
distal metapodia	9		2	
distal tibia	2	2	3	
calcaneus			4	
2-2.5yrs	*12*	*2*	*10*	*50*
ulna	1		3	
proximal humerus		1	3	
distal radius			2	
proximal femur	1		3	
distal femur			3	
proximal tibia	2		4	
3-3.5yrs	*4*	*1*	*18*	*17*

Table C.2.4 Ayia Aikaterini: epiphyseal fusion data for pig from LMIIIC phases (age stages after Silver 1969).

Ayia Aikaterini				
cattle LMIIIB:2	**fused**	**fusing**	**unfused**	**%fused**
scapula	2			
<1yrs	*2*			*100*
distal humerus	6		1	
proximal radius	3			
proximal phalanges	13			
1-1.5yrs	*22*		*1*	*96*
distal metapodia	6		2	
distal tibia	1		1	
2-2.5yrs	*7*		*3*	*70*
calcaneus	1			
proximal femur	3		5	
3-3.5yrs	*4*		*5*	*44*
proximal humerus			2	
distal radius	1		1	
ulna				
distal femur	2			
proximal tibia	1		1	
3.5-4yrs	*4*		*4*	*50*

Table C.2.5 Ayia Aikaterini: epiphyseal fusion data for cattle from LMIIIB:2 phases (age stages after Silver 1969).

Ayia Aikaterini				
cattle LMIIIC	**fused**	**fusing**	**unfused**	**%fused**
scapula	3			
<1yrs	*3*			*100*
distal humerus	1			
proximal radius	1			
proximal phalanges	4			
1-1.5yrs	*6*			*100*
distal metapodia	5		1	
distal tibia				
2-2.5yrs	*5*		*1*	*83*
calcaneus				
proximal femur	1	1	1	
3-3.5yrs	*1*	*1*	*1*	*33*
proximal humerus				
distal radius				
ulna			1	
distal femur	1			
proximal tibia				
3.5-4yrs	*1*		*1*	*50*

Table C.2.6 Ayia Aikaterini: epiphyseal fusion data for cattle from LMIIIC phases (age stages after Silver 1969).

Daskaloyannis/Khaniamou				
sheep/goat	**fused**	**fusing**	**unfused**	**% fused**
scapula	26		3	
distal humerus	53		2	
proximal radius	36		2	
<1yrs	*115*		*7*	*94*
proximal phalanges	8		2	
distal metapodia	31		11	
distal tibia	57	1	9	
1.5-2yrs	*96*	*1*	*22*	*81*
ulna	4		1	
proximal femur	7		2	
calcaneus	8		1	
distal radius	14	2	9	
2.5-3yrs	*33*	*2*	*13*	*69*
proximal humerus	1		1	
distal femur	8		3	
proximal tibia	1		1	
3-3.5yrs	*10*		*5*	*67*

Table C.2.7 Daskaloyannis/Khaniamou: epiphyseal fusion data for sheep/goat (age stages after Silver 1969)

Daskaloyannis/Khaniamou				
pig	**fused**	**fusing**	**unfused**	**% fused**
scapula	8			
distal humerus	17		3	
proximal radius	7		1	
proximal phalanx 2		1		
1yr	*32*	*1*	*4*	*86*
proximal phalanx 1	1			
distal metapodia	3	1	11	
distal tibia	6	2	3	
calcaneus	5		1	
2-2.5yrs	*15*	*3*	*15*	*45*
ulna	3		5	
proximal humerus			1	
distal radius	2		5	
proximal femur			4	
distal femur		1	7	
proximal tibia	2		2	
3-3.5yrs	*7*	*1*	*24*	*22*

Table C.2.8 Daskaloyannis/Khaniamou: epiphyseal fusion data for pig (age stages after Silver 1969).

Daskaloyannis/Khaniamou				
cattle	**fused**	**fusing**	**unfused**	**% fused**
scapula				
<1yrs				
distal humerus	7			
proximal radius	7			
proximal phalanges	17			
1-1.5yrs	*31*			*100*
distal metapodia	15		3	
distal tibia	5		4	
2-2.5yrs	*20*		*7*	*74*
calcaneus	5		2	
proximal femur	2		1	
3-3.5yrs	*7*		*3*	*70*
proximal humerus	2			
distal radius	3	1	3	
ulna	2		2	
distal femur	1		1	
proximal tibia	1	1	2	
3.5-4yrs	*9*	*2*	*8*	*47*

Table C.2.9 Daskaloyannis/Khaniamou: epiphyseal fusion data for cattle (age stages after Silver 1969).

Mathioudaki				
sheep/goat	**fused**	**fusing**	**unfused**	**%fused**
scapula	7		1	
distal humerus	9		3	
proximal radius	11			
<1yrs	*27*		*4*	*87*
proximal phalanges	4		1	
distal metapodia	7		1	
distal tibia	7		1	
1.5-2yrs	*18*		*3*	*86*
ulna	1		2	
proximal femur	1			
calcaneus	2			
distal radius	3		1	
2.5-3yrs	*7*		*3*	*70*
proximal humerus			1	
distal femur	1		2	
proximal tibia	1		3	
3-3.5yrs	*2*		*6*	*25*

Table C.2.10 Mathioudaki: epiphyseal fusion data for sheep/goat (age stages after Silver 1969).

Mathioudaki				
pig	**fused**	**fusing**	**unfused**	**% fused**
scapula			1	
distal humerus	1	1	4	
proximal radius	1			
proximal phalanx 2	3			
1yr	*5*	*1*	*5*	*45*
proximal phalanx 1	2		3	
distal metapodia	2		2	
distal tibia				
calcaneus				
2-2.5yrs	*4*		*5*	*44*
ulna			4	
proximal humerus				
distal radius			1	
proximal femur				
distal femur				
proximal tibia				
3-3.5yrs			*5*	*0*

Table C.2.11 Mathioudaki: epiphyseal fusion data for pigs (age stages after Silver 1969).

Mathioudaki				
cattle	**fused**	**fusing**	**unfused**	**%fused**
scapula				
<1yrs				
distal humerus				
proximal radius				
proximal phalanges	1			
1-1.5yrs	*1*			*100*
distal metapodia				
distal tibia	2		1	
2-2.5yrs	*2*		*1*	*67*
calcaneus				
proximal femur			1	
3-3.5yrs			*1*	*0*
proximal humerus	1			
distal radius	1			
ulna				
distal femur				
proximal tibia	2			
3.5-4yrs	*4*			*100*

Table C.2.12 Mathioudaki: epiphyseal fusion data for cattle (age stages after Silver 1969).

Appendix D: Metrical data

The following presents the metrical data in summary form (i.e. min. and max. reading for each measurement), all measurements follow von den Driesch (1976) and presented are as mm.

D.1 Metrical data from Ayia Aikaterini, Daskaloyannis/Khaniamou and Mathioudaki sites

Fallow deer	**GL**	**Bp**	**DC**	**Bd**	**Bt**	**SD**	**GLpe**	**GLl**	**GLm**	**SLC**	**GLP**	**BG**	**LG**	**LAR (LA)**
scapula										17.5-29.2	32.4-47.0	22.1-33.5	28.3-34.5	
pelvis														32.0-35.5 (39.0-43.8)
humerus				30.8 -36.0	33.0-39.0									
femur			23.8- 26.3	44.6-48.9										
radius	179.5	35.4-42.6		31.2-39.1		18.4-24.5								
tibia		28.0-56.5		31.6-37.5										
ulna	BPO:19.6	DPA: 30.5	LO:44.7											SDO:28.5-28.6
astragalus				22.5-26.1				34.1-39.0	32.0-36.6					
metacarpal	175.0-193.0	25.6-36.3		25.9-32.9		16.0-20.2								
metatarsal	194.0-265.0	22.7-38.2		28.8-32.1		12.0-20.7								
phalanx 1		11.6-18.8		11.7-14.7			40.5-45.0							
phalanx 2	29.3	15		12.4										
phalanx 3	DLS:32.5-35.4													

Table D.1.1 Daskaloyannis/Khaniamou, Ayia Aikaterini, Mathioudaki: summary of metrical data for fallow deer (all sites combined).

Red deer	**GL**	**GB**	**Bp**	**Bd**	**Bt**	**SD**	**GLpe**	**GLl**	**GLm**	**SLC**	**GLP**	**BG**
scapula										27.8-32.5	41.9-54.6	33.9
humerus				44.6-48.4	45.7							
radius	201.0		46.2-52.2	42.7-47.4		23.0-29.0						
tibia			58.0	34.4-44.6		23.4						
ulna	DPA:48.4	SDO:42.6										
calcaneus	79.5-107.6	27.8-34.3										
astragalus				29.6-35.6				46.0-48.9	42.9-46.0			
metacarpal			30.7-38.0	38.2		20.0						
metatarsal	32.0-35.6			37.7								
phalanx 1			17.1-21.4	16.3-19.9		15.0-16.2	43.7-55.0					

Table D.1.2 Daskaloyannis/Khaniamou, Ayia Aikaterini, Mathioudaki: summary of metrical data for red deer (all sites combined).

Sheep	**GL**	**GB**	**Bp**	**DC**	**Bd**	**SD**	**GLpe**	**GLl**	**GLm**	**SLC**	**GLP**	**BG**	**LG**	**LAR**	**41**	**42**
horncore															40.3-50.5	29.0-33.0
scapula										15.5-23.8	29.8-39.7	21.3 -25.0	20.0-28.5			
pelvis														23.5		
humerus					24.0-37.7											
femur			36.5-44.1	17.0-18.5												
radius	133.5-145.0		25.0-35.3		23.5-30.5	15.3-16.8										
tibia					17.0-30.8											
ulna	DPA:20.8	SDO:18.3														
calcaneus	49.6-64.0	10.8-20.7														
astragalus					15.0-28.8			23.3-35.0	22.5-33.5							
metacarpal	111.6-121.5		18.6-24.8		22.2-24.7	11.5-17.0										
metatarsal	114.5-136.5		16.6-26.2		20.0-28.8	10.7-12.3										
phalanx 1			11.5-16.4		7.9-14.9	8.9-12.6	29.9-41.0									
phalanx 2	20.8-23.3		10.7-14.0		8.8 -11.5											
phalanx 3	DLS:31.0															

Table D.1.3 Daskaloyannis/Khaniamou, Ayia Aikaterini, Mathioudaki: summary of metrical data for sheep (all sites combined).

Goat	**GL**	**GB**	**Bp**	**Bd**	**Bt**	**SD**	**GLpe**	**GLl**	**GLm**	**SLC**	**GLP**	**BG**	**LG**	**41**	**42**
horncore														26.7-47.8	17.8-47.2
scapula										14.5-27.1	25.4-39.1	16.0-27.7	21.8-31.4		
humerus			40	25.4-38.2	27.3-36.7										
radius			25.6-40.0	25.6-37.4		19.5-25.3									
tibia				21.2-33.7											
calcaneus	51.3-73.6	17.3-27.3													
astragalus				16.8-23.7				26.5-34.2	24.9-31.8						
metacarpal	107.5-125.5		19.0-30.3	22.2-50.5		11.6-20.6									
metatarsal	141.5		17.2-27.0	21.0-30.5		10.8-18.3									
phalanx 1			9.5-16.3	8.8-16.4		10.3-11.0	31.6-45.4								
phalanx 2	22.0-30.4		10.7-16	12.2-13.0											

Table D.1.4 Daskaloyannis/Khaniamou, Ayia Aikaterini, Mathioudaki: summary of metrical data for goat (all sites combined).

Pig	GL	GB	Bp	Bd	Bt	GLpe	GLl	GLm	SLC	GLP	BG	LG	LAR
scapula									20.7-25.4	30.5-37.9	21.2-24.7	25.0-26.9	
pelvis													25.0-35.3
humerus				31.7-42.6	27.3-32.4								
radius			24.1-34.6	33.2									
tibia			40.9-52.4	21.2-31.3									
ulna	LO:50.5	SDO:24.5	DPA:32.8										
calcaneus	78.5-84.3	20.0-23.1											
astragalus							34.1-38.8	32.6-39.3					
metacarpal 3	68.8-76.0		14.5-27.6	13.5-27.5									
metacarpal 4	75.9-82.0		13.0-17.4	16.9-22.0									
metatarsal 3	71.9-87.3		13.4-15.6	16.6-17.0									
metatarsal 4	77.2		12.9-14.8	15.2									
phalanx 1			11.0-19.8	12.7-16.8		29.8-36.8							
phalanx 2			9.8-18.5	12.0-17.6		21.5-23.0							
phalanx 3	DLS:21.9-28.8												

Table D.1.5 Daskaloyannis/Khaniamou, Ayia Aikaterini, Mathioudaki: summary of metrical data for pigs (all sites combined).

Cattle	GL	Bp	DC	Bd	GLpe	GLl	GLm	DLS	GLP	BG	LG	45	46
horncore												33.9-64.6	31.0-57.2
scapula									70.0	57.6	49.4		
humerus				64.5-83.8									
femur			44.2-44.4										
radius		70.1-75.0		60.7-80.1									
tibia				53.0-61.9									
astragalus				39.4-46.3		55.5-65.3	51.0-62.9						
metacarpal		45.9-58.0		43.9-63.8									
metatarsal		38.3-52.0		42.8-59.0									
phalanx 1		22.5-33.7		22.1-37.4	49.6-66.4								
phalanx 2	35.1-37.0	21.1-32.2		19.0-27.1									
phalanx 3								52.7-76.2					

Table D.1.6 Daskaloyannis/Khaniamou, Ayia Aikaterini, Mathioudaki: summary of metrical data for cattle (all sites combined).

Equids												
Spec. #	**Site**	**Element**	**GL**	**Bp**	**BFp**	**Dp**	**DC**	**Bd**	**BFd**	**Dd**	**SD**	**LAR**
468	AA	pelvis										41.2
911	AA	humerus						56.4				
150	D/K	humerus						58.2			26.3	
378	D/K	humerus									25.5	
392	D/K	radius	266.5	60.9	54.7			54.8	44.8		28.65	
688	D/K	radius		72.6	65.5			63.9	57.1		34.0	
687	D/K	radius	302.0	71.8				66.1	57.5		34.5	
505	D/K	radius						77.2	64.4			
795	D/K	tibia						48.8		31.0		
737	D/K	astragalus						51.9				
1132	*D/K*	*metacarpal*						*30.7*	*30.0*	*23.9*		
2076	AA	metacarpal	173.5	37.0		24.5		34.8			21.8	
2522	AA	metacarpal						35.0		26.7		
1605	AA	metacarpal		36.0		25.1						
1000	D/K	metacarpal		38.0		24.4						
1999	AA	phalanx 1	67.3	36.6	33.9	27.0		34.0	30.1			
470	AA	phalanx 1	69.5	36.9		27.1		34.2	33.2		24.0	
128	D/K	phalanx 1	69.9	35.9		25.3		32.1	31.4		22.8	
151	D/K	phalanx 1	84.0	55.0		36.0		47.9	45.0		35.5	
227	M	phalanx 2	46.3	50.8				46.9			42.0	

Table D.1.7 Daskaloyannis/Khaniamou (D/K), Ayia Aikaterini (AA), and Mathioudaki (M): metrical data for equids.

Canids											
Spec. #	**Site**	**Element**	**GL**	**Bp**	**Dp**	**DC**	**Bd**	**SD**	**SLC**	**GLP**	**LAR**
1565	AA	scapula							22.5	26.0	
523	AA	pelvis									19.8
1155	AA	pelvis									22.0
2234	AA	humerus			32.2			9.2			
498	D/K	humerus					27.4				
680	AA	femur					28.5				
1051	AA	femur				18.0					
1551	AA	radius					22.5				
1734	AA	tibia					21.1				
485	D/K	tibia					18.5				
976	D/K	tibia					18.6				
2321	AA	ulna									
467	D/K	metacarpal	56.1				9.5				
684	AA	mc2	50.2	6.3			8.3				
72	D/K	mc3	54.9				6.6				
513	AA	mt3	63.8	8.0			8.5				
997	AA	mt5	62.0				8.2				

Table D.1.8 Daskaloyannis/Khaniamou (D/K), Ayia Aikaterini (AA), Mathioudaki (M): metrical data for canids.

Species	Greatest width at base (41)	Least width at base (42)
agrimi	53.5	37.9
	53.7	35.2
	55.1	37.6
	55.4	35.6
	55.4	37.8
	57.0	37.5
	59.0	34.7
	61.5	40.9
	62.0	41.0
	66.2	44.5
goat	26.7	24.4
	28.1	17.8
	28.6	19.0
	28.8	19.2
	29.0	18.2
	29.3	21.6
	29.7	19.0
	29.9	19.6
	30.2	20.1
	30.9	20.8
	31.0	20.0
	31.3	20.0
	32	20.2
	33.0	20.6
	34.4	24.5
	47.8	29.2
sheep	40.3	33.0
	41.7	29.0
	50.5	33.0

Table D.1.9 Daskaloyannis/Khaniamou, Ayia Aikaterini, Mathioudaki: measurements for caprid horncores (von den Driesch measurements 41 and 42).

D.2 Comparative metrical data from other sites

Site (species)	Element	GL	Bp	BFp	Bd	BFd	SD
Lerna (*E. asinus*)	humerus						27.5
Lerna (*E. asinus*)	radius				57.0	46.5	31.0
Lerna (*E. asinus*)	radius				61.2	51.5	35.0
Lerna (*E. asinus*)	tibia				55.1		
Lerna (*E. asinus*)	tibia				58.5		
Lerna (*E. asinus*)	metacarpal		37.5				
Lerna (*E. asinus*)	metacarpal		39.0				
Lerna (*E. asinus*)	metacarpal						25.0
Lerna (*E. asinus*)	phalanx 1	65.0	33.0		27.1		21.0
Lerna (*E. asinus*)	phalanx 1	70.0	36.0		32.0		23.0
Lerna (*E. asinus*)	phalanx 1	73.0	38.5		35.0		23.2
Lerna (*E. asinus*)	phalanx 2	36.0	36.0				32.5
Lerna (*E. caballus*)	radius		77.5	67.0			
Lerna (*E. caballus*)	metacarpal	226.0	48.0		47.5		32.6

Table D.2.1 Lerna: metrical data for equids (after Gevjall 1969).

Canids

Site	Element	GL	Bp	DC	Bd	SD	GLP
(LN)Phaistos	femur				30.0		
Galatas	scapula						18.2
Galatas	humerus				20.5		
Galatas (max.)	radius	118.2	12.3		15.0		
Galatas (max.)	mt3	63.1					
Kalapodi	metacarpal	59.8					
Lerna	femur			17.0-18.0	30.0	11.8	
Lerna	radius	154.0	17.0		18.3-22.0	10.3-11.4	
Lerna	tibia				19.5-21.8	10.3-12.5	
Lerna	mc2	55.0	6.2-6.4		8.6-8.7	6.1-6.2	
Lerna	mc3	55.8-63.0	7.4-7.8		7.8-7.9	5.3-6.1	
Lerna	mt3	70.0	8.8		8.8	6.9	

Table D.2.2 Metrical data for canids from Phaistos (after Wilkens 1996), Galatas, Kalapodi (after Hamilakis 1996b) and Lerna (after Gevjall 1969).

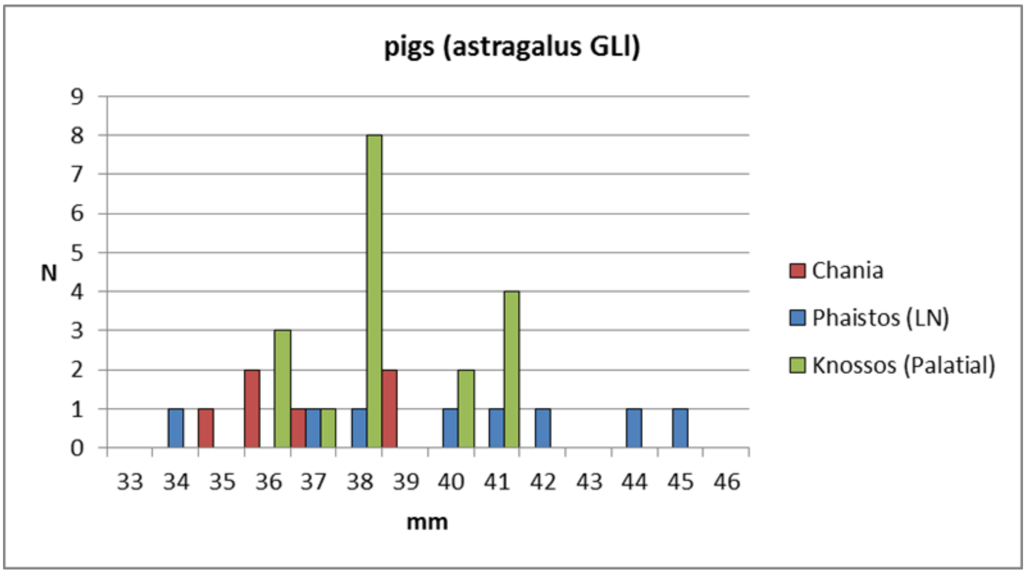


Figure D.2.1 Comparison of pig astragalus greatest length (Knossos data after Isaakidou 2004, Phaistos data after Wilkens 1996).

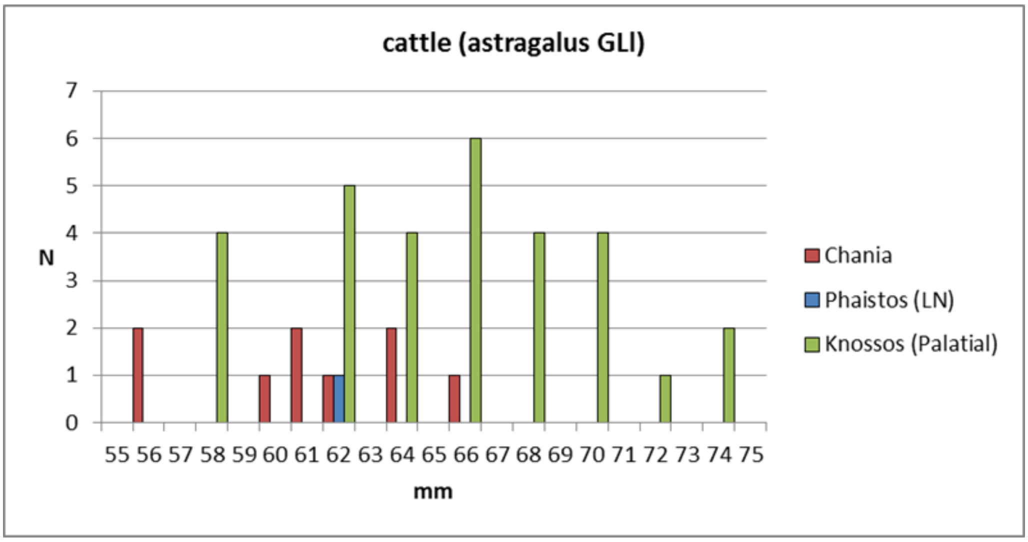


Figure D.2.2 Comparison of cattle astragalus greatest length (Knossos data after Isaakidou 2004, Phaistos data after Wilkens 1996).

Appendix E: Butchery data

E.1 Butchery data per element for each species (all sites combined)

fallow deer	horncore/antler	skull	maxilla	mandible	atlas	axis	scapula	pelvis	humerus	femur	radius	tibia	ulna	calcaneus	astragalus	metacarpal	metatarsal	phalanx 1	phalanx 2	other	Grand Total
skinning		5															1				6
skinning/filleting																1	1				2
dismemberment							2	5	17	1	6	4	3	5	2		1				46
dismemberment + filleting							1			2											3
dismemberment/decapitation					4																4
dismemberment/filleting								1	2												3
dismemberment/marrow									1			1									2
filleting							3	1	2	3	4	2	1								16
filleting + chopped							1														1
filleting/marrow											1	1									2
filleting/portioning							2	1													3
marrow											1	1				1	2				5
chopped									1	1	2	1									5
working	2																				2
Grand Total	2	5			4		9	8	23	7	14	10	4	5	2	2	5				100

Table E.1.1 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: butchery marks occurring on fallow deer elements (all sites combined).

red deer	horncore/antler	skull	maxilla	mandible	atlas	axis	scapula	pelvis	humerus	femur	radius	tibia	ulna	calcaneus	astragalus	metacarpal	metatarsal	phalanx 1	phalanx 2	other	Grand Total
skinning																	1				1
skinning/consumption				1																	1
skinning/dismemberment																		1			1
dismemberment							1		2	2	1	1	3	1	2						13
dismemberment/decapitation					1																1
filleting							1	2		1	1	2									7
filleting + chopped											1										1
filleting/marrow												1									1
marrow											2	1					3				6
working/marrow																1					1
chopped							1														1
Grand Total				1	1		3	2	2	3	5	5	3	1	2	1	4	1			34

deer	**horncore/antler**	**skull**	**maxilla**	**mandible**	**atlas**	**axis**	**scapula**	**pelvis**	**humerus**	**femur**	**radius**	**tibia**	**ulna**	**calcaneus**	**astragalus**	**metacarpal**	**metatarsal**	**phalanx 1**	**phalanx 2**	**t vert**	**Grand Total**
skinning/removal of antler	1																				1
dismemberment								4		5			1								10
dismemberment/decapitation					2	1															3
removal of ribs?																				3	3
filleting							1	1		1											3
filleting/marrow										1		1									2
chopped							1														1
Grand Total	1				2	1	2	5		7		1	1							3	23

Table E.1.2 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: butchery marks occurring on red deer elements (all sites combined).

Table E.1.3 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: butchery marks occurring on deer elements (all sites combined).

agrimi	**horncore**	**skull + horncore**	**Grand Total**
horn frontlet		3	3
removal of horn	2		2
skinning/removal of horn	4	3	7
chopped		1	1
Grand Total	6	7	13

Table E.1.4 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: butchery marks marks occurring on agrimi elements (all sites combined).

sheep	**horncore/antler**	**skull**	**maxilla**	**mandible**	**atlas**	**axis**	**scapula**	**pelvis**	**humerus**	**femur**	**radius**	**tibia**	**ulna**	**calcaneus**	**astragalus**	**metacarpal**	**metatarsal**	**phalanx 1**	**phalanx 2**	**other**	**Grand Total**
skinning																1	1				2
skinning/consumption				6																	6
skinning/filleting																1					1
skinning/removal of horn	1	1																			2
removal of horn	1																				1
dismemberment							2	6	18	1	5	1	4	2	2	1	3				45
dismemberment (brain)		2																			2
dismemberment + filleting												1									1
dismemberment/filleting											3										3
dismemberment/portioning							1														1
filleting								1	3		16	3									23
filleting + chopped											1	1									2
filleting/marrow									1		3	1									5
marrow											3	3									6
working/marrow																1					1
chopped		1						1	1		6	7									16
Grand Total	2	4		6			3	8	23	1	37	17	4	2	2	4	4				117

Table E.1.5 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: butchery marks occurring on sheep elements (all sites combined).

goat	**horncore/antler**	**skull**	**maxilla**	**mandible**	**atlas**	**axis**	**scapula**	**pelvis**	**humerus**	**femur**	**radius**	**tibia**	**ulna**	**calcaneus**	**astragalus**	**metacarpal**	**metatarsal**	**phalanx 1**	**phalanx 2**	**other**	**Grand Total**
skinning																2	1				3
skinning/consumption				3																	3
skinning/filleting																2					2
skinning/removal of horn	4																				4
removal of horn	5	1																			6
dismemberment							1	1	18		4		2	1	3		2				32
dismemberment/filleting									2		1										3
dismemberment/marrow																	1				1
dismemberment/portioning							1														1
portioning							1														1
filleting							1	5	6		10										22
filleting + chopped											1										1
filleting/marrow											1										1
chopped											2	2									4
Grand Total	9	1		3			4	6	26		19	2	2	1	3	4	4				84

Table E.1.6 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: butchery marks occurring on goat elements (all sites combined).

sheep/goat	**horncore/antler**	**skull**	**maxilla**	**mandible**	**atlas**	**axis**	**scapula**	**pelvis**	**humerus**	**femur**	**radius**	**tibia**	**ulna**	**calcaneus**	**astragalus**	**metacarpal**	**metatarsal**	**phalanx 1**	**phalanx 2**	**sacrum**	**Grand Total**
skinning																1	1	1			3
skinning/consumption			1	4																	5
skinning/filleting																1					1
removal of horn	1																				1
dismemberment							9	15	11	8		2	5	1			1				52
dismemberment (brain)		1																			1
dismemberment + filleting									1												1
dismemberment/decapitation					3	3															6
dismemberment/filleting								2	4		4										10
dismemberment/skinning/filleting																	1				1
portioning							3	1													4
secondary butchering																				1	1
filleting							8	5	9	9	26	6					1				64
filleting + chopped											2										2
filleting/marrow									1	1	4	2									8
filleting/portioning							1														1
marrow											2	3									5
chopped		1						1	1	2	9	15									29
working												1									1
Grand Total	1	2	1	4	3	3	21	24	27	20	47	29	5	1		2	4	1		1	196

Table E.1.7 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: butchery marks occurring on sheep/goat elements (all sites combined).

pig	**horncore/antler**	**skull**	**maxilla**	**mandible**	**atlas**	**axis**	**scapula**	**pelvis**	**humerus**	**femur**	**radius**	**tibia**	**ulna**	**calcaneus**	**astragalus**	**metacarpal 3**	**metatarsal**	**phalanx 1**	**phalanx 2**	**other**	**Grand Total**
skinning																1		1			2
skinning/consumption				19																	19
skinning/filleting																	1				1
removal of ear		3																			3
dismemberment							5	18	22	2	6		12	3	4						72
dismemberment (brain)		2																			2
dismemberment + filleting									1				1								2
dismemberment/decapitation		2			5																7
dismemberment/filleting									1	1	1		1								4
portioning							2					2									4
filleting							12	4	11	2	4	6	2	1							42
filleting/marrow									2	1		1									4
marrow									1			2									3
chopped									1	3	1	7	2								14
Grand Total		7		19	5		19	22	39	9	12	18	18	4	4	1	1	1			179

Table E.1.8 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: butchery marks occurring on pig elements (all sites combined).

cattle	**horncore/antler**	**skull**	**maxilla**	**mandible**	**atlas**	**axis**	**scapula**	**pelvis**	**humerus**	**femur**	**radius**	**tibia**	**ulna**	**calcaneus**	**astragalus**	**metacarpal**	**metatarsal**	**phalanx 1**	**phalanx 2**	**other**	**Grand Total**
skinning		1														2		3	3		9
skinning/consumption				8																	8
skinning/dismemberment																	2	1	1		4
skinning/filleting																	1				1
skinning/marrow/working																	1				1
skinning/removal of horn	4																				4
removal of horn		1																			1
dismemberment							3	7	3	6	2		3	1	3						28
dismemberment/filleting								1					1								2
dismemberment/portioning								1													1
portioning							1														1
filleting								2	1	1	2	2		1							9
filleting/marrow											1	2									3
filleting/skinning				1																	1
marrow										2		1				1	1				5
chopped		1		1				1		1	2	1		1							8
Grand Total	4	3		10			4	12	4	10	7	6	4	3	3	3	5	4	4		86

Table E.1.9 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: butchery marks occurring on cattle elements (all sites combined).

equid	**scapula**	**pelvis**	**humerus**	**radius**	**Grand Total**
dismemberment		1			1
filleting	1				1
chopped			1	1	2
Grand Total	1	1	1	1	4

Table E.1.10 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: butchery marks occurring on equid elements (all sites combined).

dog	**mandible**	**atlas**	**pelvis**	**femur**	**radius**	**tibia**	**Grand Total**
skinning/consumption	1						1
dismemberment			1	1	1		3
dismemberment + filleting			1				1
dismemberment/decapitation		1					1
filleting			1		1	1	3
Grand Total	1	1	3	1	2	1	9

Table E.1.11 Ayia Aikaterini, Daskaloyannis/Khaniamou, Mathioudaki: butchery marks occurring on dog elements (all sites combined).

E.2 Cutmarks and Chopmarks per element for each species at each site

Ayia Aikaterini

Group	**Element**	**cattle**		**pig**		**goat**		**sheep**		**sheep/goat**		**equid**		**dog**		**agrimi**		**deer**		**fallow deer**		**red deer**		**Total Sum**	**Total Sum**
		CU	**CH**	**CU**	**CH**	**CU**	**CH**	**CU**	**CH**	**CU**	**CH**	**CU**	**CH**	**CU**	**CH**	**CU**	**CH**	**CU**	**CH**	**CU**	**CH**	**CU**	**CH**	**CU**	**CH**
Head	antler																		1						1
	horncore	3	1				4		2								1							3	8
	skull		2	1	2				1		1						1							1	7
	maxilla									1														1	
	mandible	3	2	2	8	1	1	3	1		1				1							1		10	14
	atlas			3	1					3				1	1			1	1	1				9	3
	axis									1	1								1					1	2
	Sub-total	*6*	*5*	*6*	*11*	*1*	*5*	*3*	*4*	*5*	*3*			*1*	*2*		*2*	*1*	*3*	*1*		*1*		*25*	*35*
Upper limbs	scapula		2	7	6	2	2	1		5	6							2		3	4			20	20
	pelvis	1	5	10	6	6		5	5	5	5		1	3	1			5		2		1		38	23
	humerus	1	1	20	6	19		15		14			1							11	2			80	10
	femur	2	2	2	2	1		1		8	3			1				4	3	1			1	20	11
	radius		4	10	2	14	4	13	8	16	14			1						7	5	1	1	62	38
	tibia	1		2	11	1	2	4	7	3	14									3	1	2	1	16	36
	ulna		1	5	4		1	1		2								1		1	2	1	1	11	9
	fibula			1																				1	
	Sub-total	*5*	*15*	*57*	*37*	*43*	*9*	*40*	*20*	*53*	*42*		*2*	*5*	*1*			*12*	*3*	*28*	*14*	*5*	*4*	*248*	*147*
Lower limbs	calcaneus		1	3				1	1											1		2		7	2
	astragalus	1		2	1	1	1	1												2		1		8	2
	metacarpal	2	4		1	3		1	2		1										1			6	9
	metatarsal		2			1	1	3		1										1	1	1		7	4
	phalanx 1	3			1																			3	1
	phalanx 2	2	1																					2	1
	Sub-total	*8*	*8*	*5*	*3*	*5*	*2*	*6*	*3*	*1*	*1*									*4*	*2*	*4*		*33*	*19*
	Grand Total	**19**	**28**	**68**	**50**	**49**	**16**	**49**	**27**	**59**	**46**	**0**	**2**	**6**	**3**	**0**	**2**	**13**	**6**	**33**	**16**	**10**	**4**	**306**	**201**

Table E.2.1 Ayia Aikaterini: quantities of cut and chop marks per element per species.

Daskaloyannis/Khaniamou

Group	**Element**	**cattle**		**pig**		**goat**		**sheep**		**sheep/goat**		**equid**		**dog**		**agrimi**		**deer**		**fallow deer**		**red deer**		**Total Sum**	**Total Sum**
		CU	**CH**	**CU**	**CH**	**CU**	**CH**	**CU**	**CH**	**CU**	**CH**	**CU**	**CH**	**CU**	**CH**	**CU**	**CH**	**CU**	**CH**	**CU**	**CH**	**CU**	**CH**	**CU**	**CH**
Head	horncore						4				1						2								7
	skull + antler																			1	4			1	4
	skull + horncore						1		1								5								7
	skull	1			2				1	1														2	3
	mandible	2	5	1	3			1		2	1													6	9
	atlas			1																	2			1	2
	axis										1														1
	Sub-total	*3*	*5*	*2*	*5*		*5*	*1*	*2*	*3*	*3*						*7*			*1*	*6*			*10*	*33*
Upper limbs	scapula		1	3	3		1	2		8	3	1								2	2	1		17	10
	pelvis	2	4	6	2					9	4									3	2	3		23	12
	humerus	2	1	7	8	9	1	6	2	12	2									8		1		45	14
	femur	2	2	1	4					8	3									5	1	2		18	10
	radius	1	2	2	2	4	3	8	8	16	8		1							1	3	2	1	34	28
	tibia	1	2		5		1	2	3	4	7			1					1	1	4	1	1	10	24
	ulna	2		8	3	1		2		1	2												1	14	6
	Sub-total	*10*	*12*	*27*	*27*	*14*	*6*	*20*	*13*	*58*	*29*	*1*	*1*	*1*					*1*	*20*	*12*	*10*	*3*	*161*	*104*
Lower limbs	calcaneus	2		1							1									1	1			4	2
	astragalus	1	1					1														1		3	1
	metacarpal					1		1		1	1									1			1	4	2
	metatarsal	1	2	1		1		1		3										2			3	9	5
	metapodial																								
	phalanx 1	1								1												1		3	
	phalanx 2	1																						1	
	Sub-total	*6*	*3*	*2*		*2*		*3*		*5*	*2*									*4*	*1*	*2*	*4*	*24*	*10*
	Grand Total	**19**	**20**	**31**	**32**	**16**	**11**	**24**	**15**	**66**	**34**	**1**	**1**	**1**	**0**	**0**	**7**	**0**	**1**	**25**	**19**	**12**	**7**	**195**	**147**

Table E.2.2 Daskaloyannis/Khaniamou: quantities of cut and chop marks per element per species.

Mathioudaki																					
Group	**Element**	**cattle**		**pig**		**goat**		**sheep**		**sheep/goat**		**dog**		**agrimi**		**fallow deer**		**red deer**		**Total Sum**	**Total Sum**
		CU	**CH**	**CU**	**CH**	**CU**	**CH**	**CU**	**CH**	**CU**	**CH**	**CU**	**CH**	**CU**	**CH**	**CU**	**CH**	**CU**	**CH**	**CU**	**CH**
Head	horncore						1								1						2
	skull			1	1				1											1	2
	mandible			2	2		1		1											2	4
	atlas																		1		1
	Sub-total			*3*	*3*		*2*		*2*						*1*				*1*	*3*	*9*
Upper limbs	scapula	1		1	1						2							1		3	3
	pelvis	1			1					1	1					1				3	2
	humerus			1		1		1		1						2		1		7	0
	femur									1										1	0
	radius			1		2	1	3	2	1		1				1		1		10	3
	tibia		1						1		2									0	4
	ulna		1	2					1											2	2
	Sub-total	*2*	*2*	*5*	*2*	*3*	*1*	*4*	*4*	*4*	*5*	*1*				*4*		*3*		*26*	*14*
Lower limbs	calcaneus						1									2				2	1
	astragalus			1		1														2	0
	metatarsal						1													0	1
	Sub-total			*1*		*1*	*2*									*2*				*4*	*2*
	Grand Total	**2**	**2**	**9**	**5**	**4**	**5**	**4**	**6**	**4**	**5**	**1**	**0**	**0**	**1**	**6**	**0**	**3**	**1**	**33**	**25**

Table E.2.3 Mathioudaki: quantities of cut and chop marks per element per species.

E.3 Butchery data per feature type at each site

Ayia Aikaterini: RAN, 22-Pit B	**cattle**	**pig**	**goat**	**sheep**	**sheep/goat**	**dog**	**deer**	**fallow deer**	**red deer**	**Total**
chopped										
radius				1	5					6
scapula							1			1
tibia		2		1	1			1		5
Subtotal		*2*		*2*	*6*		*1*	*1*		*12*
dismemberment										
astragalus			2					1	1	4
femur						1	3			4
humerus	2	1	1	2	1			3		10
pelvis		2		2			1	1		6
radius		1						1		2
scapula				1				1		2
ulna		1						1		2
Subtotal	*2*	*5*	*3*	*5*	*1*	*1*	*4*	*8*	*1*	*30*
filleting										
humerus		1	1	1	1					4
radius			1					2		3
scapula					1			1		2
tibia		1							2	3
Subtotal		*2*	*2*	*1*	*2*			*3*	*2*	*12*
marrow										
metatarsal								1		1
radius								1		1
Subtotal								*2*		*2*
skinning/removal of horn										
horncore	1									1
phalanx 1	1									1
mc3		1								1
Subtotal	*2*	*1*								*3*
dismemberment/decapitation										
atlas						1		1		2
axis							1			1
dismemberment/filleting										
radius		1	1							2
dismemberment/marrow										
humerus								1		1
filleting + chopped										
radius					1					1
scapula								1		1
filleting/marrow										
femur							1			1
skinning/consumption										
mandible		2			1					3
Subtotal		*3*	*1*		*2*	*1*	*2*	*3*		*12*
Grand Total	4	13	6	8	11	2	7	17	3	71

Table E.3.1 Ayia Aikaterini: summary of butchery marks per species and element in Rubbish Area North, 22-Pit B.

Ayia Aikaterini: RAN, 16-Pit E	**cattle**	**pig**	**goat**	**sheep**	**sheep/goat**	**dog**	**deer**	**fallow deer**	**red deer**	**Total**
chopped										
skull	1									1
femur		1								1
humerus		1			1			1		3
pelvis	1				1					2
radius	2									2
tibia				3	2					5
Subtotal	*4*	*2*		*3*	*4*			*1*		*14*
dismemberment										
astragalus	1									1
calcaneus		1		1				1		3
femur	1						1		1	3
humerus		3	2*	4	1			2		12
pelvis	2	4		2	2	1	1			12
radius	1	1				1		1		4
scapula	1	2								3
tibia								1		1
ulna		3			1		1	1		6
Subtotal	*6*	*14*	*2*	*7*	*4*	*2*	*3*	*6*	*1*	*45*
filleting										
femur					1					1
pelvis		2	1	1						4
radius		1	3*	1	1					6
scapula		2			2			1		5
tibia				1						1
Subtotal		*5*	*4*	*3*	*4*			*1*		*17*
skinning/removal of horn/antler										
antler							1			1
horncore				1						1
skull	1									1
metatarsal									1	1
Subtotal	*1*			*1*			*1*		*1*	*4*
dismemberment + filleting										
scapula								1		1
humerus					2			1		3
radius				1	1					2
dismemberment/portioning										
scapula			1							1
dismemberment/decapitation										
atlas		2					1	1		4
removal of ear										
skull		2								2
skinning/consumption										
mandible	1	3		3					1	8
Subtotal	*1*	*7*	*1*	*4*	*3*		*1*	*3*	*1*	*21*
Grand Total	12	28	7	18	15	2	5	11	3	101
Notes: * 1 large, possible agrimi										

Table E.3.2 Ayia Aikaterini: summary of butchery marks per species and element in Rubbish Area North, 16-Pit E.

Ayia Aikaterini: RAN, southern and central dumps	**pig**	**goat**	**sheep**	**sheep/goat**	**dog**	**deer**	**Total**
chopped							
skull			1				1
radius			1	1			2
tibia	1			2			3
Subtotal	*1*		*2*	*3*			*6*
dismemberment							
femur			1				1
humerus	1	1					2
pelvis						1	1
scapula	1						1
Subtotal	*2*	*1*	*1*			*1*	*5*
filleting							
humerus	1						1
pelvis				1			1
Subtotal	*1*			*1*			*2*
dismemberment/decapitation							
atlas				2			2
dismemberment/filleting							
humerus	1						1
radius			1				1
skinning/consumption							
mandible					1		1
Subtotal	*1*		*1*	*2*	*1*		*5*
Unknown							
humerus			1				1
pelvis			1				1
radius	1						1
tibia		1					1
Grand Total	6	2	6	6	1	1	22

Table E.3.3 Ayia Aikaterini: summary of butchery marks per species and element in Rubbish Area North, central and southern dumps.

Ayia Aikaterini: RAN, LMIII C layers	**cattle**	**pig**	**goat**	**sheep**	**sheep/goat**	**equid**	**dog**	**agrimi**	**deer**	**fallow deer**	**red deer**	**Total**
chopped												
humerus						1						1
radius		1			3							4
tibia		1		1	3							5
Subtotal		*2*		*1*	*6*	*1*						*10*
dismemberment												
astragalus		1								1		2
calcaneus		1									1	2
femur			1*									1
humerus		3	5	2	1					2		13
pelvis		1			1	1			1	1		5
radius				4						2		6
scapula										1		1
ulna	1	1		1								3
Subtotal	*1*	*7*	*6*	*7*	*2*	*1*			*1*	*7*	*1*	*33*
filleting												
femur	1											1
humerus			1									1
pelvis	1								1		1	3
radius				3	1							4
scapula		3										3
Subtotal	*2*	*3*	*1*	*3*	*1*				*1*		*1*	*12*
skinning/removal of horn												
horncore	1		1					1				3
phalanx 1	1											1
Subtotal	*2*		*1*					*1*				*4*
dismemberment + filleting												
femur										1		1
pelvis							1					1
dismemberment/decapitation												
atlas		1							1			2
axis					1							1
dismemberment/filleting												
radius					1							1
filleting + chopped												
radius			1									1
tibia				1								1
marrow												
metacarpal	1									1		2
metatarsal										1		1
portioning												
tibia		1										1
removal of ribs?												
t vert									3			3
secondary butchering												
sacrum					1							1
skinning/consumption												
mandible	2	2										4
skinning/marrow/working												
metatarsal	1											1
Subtotal	*4*	*4*	*1*	*1*	*3*		*1*		*4*	*3*		*21*
Unknown												
skull								1				1
calcaneus											1	1
pelvis					1							1
radius										1		1
Grand Total	9	16	9	12	13	2	1	2	6	11	3	84
Notes: * 1 large, possible agrimi												

Table E.3.4 Ayia Aikaterini: summary of butchery marks per species and element in Rubbish Area North, Late Minoan IIIC layers.

Ayia Aikaterini: other pits	**cattle**	**pig**	**goat**	**sheep**	**sheep/goat**	**dog**	**agrimi**	**deer**	**fallow deer**	**red deer**	**Total**
chopped											
skull					1						1
calcaneus	1										1
femur		1			2						3
pelvis				1							1
radius			1	3					1		5
tibia	1		2	2	5						10
Subtotal	*2*	*1*	*3*	*6*	*8*				*1*		*21*
dismemberment											
astragalus		2									2
calcaneus		1									1
femur	2	1			3						6
humerus		4	4	4	4				1		17
metacarpal				1							1
metatarsal			1	1	1						3
pelvis	1	3		2	1						7
radius		4							1		5
scapula					2						2
tibia					1				2		3
ulna		1	1							1	3
Subtotal	*3*	*16*	*6*	*8*	*12*				*4*	*1*	*50*
filleting											
femur					3			1			4
humerus		4	1		2						7
pelvis		1	3			1					5
radius	1		2	1	7						11
scapula		2			2						4
tibia	1	3			1						5
Subtotal	*2*	*10*	*6*	*1*	*15*	*1*		*1*			*36*
skinning/removal of horn											
horncore	2		3	1			2				8
metacarpal			2	1							4
metatarsal			1	1							2
phalanx 1	1										1
phalanx 2	3										3
Subtotal	*7*		*6*	*3*			*2*				*18*
marrow											
metacarpal	*1*										
dismemberment + filleting											
ulna		1									1
dismemberment/decapitation											
atlas		1			1						2
filleting + chopped											
radius				1	1					1	3
portioning											
tibia		1									1
removal of ear											
skull		1									1
skinning/consumption											
maxilla					1						1
mandible	2	4	2								8
skinning/filleting											
metacarpal			1								1
metatarsal	1										1
Subtotal	*3*	*8*	*3*	*1*	*3*					*1*	*19*
Unknown											
metacarpal	2										2
pelvis		1									1
radius		1	1	1	2						5
tibia					1						1
Grand Total	19	37	25	20	41	1	2	1	5	2	153

Table E.3.5 Ayia Aikaterini: summary of butchery marks per species and element in ‘other pits’.

Ayia Aikaterini: internal rooms	**pig**	**sheep**	**deer**	**Total**
dismemberment				
femur			1	1
humerus	1			1
Subtotal	*1*		*1*	*2*
filleting				
radius		1		1
Subtotal		*1*		*1*
dismemberment + filleting				
tibia		1		1
dismemberment/filleting				
radius		1		1
Subtotal		*2*		*2*
Grand Total	1	3	1	5

Table E.3.6 Ayia Aikaterini: summary of butchery marks per species and element in internal rooms.

Ayia Aikaterini: external spaces	**pig**	***goat**	**sheep**	**sheep/goat**	**fallow deer**	**Total**
chopped						
tibia	1					1
Subtotal	*1*					*1*
dismemberment						
calcaneus			1			1
pelvis				1		1
radius		1				1
scapula				1		1
Subtotal		*1*	*1*	*2*		*4*
filleting						
pelvis				1		1
radius		1				1
scapula	1					1
Subtotal	*1*	*1*		*1*		*3*
dismemberment/filleting						
radius				1		1
Unknown						
radius					1	1
Grand Total	2	2	1	4	1	10
Notes: * 1 large, possible agrimi						

Table E.3.7 Ayia Aikaterini: summary of butchery marks per species and element in external spaces.

Daskaloyannis/Khaniamou: Pit M	**cattle**	**pig**	**goat**	**sheep**	**sheep/goat**	**equid**	**agrimi**	**deer**	**fallow deer**	**red deer**	**fish**	**human**	**Total**
chopped													
mandible	1												1
femur	1	1							1				3
radius				1		1							2
scapula										1			1
tibia					2								2
ulna		1											1
Subtotal	*2*	*2*		*1*	*2*	*1*			*1*	*1*			*10*
dismemberment													
astragalus				1						1			2
calcaneus	1								1				2
femur	2				1					1			4
humerus		5	4	1	3				2				15
metatarsal			1	1									2
pelvis	1	5			5				2				13
radius	1		2										3
scapula					2								2
tibia				1									1
ulna	1	1	1	2	1					1			7
Subtotal	*6*	*11*	*8*	*6*	*12*				*5*	*3*			*51*
filleting													
calcaneus	1	1											2
femur					2					1			3
humerus		2	1										3
pelvis		1			2					1			4
radius	1	1		5	4				2	1			14
scapula		2							1				3
tibia					1				1				2
ulna		2							1				3
(blank)											1		1
Subtotal	*2*	*9*	*1*	*5*	*9*				*5*	*3*	*1*		*35*
skinning/removal of horn/antler													
horncore			2				2						4
skull + horncore			1				5						6
skull + antler									4				4
skull	1												1
Subtotal	*1*		*3*				*7*		*4*				*15*

Table E.3.8 Daskaloyannis/Khaniamou: summary of butchery marks per species and element in Pit M (continued in Table E.3.9 below).

Daskaloyannis/Khaniamou: Pit M	**cattle**	**pig**	**goat**	**sheep**	**sheep/goat**	**equid**	**agrimi**	**deer**	**fallow deer**	**red deer**	**fish**	**human**	**Total**
dismemberment (brain)													
skull		1			1								2
dismemberment + filleting													
humerus		1			1								2
dismemberment/decapitation													
skull		1											1
atlas		1							2				3
dismemberment/filleting													
humerus			1						1				2
pelvis					1				1				2
ulna		1											1
dismemberment/marrow													
tibia									1				1
dismemberment/portioning													
pelvis	1												1
filleting/marrow													
femur					1								1
humerus		1											1
radius	1		1	1	1				1				5
tibia		1						1	1				3
filleting/portioning													
pelvis									1				1
scapula					1				2				3
filleting/skinning													
mandible	1												1
marrow													
femur	1												1
metatarsal										2			2
radius				2	1					1			4
tibia		1		1					1				3
skinning/consumption													
mandible	2	5			3								10
skinning/dismemberment													
metatarsal	1												1
skinning/filleting													
metacarpal				1					1				2
working													
antler									2				2
working/marrow													
metacarpal										1			1
Subtotal	*7*	*13*	*2*	*5*	*10*			*1*	*14*	*4*			*56*
Unknown													
skull												1	1
humerus			1		1								2
pelvis										2			2
radius					1								1
tibia			1	1	1								3
Grand Total	18	35	16	18	36	1	7	1	29	13	1	1	176

Table E.3.9 Daskaloyannis/Khaniamou: summary of butchery marks per species and element in Pit M (continued from Table E.3.8 above).

Daskaolyannis/Khaniamou: Pit ?M	**cattle**	**pig**	**goat**	**sheep**	**equid**	**dog**	**agrimi**	**fallow deer**	**Total**
chopped									
skull + horncore							1		1
radius			1					1	2
Subtotal			*1*				*1*	*1*	*3*
dismemberment									
astragalus	1								1
humerus		1						3	4
tibia								1	1
Subtotal	*1*	*1*						*4*	*6*
filleting									
femur								2	2
humerus		2							2
radius			1	1					2
scapula					1				1
tibia	1					1			2
Subtotal	*1*	*2*	*1*	*1*	*1*	*1*		*2*	*9*
skinning/removal of horn									
skull + horncore				1					1
horncore			1						1
Subtotal			*1*	*1*					*2*
filleting/marrow									
humerus		1							1
portioning									
scapula		1							1
skinning/dismemberment									
phalanx 1	1								1
Subtotal	*1*	*2*							*3*
unknown									
femur		1							1
pelvis		1							1
Grand Total	3	7	3	2	1	1	1	7	25

Table E.3.10 Daskaloyannis/Khaniamou: summary of butchery marks per species and element in Pit ?M.

Daskaloyannis/Khaniamou: Pit ND	**cattle**	**pig**	**goat**	**sheep**	**sheep/goat**	**agrimi**	**fallow deer**	**red deer**	**Total**
chopped									
humerus				1					1
ulna		1							1
Subtotal		*1*		*1*					*2*
dismemberment									
calcaneus							1		1
femur		1					1		2
humerus								1	1
pelvis							1		1
scapula								1	1
tibia								1	1
ulna		1							1
Subtotal		*2*					*3*	*3*	*8*
filleting									
humerus			1	1			1		3
radius		1		1					2
scapula					1				1
tibia				1			1		2
Subtotal		*1*	*1*	*3*	*1*		*2*		*8*
skinning									
skull + antler							1		1
metatarsal							1		1
Subtotal							*2*		*2*
dismemberment + filleting									
femur							1		1
dismemberment/portioning									
scapula				1					1
filleting/marrow									
radius				2					2
tibia								1	1
horn frontlet									
skull + horncore						1			1
marrow									
metatarsal	1								1
radius					1				1
tibia	1								1
skinning/consumption									
mandible	1								1
skinning/dismemberment									
phalanx 1								1	1
skinning/filleting									
metacarpal			1		1				2
metatarsal							1		1
Subtotal	*3*		*1*	*3*	*2*	*1*	*2*	*2*	*14*
unknown									
scapula					1				1
Grand Total	3	4	2	7	4	1	9	5	35

Table E.3.11 Daskaloyannis/Khaniamou: summary of butchery marks per species and element in Pit ND.

Daskaloyannis/Khaniamou: other pits	**cattle**	**pig**	**goat**	**sheep**	**sheep/goat**	**fallow deer**	**red deer**	**Total**
dismemberment								
femur	1				2			3
humerus	1	1						2
pelvis					1			1
scapula		1						1
ulna		1			1			2
Subtotal	*2*	*3*			*4*			*9*
filleting								
femur		1			1	1		3
humerus					3	1		4
radius					3			3
scapula		1						1
tibia		2			1			3
Subtotal		*4*			*8*	*2*		*14*
skinning/removal of horn								
horncore			1					1
Subtotal			*1*					*1*
marrow								
femur	1							1
humerus		1						1
metatarsal							1	1
radius							1	1
tibia		1			1		1	3
dismemberment/decapitation								
axis					1			1
dismemberment/filleting								
humerus			1		1			2
dismemberment/skinning/filleting								
metatarsal					1			1
filleting/marrow								
radius					2			2
tibia	1			1	2			4
portioning								
scapula		1			1			2
skinning/dismemberment								
phalanx 2	1							1
Subtotal	*3*	*3*	*1*	*1*	*9*		*3*	*20*
Grand Total	5	10	2	1	21	2	3	44

Table E.3.12 Daskaloyannis/Khaniamou: summary of butchery marks per species and element in other pits.

Daskaloyannis/Khaniamou: floors	**cattle**	**pig**	**goat**	**sheep**	**sheep/goat**	**Total**
dismemberment						
calcaneus					1	1
femur					1	1
humerus				3	1	4
pelvis	1	1			2	4
radius			1			1
scapula					1	1
ulna		1			1	2
Subtotal	*1*	*2*	*1*	*3*	*7*	*14*
filleting						
femur		1			1	2
humerus	1			1	2	4
metatarsal					1	1
radius					7	7
scapula					1	1
tibia					1	1
Subtotal	*1*	*1*		*1*	*13*	*16*
skinning/removal of horn						
horncore					1	1
metatarsal					1	1
Subtotal					*2*	*2*
dismemberment/filleting						
pelvis	1				1	2
ulna	1					1
filleting/marrow						
femur		1				1
humerus				1	1	2
marrow						
tibia					1	1
portioning						
pelvis					1	1
scapula			1			1
skinning/consumption						
mandible				1		1
skinning/dismemberment						
metatarsal	1					1
skinning/filleting						
metatarsal		1				1
Subtotal	*3*	*2*	*1*	*2*	*3*	*11*
unknown						
humerus					1	1
radius		1				1
scapula					1	1
Grand Total	5	6	2	6	28	47

Table E.3.13 Daskaloyannis/Khaniamou: summary of butchery marks per species and element in floor deposits

Mathioudaki: Pits	**pig**	**goat**	**sheep**	**sheep/goat**	**fallow deer**	**red deer**	**Total**
dismemberment							
calcaneus		1					1
humerus					2		2
pelvis				2			2
radius						1	1
Subtotal		*1*		*2*	*2*	*1*	*6*
filleting							
pelvis					1		1
radius	1						1
scapula						1	1
marrow							
radius			1				1
Subtotal	*1*		*1*		*1*	*1*	*4*
skinning/removal of horn							
horncore		1					1
Subtotal		*1*					*1*
dismemberment/decapitation							
skull	1						1
atlas						1	1
portioning							
scapula				1			1
skinning/consumption							
mandible	1	1	1				3
Subtotal	*2*	*1*	*1*	*1*		*1*	*6*
Grand Total	3	3	2	3	3	3	17

Table E.3.14 Mathioudaki: summary of butchery marks per species and element in pits.

Mathioudaki: floors + Room A	**pig**	**goat**	**sheep**	**sheep/goat**	**fallow deer**	**Total**
dismemberment						
calcaneus					1	1
humerus	1					1
ulna	1					1
Subtotal	*2*				*1*	*3*
filleting						
femur				1		1
radius		1	1	1		3
Subtotal		*1*	*1*	*2*		*4*
dismemberment (brain)						
skull	1					1
dismemberment/filleting						
humerus				1		1
dismemberment/marrow						
metatarsal		1				1
Subtotal	*1*	*1*		*1*		*3*
Grand Total	3	2	1	3	1	10

Table E.3.15 Mathioudaki: summary of butchery marks per species and element in floors and Room A deposits.

Mathioudaki: unknown contexts	**cattle**	**pig**	**goat**	**sheep**	**sheep/goat**	**dog**	**agrimi**	**fallow deer**	**red deer**	**Total**
dismemberment										
astragalus		1	1							2
calcaneus								1		1
humerus			1	1					1	3
pelvis	1	1								2
radius				1				1		2
scapula	1	1			1					3
ulna	1	1		1						3
Subtotal	*3*	*4*	*2*	*3*	*1*			*2*	*1*	*16*
skinning/removal of horn										
horncore							1			1
Subtotal							*1*			*1*
dismemberment (brain)										
skull				1						1
filleting										
radius			2	1		1				4
scapula		1								1
tibia					2					2
filleting/marrow										
tibia	1									1
marrow										
tibia				1						1
skinning/consumption										
mandible		1								1
Subtotal	*1*	*2*	*2*	*3*	*2*	*1*				*11*
Grand Total	4	6	4	6	3	1	1	2	1	28

Table E.3.16 Mathioudaki: summary of butchery marks per species and element in contexts of unknown function.

Appendix F : Burning data

F.1 Burning data per species at each site

Ayia Aikaterini	**totally**	**patch**	**spot**	**Total**
cattle (sub-total)		*2*		*2*
radius		1		1
metatarsal		1		1
pig (sub-total)	*1*			*1*
tooth	1			1
goat (sub-total)	*2*	*1*		*3*
humerus	1*	1		2
phalanx 2	1			1
sheep (sub-total)	1			1
astragalus	1			1
sheep/goat (sub-total)	*5*	*1*	*1*	*7*
scapula	1			1
humerus	1	1		2
ulna	1			1
calcaneus	1			1
metacarpal			1	1
metapodial	1			1
fallow deer (sub-total)		**1**		**1**
calcaneus		1		1
Grand Total	*10*	*7*	*1*	*15*
* 1 possible agrimi				

Table F.1.1 Ayia Aikaterini: burnt fragments per element per species.

Daskaloyannis/ Khaniamou	**totally**	**patch**	**spot**	**surface**	**Total**
cattle (sub-total)	*5*	*1*	*3*	*6*	*15*
skull + horncore			1		1
mandible			1		1
tooth				1	1
pelvis	1				1
humerus	1				1
femur				1	1
tibia				1	1
ulna				1	1
astragalus				1	1
metacarpal		1		1	2
metatarsal	1		1		2
metapodial	1				1
phalanx 1	1				1
pig (sub-total)	*4*	*1*	*5*	*3*	*13*
skull				1	1
scapula			1	1	2
pelvis	1		1		2
humerus	1	1			2
femur			1		1
radius			1		1
ulna			1		1
metapodial	2				2
phalanx 1				1	1
goat (sub-total)	*4*	*4*	*5*	*1*	*14*
skull	1				1
humerus	1				1
radius		1	1	1	3
tibia	1	1	1		3
metacarpal			2		2
metatarsal		2	1		3
phalanx 2	1				1
sheep (sub-total)	*2*	*3*			*5*
mandible	1				1
radius	1				1
tibia		1			1
metacarpal		1			1
metatarsal		1			1
sheep/goat (sub-total)	*28*	*9*	*10*	*7*	*54*
skull	1		2		3
tooth	1			1	2
scapula	2		1		3
pelvis	1		1		2
humerus	4	1			5
femur	8		1	1	10
radius	2	1	1		4
tibia	6	2	1	4	13
calcaneus	1				1
metacarpal	2	1	2		5
metatarsal		4	1		5
thoracic vertebrae				1	1
equid (sub-total)	*1*				*1*
tooth	1				1
fallow deer (sub-total)	*2*	*4*	*5*		*11*
pelvis	1				1
radius		1	2		3
tibia		2			2
calcaneus		1			1
metatarsal	1		3		4
red deer (sub-total)		*2*	*1*		*3*
radius		2			2
metatarsal			1		1
Grand Total	*46*	*24*	*29*	*17*	*116*

Table F.1.2 Daskaloyannis/Khaniamou: burnt fragments per element per species.

Mathioudaki	**totally**	**patch**	**partial**	**Total**
cattle (sub-total)	*1*	*1*		*2*
radius	1			1
metatarsal		1		1
pig (sub-total)	*1*			*1*
humerus	1			1
goat (sub-total)	*1*			*1*
radius	1			1
sheep/goat (sub-total)	*10*		*1*	*11*
atlas	1			1
scapula	2			2
pelvis	2		1	3
femur	1			1
radius	1			1
metacarpal	2			2
phalanx 1	1			1
Grand Total	*13*	*1*	*1*	*15*

Table F.1.3 Mathioudaki: burnt fragments per element per species.

F.2 Burning data per feature type at each site

Burning	**Rubbish Area North, 22-Pit B**	**Rubbish Area North, 16-Pit E**	**Rubbish Area North, 1st layer (LMIIIC)**	**Rubbish Area North, 3rd layer (LMIIIC)**	**11-Pit E**	**20-Pit B**	**Courtyard F (LMIIIC)**	**Room K/H (LMIIIIC)**	**Space O, Patio? (LMIIIC)**	**Grand Total**
cattle										
metatarsal				1						1
radius	1									1
pig										
tooth					1					1
goat										
humerus		1								1
metacarpal										
phalanx 2								1		1
**goat*										
humerus							1			1
sheep										
astragalus				1						1
sheep/goat										
scapula				1						1
humerus				1		1				2
ulna			1							1
calcaneus				1						1
metacarpal		1								1
metapodial									1	1
fallow deer										
calcaneus		1								1
metatarsal										
Grand Total	1	3	1	5	1	1	1	1	1	15
* possible agrimi										

Table F.2.1 Ayia Aikaterini: burning data per feature type

Daskaloyannis/Khaniamou				
pit M	**total**	**patch**	**spot**	**Total**
cattle (sub-total)				*4*
mandible			1	1
humerus	1			1
metacarpal		1		1
phalanx 1	1			1
pig (sub-total)				*2*
humerus	1			1
metapodial	1			1
goat (sub-total)				*4*
humerus	1			1
radius		1		1
tibia		1		1
metatarsal		1		1
sheep (sub-total)				*2*
metacarpal		1		1
tibia		1		1
sheep/goat (sub-total)				*7*
skull			1	1
femur			1	1
tibia		1		1
metacarpal			2	2
metatarsal		2		2
fallow deer (sub-total)				*4*
pelvis	1			1
radius		1		1
calcaneus		1		1
metatarsal			1	1
red deer (sub-total)				*1*
radius		1		1
Grand Total	6	12	6	24

Table F.2.2 Daskaloyannis/Khaniamou: burning data for Pit M.

Daskaloyannis/Khaniamou				
pit ?M	**total**	**patch**	**spot**	**Total**
cattle (sub-total)				*1*
skull + horncore			1	1
pig (sub-total)				*1*
humerus		1		1
sheep/goat (sub-total)				*2*
metatarsal		1		1
radius		1		1
fallow deer (sub-total)				*2*
metatarsal	1		1	2
Grand Total	1	3	2	6

Table F.2.3 Daskaloyannis/Khaniamou: burning data for Pit ?M.

Daskaloyannis/Khaniamou			
pit ND	**patch**	**spot**	**Total**
cattle (sub-total)			*1*
metatarsal		1	1
pig (sub-total)			*3*
femur		1	1
radius		1	1
ulna		1	1
goat(sub-total)			*1*
metacarpal		1	1
sheep/goat (sub-total)			*2*
skull		1	1
metacarpal	1		1
fallow deer (sub-total)			*3*
radius		2	2
metatarsal		1	1
Grand Total	1	9	10

Table F.2.4 Daskaloyannis/Khaniamou: burning data for Pit ND.

Daskaloyannis/Khaniamou			
other pits	**patch**	**spot**	**Total**
pig (sub-total)			*1*
scapula		1	1
goat (sub-total)			*1*
metacarpal		1	1
sheep (sub-total)			*1*
metatarsal	1		1
fallow deer (sub-total)			*2*
tibia	2		2
red deer (sub-total)			*2*
radius	1		1
metatarsal		1	1
Grand Total	4	3	7

Table F.2.5 Daskaloyannis/Khaniamou: burning data for other pits.

Daskaloyannis/Khaniamou				
floor 20	**total**	**spot**	**surface**	**Total**
cattle (sub-total)				*2*
tibia			1	1
astragalus			1	1
pig (sub-total)				1
pelvis	1			1
sheep/goat (sub-total)				*11*
scapula	1			1
femur	4		1	5
radius	2	1		3
tibia	2			2
Grand Total	10	1	3	14

Table F.2.6 Daskaloyannis/Khaniamou: burning data for floor 20.

Daskaloyannis/Khaniamou				
'niche'	**total**	**spot**	**surface**	**Total**
cattle (sub-total)				*1*
pelvis	1			1
pig (sub-total)				*1*
pelvis		1		1
scapula			1	1
phalanx 1			1	1
goat (sub-total)				*3*
skull	1			1
radius		1		1
tibia		1		1
sheep/goat (sub-total)				*7*
skull	1			1
scapula		1		1
pelvis		1		1
femur	1			1
tibia		1		1
metacarpal	1			1
metatarsal		1		1
Grand Total	5	7	2	14

Table F.2.7 Daskaloyannis/Khaniamou: burning data for the courtyard ‘niche’.

Daskaloyannis/Khaniamou					
other floors	**total**	**patch**	**spot**	**surface**	**Total**
cattle (sub-total)					*6*
tooth				1	1
femur				1	1
metacarpal				1	1
metatarsal	1				1
ulna				1	1
metapodial	1				1
pig (sub-total)					*2*
skull				1	1
metapodial	1				1
goat	1	1	1		3
tibia	1				1
metatarsal		1	1		2
sheep (sub-total)					*2*
mandible	1				1
radius	1				1
sheep/goat (sub-total)					*21*
tooth	1			1	2
pelvis	1				1
humerus	3				3
femur	3				3
tibia	4	1		4	9
calcaneus	1				1
metacarpal	1				1
t vert				1	1
equid (sub-total)					*1*
tooth	1				1
Grand Total	21	2	1	11	35

Table F.2.8 Daskaloyannis/Khaniamou: burning data for other floors.

Mathioudaki			
Burning	**Pit B**	**unknown**	**Grand Total**
cattle (subtotal)	*1*	*1*	*2*
radius	1		1
metatarsal		1	1
pig (subtotal)	*1*		*1*
humerus	1		1
goat (subtotal)	1		1
radius	1		1
sheep/goat (subtotal)	*8*	*3*	*11*
atlas	1		1
scapula	2		2
pelvis	3		3
femur		1	1
radius		1	1
metacarpal	1	1	2
phalanx 1	1		1
Sub-total	*11*	*4*	*15*
c size (subtotal)		*1*	*1*
mandible		1	1
s size (subtotal)	*3*		*3*
LB	3		3
Grand Total	14	5	19

Table F.2.9 Mathioudaki: burning data per feature type.

Appendix G: Catalogue of antler

Catalogue of deer antler (ordered by species, then by age, then specimen number).

Fallow deer age stages after comparison with images in Chapman & Chapman 1975.

Spec. #	**FALLOW DEER**	Notes
D32		Fallow deer Skull, pedicle, antler Yearling spike (right) Chopped
D263		Fallow deer Skull, pedicle, antler Yearling spike (right) Chopped
D676		Fallow deer Skull, pedicle, antler Yearling spike (left) Chopped
D2138		Fallow deer Skull, pedicle, antler Yearling spike (right)
D2145		Fallow deer Skull, pedicle, antler Yearling spike (right)
D609		Fallow deer Skull, pedicle, antler 2yrs + (left) Chopped

D931		Fallow deer Skull, pedicle, antler. 2yrs + (left) Cutmarks – see lateral view
D780		Fallow deer Cast antler, 2yrs + (Chapman & Chapman 1975). Chopped - chops to palm area, tres tine possibly cut off
D781		Fallow deer Cast antler. 2yrs + (Chapman & Chapman 1975) Chopped - chops to brow tine
D782		Fallow deer Cast antler 2yrs + (Chapman & Chapman 1975)
D831		Fallow deer 2yrs + (Chapman & Chapman 1975)
D439		Fallow deer c. 3yrs (Chapman & Chapman 1975)
D440		Fallow deer 3yrs + (Chapman & Chapman 1975)

D783		Fallow deer 3yrs + (Chapman & Chapman 1975)
D929		Fallow deer 3yrs + (Chapman & Chapman 1975)
D930		Fallow deer 3yrs + (Chapman & Chapman 1975)
D261		Fallow deer Cast antler
	RED DEER	
D676		Red deer Skull + pedicle (antler cast)
D262		Red deer Cast antler
AA1420		Red deer
	DEER (species not known)	

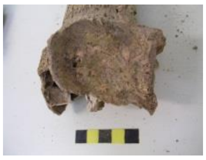
D613		Deer (probably red) Worked
AA514		Deer Pedicle, antler Yearling spike
AA1510		Deer Pedicle and antler Yearling spike Chopped
AA1511		Deer
	OTHER	
D848	Three small fallow deer antler fragments, fresh breaks tine tip, rosette, fragment. Not photographed	Fallow deer
AA1688	Tine fragment, red deer? Not photographed.	Red deer
	D = Daskaloyannis AA = Ayia Aikaterini Number following the above prefix refers to specimen number	
	REFERENCES TO ANTLER IN PREVIOUS REPORTS	
	"One of the Cervus fragments was part of the frontal bone of the skull with the antler base and a tooled (carved and sawn) wreath of roses" (Hallager &Hallager 2003:44). LMIIIB:2, Rubbish Area North, 22-pit B, Upper layer	Red deer?

	"Deer antler, almost complete. Sawn off at end. Saw marks not visible, however (polished?) Otherwise not worked. Worn at outer end. L.0.432. Diam. of end 0.026-38. W. at end 0.135" (Hallager & Hallager 2000:108, Pl 33d). Rubbish Area North, 3rd layer.	Fallow deer (based on observation of Pl 33d, Hallager & Hallager 2000)
	"Red deer (*Cervus elaphus*). An antler, preserved in two parts (joining). It bear traces of working. It is sawn of on one end and chopped of on the other. Some copper stains on its surface. This object represent some antler tool making activity on site." (Mylona n.d.*a*, Mathioudaki report)	Red deer

Appendix H: Catalogue of agrimi horncores

Spec. #	**AGRIMI**	Notes
D31	  Anterior Lateral	CHOPPED Chop to left side frontal and parietal
D226	 Lateral	CHOPPED Chop to anterior base of horn core
D267	 Anterior	
D434	    Anterior Lateral Medial	
D607	  	

		
D608	   	CHOPPED Chop to lateral
D675	    Anterior Lateral Medial Posterior	
D785	   Anterior Lateral Medial	
D832	  	CHOPPED? Possible chop to lateral

		
D833	 Anterior  Lateral  Lateral (close up)	CHOPPED Chop to left side cranium
D834	 Anterior  Lateral  Medial	
D876	  	
D877	  	
D963	  	
D1011	  	CHOPPED Chop to both lateral sides below base of horncore.

D1030		
D1062		
D1078		
D1832		
D2143		
AA2086	Anterior Lateral Medial	
AA2087		SAWN? Sawn at base

	Anterior Lateral Sawn?	
AA2595	  Lateral Medial	
AA2728	   Anterior Lateral Posterior	CHOPPED Chop to base of skull posterior
AA2790	    Anterior Lateral Medial Sawn top  Sawn top	CHOPPED Chop to lateral base of horncore and also sawn at top
M241	   	CHOPPED Twists inwards
D136	Skull +horncore; piece of left side of frontal with base of horncore. No photo	
D1251	Small fragment of right side horncore tip, texture more similar to agrimi than domestic goat. No photo	

AA 1653	Fragment of large horncore, could be agrimi? No photo	
AA481	Skull frontal plus base of horncore, seems very wide at base *agrimi? Not enough to measure. Freshbreak on horncore. Chop to lateral side. No photo	
AA2536	Fragment of right side horncore. No photo	
	D = Daskaloyannis/Khaniamou AA = Ayia Aikaterini M = Mathioudaki Number following the above prefix refers to specimen number	

Appendix I : Identification photographs

Figure I.1 Ayia Aikaterini: *E.asinus* lower incisor with wear (specimen number AA550).

Figure I.2 Ayia Aikaterini: dolphin vertebra (specimen number AA1041).

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