

Animals at Ashton:
Diet and human-animal dynamics in a Romano-
British Small Town

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Abstract

The animal bones from the Roman-period small town at Ashton represent an excellent opportunity to examine animal husbandry, consumption, and relationships in the province of Britain. Analysis of this large dataset provides data for a key gap in our understanding of how small towns functioned in the Nene Valley region, which has been increasingly well-studied in recent years. The data showed that although Ashton possessed a strong iron-working industry, the site was more geared towards the production of animals in a manner similar to local rural sites than it was to the pattern of requisitioning seen in larger towns. Significant changes throughout the site's occupation show that although an increasingly urban pattern builds up through the third century, a sudden shift occurs in the mid-fourth to early fifth century that results in a return to a more self-sufficient style of animal husbandry due to the decreased pressures of taxation and the decline of imperial control. In addition to this important economic data, patterns of ritual behaviour can be tracked both in the earlier exclusively pagan periods as well as into the Later Roman phases when a substantial Christian population is in evidence. The presence of animals in economy, industry, ritual, and personal expression create a picture of a rapidly evolving site, as it moved from one extreme of involvement in imperial exchange to the other, and then back again.

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1 Introduction

For the inhabitants of Britain in the first few centuries AD, waves of change were matched by threads of continuity. One constant in the lives of these people would have been the presence of animals, whether as domestic livestock on which their livelihood depended, a cut of meat for the table, a sacrifice to ensure the granting of a request from a divinity, a companion animal in the home, or a wild animal encountered in either town or countryside. These are only a few of the many roles that animals served in the lives of people in Roman Britain.

The key aim of this thesis is to examine how people and animals intersected in a small town in what is today the village of Ashton, Northamptonshire. Across the River Nene from the larger town of Oundle, the site lies approximately 12 miles southwest of modern Peterborough. In the Roman period, it would have been part of a dense network of villas, farms, villages, and small roadside settlements, linked into larger small towns and the world beyond with the roads laid out under the Roman administration after the conquest in 43 AD (Taylor 2002; Parry 2006).

The animal bone assemblage recovered from excavations spanning from the mid-1970s to early 1980s includes material from all parts of the sites and a wide range of temporal periods spanning from the mid-1st century AD into the early 5th century. The spatial and temporal resolution of these data allow more detailed questions to be asked of them. Analysis presented in this thesis was carried out with the aim of exploring the space between how people exploited animals for economic purposes and how people experienced animals as a part of their landscapes and livelihoods.

1.1 Research background

The dataset from Ashton is widely recognized as important for the understanding of small town functions and the regional character of the Nene Valley (Taylor 2000). Although preliminary work towards publication was begun, the animal bone report remained outstanding, preventing full completion of the post-excavation analysis (Parry, pers. comm.). The ability to conduct a thorough analysis of a well-dated, well-preserved animal bone assemblage allowed this thesis to ask more detailed questions than the use of secondary data, with restrictions based on what other authors chose to record.

Recording was designed to query the key research goals for the material, and begin to understand the nature of animals at the site.

A desire to understand transitions in terms of temporal shifts in power, changing responses to social and economic stimuli, and changing belief structures motivated the exploration of these data. Although initially hoping to explore the transition from a more rural Iron Age pattern of animal husbandry and interactions into a more urbanised, global Roman pattern, it was the late period transition that ultimately provided the most intriguing results for the site. Examining how Ashton's inhabitants negotiated the reduction of trade with the wider imperial network but still displayed some elements of Roman beliefs and practices was one of the most rewarding outcomes of this thesis.

Reviews of zooarchaeological work in Roman Britain and the classical world in general highlight the need for an increased focus on the use of animal bones to illuminate the lives of Romano-British peoples. In his State of the Discipline article, MacKinnon calls for an increased focus of larger issues of production, trade, ethnicity, religion, and personal choice in the interpretation of faunal remains, not merely focusing on the economics (2007: 488). This accords with the increased emphasis on identity, and highlights the need to understand how people used and interacted with their animals and animal foods. MacKinnon also urges an exploration of "edible and nonedible and renewable and non-renewable resources," key factors that are too often overlooked when reconstructing the motivations behind past animal husbandry schemes (2007: 488). The data from Ashton show that the production and trade of animals and associated products, whether those were renewable food sources from a live animal or raw craft material from a deceased animal, was of great importance to the people of the settlement throughout. Beyond these products, people were selecting certain animals for burial in ritual deposits to fulfil their spiritual needs even as they were adopting small breeds of dogs for pest-control and companionship, and choosing to import larger stock to improve their cereal output. A well-dated and carefully recorded assemblage with good preservation and description is crucial for answering these questions, and the Ashton dataset provides such an opportunity.

Part of a wider effort to set forward a research agenda for scholars of Roman Britain re-organising their research beyond the bounds of Romanisation, Dobney calls for an increased emphasis on land-use, environment, and resource exploitation, as well as the wider effects of exchange and craft working on animal husbandry and diet (2001: 36). The investigation of size changes in cattle is a major point in his research agenda,

and the intriguing data from Ashton contributes to this discussion (Dobney 2001: 38). Another gap identified by Dobney that this research fills is the lack of knowledge with regards to economic changes from the third century on (2001: 43). The late boom of activity at Ashton provides an ideal sample for considering how sites beyond the major urban centres adapted in the shift between Roman imperial control and the domination of Anglo-Saxon leadership.

Beyond pure zooarchaeology, there is also a call for interdisciplinary approaches to the understanding of food, small towns, and life in Roman Britain. Animals are too often considered only as economic food productions, and a more detailed look at the individual traits and uses of animals will provide a more nuanced look at animal husbandry practices. Twiss also emphasises the need to move beyond an economic view of food, towards a view that considers symbology and social meanings (2007: 4-5).

Ashton is a key site for filling in the gaps in our knowledge about the roles of nucleated settlements in Roman Britain (Taylor and Flitcroft 2004: 70). Few other towns have such extensive excavation in the core of their site, and the dataset from Ashton is large enough to provide excellent insight into how small towns functioned (Taylor and Flitcroft 2004: 70). Questions about the role of sites like Ashton in the “follow-on” processing of meat and animal products have been raised in the justification for further analysis of the faunal remains developed by the Northamptonshire archaeological unit (Northamptonshire County Council n.d.). This thesis also seeks to answer the other research questions brought up by the unit, including the extent of the small town’s effects on the rural hinterland, evidence for change over time including breed improvement, and spatial patterning of activity. With the excellent record of comparative information from nearby sites such as Higham Ferrers or Orton Hall Farm, it is clear that this site is ideal for the exploration of these key research questions, despite a current lack of a detailed regional synthesis of agricultural activity (Taylor and Flitcroft 2004: 74; Taylor 2000: 5).

1.2 Key research questions

In order to explore the nature of human-animal interactions at Ashton, the data were used to answer a few key questions about the remains and the site. From the factors that contributed to an animal’s presence to the factors that resulted in its deposition and eventual recovery, many considerations were taken into account to describe the fauna from Ashton.

Research Aims

(1) How do patterns of animal deposition change over the occupation history of the site? How does this relate to the production and consumption of animal remains?

(2) Can spatial patterns be identified in animal deposition across the site? Are there identifiable areas of higher status or specialised activity?

(3) How did Ashton's place in the economic and social hierarchy of the region affect the way the inhabitants interacted with animals and animal products?

(4) How did the people of Roman Ashton experience the animals around them, and how were they utilized for social, economic, and other purposes?

Answering these questions required the detailed analysis of the animal bone assemblage from Ashton. By recording a wide suite of zooarchaeological categories such as taxon, element, zoning, side, weathering, biometrics, and the presence or absence of gnawing, burning, and butchery marks, data were generated that allowed additional derived measures to be calculated in order to quantify the material. Only data with solid contextual information was analysed. In addition to the primary data collection, comparative material from specific sites in the region and collections of data from the Animal Bone Evidence for Central England project (Albarella and Pirnie 2008) were used to compare the material from Ashton with its wider regional context.

Having outlined the aims and objectives of the thesis (Chapter 1), the research context for small towns, Ashton and its regional context, and the analysis of animal bone as a means for understanding human practice is examined (Chapter 2). The materials and methodologies utilized are also detailed in order to be as transparent as possible in regards to how data was collected and quantified (Chapter 3). The bulk of these analyses are presented in the chapter on temporal change for all taxa (Chapter 4) and the spatial patterning of animal bone assemblages (Chapter 5). Comparative analysis was then conducted (Chapter 7), followed by discussion of the key findings (Chapter 8).

Although caveats exist for the use of animal bone data, as will be discussed below, it is still a key resource in understanding one of the fundamental aspects of life for people in every time period. The human relationship with animals informs us about how they conceived of their world and their place within it, and the uses to which they put these animals, whether concrete or abstract, shaped the nature of settlements such as

Ashton as much as Roman roads or river courses. They highlight key themes of simultaneous aspects continuity and change, as well as the fundamental contribution of animals to human social and economic structures.

2 Research Context

This thesis aims to draw together several separate areas of research. Although a great deal of scholarship has been produced on the subjects of animal husbandry in Roman Britain, the study of small towns, and theories of identity, the incorporation of all of these will be crucial to the understanding of how the people in Ashton lived and interacted with the animals in their lives.

2.1 Animals and Animal Husbandry in the Roman World

Farming was an integral part of life for most people in the Roman empire. The most ample evidence for how this was carried out in Roman Britain comes from the archaeological remains, although a brief consideration of some key written sources gives us an idea of the colloquial wisdom of the time.

2.1.1 Classical Sources

One of the most useful sources for studying the agriculture of the Roman world from a historical perspective is White's 1970 book, *Roman Farming*. It presents an excellent overview of Roman authors writing on agriculture, both directly and indirectly, and sums up their general conclusions in various fields of agriculture.

The first of the key authors of agricultural works that White identifies is the Cato the Elder, who wrote *De Agri Cultura* in the mid-2nd century BC (White 1970:19). His focus on managing the large estates of the landed aristocracy makes his work less than useful for considering Romano-British farms and villas, where the same social structures were not in operation (White 1970: 20). Varro, writing in the mid-1st century BC is similarly problematic for use here, as his work, *De Re Rustica*, also focuses on aristocratic estate farming (White 1970: 21). The most applicable writer is probably the first century author Columella. His *De Re Rustica* set out best practice for farmers in the areas of both plant and animal husbandry, as well as detailing how to manage estates and employees (White 1970: 26). Although these authors were writing their treatises

Before Ashton was founded, and they were largely written for an aristocratic audience, they are our only illustration of a "best practice guide" for the Roman World. Although they are not directly applicable, some of the information contained therein can be useful for interpreting certain patterns.

Direct mentions of animals and farming in Roman Britain are less common. Caesar briefly mentions the dietary habits of the Britons in his Gallic War, although his purpose was likely to depict coastal “sowers of corn” as being far more civilised and thus worthy of alliances than inland people who “live on milk and flesh, and are clad with skins” (Caes. Gal. 5.14). It is unlikely that this dichotomy between cereal agriculturalists and herders actually existed (Albarella 2007: 390). More usefully, Caesar mentions that Iron Age people did not commonly eat domestic fowl, geese, or hares, although they occasionally kept them in captivity; this fits with evidence for the consumption of these animals, especially domestic chicken, becoming much more common after Roman conquest (Caes. Gal. 5.12). Strabo’s *Geographia* is also useful in its mention of Britain’s key exports in the 1st century BC: grain, cattle, hides, and hunting dogs (Geo. 4.5.4).

Although these authors give us some idea of the thinking on animals and animal husbandry in the Roman world, scholars must remain skeptical when considering how these sources applied to actual practice of farming in Roman Britain, which significantly differed from the Italian audience of these texts in terms of social structure, climate, traditions, and many other aspects. Archaeology has generally shown that many sites maintained practices very similar to pre-Conquest Iron Age peoples, with change coming gradually; this suggests the durability of traditional farming wisdom native to the British Isles (Grant 1989; 2004). The fact that farming practices seem to revert to a pattern similar to the Iron Age after the end of the Roman period has led Holmes to suggest that farming in the Iron Age through to the early Anglo-Saxon period was mostly determined by the needs of self-sufficiency in comparison to taxation and requisition (2015: 123). The necessities of the soils, potential for grazing and overwintering animals, and other landscape factors surely would have affected the average Romano-British farmer more than the texts of Columella.

2.1.2 Animal Husbandry Practices in Roman Britain

The study of animal husbandry and consumption in Roman Britain has recently benefitted from a flowering of scholarship. Authors engage actively with theoretical debates in archaeology, and the importance of animal bone reports is increasingly recognised by other archaeologists. Several important syntheses have been produced in recent years that set forth new ideas about how the animal economies and human-animal relationships in Roman Britain functioned.

Key Syntheses

When considering how animals were raised and used in Roman Britain, it is important to remember the complex web of factors that go into creating the practices and patterns of animal husbandry. Classical authors such as Varro emphasise the importance of combining animal and plant husbandry in particular, which is probably applicable to Romano-British practices (White 1970: 51). Annie Grant states this clearly in her review of faunal data from Roman Britain, suggesting that:

“Further research is required to establish whether the factors that had the most significant influence on the early development of Romano-British animal husbandry and meat consumption were the local environment, pre-existing traditions, the development of a market for animal products and distribution networks, social and economic status, food preferences, population migration, or new ideas and ideologies; all may have played a part.” (Grant 2004: 376)

Several overviews of animal husbandry and food in Roman Britain have been produced over the past three decades. Each takes a very different theoretical stance on food and farming in the province. The exploration of drivers of changing patterns in animal husbandry were explored by Anthony King in a series of articles, with alternatives presented by Annie Grant. In addition to these, overviews of animals as food are provided in two very different texts by Hilary Cool and Joan Alcock. These overviews were bolstered by examinations of the current state of the discipline, both for Roman Britain (Dobney 2001) and Roman zooarchaeology as a whole (MacKinnon 2007). Consideration of the themes from these key syntheses have contributed towards large and crucial projects that help examine the data from Roman Britain, such as Albarella and Pirnie’s Animal Bone Evidence From Central England project (2008) and the recent Rural Settlement of Roman Britain project (Allen et al. 2015).

With chapters and articles in 1984, 1999, and 2001, Tony King stressed the active role the army played on influencing British tastes and animal husbandry practices. King was mostly interested in changing practices from the Iron Age throughout the Roman period, and explores these changes by comparing the ratio of cattle, sheep, and pigs present on a variety of site types (see Figure 2-1). Although he did suggest that the increasing amount of cattle seen throughout the first century in Britain may be due to an increased need for plough animals, his later article stressed the transfer of Gallo-Germanic foodways via auxiliary army units as the key motivator for change (King

1984: 193; King 2001: 220). Although King was correct to reject all change as a result of Roman dietary preference necessitating a comparison with Italian practices, there are several issues with his interpretation of the data. He focused mostly on status-relations and site types, but did not consider the important effects of secondary product usage, ease of preservation, ecology, and regionality within provinces. Furthermore, Grant pointed out that using cattle percentages as a measure Italian or Germanic preferences is complicated by the fact that over half of sites he listed as “unromanised” also feature cattle as the most common animal (Grant 1989: 139).

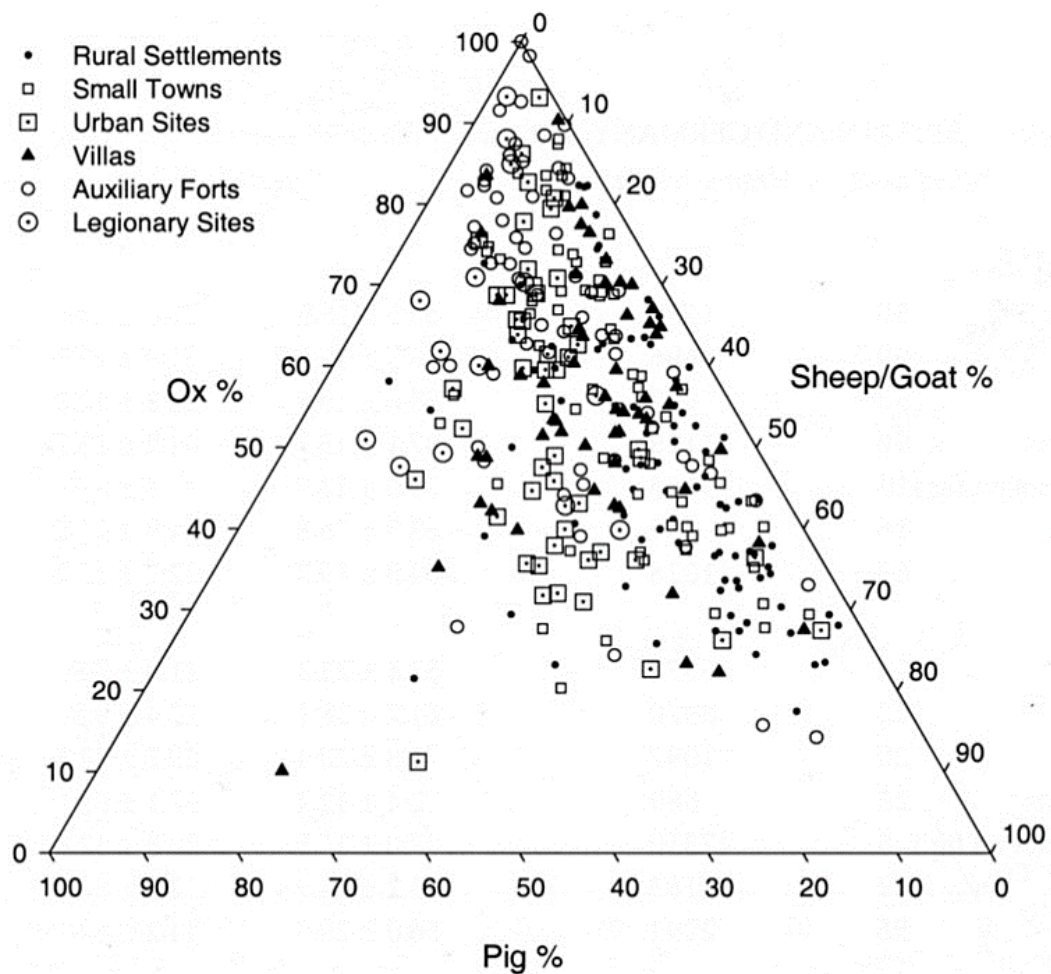


Figure 2-1- Ratio of Major Domesticates by Site Type (King 1999, Fig. 9, pp. 179)

King’s other key contribution to the study of Romano-British zooarchaeology was his popularisation of the triplot graph. This allows the comparison of three different groups in visual space. The graph is read by looking at the relative spacing of data points. Data towards the top of the triangle are read as almost entirely cattle, in the lower right corner as almost entirely sheep/goat, and in the lower left corner as almost entirely pig. Balanced sites will hover in the middle. King’s triplot of animal

distribution by site type illustrates the main trends in representation (1999:179, see Figure 2-1). There is a great deal of variation, but those with the highest pig numbers, the datapoints farthest to the left, tend to be from military or urban sites. Rural settlements more commonly have higher sheep number than the urban sites, as seen by the greater number of dark filled circles along the axis for sheep along the right side of the graph. Although this only looks at site type, triplots are useful for examining temporal as well as spatial change, and can be used for many different species.

Other important summations of Romano-British zooarchaeology were compiled by Annie Grant (1989; 2004). Grant's work tends to focus more on the complicating factors that contribute to patterns of animal husbandry. She stresses the increasing presence of foods such as fish, oysters and other shellfish, and chickens in examining the differences between various settlement types, as well as paying closer attention to patterns of age at slaughter (Grant 2004 377-378). Her work focuses largely on agricultural practices and the many uses of key animal species, rather than on animals as food items.

Syntheses on animals as food items in Roman Britain were compiled by Hilary Cool (*Eating and Drinking in Roman Britain*, 2006) and Joan Alcock (*Food in Roman Britain*, 2001), although each took a drastically different approach. Both authors put meat and other animal food products in context with plant foods and dining practices. Less emphasis was placed on tracing patterns over time with and across different settlement types with archaeological data, relying instead on the previous work done by scholars like King to illustrate broad patterns of change. Alcock was more reliant on depictions of animals and animal husbandry in ancient art, inscriptions, and reliefs for information about their use, whereas Cool more explicitly referenced faunal studies.

The present study will build on the data and interpretations amassed by the above authors in order to situate Ashton within the larger context of Romano-British diet and farming. Consideration of the various hypotheses for dietary change set forward by the authors, especially King and Grant, will be especially useful in examining change over time at Ashton, as it is neither a major urban centre nor wholly agricultural, and thus does not fit neatly into the definitions used in these models.

Changing Practices Over Time

Much research has focused on periods of transition in British diet. An obvious period of change is the transition from the Late Pre-Roman Iron Age, in which some

people had indirect contact with goods and ideas from the Roman world, to the Roman era, when full-scale military occupation created significant changes for Britain's inhabitants. However, change also occurred on various levels throughout the following four centuries of Roman occupation, with major shifts being seen in the Late Roman period in particular.

Albarella has referred to the Iron Age-Roman transition as "the end of the Sheep Age" (Albarella 2007: 397). King also noted the pattern of shifting emphasis from sheep to cattle (King 1984), although Albarella suggests a different suite of potential causes for this change. He cites the reorganisation of farming and ploughing and demand for quick meat supplies in addition to cultural preferences as possible motivators (Albarella 2007: 391). Another pattern to be examined is the general increase of imported foodstuffs during the Roman period (UA07 391).

The other most commonly cited change between these two periods is the shift seen in Roman urban and military assemblages towards butchery using large cleavers to chop through bones rather than the Iron Age and rural Roman pattern of careful disarticulation using knives (Maltby 2007: pp; Cool 2006: 89). Even at larger Iron Age sites, animals tended to be processed using knives rather than cleavers, suggesting that the change in butchery was not simply a shift in necessities of feeding large sites but a change in cultural practice (Hambleton 2008: 53). During the Roman period, increased meat production for urban markets was a key consideration, and often had several distinctive features, such as punched holes in scapulae for hanging meat, or specific portions of bone that tend to be shaved off by cleavers (Maltby 2007:59).

The Later Roman period also sees interesting shifts in diet. Evidence of increasing wild game in deposits has led some authors to speculate that this might be a sign of economic hardship (Grant 1989: 144). A general trend towards older ages-at-slaughter for sheep suggests either a changing taste for older mutton or an increasing focus on wool and other secondary products (Cool 2006: 87). King suggests a migration of dietary patterns toward a high pig, low sheep ratio that intensifies over time (King 1984: 193). As the fifth century begins, the animal patterns appear to revert back toward a pattern reminiscent of the Iron Age, with less emphasis on cattle and pigs; this is likely due to the collapse of the taxation system and the need for extensive surplus production (Holmes 2014: 10-12).

2.1.3 Animals in Roman Britain

Romano-British assemblages often return a wide variety of species, but the most common are cattle, sheep and goats, and pigs. Subsequently, the ratio of cattle to sheep to pigs receives the most attention in the literature, and it is clear that these three were the main focus on animal husbandry on most sites. The Ashton assemblage contained a range of wild and domesticated species, including waste of animals that were eaten, animals that served other functions in the lives of people, and animals whose presence is incidental to any human activity.

Cattle

Cattle have been an important part of British life since the Neolithic. Especially by the Late Roman period, a high percentage of cattle was very common for most sites (Murphy et al. 2000: 37). Cattle can be extremely productive animals, and can be used for both secondary products and important tasks in addition to meat.

Keeping a herd of live cattle into maturity could be quite valuable. Traction was one of their main uses in the Roman period, and some show arthropathies related to the strain of ploughing (Grant 2004: 376; Cool 2006: 85; Bartosiewicz et al. 1997: 11). Live cattle also produced manure, which could be used to enrich the soil (Cool 2006: 69, White 1970: 127). Although this manure was not as rich in nitrogen and phosphorus as that of other animals, cows could certainly produce a great deal of it (White 1970: 127). Milk was also a potential product, but the general pattern of age-at-slaughter and herd composition at most sites don't match well with dairying, which usually requires a large number of male calves slaughtered at a very young age to free up their mothers to be milked (Cool 2006: 93). Pliny the Elder suggests that the main purpose of cows' milk was medicinal, except where pasture was especially luxurious; this attitude may have extended to British practice as well (White 1970: 277).

Meat was probably the key food product gained directly from cattle, with culling likely if sufficient fodder for winter could not be gained (Alcock 2001: 33). Once cattle reached the end of their working life, many products in addition to be meat could be gained from their bodies. Cattle skins could be tanned into leather, which was in high demand by the army in particular (Alcock 2001: 33). Bone and horn would also have been worked, especially in the suburban areas of towns (Grant 2004: 380). Bone marrow and grease gained from boiling down the bones could also be transformed into useful products (Cool 2006: 91). Marrow could either be eaten or made into a poultice,

which was believed to “relieve weariness” (Cool 2006: 91; Alcock 2001: 37). The practice of splitting bones for marrow was much more common on urban sites than in rural areas, and might have been processed in considerable quantity (Maltby 2007: 67).

The age-at-slaughter data for cattle reflected their usefulness as live, working animals. Animals on most sites were largely slaughtered when they were four years old or older, compared to the modern standard which slaughters beef cattle at around eighteen to twenty-four months (Cool 2006: 85). Rural sites tended to have a wider range of ages, which fits with a pattern of on-site husbandry and selective culling (Cool 2006: 86). Veal, from calves less than six months old, was especially rare, although whether this was due to the necessity of using animals before slaughter, taphonomic variables such as the fragility of juvenile bone, or differential processing is difficult to determine (Cool 2006: 86).

Urban processing of cattle has received a great deal of attention in the literature (eg: Maltby 2007; Seetah 2005). In these larger settlements, specialist butchers and slaughterers created a very distinctive pattern of butchery marks and large dumps of primary butchery waste (Cool 2006: 85; Maltby 2007: 60). Maltby identified the three key butchery mark indicators of this organised butchery style as consisting of superficial blade marks on shafts of upper limb bones, long bones split axially, and metapodials split transversely (Maltby 2007: 59). There was some disagreement to how these cattle were processed. A Roman relief found in Italy showed animals hanging from the ceiling to be processed, but Alcock stated that cattle were more likely butchered flat on a table instead of being suspended (Alcock 2001: 37). Seetah disagreed, having done experimental work that suggested processing meat that had been hung was much more efficient (Seetah 2006: 27). Even if it was not butchered while hanging, elevation would have been necessary to drain the carcass of blood before butchery (Alcock 2001: 38).

The question of where this well-organised supply of cows came from is an important one for understanding relationships between town and country. A passage from the New Testament suggested that it was not uncommon for meat from sacrifices to be sold in butcher shops (Alcock 2001: 39). A relief from the Antonine Wall also showed cattle being dispatched for sacrifice using a poleaxe, suggesting that consumption of meat after a ritual was not uncommon (Alcock 2001: 39). However, the demand for meat in these lucrative urban markets would have far outstripped the supply from sacrifices, and Seetah proposed that this demand may have eroded the symbolic

significance of cows, leading people to view them as more of a commodity (2005: 5). He speculated that the cattle seen in these urban butchery deposits might have been specially raised as meat-producers, and thus might not be representative of the cattle raised in the countryside (2005: 4).

The increasing demand for cattle in all their various capacities spurred a great deal of change over the Roman period in Britain. Celtic shorthorns were the most common species identified at Vindolanda, and some of them were extremely large (Albarella 2007: 397). Large animals were capable of providing more meat and traction power, but at the cost of being less hardy and more expensive to keep (Albarella 2007: 397). Castration had been practiced in Britain since the Iron Age in order to create large individuals to pull ploughs (Seetah 2005: 4). There is considerable debate amongst scholars as to whether the size increase observed during the Roman period was due to selective breeding for large draught oxen or to the importation of larger stock from the continent (Albarella 2007: 398). After exploring the pattern of cattle measurements at Great Holts Farm in Essex, the authors suggested that comparing the incidence of very large cattle to areas with clay soils requiring heavier traction could be a useful line of inquiry (Murphy et al. 2000: 45). A few sites existed where imports were almost definitely present, including Bancroft, Owslebury, Elms Farm (Heybridge) in the Early Roman Period and Great Holts Farm in the 3rd century AD (Albarella 2007: 397; Murphy et al. 2000: 38-9). Very large cattle bones from the Ashton materials encouraged a closer examination of this phenomenon.

Sheep and Goats

As their bones are very difficult to distinguish, sheep and goats are here considered together (see Section 3.4.1 below). Furthermore, sheep are much more commonly used for meat than goats, and thus many authors often refer to the entire category of “sheep-goats” simply as “sheep” (Cool 2006: 87). Sheep were usually fairly small, although the Romans introduced some larger breeds (Cool 2006: 88). Alcock described these Roman breeds as being closest to today’s Hebridean and Soay sheep (Alcock 2001: 40). Goats were present in small numbers, but were largely used for secondary products such as leather and milk (Cool 2006: 87).

The Roman authors described a similar pattern of heavy secondary product exploitation for sheep, with White concluding that wool was of the greatest importance, followed by dairying, and then meat. When this is compared to the archaeological data

from Britain, it does not seem that wool had the same importance in British sheep husbandry (Gidney 2000: 171). Wool was certainly being produced in Roman Britain; there is a mention of a wool cloak called a *byrrhus* being worth 6000 *denarii* (Alcock 2001: 34). The Vindolanda tablets also expressed a preference for hairy, medium wools, which contrasted the Roman preference for softer wools (Alcock 2001: 34; White 1970 303). Roman authors also believed that the best wool came from breeds originating from drier regions (White 1970: 206).

Milk was also a key product. Goats were not often eaten as adults, and thus when adults were present, they were likely to represent animals kept for their milk (Cool 2006: 94). Classical authors agreed that goat milk was the most valuable dairy product when compared to milk from sheep and cattle (White 1970: 313). Sheep milk may have increased in importance during the later Roman period, when an increase in the age-at-slaughter can be seen (Cool 2006: 94). The recovery of objects interpreted as cheese presses and strainers indicate the extent of this practice (Cool 2006: 96). Not only was the milk of these animals used in cheese-making, but rennet from the stomach of lambs was also used as a thickening agent (Gidney 2000 170). Like cattle, herds of sheep and goats could also produce manure for the fields; goat manure was especially lauded by the agricultural writers of the time (White 1970: 128).

Meat, bone, and horn could also be used after slaughter. Most urban and rural sites in Roman Britain slaughtered sheep for their meat at less than two years of age, although this pattern shifted toward older sheep beginning in the 3rd century AD (Cool 2006: 88). Although it is tempting to project our modern tastes for lamb onto Romano-British people and accord mutton lower status, taste preferences for sheep meat has changed significantly between different periods of time (Cool 2006: 87). Neonatal sheep appeared occasionally in smaller towns; this might be evidence for breeding in the hinterlands (Grant 2004: 380). Very young sheep and goats were also common sacrifices, as seen at Uley (Cool 2006: 87).

Pigs

The third common domesticated food animal kept in Roman Britain was the pig. Unlike cattle and sheep, pigs have fewer useful secondary products to be gained during the pig's lifetime. Columella recommended castrating male pigs at around six months in order to make them grow fat (Col VII.IX.4). Most pigs were slaughtered around prime meat age, which is reached at twelve to eighteen months (Cool 2006: 88). Suckling pig

was considered a delicacy, and Columella recommended that anyone raising pigs in the vicinity of a market should sell off at least half the litter for this delicacy in order to maximise profits and free up more milk to fatten the other piglets (Col. VII.IV 3-4). This was not a common practice in Britain, as suckling pig usually only appears at high-status occupation sites, such as Fishbourne villa (Cool 2006: 88). Pigs are not utterly without uses beyond meat, however they can be used for bristle, brawn, pig skin, and other food products like sausage casings and lard (Alcock 2001: 34). The carcass of a dead pig is also more efficiently used than those of cattle and sheep; only a quarter is not used, compared to half for cattle and sheep (Cool 2006: 82).

Pigs are often cited as indicators of status, and tend to be more common on urban and military sites in Britain (Grant 2004: 373; King 1999: 189). Although its status seems clear, we must also keep in mind other characteristics of pigs that make it more likely to appear in urban and military assemblages. Pigs are easy to rear in cities, and sources from Roman Italy mention them as being kept even by the poor due to pigs' capacity to forage and live off scraps (Grant 2004: 379; White 1970: 316). Age profiles can be used to examine breeding in towns. While neonatal pig bones from Lincoln, Silchester, and Dorchester did suggest some degree of in-town pig breeding, many other sites have an age profile restricted to prime meat-age animals, which meant they were being imported from the countryside (Grant 2004: 379). Two key characteristics that make pork a useful source of protein for demanding markets are their fecundity and the ease of preservation. Sows can produce litters of up to twelve piglets, and selling these off early can free up the mother to produce two litters in a year (White 1970: 317). This creates a quick-growing, productive source of meat for settlements that need a great deal of meat in a short amount of time (Grant 2004: 373). The ease of preservation through techniques such as smoking and salting also makes it an ideal food to be traded or sent over long distances, although if this was transported off the bone, it would not be archaeologically visible (Grant 2004: 374).

Horses, Donkeys, and Mules

After cattle, sheep, and pigs, the most common animals on Roman sites in Britain tend to be equids. Again, distinction between species is quite difficult (see Section 3.4.1, below). However, these animals served quite different purposes for Romano-British people.

Horses were not usually eaten, although they occasionally display butchery marks (Cool 2006: 91). They were generally between 138 and 154 centimetres tall at the shoulder, which ranges from the size of a modern large pony to a medium horse (Johnstone 2004: 74). Little work has been conducted on Romano-British horse breeds, but they are notably larger than Late Iron Age horses (Johnstone 2004: 73). Classical authors often cite Eastern and Spanish breeds as being the swiftest and most prized (White 1970: 289). In the Roman world, horses were largely used for riding rather than traction, although ponies were commonly employed in army baggage trains (Johnstone 2004: 49). Racing horses were especially prestigious (White 1970: 288). The *cursus publicus*, connecting the various points of the province made use of many horses as well (Johnstone 2004: 60).

Horses seem to have special ritual significance. They were commonly found in wells, bogs, and other watery votive deposits in addition to “foundation deposits” beneath temples, buildings, and roads (Johnstone 2004: 83-4). Horses were also associated with some human burials in Roman Britain, indicating both the importance of the species and possible connections with horse-related deities (Johnstone 2005: 85).

In addition to horses, donkeys and mules were widely utilised in the Roman world. Their capacity to pull heavy loads was exploited in plowing and working in mills (White 1970 293-94). They were usually castrated to make them more docile, except in the case of breeding donkeys (Johnstone 2004: 71). In Rome, breeding mules was a lucrative business, and thus Varro and Columella expound at length on the various points of mule-breeding (White 1970: 294). Mules were produced both by crossing mares with jack-asses, which created larger offspring, as well as by crossing stallions with jennies (White 1970: 294; Johnstone 2004: 65). In the city of Rome, mules were used to pull vehicles more often than horses (White 1970: 300); they were also occasionally ridden (Johnstone 2008: 129).

Domestic Birds

Domestic birds were raised in Roman Britain, the most common of which is the chicken; however some animals may simply have been tamed or caught from the wild (Cool 2008: 99). The domestic chicken was introduced to Britain during the Iron Age, but it was not commonly eaten until the Roman period (Parker 1988: 202). It is often considered an indicator of status, as it often appears in association with high-status sites such as the officer’s residence which also contained a great deal of pork (Cool 2006:

100). Apicius wrote several recipes for chicken, featuring various sauces (Alcock 2001: 45). Despite this link with status, chicken is usually present in some

Chicken bones are also commonly found in association with graves, perhaps as part of a funeral meal or offering for the deceased (Cool 2006: 101). This connection may arise from the fact that cockerels were sacred to Mercury, who was believed to have accompanied the soul after death (Cool 2006: 101).

Geese were probably bred on Romano-British farms, and both Varro and Columella give instructions on the breeding and raising of geese (Albarella 2005: 253). Keeping geese in captivity allowed for the easier collection of eggs and down feathers, as well as exploiting the animals for their fat and livers (Albarella 2005: 253). As with today's, geese were overfed in order to produce an extremely fatty liver, which was considered a delicacy (Albarella 2005: 253). Columella and Pliny also note the usefulness of geese as guards, citing the famous legend of the Capitoline geese warning of an attack on Rome (Albarella 2005: 253).

Although domestic ducks might have been kept in some parts of the Roman empire, there is little evidence for duck breeding in Britain (Albarella 2005: 254-55). Although ducks bones tend to be more common on many sites than the bones of geese, these more likely represent wild ducks (Albarella 2005: 255). For both ducks and geese, it is very difficult to separate wild from domestic species (see Section 0 below), which contributes to the difficulty in identifying husbandry practices for these birds (Albarella 2005: 249; Barnes et al. 1998: 280-1).

Some wild birds were hand-raised, such as doves kept in columbaria (Alcock 2001: 46). There is also some suggestion that the pheasants found at Fishbourne might have been imported and reared purposefully for the villa (Alcock 2001: 46). The domestic pigeon was known in Roman Britain, although it likely interbred with wild birds, and no specific housing for these animals has ever been located (Parker 1988: 203).

Dogs

The domestic dog was a common animal on many Romano-British sites, and although they were not often found in great numbers in contexts containing mostly food waste, they were nonetheless an important part of peoples' lives (Smith 2006: 1). Dogs served many familiar purposes during the Roman period: as guard dogs, herders, and as companion animals (Smith 2006: 14). However, their function as rat-catchers, urban

scavengers, and a source for skins and meat is less familiar (Smith 2006: 14). Dogs were rarely eaten during the Roman period, but their skins were occasionally used, as seen in a 2nd-century AD child's burial containing a dog-skin blanket (Smith 2006: 14). In addition to being used for leather, there is also evidence from Wroxeter that dog faeces were collected and used to soften leather during the tanning process (Smith 2006: 14).

Romano-British dogs came in all shapes and sizes, ranging from small "toy dogs" about 230mm at the shoulder up to large dogs up to 720mm at the shoulder (Cram 2000: 172). Larger dogs become more common over time, but the largest of these may in fact have been wolves (Smith 2006: 1; Cram 2000: 173). The Romans may have introduced lapdogs to Britain, as they appeared in the Late Pre-Roman Iron Age alongside other Roman imports (Cram 2000: 171). Classical sources highlighted the fame of British hunting dogs, with one mentioning an "Agassian" breed in the 3rd century AD (Alcock 2001: 41). These various uses and special relationships created a unique role for the dog in human society. Dogs were commonly found in ritual deposits, especially wells, shafts, pits, and other sacred "entryways" (Smith 2006: 16). Dogs were by far the most common domestic animal in Morris' study of Associated Bone Groups from the Roman period of Southern England (Morris 2011: 69).

Cats

Cats were also occasionally kept as companion animals, although their role as rodent-catchers was also important in an agricultural economy centred around grain (Alcock 2001: 44). First introduced in the last quarter of the 1st century BC, the nature of their relationship with humans was a highly variable one (O'Connor 1992: 110). Despite documentary evidence that states cats were kept as pets, there was little bone evidence for them from Romano-British deposits (O'Connor 1992: 110). Cats were sometimes also utilised for their skins, whether this was at the end of a companion's life or the cat represented unwanted vermin that could be made useful (O'Connor 1992: 112).

Hunting and Wild Game

From the artistic and documentary evidence available, hunting appears to have been a very popular pastime in Roman Britain (Cool 2006: 111). The remains of these hunts were less prevalent; wild game is often rare or absent on most types of site (Cool 2001: 111). This does not prevent motifs such as hunts for hare and deer using hounds

appearing on art objects such as Castorware pottery (Alcock 2001: 42). Cool described this as a pattern of “casual, opportunistic consumption” (Cool 2006: 115). She further speculated that this may represent a cultural taboo against eating wild animals, which belong more to the ritual sphere of life than economic spheres (Cool 2006: 117). This is echoed in work by Naomi Sykes, who notes that wild animals are more common in structured deposits or animal burial groups than their general representation would suggest (Sykes 2010: 23). Wild animal remains were slightly more common on military sites, perhaps due to the designation of *venatores* to bring in additional meat for the units (Cool 2006: 113).

Animals hunted include a wide range of mammals and birds. Wild boars were hunted both for food and sport, and were famed as formidable adversaries (Davies 1971: 128). Deer were also hunted in the Roman period, with red and roe deer being the most common (Alcock 2001: 43). Although previously believed to only have been introduced after the Norman conquest, the presence of fallow deer has been confirmed for at least two Roman period contexts from Britain (Sykes et al. 2011: 163). One of these sites is the spectacularly rich villa at Fishbourne, which might be continuing the Mediterranean Roman tradition of creating enclosed game parks for the elites to hunt in (White 1970; Sykes 2010: 31-2).

Wild birds were commonly hunted and eaten. The most common tended to be wild geese, wild ducks, and woodcocks (Parker 1988: 218). People in Roman Britain ate a whole range of wild birds, from the very small, like thrushes, to the very large, like cranes (Parker 1988: 202). Parker rightly cautioned scholars to be very careful in interpreting the bird bones from Romano-British sites, as tastes were very different from our own modern ideas about acceptable foods, and people often treated birds in highly variable ways (Parker 1988: 202). Some wild bird remains could be from urban scavengers; corvids would likely have been attracted to the waste produced in settlements (Cool 2005: 115; Parker 1988: 206). There is some speculation that ravens might have been kept as pets, as they are highly intelligent and are often found as whole skeletons, especially in ritual contexts (Cool 2005: 115). In addition to these purposes, wild birds were also exploited for their feathers; goose and eagle wings were occasionally used as brushes, and feathers could be used for various purposes such as quills or arrow fletching (Parker 88: 201). Therefore, the presence of only wing bones on a site may be evidence not of hunting, but the trade of feathers as commodities (Parker 1988: 201).

One of the more contentious groups of wild animals in Roman Britain are rabbits and hares. As previously mentioned, these animals often feature in hunt scenes, but whether the animals depicted are hares or rabbits is debatable. Mountain hares (*Lepus timidus*) were native to Britain, but genetics show that brown hares were introduced (Sykes 2010: 26). Like domestic chicken, the presence of hare bones increased in both the number of sites and the number of bones present on each site (Sykes 2010: 26). Sykes suggested that this could be due to the new introduction of brown hare, or simply a new trend of increased exploitation of existing hare populations (Sykes 2010: 26).

The presence of rabbit in Roman Britain is even more problematic. Many sites produced rabbit bones, but most are assumed to be intrusive (Sykes and Curl 2010: 119). There is limited evidence for rabbit from reliably Romano-British contexts at the Roman villa of Latimer (Buckinghamshire), Lynford (Norfolk), and Beddingham Villa (East Sussex (Sykes and Curl 2010: 119). These rabbits were as small as Mediterranean rabbits, and might have been imported in limited numbers and enclosed for elite hunting (Sykes and Curl 2010: 120; Sykes 2010: 29). *Leporaria*, enclosed parks for wild animals, were mentioned by several classical authors, including Columella (White 1970: 400; Col. IX.I.8). However, no documentary or definite structural evidence has been identified in Roman Britain (Sykes and Curl 2010: 121). Due to their limited presence and the fact that they disappear with the end of the Roman period, it is unlikely that rabbits ever became fully established in Britain until after the Norman conquest (Sykes and Curl 2010: 125). There was some suggestion that Whitehall villa in Northamptonshire might have had a Mediterranean-style *leporarium* given the large percentage of hare bones there (2.8%); Fishbourne villa had a similar percentage (3%) and may also have had imported rabbits and hares (Sykes 2010: 29).

Fish and Shellfish

Fish and shellfish remains are often glossed over in zooarchaeological syntheses, or are considered separately from the remains of mammals and birds. This is likely due to the lack of sieved deposits from Roman contexts (Cool 2006: 104). Intensive urban archaeology has produced an increasing number of sieved deposits, and fish have been identified on sites such as Leicester, Colchester, and London (Cool 2006: 105). These urban assemblages contain mostly freshwater or estuarine and inshore fish species, especially eel, roach, salmon, and trout (Cool 2006: 105). Cod and other large marine

fish are fairly rare, and usually only appear in high-status locations (Cool 2006: 106). Some fish bones may be the remains of imported barrels or amphorae of whole fish and fish sauce, as evidence of Spanish mackerel in Leicester suggests (Cool 2006: 105).

If fish is fairly rare, remains of oysters and other shellfish is common on many Romano-British sites. Britain was famous for its oyster beds along the southern coast and the east coast near Essex and northern Kent, where both wild and cultivated oysters were harvested (Cool 2006: 107). Oysters can survive out of water for several weeks, and thus could be shipped inland easily (Cool 2006: 107). They are present on all types of sites, even the smallest rural settlements (Cool 2006: 108). Other species of shellfish eaten include mussels, cockles, periwinkles, whelks, scallops, sea limpets, winkles, and carpet shells (Alcock 2001: 54).

Incidental Species

In addition to animals intentionally deposited by humans as burials or rubbish disposal, some bones from archaeological assemblages result from intrusive animals that enter contexts at all points in their taphonomic history, from when they were still forming to the present day. These intrusive animals can significantly disturb archaeological remains, as is the case with burrowing. However, animals present in sealed deposits dating to the Roman period can provide clues about the ancient environment and ecology of the area.

Small animals are particularly susceptible to being caught in pits and other deep features (for a detailed analysis, see Feider 2008). The sieved contexts from the wells at Ashton have so far revealed a great deal of amphibian bone, as well as a less prevalent but significant amount of rodent bones. Special caution will be taken with the rodent bones, as Romano-British sites have been known to produce edible dormice (Alcock 2001: 44). As dormice spend most of their time above ground, they are less likely than other mice to be caught in pit traps, and thus the species distinction is important for determining how the animals entered the deposit (Feider 2008: 10). Additionally, Feider predicts that shrews and voles are more likely to be incidental victims of pitfalls than mice, which is borne out by the evidence of small bones from the Ashton wells so far (Feider 2008: 33). Frogs and toads have been found in Roman contexts on several sites, and Alcock suggests that they may have been eaten (Alcock 2001: 44). However, frogs and toads are incredibly susceptible to pitfalls and often have great difficulty getting out

again; waterlogged areas with a great deal of small insects buzzing around must have been particularly attractive for these species (Feider 2008: 11).

2.1.4 Conclusions

Understanding the relative prevalence and importance of animals across Roman Britain in general is a crucial foundation for discerning patterns at Ashton. Although one cannot entirely trust general convention when separating species that were probably eaten from those that were likely present on the site for other purposes, knowledge of standard practices for the time period helps shape interpretations.

2.2 Food, Identity, and the Experience of Animals in Roman Britain

Although many scholars consider people in the Roman world as eating mainly cereals and other plant products, meat was nevertheless an important component of the diet. How people eat has long been recognised as a crucial part of their belonging to social groups or expressing their identity.

Using identity as a tool for the interpretation of assemblages is a growing trend in Roman and other archaeologies. Although much of the literature was dominated by ideas of Romanisation since the 19th century, scholars are now seeking new paradigms with which to examine the interactions between different groups of people during the Roman period in Britain. With more data, refined recording techniques, and new analyses, we are able to better understand the complex drivers behind behaviour in Roman Britain. Romanisation seeks to explain change as the result of direct and passive Roman coercion, with most attention paid to the presence or absence of decidedly “Roman” signatures (Mattingly 2011: 38). It often places a positive value on what is Roman, and assumes that all people in the past would have desired the signifiers of this identity; however, Hingley rightly points out that this is a problematic assumption (1996: 44). The debate about whether to continue using the term in post-colonial discourse is still a matter of debate in arenas such as the Theoretical Roman Archaeology Conference, and we are gaining a more nuanced view of the changes occurring in Roman Britain without needing to fit them to a single paradigm (Hill 2001: 12). Constructs such as identity allow us to take a more nuanced view of the evidence.

The study of identity entails a wide variety of factors, and is often defined differently by individual scholars based on their research questions and areas of interest

(Diaz-Andreu and Lucy 2005: 1). Ethnicity seems to be the most common focus, but other aspects such as gender, nationalism, age, religion, class, and status are also common; a self-created identity can also be contrasted by the outside imposition of identity on a group (*ibid.*: 1). When Caesar labelled large groups of the British interior as barbaric tribes incapable of cereal agriculture, he was imposing a specific identity on those peoples (Caes. Gal. 5.14). This is also an excellent example of the fact that identities can be expressed for political reasons, and can have many complex motives.

Identity is created through everyday choices, and how individuals choose to express themselves through display and performance. It provides a link between material culture, which can be used, exchanged, or consumed in various ways and relationships between the people who interact with the material culture and each other (Diaz-Andreu and Lucy 2005: 6). In order to understand these relationships, it is important to understand the context of the assemblage, as Hodder noted that context is what provides objects with meaning, rather than objects possessing an inherent meaning that is evident to all (Diaz-Andreu and Lucy 2005: 6; Hawkes 2003: 49). As archaeologists cannot view past behaviours directly, we must use the archaeological record to deduce these behaviours, and the construct of identity provides a useful framework for disentangling these relationships.

2.2.1 Consumption and Identity

With its focus on the everyday choices of individuals at all levels of society, it is clear that using identity to examine foodways can be a useful construct (Twiss 2012: 13). Dietler describes food as “embodied material culture”, which is destroyed in the act of consumption and incorporated into oneself (2007: 222). Eating and other food-related activity is necessary for existence, and the repetitious nature of these activities reinforces the social importance of food (Twiss 2012: 25). Foodways tend to be highly conservative, probably due to the nostalgic sensory power of traditional foods and food practices (Twiss 2012: 24). Desire for these foods creates a set of values, which in turn drive consumption, which in turn drives production (Dietler 2007: 222).

Due to this inherent connection between food and identity, there has been considerable interest in the relationship, as explored in a conference at Carbondale, Illinois (*Archaeology of Food and Identity*, Twiss 2007) and a more recent paper summing up the relationships between food and social diversity (Twiss 2012).

Examinations of identity allow the incorporation of related studies in anthropology and sociology, which will also be used to explore the interactions between people and animals at Ashton.

2.2.2 The Complex Case of Roman Britain

For people living in Ashton during the Roman period, a number of factors would have combined to create certain dietary patterns. While King used theory based on *Romanisation* to explain differentiation in the faunal record of Roman Britain, new approaches are beginning to consider other potential causes using the various types of identity detailed by authors such as Twiss and Mattingly.

Many scholars examine food and identity in Roman Britain in a dichotomous way. This is a tempting train of thought, as identity is often expressed in terms of oppositions, to separate the “us” from the “them” (Hawkes 2003: 45). The most common set of dichotomies is the paradigm of Roman vs. Native, which is juxtaposed with the dichotomies of elite vs. non-elite and progress vs. continuity (Meadows 1997: 21). The idea of non-elite, native continuity creates a picture of the poor and unimportant as hardly being affected by the Roman conquest, unable and/or unwilling to participate in the changing practices and consumption that comes with the new administration (Hawkes 2003: 47). Although it is important to consider both availability and access as well as the desire for new goods and ideas, it is also important not to marginalise the actions of people simply because they are understudied and left behind less grand assemblages (Meadows 1997: 22).

Examining the experiences of these various groups of the archaeologically-disenfranchised is assisted with the application of theories of discrepant identity. Pioneered by Mattingly, the goal is to “get away from social groups and focus instead on locales of cultural consumption” (2004: 8). Aspects of discrepant identity in Roman Britain, such as the connections with the Roman military and civil administration are key for understanding the assemblage from Ashton, which was likely subject to practices such as requisitioning and taxation that would have affected animal consumption and use in the town (Mattingly 2011: 216). Exploitation and political context have been recognised as significant factors in the patterning of assemblages resulting from consumption (Dietler 2007: 222). Another useful aspect of identity for the Ashton data is the link between food and belief, which has been largely ignored in

modern research (Twiss 2012: 17). With the co-existence of Late Roman Christian and pagan ritual practices seen in the burials at Ashton, it would be interesting to explore possible patterning that might indicate different foodways practiced in different areas of the town. The role of ideology in food selection and animal use cannot be discounted, which is aided by the incorporation of theories from anthropology and sociology in addition to traditional archaeological approaches (Twiss 2012: 18; for examples of anthropological approaches, see Campana et al. (eds.) 2010).

2.3 Defining the Different: Animal Bone Groups, Structured Deposition, and Ritual

Animals are a crucial part of the structures that underpin not only day-to-day subsistence, but were also considered a part of the wider cosmos, which included supernatural powers and entities that could be appealed to through rituals. Animal sacrifice was an important part of Roman ritual practice, and a means of communication with the gods (Henig 1984: 115, 118). These practices often involved the slaughter of an animal, cooking and consumption of a part of it, and an offering of another part to the supernatural power or deity being invoked (*ibid.*: 118). At temples, these offerings were sometimes deposited in votive pits or presented on altars; deposition of remains likely created during ritual practices have also been identified at non-religious sites in Roman Britain (King 2005: 359).

In order to consider how data from Ashton might be used to make interpretations about the nature of ritual practice or structured deposition, it is important to unpack these terms and consider them in their theoretical and historical context. Interpretations suggesting ritual or structured deposition usually rely on the presence of Associated Bone Groups, or ABGs (Morris 2011: 1). The concept of whole or partially articulated animals as a phenomenon in zooarchaeology was thoroughly explored by Morris in a British Archaeological Reports publication following on from his thesis work (*ibid.*). Although referred to in this thesis as ABGs, following Morris' example, the terms 'special animal deposit' (Grant 1984) and 'associated' or 'articulated animal bone group' (Hill 1995) have also been utilized to describe the same concept (Morris 2011: 1). The term 'special deposit' is a tempting one to use, but it carries with it a value judgment. What looks special to an analyst in the present may be the result of unintentional practice or natural processes. The peculiar nature of complete and partially

complete animal skeletons has been noted by many scholars, particularly in terms of their involvement with structured deposition.

The term ‘structured deposition’ was first used by Richards and Thomas (1984) to examine the relationship between ritual activity and material culture in Neolithic-period Wessex. Subsequent works dealing with specific patterning of deposition and the potential for ritual activity all refer back to this study (eg: Hill 1995, 1996; Fulford 2001; Morris 2011; Garrow 2012). In a contribution to *Archaeological Dialogues*, Garrow fully unpacks the term ‘structured deposition’ with a critical consideration of the initial paper and its reception in the years since (2012). Originally, the term was used to help the authors identify ritual practice in the archaeological record, but Garrow and other authors rightly indicate that even everyday activities can demonstrate specific patterning (2012: 91; Hill 1996: 20). Hill, in particular, confronts the issue of casting ritual practice as necessarily opposed to more mundane activities such as the disposal of animal bone waste, and suggests that even everyday activities can be structured, as well as the fact that extremely well-preserved material will be better preserved and stand out in the archaeological record (1995: 96; 1996: 20). Thus, ritual activities are structured deposits, but not all structured deposits are necessarily ritual activities; this point is further emphasized by Morris when he discusses the interpretation of ABGs and the problems with assuming ritual nature based on structured patterning (2011: 152).

Garrow suggests that trying to make definitive statements about the intentions behind past practices is too fraught using archaeological evidence, and instead focuses on interpreting data in terms of looking at a spectrum between ‘odd deposits’ and ‘material cultural patterning’, which examines whether something labeled a ‘structured deposit’ represents a single occurrence of an unusual pattern or is a spatially distinctive pattern (2012: 94). He questions whether ‘symbolically rich’ objects were necessarily purposeful deposits (ibid.: 106-7). Animals are certainly ‘symbolically rich’, and were often considered to be valuable offerings for invoking the help of supernatural powers in Roman Britain, as mentioned above in King (2004). However, before any particular ritual intention can be ascribed to their deposition, the possibility that their final state was the result of natural taphonomic processes must be addressed. Morris suggests assuming a “biography” of individual ABGs and assemblages in order to consider the context carefully before applying blanket interpretations (2011: 167). Hence, taphonomic considerations will play an important role in interpreting the data from Ashton. Additionally, unique deposits will be examined against similar deposit types in

order to explore whether they represent something truly ‘odd’, or whether they are part of a wide pattern.

Throughout this work, I will refer to ‘structured deposits’ where distinctive deposition behaviour occurs. This may include the presence of rare species or associated bone groups; these represent phenomena distinct from the usual patterning seen on the site. The term itself was in fact developed to help interrogate the differences between wider patterning as opposed to distinctive occurrences. However, it must be remembered that life rarely works in dichotomies, but rather as a continuum.

Still, there is validity in considering ‘odd deposits’, as Garrow terms them (2012: 94). Repetitive patterning can be identified, such as the overrepresentation of species such as dogs in ABGs (Hill 1996: 18; Morris 2011: 130). Hill highlights Lewis’ concept of an ‘alerting quality’, something that is so clearly different from the material around it that we are driven to seek an explanation and provide another layer of interpretation (Lewis 1980: 20 in Hill 1996: 22). This quality was noted for several specific features at Ashton that contained distinctive animal bone deposits, and are discussed in Chapter 5.

Moving from the recognition of unique patternings in the animal bone assemblage to interpretations involving concepts such as ritual is very difficult, and must be made using all available contextual information. Ritual in archaeology has been an increasingly popular subject in the past decade or so (Oras 2013: 125). With the rise of post-processual theory, British archaeology has embraced ritual interpretation, perhaps uncritically in some cases (Garrow 2012: 92; Oras 2013: 125; Morris 2011: 165).

Ritual involves not only material objects and traces, but less tangible beliefs that affect how people behave (Insoll 2011: 2). However, beliefs can affect how people consciously and unconsciously go about activities that result in the deposition of animal bone. Just because something is part of a ritual practice does not mean it is not part of the wider economy; ceremonial events are often combined with material considerations such as consumption (Swenson 2015: 332). Hill also cautions against interpreting practices involving conscious expression of beliefs that may involve supernatural or divine power at odds with practices that are done out of habit; considering the ritual and mundane as overlapping categories allows for the most flexible interpretations of the archaeological record (1996: 24). Being able to test each example from the

archaeological record against each concept prevents limitation of our interpretations, which almost all the above authors caution against.

When dealing with such an endlessly complex subject capable of spanning such extremes, it is important to make explicit one's definitions and assumptions. For Hill, what is important is the irregularity of ritual behavior, the fact that it is done in a prescribed sequence, and its tendency to be performed on a large scale beyond the individual; however, he admits that this is his own personal definition and encourages others to form their own and make it explicit (1996: 26). Too often, 'ritual' is used as a vague blanket term for a large number of different processes, including feasting, sacrifices, offerings, and other ritual acts, especially in the interpretation of ABGs (Morris 2011: 165). Being clear about exactly how interpretations are formed and what evidence is used from them allows for a greater range of discussion.

Hill also suggests that ritual is fundamentally embedded in society, and thus a careful consideration of context will assist in interpretation. The necessity for basing inferences about ritual on context is echoed by Swenson, who suggests that what we should really be focusing on is the "material scaffolding sustaining the ritual process" (2015: 221). Thinking about variables such as the social structures that people operated within, the constraints of availability of certain species for different purposes, and the prevalent beliefs at various points in time will all assist in the interpretation of deposits when considering possible ritual dimensions. Thus, although similarities in deposition of ABGs may be identified between Iron Age and Romano-British contexts in the same area of Britain, the interpretations will depend on the varying social frameworks involved; furthermore, differential treatment of different animal taxa will add a further layer of consideration when drawing interpretations (Morris 2011: 149).

Studies such as the one by Fulford (2011) on distinctive patterns of deposition in wells and Woodward and Woodward's examination of how the placement of wells and the examination of the various artefact types contained within (2004) both provide excellent examples of how these concepts have been applied in work on Romano-British contexts. Although most of the work on ritual and structured deposition has been done by prehistorians, their discoveries and considerations of the terminology and baggage surrounding the concepts are useful going forward with work that can be assisted by iconography, critical consideration of ancient sources, and the rich material deposits of the Roman period (Morris 2011: 149; Hill 1996: 17-18).

2.4 Small Towns and Settlement Hierarchies

The third key consideration of this work moves beyond animals, husbandry, and consumption, and examines the context in which it occurs. The classification of site types is an important tool in comparing data from different sites in Roman Britain. However, the definition of those types is often contentious, especially the category of small towns.

Most sources agree that Ashton can be classified as a “small town,” but the question of what defines a small town and how they should be studied is heavily debated. Publications and conferences on these unique settlements, somewhere in between *civitas* capitals and small rural sites, present a variety of definitions, descriptions, and interpretations. Todd’s 1970 article in *Britannia* was the first to point out many of the issues in studying small towns, spurring interest for a conference on the subject in 1975 (Todd 1970; Rodwell and Rowley 1975). Since then, the definitive volume has been Burnham and Wachter’s *The ‘Small Towns’ of Roman Britain*, which highlights various classifications for small towns and a description for those identified at the time of publication (1990). Another conference in the 1990’s updated this research, discussing key issues yet to be solved in the study of this interesting settlement type (*Roman Small Towns in Eastern England*, Brown (ed.) 1995).

In Roman Britain, the wide diversity of sites is usually organised according to the type of settlement. When focusing on civilian populations, a hierarchy is often established, from the large urban areas of *civitas* capitals and *coloniae* down to humble rural settlements. Large, or “major” towns receive a great deal of attention, due to the recent surge of urban rescue archaeology, and small towns are only recently receiving more attention. The variation in small towns presents another complicating factor: the largest can cover areas larger than some “large towns” and the smallest can be smaller than “rural settlements” (Burnham and Wachter: 1990). Some, but not all, are enclosed in whole or in part by defences (*ibid.*). It is speculated that these settlements are also defined as being in between the consumer-dominated large towns and agriculturally self-efficient, producer-dominated rural settlements (*ibid.*: 45).

Non-urban sites are usually classified either as “rural sites” or “villas,” although the distinction is again quite difficult. Villas are usually identified by architectural grandeur and connections with Roman ideas and material culture, but this is not always the case (Condrón 1995: 103-4). Rural sites are often defined as “any non-villa rural site”, which mirrors the difficulty in separated “large” and “small” towns (Condrón

1995). Although clear categories are useful for organising discussion of various site types, it is perhaps better to consider sites as belonging to a continuous spectrum of settlement with varying levels of urbanisation, architectural aspirations, wealth, and status.

2.4.1 Terminology and Definitions

The first conference on small towns in 1975 recognised the variability and difficulty inherent in the term (Rodwell and Rowley 1975: 1). Millett in particular did not like the term “small” or “minor” town due to their tendency to overlap with either end of the urban/rural spectrum (Millett 1992: 143). Hodder preferred to look at what he termed “lesser walled towns,” defined as any town with walls that is not a *colonia* or *civitas* capital, an approach which marginalises undefended urban areas like Ashton (Hodder 1975: 67). Some sought to apply Roman terminology, but this is complicated by the lack of documentation we have for many small towns (Johnson 1975: 75). Although the town of Durobrivae is referred to as a “vicus” on a mortar stamp, this word also has various meanings, referring to settlements around forts, closed communities, areas inside large towns or households (Johnson 1975: 75). The nature of Durobrivae as a regional centre for trade independent of a fortress makes it very different from other *vici* attached to forts along Hadrian’s Wall; Roman grants of official status do not always equate to comparability. Using the term “small town” is perhaps the easiest, as it is the term utilised in most of the conferences and syntheses on the subject. The term will be used herein with the caveat that it remains highly variable and difficult to define..

Defining small towns is just as contentious as what to call them. In a previously historical-based approach focusing on the Antonine Itinerary, many smaller towns without legally-defined Roman status have been ignored (Burnham and Wachter 1990: 3; Millett 1995: 30). We must be wary of projecting our own attitudes of urbanity or the type of urbanity we are familiar with from studies of Mediterranean cities like Rome onto the sites from Roman Britain; Millett suggested that Italians coming to the province may not have recognised Romano-British small towns as towns at all (Millett 1992: 144). What is important was how the people of Roman Britain used these centres, as places for exchange of goods, collection of taxes, or nodes of communication with the wider world.

Burnham and Wachter used several characteristics to separate small and large towns, including legal status (importance of officially-inspired functions and buildings), functional capacity (level of economic specialisation versus agricultural activity, specialised functions), and morphological features (existence of an internal street network, central core or focus, range and diversity of building types, presence or absence of “Romanised” features, nature of defences) (1990: 6). The small town categories they created largely relied on the morphological features, such as the layout of streets and presence or defences (Burnham and Wachter 1990: 23-25). Burnham would later simplify this complicated categorisation into three new categories, as defined in Table 2-1 (Burnham 1995). Condrón seconded the need for this reorganisation of small town types in her paper from the same conference, for its increased emphasis on functional characteristics (Condrón 1995).

Small Town Type	Description
Upper Order	Have defences, a well-defined urban core, zonation, and a street network. Broad range of building types, industry, organised cemeteries.
Middle Order	Have specialised functions, but possess fewer of the above "urban" characteristics.
Lower Order	Lack defences, specialised functions, and sophisticated buildings. Very similar to large villages.

Table 2-1- Burnham (1995) Small Town Categories

These descriptions are more useful for categorising Ashton. It can be placed in a regional hierarchy with other small towns in the area. Larger settlements like Durobrivae and Towcester would both fit in this upper order; their differentiation of activity and occupation, public buildings, and defined intramural and extramural areas make them the largest centres for the Nene Valley region. Ashton’s position on this hierarchy varies over time. Although early on it is more of a large village, the quantity of iron production beginning from the late 2nd century hints at specialisation. This highlights the need to consider settlement change over time, as many sites in the region may shift from one category into another.

Still other scholars maintain a subtractive definition for small towns. Rodwell and Rowley defined them as what is left when a site cannot be defined as a colonia, municipia, civitas capital, villa, farmstead, or small village (Rodwell and Rowley 1975: 1). This “catch-all” nature is rightly pointed out by Millett as being highly problematic in our consideration of small towns (1995: 29). He preferred to classify site types based on their function as local and regional distribution centres, but where evidence of

material culture and recent excavation and survey are lacking, this can be difficult (Millett 1995: 29-30).

Millet's emphasis on the nature of urbanity as control of the distribution of resources has considerable merit. In order to be more than a village, small towns must be able to support non-agricultural specialists. However, the presence of these specialists will not necessarily involve differentiated social structures or physical structures. It is also difficult to assess the extent to which some of these settlements acted as market centres. What is more useful is perhaps to consider small towns in terms of the means of production and consumption, and the settlements' abilities to act as nodes of activity for the surrounding rural and urban areas. Definite connection to the means of trade and exchange, as seen through road systems, is also a key feature. These aspects are the most useful when defining the term "small town," and describing its differences from larger settlements. Perhaps Thomas Rust was correct when he stated in his thesis that it is probably good that there is no one definition for this site type, as they are amazingly complex settlements and the scholarly debate spurs continued interest in them; what is most important is being explicit about what you consider to be a small town (Rust 2006: 40).

2.4.2 *The Development of Small Towns in Roman Britain*

The origins and development of small towns are as diverse as their functions and morphology. Frere previously asserted that most small towns had military origins, and later amended this to include other official administrative activity as the impetus for foundation (Frere 1975: 7; Burnham and Wachter 1990: 7-8). Millett promoted the idea that most were the heirs of pre-existing Iron Age settlements and the native British response to Roman ideas of urbanism, although he himself later admitted that there were issues with widespread application of this idea (Millett 1995: 33). Yet another theory by Hodder posits that small towns cluster on the peripheral zones of larger centres, although this assumes that major centres came first and the small towns popped up later to fill the gaps; furthermore, his mathematical model failed to prove the superiority of any one theory over another (1975: 67). Here, Burnham and Wachter take the conciliatory route, and suggest the origins of small town vary by region, with developed lowland areas of considerable Iron Age settlement more likely to have complicated origins and the more heavily-militarised zones to the north and west most

often developing small towns around forts (1990: 9). The focus on this “overlap in influence” between Roman and traditional Iron Age ideas and patterns is useful for examining how these towns formed (Burnham and Wachter 1990: 9).

Many small towns show broad similarities in patterns of development, especially those in the region of southern and central England. The second century seems to be a general time of development, increases in roadside settlement, and economic incentives for industrial activity (Burnham 1995: 10; Burnham and Wachter 1990: 13). The replacement of timber buildings in stone is a common pattern during the second and third century, as is the construction of earthwork defences (Burnham 1995: 13). The growing prosperity may be due to increasing inter-provincial trade as trade with the continent decreased, indicating that wealth was being kept closer to home (Rust 2006: 98). The third and fourth century shows a pattern of continued prosperity and differentiation for most sites, with some gaining masonry defences (Burnham 1995: 13-4). Although some small towns show continuity into the Anglo-Saxon period, most were abandoned by the late fourth or early fifth century (Burnham 1995: 14).

The consideration of roads as creating foci for settlement can incorporate several of these theories. The military moved across Britain on a series of roads, with sites like Towcester being placed based on its position along Watling Street and another road to the southwest as well as its position along the River Tove (Burnham and Wachter 1990: 152). Settlements also formed along less influential droveways, but what allowed some of these to flourish was the formalisation of these routes and their connection to larger thoroughfares. Connection to larger towns and forts opened up the capacity for exchange of industrial products, which drove the development of larger, more complex settlements. When defining small towns and examining their development, perhaps the best method of categorisation is not simply to quantify them based on what is there, but why it is there.

2.4.3 Small Town Functions

Small towns served a variety of needs within the settlement hierarchy of Roman Britain. They could be administrative centres for smaller-scale government operations, including policing, tax-collection, and the maintenance of the *cursus publicus* (Burnham and Wachter 1990: 32-3). Those located along roads and other communications and trade networks also suggest their function in linking together various parts of the

province, as discussed above (Burnham and Wachter 1990: 39). Some have also been linked to religious or ritual functions, with the most focus here on sites such as Bath (Burnham and Wachter 1990: 40).

Most commonly, small town studies focus on economic features (Burnham and Wachter 1990: 43). Industrial activity such as leatherworking, ceramic production, and iron production is often observed in small towns (Burnham and Wachter 1990: 47). It is often assumed that they functioned as distribution centres and markets for the local rural population, but Condrón is critical of their influence (1995: 193). Her study of the diffusion of material culture and the presence of coinage in small towns suggested that itinerant merchants and tradesmen may have been the primary means of exchange for many rural people, and that small towns served a far more exclusive audience than previously believed (Condrón 1995: 193). However, this may simply highlight to the extractive nature of the Roman imperial economy, in which powerful entities were able to requisition resources from rural communities without an equal exchange of goods recognised as high-status.

Small towns are the sum of their production and consumption and the connections that drive these aspects. They are also the product of social cohesion and the willingness or necessity of groups of people coming together to live in close quarters and operate at a level beyond self-sufficiency. Through the examination of diet, architecture, material culture, and other aspects of the lives of these inhabitants, small towns can be better understood as one part of the net of settlement that stretched across the Roman province of Britain.

2.5 Conclusions

The development of methodologies and theories to study zooarchaeology and small towns has created an excellent foundation on which to build future research. Additionally, the potential to answer previously unexplored questions using the Ashton material abounds. The need for an increased focus on regional and temporal variation in understanding patterns of deposition and practice are directly applicable to this project, as two of the key objectives of this project are to use the well-stratified, comprehensively excavated assemblage to track changes over time and regional variations in the area.

The large sample sizes allow a close interrogation of how various taxa interacted with humans on the site, and how this compares to records from elsewhere in the province and with the classical sources and iconography. It is important to remember that people in Ashton and Roman-Britain as a whole not only would have seen many of these animals in their daily lives, but would have experienced representations of them in art, religion, and other contexts. Although we cannot know how people in the past felt about various animals, both as a collective and as individuals, we can examine animal bone depositions for information about how people treated animals and what effects they had on each other, spanning the continuum from the mundane realm of economics and subsistence to symbolic ritual transactions.

Ashton itself is also a unique opportunity for exploring both the structure of small towns in the Nene Valley and for using a well-documented assemblage from a thorough and complete excavation of a site to answer a wide variety of research questions with fewer limitations due to sample bias. The publication of this site has been called for in multiple research reviews of the area (Taylor 2000). Analysis and interpretation of the animal bone assemblage is one of the few outstanding portions of post-excavation analysis to be completed. Taylor's review of Roman Northamptonshire called for an increased emphasis on palaeoenvironmental analysis in order to better understand agricultural strategies and how they changed over time, which matches well with the aims and objectives of this project (Taylor 2000: 8).

3 Materials and Methods

3.1 Introduction

In order to address the questions set out in this thesis, the key body of evidence was the vertebrate bone from Ashton. Although shell and eggshell also provided information about environment and diet at the site, they were not considered in this study. In order to contextualise the animal bone data, an overview of the site and the nature of the bone collection are detailed. Additionally, all methods are explicitly laid out for the sake of comparison with other reports.

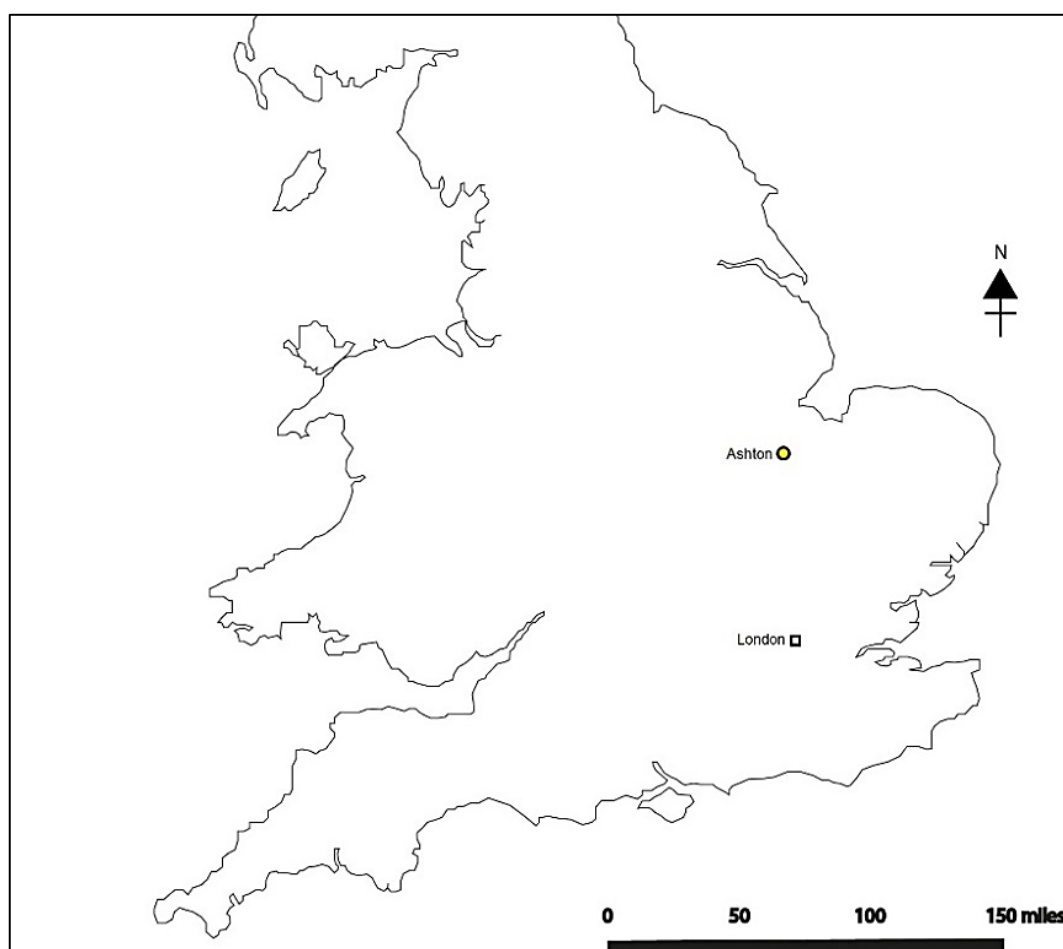


Figure 3-1: Location of Ashton in Britain, OS Grid Reference SP7649

3.2 Site Overview

Ashton is located in Northamptonshire, across the river Nene from the current town of Oundle (see position on Figure 3-1, Figure 3-2). It has been scheduled as an ancient monument, county no. 169 (Dix 1983: 18). The Extensive Urban Survey for Northamptonshire has identified it as one of fourteen nucleated sites in the area (Taylor 2002: 6). In terms of the Roman landscape, it is located just off the road running from

Durobrivae to Titchmarsh. The town itself was on a road that went to meet this main thoroughfare. The town's Roman name is not known from official documents or inscriptions; however, this is not uncommon for small towns in the area (Taylor 2002: 12).

Ashton is classified as a small town, and Burnham and Wachter describe it as a "classic ribbon development" of strip buildings along a main through route (1990: 279). The Extensive Urban Survey estimates its size at about 15 hectares (Taylor 2002: 6). There is no evidence for any official building such as a *mansio*, forum, or bath complex. Most of the strip buildings fronting the road appear to have functioned as workshops, domestic spaces, or both.

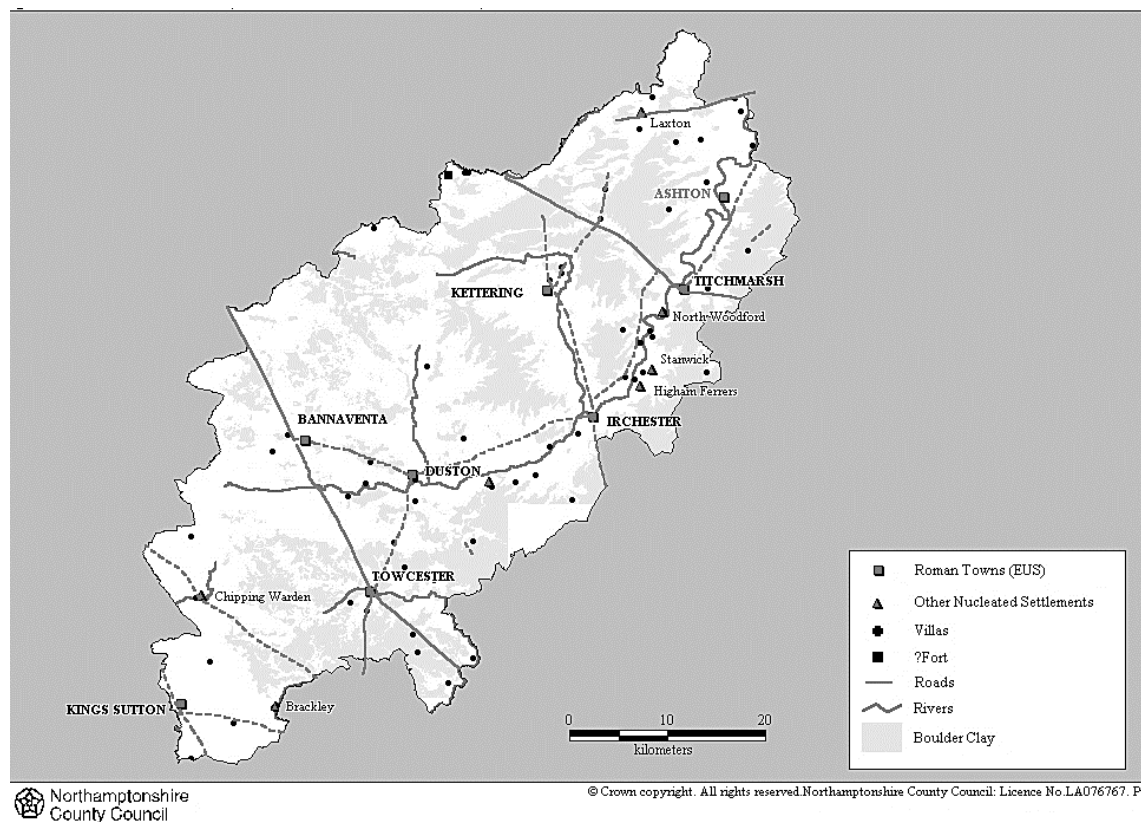


Figure 3-2: Image of Ashton's position in Northamptonshire with reference to roads and the River Nene (from the Ashton Extensive Urban Survey for Northamptonshire, Taylor 2002: Figure 1)

The settlement can be viewed as part of the Nene Valley region, which is usually noted for its pottery industry. The Lower Nene Valley pottery complex stretches between Ashton and *Durobrivae*, and supplied the surrounding area from the 2nd century on (Taylor 2002: 16). Perhaps more relevant to the finds from Ashton, the site is also near the Rockingham Forest iron extraction region, which resulted in extensive evidence for iron working in the region (Taylor 2002: 16). In addition to these industrial

pursuits, the area also has a large number of villas, especially along the Lower Nene in Cambridgeshire, with Cotterstock and Barnwell providing two nearby examples (Taylor 2002: 16).

Over time, the site progressed from a largely agricultural site consisting of enclosures and a few small houses arranged along droveways into a roadside settlement with a formalised road alignment and stone-founded strip buildings. Occupation began sometime in the first century AD, although there is some debate over whether the settlement existed prior to the conquest (Condrón 1995: 110; Upex 2008; Taylor 2002). That occupation continued throughout the fourth century and possibly into the fifth century is more generally accepted (Upex 2008, Parry *pers comm.*).

3.2.1 Areas within the town

The various excavation areas each have unique characteristics and features that show a variety of activities across the site. The first area to be excavated was Area H, which encompasses the Middle Nene Archaeological Group amateur excavations supervised by John Hadman. This project will not utilize material from the Hadman area, due to a lack of securely dated deposits, but the finds from the site do contribute to an overall understanding of this small town. Area A was excavated in the most detail, with the road and row of strip buildings as the most recognizable features. Area B largely consists of enclosures, with a few early buildings and a drying kiln. Areas C and D are often considered together, as they each contain part of the cemetery and connected enclosures. For the location of all excavation areas, see Figure 3-3 below. Although more detailed plans do not exist at the this time, preliminary diagrams and maps kindly supplied to the author by Steven Parry have been utilised as best they can be.

Area A

Area A is the northernmost excavated portion of the site and follows the line of the main road running through the town. The road runs on a roughly northeast to southwest axis, with possible side roads running off to the west (Hadman and Upex 1977: 6). This road was resurfaced and repaired several times, indicating heavy use (Hadman and Upex 1977: 6). There were also deep wheel ruts from heavy cart traffic (Hadman and Upex 1977: 6).

The first features here were a set of enclosures occupied over various road phases. Eventually, these were replaced by a series of strip buildings and their

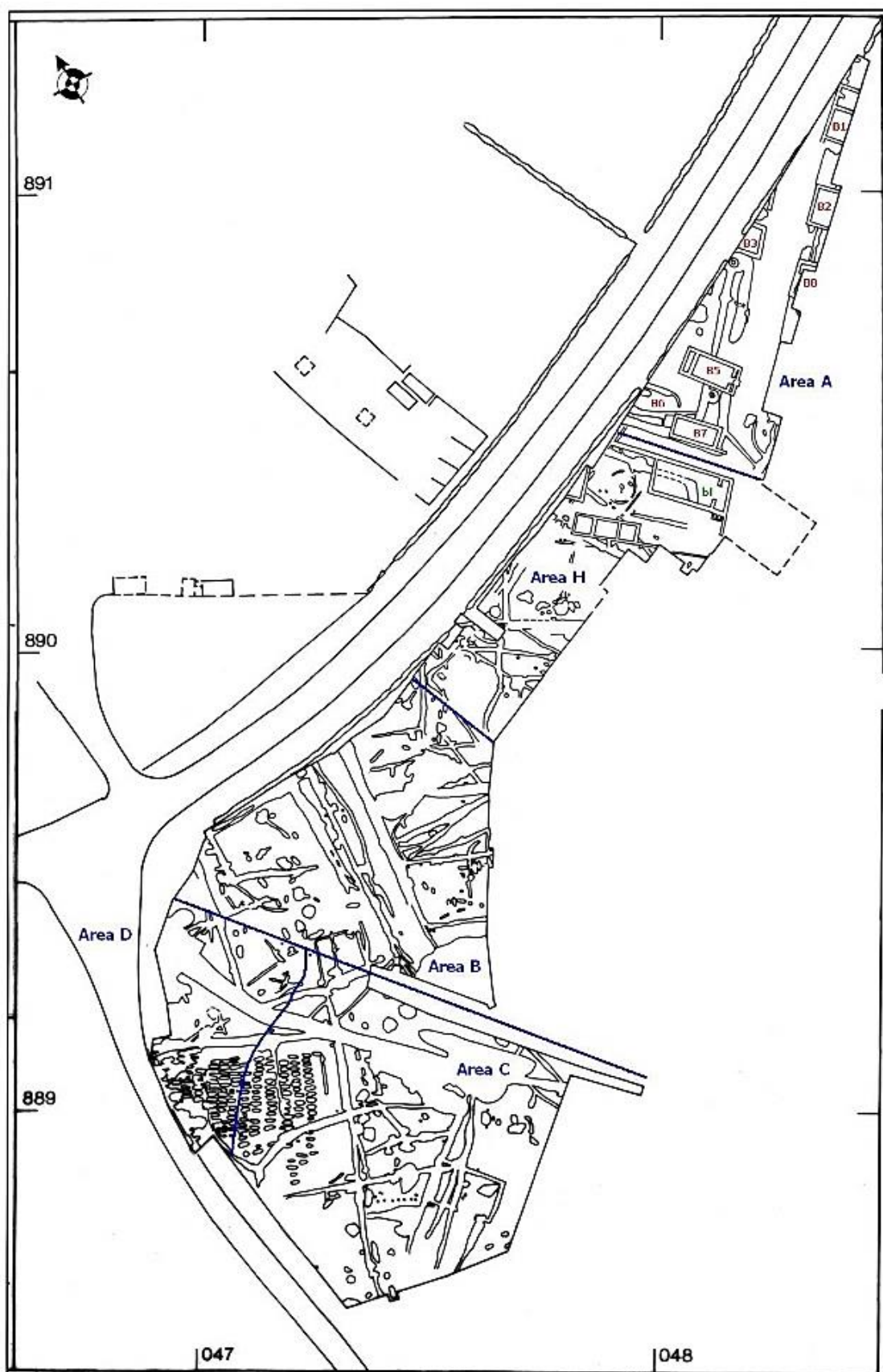


Figure 3-3: Site map of Ashton, including excavation areas (Northamptonshire Count Council n.d.; scale not available)

accompanying yards. Most of these buildings had their long ends fronting the street with passages to yards in the back: a typical layout for roadside settlements (Burnham and Wachter 1990: 279). Individual yards were often separated by shallow ditches or gullies (Dix 1983: 19). Later, some of these boundaries were marked by post-built fences (Burnham and Wachter 1990: 279). Most buildings also contain hearths, with evidence of possible metalworking; it has been speculated that these may have been workshops and domestic spaces (Dix 1985: 148). Metalled yards are also a common feature, some of which contain wells.

The buildings along the road are mostly of solid limestone construction, as was common in the area around *Durobrivae* (Rust 2006: 47). However it cannot be ruled out that some of these might have supported a timber superstructure, as stonework often does not survive higher than a few courses above the foundations. Only one building was fully excavated (B5), with most exposed for only four to five meters of their total length. There are some signs of internal divisions in some buildings, whether another room built onto a previous structure or a range of postholes suggesting an internal wall. It is unknown whether these buildings supported one or two levels. B7 alone is noted as having a sufficiently sturdy superstructure to support a second story. Extensive robbing and post-Roman agricultural activity has removed most of the superstructures, but several intact floors and features still exist

Area H (Middle Nene Archaeology Group amateur excavations)

The area directly south of Area A was the first to be excavated at Ashton, and contains several interesting features. The earliest features consist of several ditches and the stone-lined outline of a first century roundhouse (Hadman and Upex 1979: 29). Stone-built roundhouses are not uncommon in Northamptonshire, and other examples can be found at nearby Stanwick (Keevil and Booth 1997: 31). Other early features include gullies, a midden, and two hearths which may or may not be pottery kilns (Hadman and Upex 1979: 30; MacRobert n.d.: 4).

The previous ditches and roundhouse were superseded by rectilinear structures and metalled yards. The line of the main road continues from Area A, and meets with a side road running between the building Hadman labelled as Building I and Area A's Building 7 (Hadman and Upex 1976: 6). Hadman's Building I is one of the more complex structures at Ashton, with a large enclosed yard bounded to the south by another series of rooms (Hadman and Upex 1976: 8). This building contained four

separate floors, each with its own associated furnace, accompanied by a great deal of hammer-scale from processing iron (Upex 2008: 100-101). Finds such as a smith's hammer and a portable anvil provide further evidence for smithing activities (Burnham and Wachter 1990: 281). Like other areas south of the main strip, Area H also contains a series of ditched enclosures, isolate burials, and wells.

In the metalled courtyard of the smithy compound, a well shaft approximately 8.1 meters deep produced some of the site's best finds. Approximately 3.5 meters down the shaft, a lead tank separated the top fills from a lower deposit containing fourth-century ceramics (Hadman and Upex 1976: 8). This lead tank was inscribed with a *chi-rho* monogram, suggesting Christian associations (Burnham and Wachter 1990: 281). Fragments of another lead tank were found next to the complete tank (Hadman and Upex 1976: 8). As of 1981, 12 examples of lead tanks were known from Roman Britain, mostly in Cambridgeshire and Northamptonshire (Guy 1981: 271). At present, the use of these tanks is highly debated (Guy 1981: 274-5).

Area B

Area B largely consists of yards and enclosures, with a few buildings. A progressive series of enclosures in this area were likely used as agricultural plots, quarrying areas, or stock yards (Taylor 2002: 6). In later phases, some of these enclosures were subdivided into smaller allotments, perhaps indicating changing land ownership and use. They seem to cluster into two main groups: Enclosures I, II, and III forming one progression south of the track and Enclosures IV through VIII north of the track.

This area also contains traces of three buildings of less substantial construction than the strip buildings to the north. SG101 was a roundhouse with a diameter of 10 meters, probably constructed using the wicker and hurdle method. The building was inside one of the large enclosures dating to the mid- to late first century AD. Another roundhouse (SG103), occupying a similar position inside its own enclosure, may have been contemporary. SG102, by contrast, was a rectangular structure that may have had two rooms. It postdates SG101 slightly, perhaps indicating a transition in architectural styles, although material found within still dates to the last half of the first century. This building is probably associated with a nearby well (F1000).

Another important structure in the area is a possible limestone “drying kiln.” Speculations for the use of such structures include both corn preservation and malting, or even smoking meat (B4.3).

Burials in this area are spread throughout, and usually occur in pairs. Dating is difficult, but excavators seem to agree that many were probably from the fourth century AD. If these dates are correct, this presents an interesting contrast to the more organised burial practice occurring in the southern cemetery.

Area C and D

Areas C and D comprise the southernmost excavated portions of the site. They are divided down the middle of the organised cemetery. Despite this division, they are often considered together in terms of enclosure and structure sequences. They also share a stratigraphic phasing system with Area B.

The first enclosure was probably contemporary with the first enclosure in Area B. It contains a probably contemporary roundhouse on either side of a curving ditch. This enclosure may be part of a property boundary. After this first phase, the enclosure was expanded both north and south, with the land inside subdivided into smaller units. It is during this period that a rectilinear building is constructed. The next enclosure phase was the most stable, and continued until the site’s abandonment, with ditches that were repeatedly cleared. At this time, the size of the land divisions was reduced to become more regular. A fourth enclosure also is reported from the site, with a building wall and a fence creating the edges.

There were very few buildings in this area of the site. The first was SG202, which left little remains to indicate its overall form and function. The superstructure was mostly removed, and it is only the alignment of the surviving foundations and ditches that suggest the presence of a building. It may have been replaced by the later building SG201. SG201 was a rectilinear structure built using re-used stone, and may have had a timber superstructure. It was extremely wide, and probably needed some sort of supports for the roof, although no internal postholes were found. This layout suggests it may have been similar to an aisled barn. It was probably at least partly used for domestic space, as it did not show any slag, contained an oven, and was associated with a nearby well (F1012). Building SG201 also appears to be aligned at a right angle to the street line coming down from Area A, although it was set away from the road edge. Perhaps contemporary to SG201 is SG203, a roundhouse approximately 9 meters in

diameter. The interior of the building may have been divided into sections using wicker-hurdle construction.

The other key feature in this area was the cemetery. It was laid out within an old enclosure and shows signs of being deliberately planned, with a boundary ditch to the east and a potential hedge to the north (Burnam and Wachter 1990: 281). Among the few finds from the cemetery were a coin from Constantinople dating to around AD 330 and a fourth century double-sided bone comb type, indicating that this cemetery may have been primarily used in the Late Roman period (Frere, Hassall, and Tomlin 1985: 399).

3.2.2 Development over time

One of the most interesting aspects of Ashton is the degree of change it undergoes over the course of its four centuries of occupation. The town has its roots in the mid-first century, and there is no evidence for Iron Age occupation.

Site History

The origin of Ashton is one of the most highly debated aspects of the town. Although there was definite Iron Age activity in the area, it is the continuity of occupation in the area that would later become the Roman town that is uncertain. Late Iron Age pottery was discovered during fieldwalking west of the town, and when combined with aerial photography of structures from the area, this suggests a possible late Iron Age centre closer to the river (Taylor 2002: 7). The amateur excavations reported a “Belgic ditch” south of the smithy compound filled with late Pre-Roman Iron Age style pottery, a similarly dated brooch, and a coin of Tasciovanus (Hadman 1977: 211). Hadman and Upex used this material to estimate the site as beginning somewhere between AD 10 and 43 (1977: 9). However, there are several issues with this interpretation which have been encountered during analysis of the whole site’s pottery assemblage. MacRobert noted that the integrity of this “Belgic ditch” was compromised by post-medieval quarrying, which mixed the contexts (MacRobert n.d.: 4). She also suggested that the amount of finewares present was not significant enough to warrant such interpretations, and that the material present might be dated slightly later than Hadman and Upex calculated (MacRobert n.d.: 4).

The pottery report for the town recognises the difficulty of recognising transitional pottery forms, especially early grog-tempered material (MacRobert n.d.: 4). The authors’ best estimate for the first phase of pottery from the site, CP1/2, is somewhere during the AD 50s or 60s (MacRobert n.d.: 4). This is based on the low

number of both late Iron Age style and Claudio-Neronian samian sherds (MacRobert n.d: 4). From both these perspectives, it is clear that dating Ashton to one side of the conquest or the other is fraught with difficulties, but a date beginning somewhere in the mid-1st century is likely.

The early enclosures on the site date to the mid- to late-1st century AD. As described above, some of these enclosures contained timber buildings. The earliest appear to have been timber-built roundhouses with diameters of nine to ten meters (Taylor 2002: 9-10). These enclosures were laid out on either side of a main driveway running through the site, and may have been used for crop and animal husbandry (Taylor 2002: 11).

By the end of the first century, the path of the road was formalised (Taylor 2002: 7). The earliest road surface appears narrower and on a slightly different alignment (Hadman and Upex 1977: 6). Additional buildings were constructed at this time, one of sill-beamed timber and another raised on postpads (Taylor 2002: 14). The road continued to be resurfaced throughout the duration of the site's occupation.

By the second half of the second century AD, the site gained more permanent architecture in the form of strip buildings constructed along the road frontage (Burnham and Wachter 1990: 280). This was a significant change from the previous set of enclosures in Area A, and represents a new approach to land division (Burnham and Wachter 1990: 280). Over time, the boundary ditches between these buildings were replaced by fences and stone walls (Dix 1985: 148).

With the advent of the strip buildings, we also see a multitude of evidence for craft production in Ashton (Taylor 2002: 9). Excavations west of the main settlement near the river in 1992 revealed a pottery kiln, which likely produced wares for local consumption (OSY). No evidence has been discovered at Ashton for the production of the famous lower Nene Valley grey wares. Some bone working may also have occurred on a moderate scale (Upex 2008: 110). Both finished pieces and debris from the bone-working process have been discovered in concentration (Northamptonshire County Council n.d.).

The biggest industry at Ashton, however, was certainly iron production. The number of hearths in the strip buildings combined with the smithy complex certainly suggests that iron was processed on a very large scale. 92.5 kilograms of smithing slag were discovered on the site, 23.7 kilograms of which were from a single context (Northamptonshire County Council n.d.). By contrast, only 0.4 kilograms of smelting

slag were discovered (Northamptonshire County Council n.d.). Upex speculates that smelting was probably carried out nearer to the site of extraction, perhaps at sites such as Glapthorne and Southwick, which do have significant smelting deposits (2008: 103). Small amounts of other metals such as lead and bronze may indicate that they were also worked in the smithies of Ashton (Upex 2008: 110).

With evidence for extensive metal production, Ashton had the potential to become a significant centre for distribution. However, from the “large but conservative” assemblage of pottery, Taylor speculates that Ashton may have only served as a local or regional market that did not participate in the redistribution of long-distance imports (2002: 14). Additionally, coin loss patterns from the town indicate that coin use and loss were only prevalent enough to be a result of intensive trade in the late 4th century (Condron 1995: 115-116).

Also during this later period, we see some of the enclosures to the south go out of used, replaced by the cemetery. This is also the period when the lead tanks were deposited in the well in Area H. Taking this evidence together with the discovery of a Christian silver plate hoard at *Durobrivae*, it has been hypothesized that this was a period of Christianisation in the area (Taylor 2002: 10). However, pagan burial practices continued, mostly in the back yard plots and on the edge of the cemetery enclosure (Condron 1995: 115).

After the early fifth century, there is very little evidence for continued occupation. Robber trenches removed stone from several of the strip buildings in this later period. No Anglo-Saxon material is present, and it has been speculated that Ashton was abandoned and later settlement focused across the river near Oundle (Taylor 2002: 8; S. Parry, *pers. comm.*). It appears that the town went out of use only a few decades after the height of its influence on trade and industry in the area.

3.2.3 Dating Methods

Three main methods were used for determining the sequence of events at Ashton. The first, and least specific was the coin evidence. The site produced five Celtic coins, 237 Roman coins, and 6 from medieval and later contexts, excluding coins from the amateur excavations (Northamptonshire County Council n.d.: 5). These coins vary in date from coins of Tasciovanus and a sestertius of Caligula on one end of the spectrum to coins of Honorius from AD 388-402 (Brown 1973: 5). The numismatic evidence is most helpful in establishing the site’s long settlement history.

The preliminary pottery report was compiled on the pottery by Elizabeth MacRobert, detailing the finds and developing a chronology based on coarsewares (MacRobert n.d. 5). Phases were determined by separating the relative proportions of various fabric groups. The chronology was cross-checked and refined using the Samian assemblage (MacRobert n.d. 5). Ceramic phases are summarised below (Table 3-1).

CP	Date
1-2	mid- to late 1st century AD
3	late 1st to early 2nd century AD
4	Hadrianic-Antonine
5	mid- to late 2nd century AD (possibly into 3rd c)
6	3rd century AD
7a	late 3rd to mid-4th century AD
7b	mid- to late 4th century AD (possibly into 5th c)

Table 3-1: Ceramic phases with dates, from MacRobert n.d.

Of the 215 contexts for which a CP phase was assigned, 136 could be assigned to a single phase. The other 79 sites contain less specific ranges that vary from CP 2-7 to dates that combine two adjacent phases. This is likely due to the high degree of residuality present at the site as a result of constant reuse of land and later disturbances. The closest dating was for phases 1 through 4, with 5 through 7 occupying much longer and less exact periods of time (MacRobert n.d.: 5). Over 50% of the dated contexts come from these later ceramic phases.

The third method of sequencing is stratigraphic phasing. Two separate approaches to this were taken, one for Area A and another for Areas BCD. This stratigraphic phasing has not yet been matched up to the Ceramic Phases for the final report, and all work to that affect has been undertaken for this thesis. The area A phasing skews slightly later than for Areas BCD, to match the later development of the strip buildings. Most of the Areas BCD phases date to CP 1-2, in the mid- to late first century. As it was difficult to tie stratigraphic phases to definite ceramic dates, they were not used in this thesis to quantify data. Their key use was in determining the sequence of features where ceramic dates matched or were in contention.

3.2.4 Site Phases for Ashton

A preliminary phasing system had to be developed for this thesis, and was performed by the author in conjunction with Jeremy Taylor and Stephen Parry. These phases are summarised in . The process was started by assigning the single Ceramic Phase contexts to a Phase. Then, contexts which stretched across multiple Ceramic

Phases were assigned to the appropriate grouping. Two levels of specificity in analysis were possible from these phases. Early, Middle, and Late material could be considered where data were insufficient for finer categorisation. These covered the first century, second to third century, and third to early 5th centuries respectively.

Phase	Single CP groups	All CP groups	Date (c. AD)
1 Early A	1, 2	1-2, 2	mid- to late 1 st
2 Early B	3	2-3, 3	later 1 st to early 2 nd
3 Middle A	4	3-4, 3-5, 4	later 1 st to late 2 nd
4 Middle B	5	4-5, 4-6, 5, 5-6	early 2 nd to late 3 rd
5 Late A	6	6	early 3 rd to late 3 rd
6 Late B	7a, 7b	7a, 7b, 7a-b	late 3 rd to early 5 th
7 Mid-to-Late	n/a	5-7b	mid-2 nd to early 5 th
8 Late AB	n/a	6-7b	early 3 rd to early 5 th

Table 3-2: Site phasing for Ashton, by CP date and century

3.3 The animal bone assemblage from Ashton

3.3.1 Excavation history and collection

Despite the extensive work of Edmund Artis at nearby sites such as Cotterstock, Ashton was largely ignored by antiquarians. The Roman occupation was first acknowledged by Reverend Hartshorne in the 1840's, when he noted the exposure of burials during the construction of a railroad line. Modern interest was revived during construction of the A605 Oundle Bypass road, which crossed the town (Northamptonshire County Council n.d.). A trial excavation by the amateur Middle Nene Archaeological Group under the supervision of John Hadman was carried out in 1971, and this group continued with annual excavations from 1974 until 1982 (Dix 1983: 18). Most of their work focused on the centre of the site, especially on a complex building on the crossroads of the main road and an important side road.

After 1982, excavation was reorganised under the supervision of the Northamptonshire Archaeology Unit, with funding from the Department of the Environment and later English Heritage, in cooperation with the Northamptonshire County Council and Manpower Services Commission (Northamptonshire County Council n.d.). Northamptonshire county archaeologists engaged in an extensive excavation of approximately one-seventh of the town's total area, with a particular focus on the strip buildings along the main road in addition to the cemetery and enclosures to the south. This main phase of excavation ended in 1984, and work began on post-excavation analysis.

The excavations were never published due to several outstanding portions of the final report (Northamptonshire County Council n.d.). A site narrative exists, and there are detailed descriptions for each area of the site, but reports on the human bone, animal bone, and plant remains are still unfinished. Due to the missing components of the report, the material from Ashton went into backlog, and lacked the funding to complete analysis and publication (S. Parry, *pers comm.*).

Some further excavation and archaeological work has continued at Ashton. In 1992, rescue excavations were carried out in the Oundle railway station goods yard under the supervision of the Northamptonshire County Archaeology Unit; systematic fieldwalking was also carried out over this same period (Northamptonshire County Council n.d.). This work resulted in the discovery of a kiln to the west of the main excavation area (S. Parry, *pers. comm.*). Aerial photography, led by Glen Foard, was also continued from 1977 until the present (Northamptonshire County Council n.d.).

3.3.2 Criteria for Inclusion

The faunal assemblage from Ashton is exceptionally large, and represents an excellent opportunity to examine a site with detailed temporal and spatial information. Material dates from the mid-1st century AD into the late 4th and possibly 5th century AD, spanning the entire length of the site's occupation. This assemblage was previously examined by an Ancient Monuments Lab analyst in 1986, but this work was deemed unusable for the final report and no bone report was produced (Northamptonshire County Council n.d.).

The total amount of material from across the site is considerable. Including the amateur excavations, the material is stored in 300 archival boxes. The entirety of the assemblage is stored in climate-controlled conditions at the Peterborough Museum. Only material from Areas A, B, and C/D with either a ceramic date or definite association with a structure was included in this analysis. Other material for which context information was available was recorded but not analysed, and it is hoped that future post-excavation analysis will refine the chronologies further for a more detailed examination of the site's progression. The estimated 29,000 fragments of bone from the Middle Neolithic Archaeology Group excavations were not be utilised due to largely missing contexts and uncertain stratigraphy (Northamptonshire County Council n.d.).

Area	# of Wells	Feature Numbers
A	3	F1949, F2103, F2758
H	3	F5027, F5063, F775
B	1	F1000
C/D	2	F1012, F1362

Table 3-3: Summary of wells by excavation area at Ashton

Where possible, material from the well and non-well contexts were considered separately. The well material was sieved, while all other material was hand-collected. The special nature of the wells is further discussed in detail, and provide several key insights for the understanding of the site. Well details are summarised in Table 3-3 above.

3.4 Methodology

3.4.1 Recording Methods

Primary analysis of the Ashton material was carried out using the comparative collection in the University of Leicester Bone Laboratory. Additionally, data on taphonomic processes, mandibular tooth presence and wear, butchery, pathology, and measurements were collected.

Identification

Specimens were identified to species, element, and side where possible. Mandibles containing teeth were counted as a single element. All teeth were recorded as being in their alveolus or loose. A tooth was considered loose if it is not surrounded by bone, or if the bone surrounding the tooth did not comprise any more than one tooth socket. Furthermore, fragments that could be refitted were counted as a single element. This also applied to unfused epiphyses which could be matched to their corresponding metaphyses.

Fragments that could not be assigned to species were identified to the lowest taxonomic level possible. Several taxa present distinct challenges for identification at the species level. The most commonly encountered of these was the sheep/goat. Due to the fragmented nature of the assemblage, most elements were only be attributable to the broader taxonomic class of “caprine”, or sheep/goat, as it is also referred to in the literature (Reitz and Wing 1999: 154-5). However, elements with diagnostic criteria as

defined by Boessneck (1969) were be classified to species, especially pieces of the skull, distal scapula, distal humerus, proximal and distal radius, proximal femur, and phalanges. Additionally, the difference between donkeys, mules, and horses is very difficult to determine. Where possible, these species were distinguished using criteria from Davis (1982) on first phalanx metrics and morphology.

Distinguishing domestic taxa from wild relatives also presented a significant challenge. Wild boar and domestic pigs were distinguished using criteria developed by Payne and Bull (1988). Molars were measured for width and length, with a focus on the widths of mandibular M1 and M2, and measurements of the diameter of the trochlear constriction (HTC) of the humerus will also be used to differentiate wild from domestic suids (Payne and Bull 1988:37). Geese and ducks also presented significant challenges, both within the taxa and in distinguishing wild from domestic specimens (Albarella 2005: 249). Often, no attempt is made to distinguish wild and domestic geese and ducks, and morphological criteria for doing so is not standardised (Barnes et al. 1998: 280-1). Additionally, the variation within the subfamilies for geese (Anserinae) and dabbling ducks (Anatinae) is so slight that it is difficult to distinguish even to the generic level (Barnes et al. 1998: 280). For the purposes of this project, no attempt was made to distinguish wild and domestic species; specimens were classified as *Anas* spp. or Anserinae spp. Significant similarities also exist between domestic fowl (*Gallus gallus*) and pheasants (*Phasianus colchicus*), which are both from the order Galliformes (Yalden and Albarella 2009: 12). However, most major elements have distinguishing characteristics, and can be discriminated (Yalden and Albarella 2009: 12). These distinctions were made in accordance with the criteria and photographic examples provided in Tomek and Bocheński (2009).

Specimens that could not be identified to taxon were assigned to size categories. Cattle- and horse-sized fragments were classified as “large mammal”, sheep-, pig-, and dog-sized fragments as “medium mammal”, and small dog- and cat-sized fragments as “small mammal”. Unidentified bird bones and fish bones were also categorised similarly. Specimens of uncertain size category were simply marked as unidentified. These elements were tallied, and included in the Number of Specimens (NSP), but not in other statistical calculations.

Anatomical Zone Recording

The portion of bone present was recorded using a zone system, which aids in the calculation of derived units and provides information on the prevalence of certain

classes of data. For recording the proportion of elements, the author developed a system that recorded a combination of zones and landmarks. This system was slightly modified from the zone system developed by Serjeantson (1996). It maintained the use of eight zones for each element, with zones one and two representing the proximal ends and zones seven and eight representing the distal ends. Additionally, it keeps the assignment of even-numbered zones to the lateral side and odd-numbered zones to the medial side where possible. Figures defining these zoning areas have been included in Appendix I.

Taphonomic Factors

Data on gnawing, burning, and preservation were recorded. Gnawing was noted as absent, or as rodent or carnivore damage, following Binford (1981). Burning was recorded on a four point scale. Bone were either identified as “unburnt”, “singed” (outsides blackened and no penetration of the outer cortical bone), “burnt” (element blackened into core of bone), or “calcined” (element turned White and has begun cracking). Preservation was also recorded on the four point system developed by Harland et al. (2003). Fragments that appeared shiny and fresh were classified as “Excellent”, solid fragments with less than 25% abrasion were classified as “Good”, mostly solid fragments with between 25% and 50% abrasion were classified as “Fair”, and flaky and fragile fragments with over 50% abrasion were classified as “Poor”.

Fragmentation and survivorship in the assemblage were also assessed using statistical analyses of element representation, bone density, and utility. In order to assess the degree of identifiability, the specimens identifiable to element and taxon (NISP) were divided by the total number of fragments (NSP). Fragmentation was measured in two ways, following Klein and Cruz-Urbe; both the extent of fragmentation measuring how many bones are incomplete and the intensity of fragmentation representing how small pieces tend to be will be calculated (Lyman 20008: 250). Extent of fragmentation was determined by counting the number of complete elements, then dividing them by the total number of specimens (NSP). Intensity of fragmentation was calculated by determining the average number of zones per element recorded. Although Lyman points out that this measure of fragmentation intensity excludes the unidentified fragments, using both statistics that measure fragmentation and identifiability provides sufficient information to interpret the assemblage’s makeup (2008: 252).

Butchery

Butchery of bones was recorded based on the system developed by Lauwerier (1988), with some additional codes. Marks on each fragment were recorded as chops, cuts, or cuts and chops. Each mark was noted using the numerical codes provided by Lauwerier.

After primary analysis, butchery marks were grouped depending on the process that likely led to each particular mark, including skinning, dismemberment of the carcass, or meat removal. Where possible, the codes reported by Lauwerier have been matched up with descriptions of the process involved with these marks using his own data on Roman butchery practices and information on butchery processes provided by Binford (1981) and Rixon (1989). Data on butchery were used to explore whether distinctive patterns of dismemberment and meat removal were utilised, and whether this matches butchery patterns observed from other Roman towns and settlements (eg: Maltby 2010).

Ageing

In order to reconstruct age patterns in the data, both mandibular tooth wear and element fusion were examined. For the three main domesticates (cattle, sheep/goats, and pigs), mandibular tooth wear were recorded using Annie Grant's Mandibular Wear Stage methodology on the P_4 , dP_4 , M_1 , M_2 , and M_3 (1982). In this process, each molar tooth, P_4 , and dp_4 in a jaw was assigned to a specific stage of eruption and wear based on comparison with diagrams provided in Grant (1982). For jaws missing some molars, the wear stage for the missing teeth was estimated using Grant's protocol (1982: 96-7). The score for each tooth was added to create an estimated Mandibular Wear Stage (MWS) score for the jaw.

These species were then be placed into age categories using the methodology set out by Hambleton (1999), which reconciles sequential age categories with estimated age-at-death. Age estimates for cattle will be taken from Halstead (1985) and from Hambleton's own estimates for pigs (1999). Sheep and goat ageing were determined based on Greenfield and Arnold's (2008) modified categories taken from Payne (1973).

Although mandibular wear is commonly employed for ageing specimens, it is not without its difficulties. One key issue with Grant's MWS system lies in the age categories; it must be recognized that each wear stage lasts for a variable amount of time, with some much longer than others (Greenfield and Arnold 2008: 837).

Additionally, these classes are ordinal, but do not assign animals to a biological age. Matching the scores from Grant's MWS to age-at-death values requires experimental work on a known-age population, although there are discrepancies about which modern populations make the best comparisons for ancient domesticates (Greenfield and Arnold 2008: 837). Another difficulty with comparing mandibular wear arises from that fact that dietary variations and behavioural patterns can cause varying rates of wear in populations (Reitz and Wing 1999: 162). Despite these challenges, mandibular tooth wear is still one of the most useful methodologies for determining age, as mandibles are durable and less prone to taphonomic damage than long bones (Greenfield and Arnold 2008: 837).

Since the sequence of fusion in mammals occurs in a predictable pattern, epiphyseal fusion data can be used to separate animals into age categories; it is only useful for looking at very young animals, as once animals reach skeletal maturity, it is no longer possible to determine their age at death (Reitz and Wing 1999: 182). Specimens where the epiphysis is fully joined with the metaphysis with no line visible were recorded as "fused". Where the epiphysis and metaphysis are joined but still have a line of fusion visible, specimens were recorded as "fusing". Unfused specimens were recorded either as an unfused metaphysis or an unfused epiphysis. This information was then compared against data for fusion from Reitz and Wing (1999: 76) in order to examine the percentage of early-, middle-, and late-fusing elements. These data can then be used to display patterns of age-at-death for these broad categories.

Measurements were also undertaken for foetal bones in order to determine their age (Prummel 1987). Elements with a complete diaphysis were measured and compared against a table compiled from known age specimens to determine their age in days from conception.

Sexing

For select species, data on sexing was recorded. Pigs were sexed based on canine and alveolus morphology (Hillson 2005). Cattle were also distinguished based on metrical data and morphological criteria for acetabular morphology (Greenfield 2006). For galliformes, the presence or absence of spurs on the tarsometatarsi was recorded as an indicator of sex. In birds, the presence of medullary bone also helped to identify females. This was recorded only where bone was already broken to expose the interior; specimens were not purposefully broken to determine its presence.

Biometric Data

In order to assess various aspects of element morphology, measurements of teeth and fused long bones were taken. These largely followed the criteria developed by von den Driesch (1976) and are detailed in full in Appendix 1.2. Most focused on recording the full length of the bone, where possible, as well as on proximal and distal depth and breadth of long bones. For teeth, only widths were be measured, as lengths are subject to variation from wear. The exception to this rule is in pigs, for which length measurements were also taken, as the crowns were not as crowded as in other artiodactyls. These data were then used to illustrate changes in size and shape over time as well as herd composition.

In addition, some measurements developed for specific distinctions of sex and species will be used. Payne and Bull's criteria for distinguishing domestic pig from wild boar call for the measurement of the diameter of the trochlear constriction (HTC). Special measurements were also employed for the distal metapodials, which were especially useful in the distinction between sheep and goat. The depth and breadth of several sections of the distal condyles of the metapodials were measured. The other non-standard measurement taken was acetabular height in cattle (H1), following the procedure described in Greenfield (2008).

Pathology

Where pathologies were identified, they were described and photographed. Both presence and absence of pathologies were stated, in order to better examine their prevalence in the assemblage (Vann and Thomas 2006). A descriptive approach allowed for more detail to be recorded, following the coding system developed by Vann and Thomas (2006). The simplicity of the system holds advantages over more complicated codified pathology recording systems, such as that developed by Buikstra and Ubelaker (1994). Additionally, it encourages description over diagnosis, which is a key benefit for faunal assemblages, in which elements tend to be fragmented and disarticulated, making the identification of conditions that effect multiple parts of the body problematic (Vann and Thomas 2006).

For each pathological specimen, a series of information was noted in a separate database sheet. For pathologies, the zone was recorded, as well as whether the lesion represented bone formation or destruction, the state of healing, the extent and type of the lesion, followed by a full description. All pathologies were placed into broad

nosological categories: trauma, inflammation, joint disease, neoplasia, oral pathology, etc... Where the precise nature and patterns of a lesion could be determined, differential diagnosis was attempted, but lacking this, a descriptive approach was favoured. Fractures had the type, angle, and any potential foreshortening of the element recorded. These procedures are in keeping with the protocol developed by Vann and Thomas (2006).

Some coded systems were also be utilised, such as the recording protocol for lower limb pathology developed by Bartosiewicz et al. (1997). This system focuses on pathologies of the foot, namely the metapodia and phalanges. Data on ten specific conditions were assigned a score by matching the observed characteristics of the bone to a pictographic key (Bartosiewicz et al. 1997: 35-57). These scores range from one to four, with a different maximum score for each category ranging from two (simple indication of present or absence) to four (representing a range of pathological progression) (Bartosiewicz et al. 1997: 33). Scores for each category were then summed, and put into an equation that adjusts for the number of variables for each bone and the maximum possible score to produce a Pathological Index (PI) score that can be used to compare deformations of each element (Bartosiewicz et al. 1997: 20). These data were only recorded for complete, fused elements, as incomplete and unfused bones will lack some important scoring areas, hindering the calculation of the Pathological Index. Although these data are often used as a direct measure of the intensity of use of cattle for draught labour, there are several complicating factors that prevent such a straightforward interpretation; these can include age, body weight, sex, nutrition, terrain, and stalling as well as use for traction (Bartosiewicz et al. 1997: 13). Thomas 2011: 191-2)

Quantification

Several important quantification methods were be used to examine taxonomic abundance, element representation, and meat consumption on the site, including the Number of Specimens (NSP), the Number of Identified Specimens (NISP), the Minimum Number of Individuals (MNI), the Minimum Number of Elements (MNE), and Minimum Animal Units (MAU).

NSP represents all fragments counted, both those that can be identified to taxon and those assigned to size categories or unidentified. NISP includes only those specimens which are identified to taxon. Both NISP and NSP for all taxa and size

categories were recorded. Although antlers are often excluded from NISP counts due to the fact that they are shed and their presence on a site may be the result of collection of shed pieces of antler rather than as the result of hunting the whole animal (Reitz and Wing 1999: 82), I chose to include identifiable portions of antler in my analysis. The presence of animal remains in terms of craftworking was an important consideration for the material at Ashton, and my focus was not simply on animals slaughtered for food, but the general presence of animals on site. Additionally, antler fragmentation was relatively low, reducing the risk of over-representation.

The issue of articulated elements is also contentious in calculating NISP (Lyman 2008: 30). Mandibles containing teeth were counted as a single specimen, and included any teeth that could be refitted into the jaw. Similarly, fragments which could be refitted were counted as a single unit, and noted as refitted in the comments. This included unfused epiphyses which could be matched with their metaphyses. Distinctions were noted regarding bones found articulated and those which were found to articulate after examination (Lyman 2008: 35).

Although using NISP as a measure of diversity does run the risk of interdependence, in which it is possible to skew the ratio by counting pieces of the same element or individual several times, Lyman maintained that the drawbacks of any other quantitative measure are even greater, and that we must assume that interdependence is distributed randomly across entire assemblages (2008: 38). Other commonly cited criticisms of NISP, such as the reductive effects of butchery and preferential recovery of certain fragment sizes must be considered when interpreting the values, but it must also be noted that these same problems affect other calculations equally (Lyman 2008: 28). Many common issues with NISP can be remedied by making explicit the methodologies used in its calculation (Lyman 2008: 35).

In addition to NISP and NSP, the Minimum Number of Individuals (MNI) was also used for very select purposes. In order to determine MNI, the Minimum Number of Elements (MNE) must first be calculated. MNE values are determined for each taxon. It divided long bones into proximal and distal ends and distinguishes between left and right elements as well as juvenile and adult elements, where possible. The proximal and distal ends were defined by their zones, following the Zone Recording system in Appendix I. The most commonly represented zone on each end were taken as the MNE value. Due to the extensive nature of the assemblage, size differences will not be assessed.

MNI was then calculated as being equal to the largest MNE value. This represents the most commonly occurring sided skeletal element in the assemblage, and estimates the minimum number of individuals needed to provide these elements. MNI values were calculated for each taxon in each phase, based on the most abundant element in the individual phases. It must be stressed that this calculation represents only the fewest number of possible individuals that can account for each element present. The true number of individuals that contributed to the assemblage is an unknown maximum (Lyman 2008: 223).

Although some scholars prefer using MNI to NISP, there are several crucial difficulties in its calculation and interpretation, as discussed in Lyman (2008: 38-81). MNI is often used as a measure of taxonomic abundance, for the purpose of avoiding the issues of interdependence accompanying NISP (Lyman 2008: 38). However, MNI has several issues of statistics and interpretation which reduce its usefulness in quantifying an assemblage. It can be calculated in several different ways depending on what unit it is calculated for (eg: each context, phases, site, etc..) or how MNE is determined, hampering comparability with sites in which methods are not made explicit. These are issues with aggregation, and there is a great deal of disagreement on what units should be used, and whether they should be divided along cultural or stratigraphic lines (Lyman 2008: 58). MNI, unlike NISP, is also not additive; it must be recalculated with any new data or changes to phasing or contexts. Additionally, it has the tendency to exaggerate the prevalence of rare taxa, as taxa which have highly fragmented remains but don't include more than one of any single element are presented as equal in value to a taxon represented by a single element (Lyman 2008: 46). This problem largely arises from the fact that MNI is aimed at investigating the presence of whole animals on a site; MNI is thus less useful for sites in which select joints of meat or portions of animals may be transported and disposed.

MNE shares many of the same issues of aggregations and over-representation as MNI, but is a far more useful calculation in terms of investigating specific aspects of elements and their distribution. It is important to consider, as it ensures that elements are not being counted twice. However, like MNI, one must be aware of how MNE is calculated before interpretations can be drawn. Wherever it is used here, the unit for which is calculated will be made explicit.

Lyman points out that the use of ordinal statistics such as MNE and MNI depends on the research questions posed, and as one of the key questions in this project is to

measure the actual contribution towards diet of each given taxon, this necessitates the use of Meat Weight (2008: 81). The meat weights provided by Bourdillon and Coy (1980: 84-5) will be used, which were taken from analysis of the Manching assemblage by Boessneck et.al (1971: 9). This assumes a live weight of 275kg of usable meat for cattle, 37.5kg for sheep, and 87.5kg for pigs (Bourdillon and Coy 1980: 84-5). Meat Weight (MW) is calculated by multiplying the MNI values for a particular unit by the live weight for each individual to estimate the amount of meat present on a site. The determination of Meat Weight is the only instance in which MNI will be utilised.

Although MNE is a useful quantification method, Minimum Animal Units (MAU) have some distinct advantages for assemblages from sites such as Ashton, which were commercial centres with a specialised butchery trade, and therefore dealt with portions of animals. MAU values are calculated using the MNE values for proximal and distal elements; The values for all sides are added together then divided by the number of times that element occurs in the skeleton. This normalisation makes MAU values more easily interpretable and comparable (Lyman 2008: 237). It can be further normed by dividing all values by the greatest observed MAU, then multiplying to produce a value between 0 and 100, which is a statistic referred to as %MAU (Lyman 2008: 234). Lyman identifies %MAU as a more advantageous statistic for inter-site comparisons, due to being normed to the same scale and eliminating sample size variation biases (2008: 234). It also focuses on parts of animals, rather than aiming to answer questions about whole animals, which is useful on a site in which commercial butcher shops are likely.

3.4.2 Statistical Tests and Data Manipulation

In order to ensure that conclusions drawn from these data are significant, several different types of statistical testing will be used. These tests will also allow more robust interpretation of the data, and make clear patterns of age and sex distribution, size and shape change, taphonomy, and other key aspects of the assemblage.

The log-scaling data transformation was used on long bone measurements in order to increase sample size and comparability. As measurements taken in the same plane (lengths with lengths, widths with widths, etc...) are highly correlated, they can be combined for comparison with a transformation that puts them on the same scale. In order to log scale the values, the long bone dimensions will be compared against

dimensions from a single known specimen from the University of Leicester bone lab collection. These known values were then inserted into a base 10 logarithm, from which the base 10 logarithm of the standard value for that element will be subtracted, creating a value ranging from -0.2 to +0.2. This value represents the difference between the sample dimension and the dimension from the known standard, with a value of 0.0 being an exact match, negative values representing a sample with a lower value. This allowed measurements from various different elements to be compared together, which was particularly useful for phases or other subdivisions with a limited number of measurements available for disparate elements.

For nominal data, in which data are represented as named categories rather than values with any rank order of values along a spectrum, Chi-squared tests were used to compare samples. The Chi-squared statistic explores whether two categories of nominal data are truly independent of each other, or whether membership to one category is related to membership in another (Shennan 1997: 109-10). The test does this by testing expected value based on the hypothesis that the categories are related, and then tests the actual sample against this hypothetical result (Shennan 1997: 111). Although it can tell you whether significant differences exist between the two populations, Chi-squared statistics cannot provide information on the way in which the variables were related or the strength of the relationship. Answering the questions of how strong relationships are and why they exist requires testing against extra variables and closer examination of the data (Shennan 1997 122-4).

In addition to these, a simple battery of univariate statistics were employed. The arithmetic average and range (minimum and maximum) were determined where there are more than 5 data for a category. The standard deviation from the mean was also determined in order to explore the effects of range. In order to reduce the effects of sample size, the coefficient of variation was also calculated, which normalises standard deviation values by dividing them by the mean.

4 Temporal Analysis:

4.1 Introduction

One of the key aims of this project was to examine the change in Ashton over time. Changes in animal husbandry from the Iron Age and into the Roman period have been a major theme in the literature on Roman Britain. Although Ashton partially follows the general pattern, there are some unique patterns that can be isolated by examining each phase sequentially (for patterns of species presence/absence, see Tables 4-1, 4-2 below). Where possible, the non-well and well contexts have been divided and considered separately, as their recovery methods were very different.

The lack of definite pre-Roman deposits from Ashton makes it difficult to assess transition from the Late Iron Age into the Roman period. Although no comment can be made on how local people utilised animals before and after the Roman Conquest, more can be said about the transition from the Late Roman period into the sub-Roman period. The late survival of the town into the 5th century AD, as well as the larger sample sizes for the later phases, makes it possible to examine the impact of such a transition on local animal husbandry and other human-animal relationships.

As discussed earlier, the phases at Ashton have been divided into six main temporal phases for the early, middle, and late periods. An additional two phases have also been used, and will be discussed where appropriate. Phase 7 Mid to Late includes contexts dated broadly from the mid-2nd to early 5th centuries AD, and largely comprises midden context 300 in Area A. Phase 8 Late AB spans the early 3rd to the early 5th centuries, and has sometimes been combined with Phases 5 Late A and 6 Late B to form a single Late phase when insufficient data are available to facilitate a more precise temporal analysis.

Tables 4-3 and 4-4 below show the relative abundance of taxa based on the number of identifiable bones. Occasionally, bones were identified to element, but not to a specific taxa, and thus were lumped into a size category; it was considered important to be able to extract the maximum amount of information from each element, even if processes such as butchery and weathering impeded full identification. Further information on quantification for all phases of the site is available in Appendix III.

Non-Well Contexts	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Cattle	X	X	X	X	X	X	X	X
Sheep/Goat	X	X	X	X	X	X	X	X
Pig	X	X	X	X	X	X	X	X
Horse	X	X	X	X	X	X	X	X
Dog	X	-	X	X	X	X	X	X
Cat	-	-	-	-	-	X	-	-
Fox	X	-	?	-	-	?	?	-
Mustelid	-	-	-	-	-	-	X	-
Wild Boar	-	-	-	?	-	?	X	-
Deer	X	-	-	X	-	X	-	-
Rabbit	-	-	-	-	-	-	-	-
Rodents	X	-	-	-	-	-	-	-
Chicken	X	X	X	X	X	X	X	X
Geese	X	-	-	X	X	-	X	-
Duck	-	-	X	-	-	X	X	-
Crane	-	-	-	-	X	-	-	-
Corvids	X	-	X	X	X	X	X	-
Raptors	-	-	-	X	-	X	X	-
Frog/Toad	X	-	-	-	-	X	-	-
Fish	-	-	-	-	X	-	-	-
#categories	12	5	8	10	10	12	12	6
total NISP	1561	235	423	935	722	860	772	53

Table 4-1: Presence of taxa in closely-dated non-well contexts at Ashton

Well Contexts	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Cattle	n/a	X	X	X	X	X	-	X
Sheep/Goat	n/a	X	-	X	X	X	-	X
Pig	n/a	X	X	X	X	X	-	-
Horse	n/a	-	-	X	X	X	-	-
Dog	n/a	-	-	X	-	X	-	-
Cat	n/a	-	-	-	-	X	-	-
Fox	n/a	-	-	-	-	X	X	-
Mustelid	n/a	-	-	-	-	-	-	-
Wild Boar	n/a	-	-	-	-	?	-	-
Deer	n/a	-	-	-	-	X	-	-
Rabbit	n/a	-	-	-	-	X	-	-
Rodents	n/a	-	-	-	X	X	-	-
Chicken	n/a	-	-	X	X	X	-	X
Geese	n/a	-	-	X	X	X	-	X
Duck	n/a	-	-	-	X	X	-	-
Crane	n/a	-	-	-	-	-	-	-
Corvids	n/a	-	-	X	-	-	-	X
Raptors	n/a	-	-	-	-	-	-	-
Frog/Toad	n/a	-	-	-	X	X	-	-
Fish	n/a	-	-	-	-	X	-	-
#categories	-	3	2	8	9	15	1	5
total NISP	0	17	6	97	101	1361	2	47

Table 4-2: Presence of taxa in closely-dated well contexts at Ashton

Table 4-3: %NISP for non-well contexts (including elements identified to size categories)

Full Name	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Mammals								
Cattle	32.4%	28.5%	47.3%	44.9%	64.7%	36.6%	51.4%	49.1%
Sheep/Goat	38.6%	40.9%	33.1%	22.4%	20.9%	26.3%	33.7%	17.0%
Sheep	3.5%	3.4%	1.2%	0.7%	1.2%	1.7%	1.3%	0.0%
Goat	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Unidentified Bovidae	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%
Pig	12.9%	13.2%	5.7%	4.7%	3.5%	12.3%	3.6%	3.8%
Pig/Boar	0.0%	0.0%	0.0%	0.4%	0.0%	0.6%	0.0%	0.0%
Wild Boar?	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%
Horse/Donkey/Mule	4.5%	5.1%	3.3%	6.1%	2.4%	4.8%	2.8%	13.2%
Horse	2.0%	0.4%	1.9%	1.9%	0.1%	0.6%	0.1%	0.0%
Donkey	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dog	0.6%	0.0%	1.9%	2.0%	1.2%	3.8%	0.6%	1.9%
Dog/fox	0.1%	0.0%	0.0%	0.1%	0.0%	2.0%	0.1%	0.0%
Red Fox	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Cat	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	1.9%
Mustelid	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%
Red Deer	0.1%	0.0%	0.0%	0.1%	0.0%	0.5%	0.0%	0.0%
Roe Deer	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Rabbit	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Water vole	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Field Vole	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Small microtus	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Small Rodent	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Unidentified small mammal	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Unidentified medium mammal	2.5%	3.8%	0.9%	1.3%	1.7%	1.4%	1.4%	5.7%
Unidentified large mammal	1.9%	3.4%	1.2%	2.2%	2.5%	3.7%	1.9%	5.7%

Full Name	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Birds								
Chicken	0.1%	0.9%	0.9%	1.0%	0.4%	0.5%	0.9%	1.9%
Chicken/pheasant	0.0%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Chicken/guinea fowl	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.1%	0.0%
Geese (Anserinae)	0.1%	0.0%	0.0%	7.8%	0.6%	0.0%	0.1%	0.0%
Large Anseriforme	0.0%	0.0%	0.0%	2.2%	0.0%	0.0%	0.0%	0.0%
Duck/Goose	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%
Duck (<i>Anas spp.</i>)	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	0.5%	0.0%
Grus spp.	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%
Corvid	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%
Raven	0.1%	0.0%	0.0%	0.6%	0.3%	0.0%	0.3%	0.0%
Crow	0.0%	0.0%	0.0%	0.0%	0.0%	0.8%	0.0%	0.0%
Rook	0.0%	0.0%	0.0%	0.7%	0.0%	0.0%	0.0%	0.0%
Crow/Rook	0.0%	0.0%	2.1%	0.0%	0.0%	0.0%	0.0%	0.0%
Accipitriforme	0.0%	0.0%	0.0%	0.1%	0.0%	0.6%	0.0%	0.0%
Barn Owl	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%
Unidentified Small Bird	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Unidentified Medium Bird	0.0%	0.0%	0.2%	0.1%	0.1%	2.1%	0.0%	0.0%
Unidentified Large Bird	0.0%	0.0%	0.0%	0.1%	0.0%	0.1%	0.0%	0.0%
Bird	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Amphibians								
Amphibian	0.2%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
Fish								
Gadid	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Pike	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%
Unidentified	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
TOTAL NSP	1561	235	423	935	722	860	772	53

Table 4-4: %NISP for well contexts (including elements identified to size categories)

Full Name	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Mammals								
Cattle	0.0%	23.5%	50.0%	19.6%	30.7%	23.7%	0.0%	2.1%
Sheep/Goat	0.0%	64.7%	0.0%	18.6%	14.9%	37.1%	0.0%	4.3%
Sheep	0.0%	5.9%	0.0%	1.0%	1.0%	1.0%	0.0%	0.0%
Goat	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
Unidentified Bovidae	0.0%	0.0%	16.7%	0.0%	0.0%	0.0%	0.0%	0.0%
Pig	0.0%	5.9%	16.7%	42.3%	5.0%	1.2%	0.0%	0.0%
Pig/Boar	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
Wild Boar?	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Horse/Donkey/Mule	0.0%	0.0%	0.0%	1.0%	9.9%	0.8%	0.0%	0.0%
Horse	0.0%	0.0%	0.0%	1.0%	5.0%	0.7%	0.0%	0.0%
Donkey	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dog	0.0%	0.0%	0.0%	1.0%	0.0%	6.0%	0.0%	0.0%
Dog/fox	0.0%	0.0%	0.0%	0.0%	0.0%	2.4%	0.0%	0.0%
Red Fox	0.0%	0.0%	0.0%	0.0%	0.0%	2.1%	50.0%	0.0%
Cat	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
Mustelid	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Red Deer	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
Roe Deer	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Rabbit	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%	0.0%	0.0%
Water vole	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Field Vole	0.0%	0.0%	0.0%	0.0%	1.0%	0.7%	0.0%	0.0%
Small microtus	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
Small Rodent	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
Unidentified small mammal	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
Unidentified medium mammal	0.0%	0.0%	16.7%	3.1%	3.0%	2.1%	0.0%	0.0%
Unidentified large mammal	0.0%	0.0%	0.0%	1.0%	0.0%	1.1%	50.0%	0.0%

Full Name	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Birds								
Chicken	0.0%	0.0%	0.0%	1.0%	2.0%	3.7%	0.0%	0.0%
Chicken/pheasant	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	59.6%
Chicken/guinea fowl	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Geese (Anserinae)	0.0%	0.0%	0.0%	9.3%	1.0%	7.1%	0.0%	17.0%
Large Anseriforme	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
Duck/Goose	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
Duck (<i>Anas spp.</i>)	0.0%	0.0%	0.0%	0.0%	1.0%	0.2%	0.0%	0.0%
Grus spp.	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Corvid	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.1%
Raven	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Crow	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Rook	0.0%	0.0%	0.0%	1.0%	0.0%	0.0%	0.0%	0.0%
Crow/Rook	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Accipitriforme	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Barn Owl	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Unidentified Small Bird	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
Unidentified Medium Bird	0.0%	0.0%	0.0%	0.0%	0.0%	1.8%	0.0%	12.8%
Unidentified Large Bird	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bird	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
Amphibians								
Amphibian	0.0%	0.0%	0.0%	0.0%	24.8%	7.1%	0.0%	0.0%
Fish								
Gadid	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
Pike	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Unidentified	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	2.1%
TOTAL NISP	0	17	6	97	101	1361	2	47

4.2 Biostratinomy and Taphonomy

Before considering the results gained from the material, it is important to first examine the biostratinomic and taphonomic processes that affect survival, recovery, and recording. The type of feature in which the material was deposited has a great effect on the survival (see Figure 4-1). Material from pits tended to show the highest levels of preservation, with most bones showing Good levels of preservation, according to the York System of recording (Harland et al. 2003). Overall, the preservation at Ashton was very good, with most features showing around 40% or more of bone material with Good or Excellent preservation. The lowest average preservation scores come from the wells, which contained a greater proportion of Poor material (>50% abrasion). This suggests that most of the material was exposed to the elements for a significant period of time before its deposition in the wells.

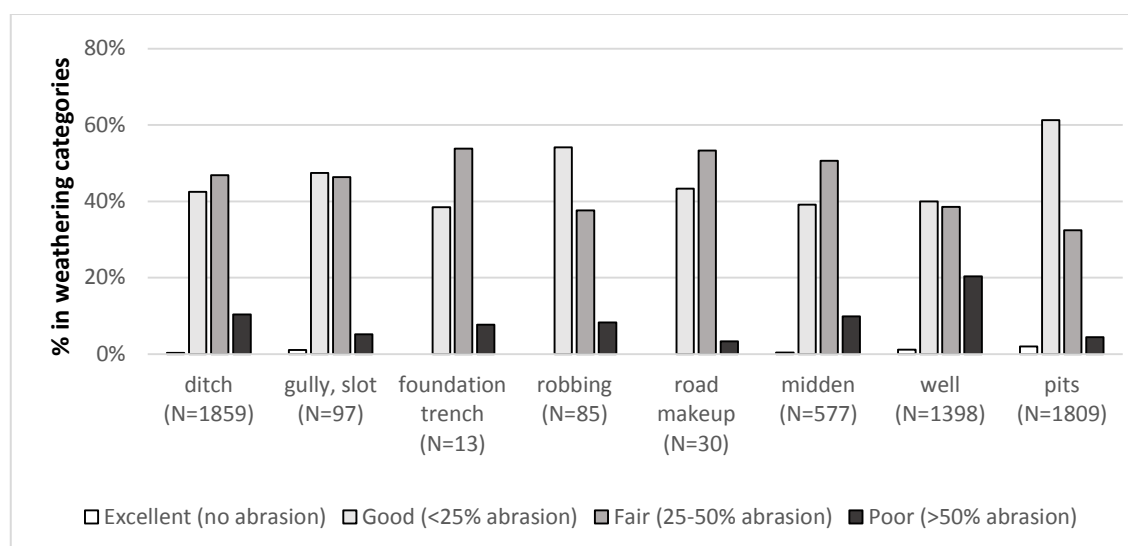


Figure 4-1: Preservation by feature type (following Harland et al. 2003)

Gnawing by carnivores and rodents varied highly by feature type (Figure 4-2). Although the road makeup features had the highest rate of carnivore gnawing, this is likely due to the small sample size. For feature types with adequate sample sizes, robber pits or trenches and midden contexts all had more than 50% of bones that showed signs of carnivore gnawing. The ditch also had a high percentage of gnawed bones. Bones in the midden would have been exposed to carnivores as they accumulated, and the robber pits and ditches were likely filled with material that had accumulated on the surface. The low percentage of gnawing on material from the well is partially due to the abundance of ABGs present in certain contexts, which contained a large number of bones from individuals that show signs of being primary depositions. It is not entirely a

factor of the larger numbers of frog, toad, and rodent remains, as excluding these from the gnawing calculations only raises the figure from 11.2% with these small animals included to 12.3% when they are excluded.

When well and non-well contexts are separated by phase, a temporal pattern appears (Figure 4-3). For non-well material, it appears that the exposure of animal bones to scavengers declines over time. One might expect better preservation of articular ends in later periods. This could also be a factor of increasingly organised waste disposal; a more organised and crowded townscape would require more attention to sanitation than a few isolated agricultural enclosures. The amount of gnawed bone in the wells also declines.

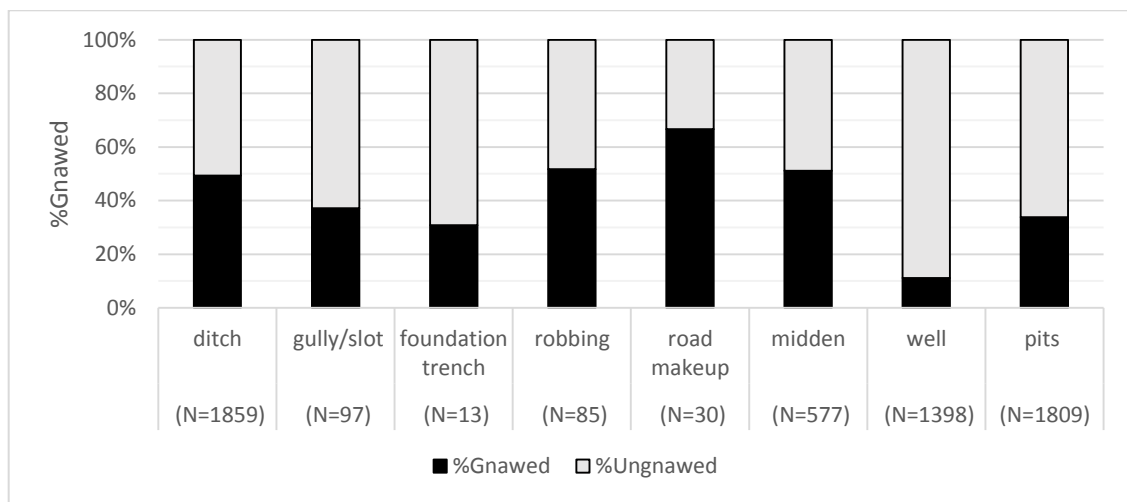


Figure 4-2: Gnawing by feature type

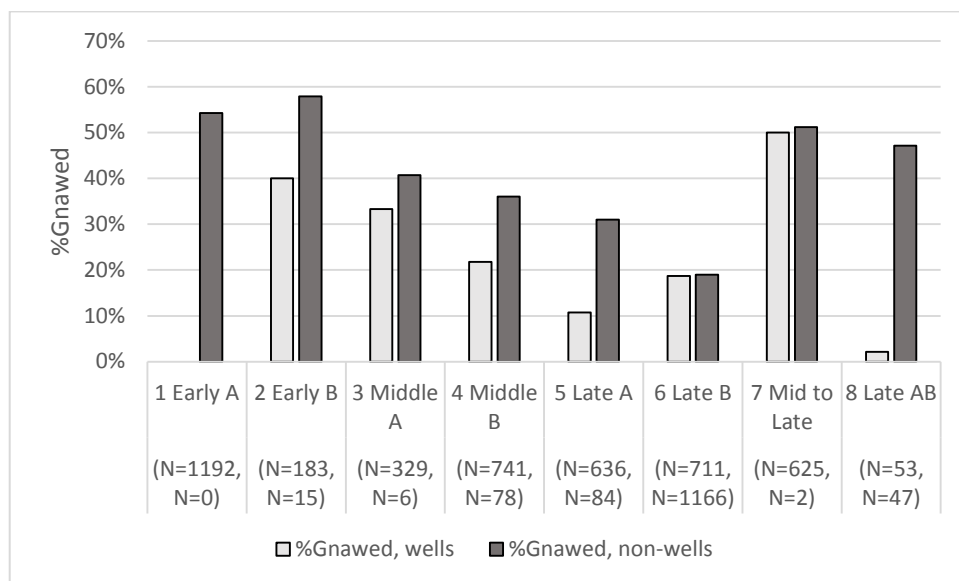


Figure 4-3: Gnawing by phase for non-well and well contexts, with NISPs given as (N= non-wells, N=wells)

Using various measures, the fragmentation and survivorship of the collection was assessed (see Table 4-5). Well and non-well contexts were separated out, as they often showed variation in preservation. The securely-dated non-well assemblage was much larger than the securely dated well assemblage. The degree of identifiability, as measured by dividing the Number of Identifiable Specimens (NISP) by the total Number of Specimens (NSP) produced fairly similar numbers, with non-well remains being slightly more likely to be identified to taxon than those from wells. Given the higher degree of poor preservation for well fills, this could explain the lower identifiability of well material. The extent of fragmentation was also assessed for each type of assemblage, following Klein and Cruz-Urbe (1984), calculated by dividing the number of complete elements by the number of total fragments (NSP). The extent of fragmentation in the wells was lower than in the non-well contexts, with far more complete elements compared to the total fragment count. This is likely due to the large number of Associated Bone Groups in the wells, as well as the preservation of small animals, whose small, dense bones were more likely to survive intact.

	Wells	Non-wells
Identified	1629	5603
Unidentified	2251	6714
Total	3880	12317
% Identifiable	42.0%	45.5%
Complete elements/NSP	7.8%	3.3%
Complete elements/NISP	18.6%	7.3%

Table 4-5: Identifiability and fragmentation in well and non-well contexts:

The average number of zones per identified element were also counted (see Figure 4-4). Fragmentation of the well material was greater than that of the non-well material, with well contexts showing an average of 4.4 identified zones per element compared to only 3.1 for elements from non-well contexts. The much larger number of complete elements from well-contexts seems largely responsible for this elevation in averages, and the lower percentages of gnawing also contribute.

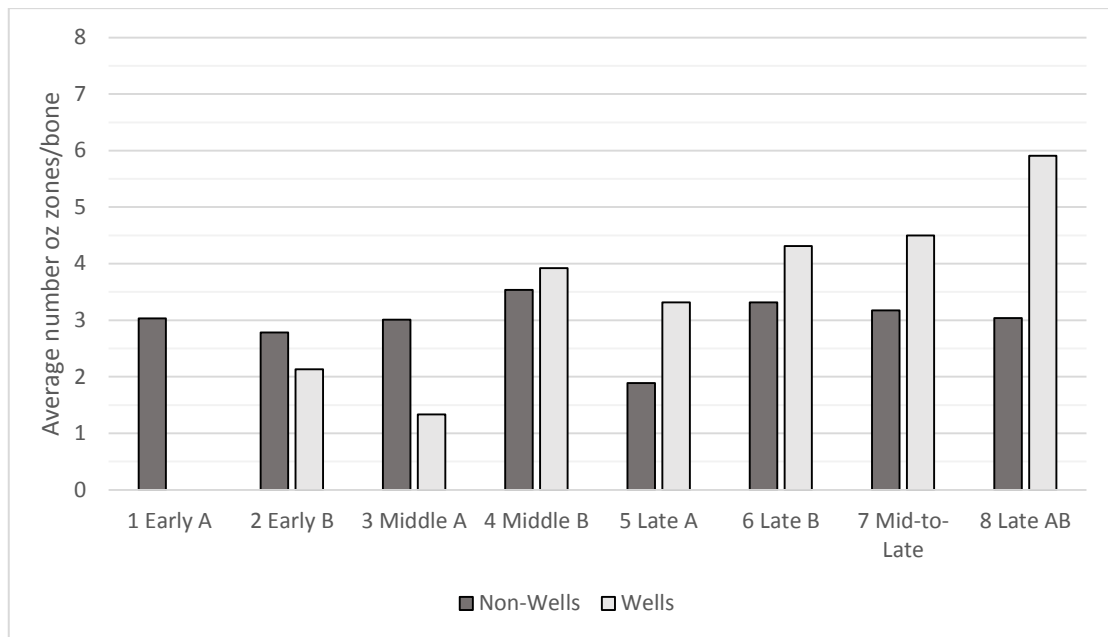


Figure 4-4: Average number of zones per bone for well and non-well contexts

In terms of preservation, Ashton as a whole was a well-preserved site. Sieving of well contexts produced less fragmented remains with more identifiable characteristics, in spite of the high degree of Poorly preserved elements. This is likely due to the process of filling wells, which included both the primary deposition or accumulation of whole animals and the dumping of weathered rubbish materials to fill in the pit up to ground level. Additionally, the small size of many of the animals from the wells recovered due to sieving made them smaller and less prone to fragmentation than larger animals where fragmentation into identifiable pieces was more likely.

4.3 Main Domestic Species

When discussing the domestic species, there are three that stand out as the most prevalent and economically important at Romano-British sites: cattle, sheep/goat, and pigs. These main three domesticates show different patterns of representation over time, and their relative proportions can inform on the taste preferences, animal and cereal agricultural strategies, and how sites functioned in their wider network of exchange. The non-well contexts (Figure 4-5) show a gradual increase in cattle proportions over time, with a steep drop in Phase 6 Late B, while sheep and pigs tend to show the opposite trend: gradual decrease, followed by more modest increases in the last phase. These changes cannot entirely be attributed to taphonomy, as we would expect the decreasing amount of dog gnawing to have a negative effect on the preservation of smaller species,

which is not the case. Further drivers of these changes will be explored for each taxon. The patterns in the well data are more mixed, and will be discussed further in the following chapter (Figure 4-6).

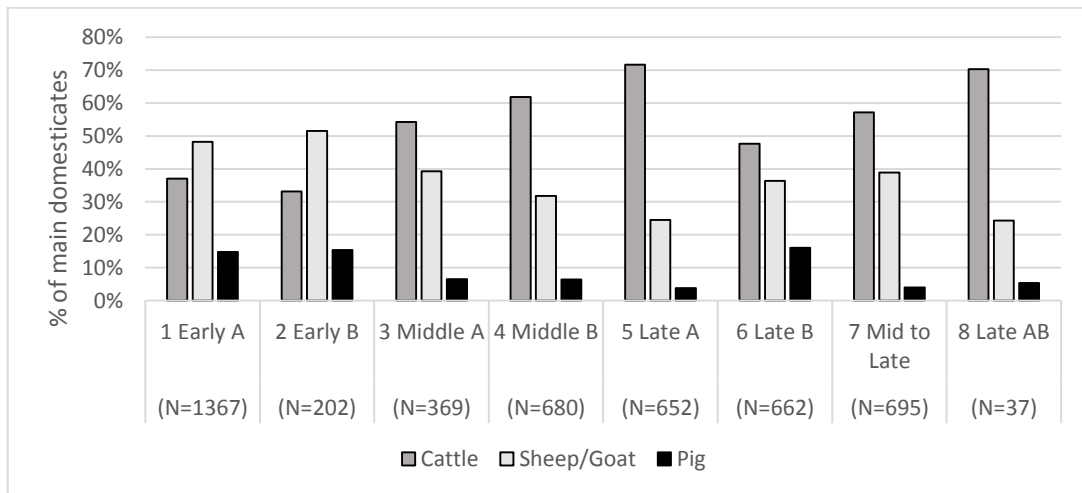


Figure 4-5: Main three domesticates by phase (non-well contexts)

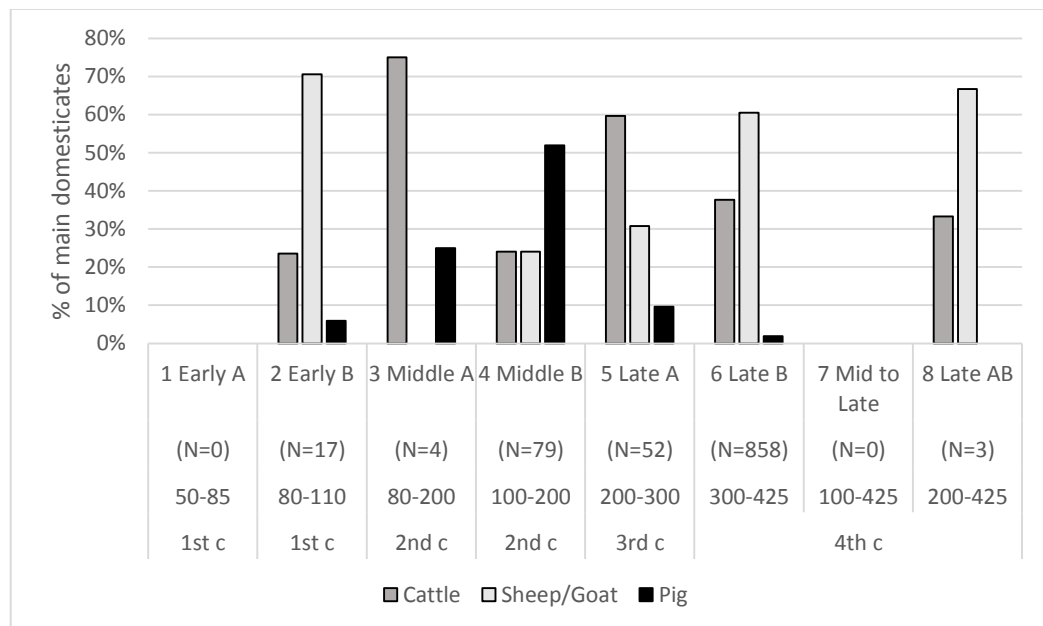


Figure 4-6: Main three domesticates by phase (well contexts)

In addition to variation in key domesticates, the proportions of domestic and wild animals also vary (see Tables 4-6, 4-7). The contribution of wild mammals to the assemblage remains low for all periods, although some are present in the early, middle, and late Roman phases. Wild mammals are more common in the wells, despite having few Associated Bone Groups. Unfortunately, no clear temporal patterns emerge.

Non-Wells	N=1483	N=215	N=399	N=780	N=680	N=770	N=727	N=46
Mammals	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Domestic	99.7%	100.0%	100.0%	99.2%	100.0%	96.6%	99.4%	100.0%
Domestic?	0.1%	0.0%	0.0%	0.6%	0.0%	2.9%	0.1%	0.0%
Wild	0.2%	0.0%	0.0%	0.1%	0.0%	0.5%	0.4%	0.0%

Table 4-6: Domestic, possibly domestic, and wild mammals in non-well contexts by %NISP (excludes rodents, size categories)

Wells	N=0	N=16	N=5	N=80	N=61	N=966	N=1	N=1
Mammals	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Domestic	n/a	100.0%	100.0%	100.0%	98.5%	93.9%	0.0%	100.0%
Domestic?	n/a	0.0%	0.0%	0.0%	0.0%	3.2%	0.0%	0.0%
Wild	n/a	0.0%	0.0%	0.0%	1.5%	2.9%	100.0%	0.0%

Table 4-7: Domestic, possibly domestic, and wild mammals in well contexts by %NISP (excludes rodents, size categories)

4.3.1 Cattle

Across all contexts assigned to a broad phase category, 2779 elements from cattle were identified. Of these, 381 elements were recovered from sieved well fills, and 2398 were recovered from hand-collected non-well contexts (for data, see Table 4-8). As a percentage of total identified specimens recovered, cattle represented 23.4% of the well contexts and 43.1% of the hand collected contexts. The increased representation of cattle bones in non-well fills is likely due to collection bias towards larger animals, as well as the increased diversity of species present in the wells.

In the non-well fills, the percentage of cattle increase from around 30% of the faunal assemblage in the mid-1st to mid-2nd century up to approximately 65% by the late 3rd century. This increase occurs at the same time as the road is being formalized and paved and the stone buildings being erected along the road frontage. However, there is a decrease in the late 3rd century and into the 4th century that is not purely an artefact of the increasing number of well fills from that period. Sheep and pigs both increase in relative abundance as cattle decrease.

Period	Dating (in centuries AD)	NIS P	non-well contexts	well contexts	%NIS P non-wells	%NIS P wells
1 Early A	mid to late 1 st	506	506	n/a	32.4%	n/a
2 Early B	mid/late 1 st to early 2 nd	71	67	4	28.5%	23.5%
3 Middle A	late 1 st to late 2 nd	203	200	3	47.3%	50.0%
4 Middle B	early 2 nd to late 3 rd	439	420	19	44.9%	19.6%
5 Late A	early to late 3 rd	498	467	31	64.7%	30.7%
6 Late B	late 3 rd to early 5 th	638	315	323	36.7%	23.7%
7 Late AB	mid 2 nd to early 5 th	397	397	0	51.4%	0.0%
8 Mid to Late	early 3 rd to early 5 th	27	26	1	49.1%	2.1%
TOTAL		2779	2398	381	43.1%	23.4%

Table 4-8: Cattle NISP by phase

Associated Bone Groups of Cattle

No signs purposeful cattle burial were observed at Ashton. However, a few body parts could be re-articulated and represent primary depositions. The absence of groups of articulated remains suggests that most material is scattered butchery waste, and that the element representation and species proportions are not biased by the presence of semi-complete individuals.

Part of an articulating neck consisting of five cervical vertebrae and a thoracic vertebra was present in a ditch fill from Area A, dating from the late 1st to early 2nd century AD. All vertebrae were unfused, and using Silver's estimate for the age at fusion, this puts the animal at less than five years of age (1969, 285). Its presence in a large fill indicates that the neck was placed in the ditch and quickly covered over, and then resisted disruption during subsequent scourings.

Another articulating set of elements included a left ankle joint consisting of the distal end of the tibia, and a complete naviculo-cuboid, astragalus, and calcaneum. The elements come from a pit dated to the late 3rd to early 5th century AD; this pit also contains non-articulating cattle remains including a second left calcaneum, as well as a few elements from sheep/goat. All joint surfaces of the articulating foot bones contained significant patches of eburnation. Cut marks were also observed on the dorsal side of the astragalus and lateral side of the calcaneum. This might have occurred during the

removal of elements below the joint No burning was observed on any of the elements. Several elements in the pit have carnivore gnawing, indicating a combination of primary and secondary deposits.

Cattle do not appear to have been deposited as individuals or large portions of individuals in the same manner as other food domesticates such as lambs and young pigs, or in the same way as non-food domesticates such as dogs and horses.

Body Part Representation in Cattle

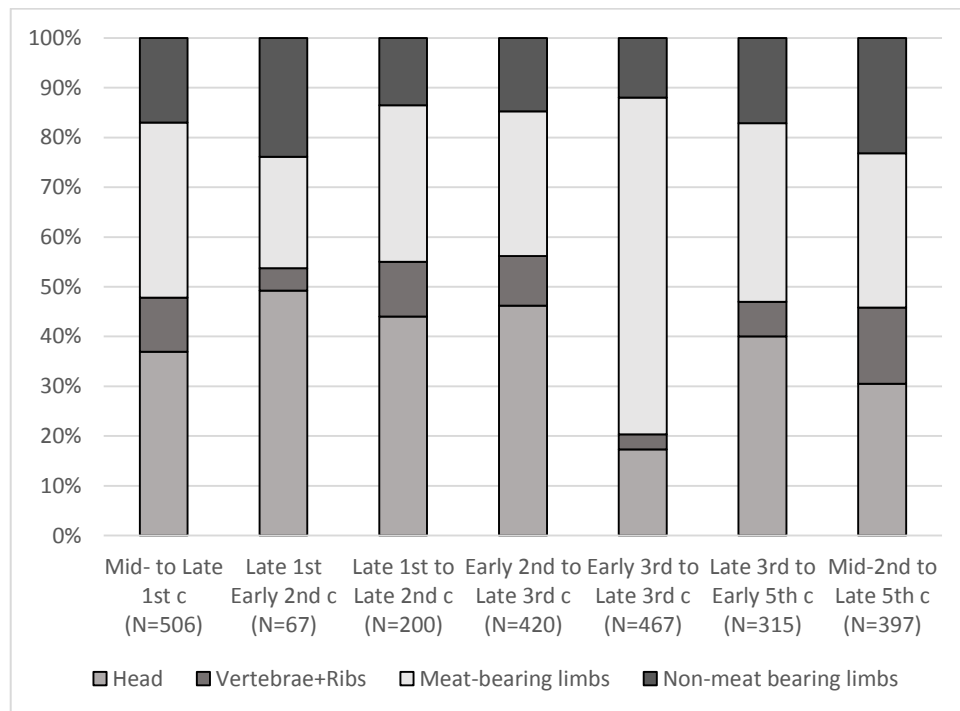


Figure 4-7: Body Part Representation for Cattle in Non-Well Contexts (NISP)

There are subtle changes in the element representation over time, although no continuous trend is observable. All parts of the body are observed in all periods.

Using NISP counts for elements and organising them into groups of the head (skull, mandible, and loose teeth), the axial skeleton (vertebrae and ribs), the meat-bearing upper limbs (scapula, humerus, radius, ulna, pelvis, femur, and tibia), and the non-meat bearing lower limbs (metapodials, phalanges), differences in the phases appear (Figure 4-7, above). Skulls, mandibles, horn cores, and teeth make up a high percentage of the assemblages, at or above 40% in the periods stretching from the late 1st into the early 3rd century and again in the late 3rd to late 4th century material. The lower percentage in Phase 5 Late A (early 3rd to late 3rd c) reflects the large accumulation of meat-bearing elements from a single context, which depresses all other values.

Due to difficulties identifying vertebrae and ribs to taxon beyond “large mammal”, the number of axial elements remains fairly low. The largest concentrations occur in the midden context. In the non-midden contexts, axial elements make up 11% or less of the total NISP.

The proportion of meat-bearing elements and non-meat bearing elements varies over time. With the exception of Phase 2, the NISP of meat-bearing elements almost always outnumbers that of the non-meat-bearing elements. Phase 2 appears to have an increased percentage of phalanges present. This could be due to the lower sample size for this phase, or it could indicate that most contexts from this phase were from deposition of primary butchery waste, supported by the high NISP for skulls, mandibles, and teeth from this phase. The percentage of meat-bearing elements seems to cluster around 30% for most contexts, with the exception of Phase 5. 273 of the 467 cattle elements identified from Phase 5 were from a single feature, Pit F1365 in Area C. This pit, which dates to the 3rd century, contains primarily heavily butchered meat-bearing limb bones. When all bones from this feature were removed, the ratio is more similar to that of other contexts, with only 27% of the NISP representing meat-bearing elements (see Table 4-9 below). The unique nature of this feature will be further discussed in the spatial analysis.

Element Type	NISP	%NISP
Head	69	46.6%
Vertebrae + Ribs	12	8.1%
Meat-bearing limbs	40	27.0%
Non-meat-bearing limbs	27	18.2%

Table 4-9: Phase 5 NISP without Pit F1365

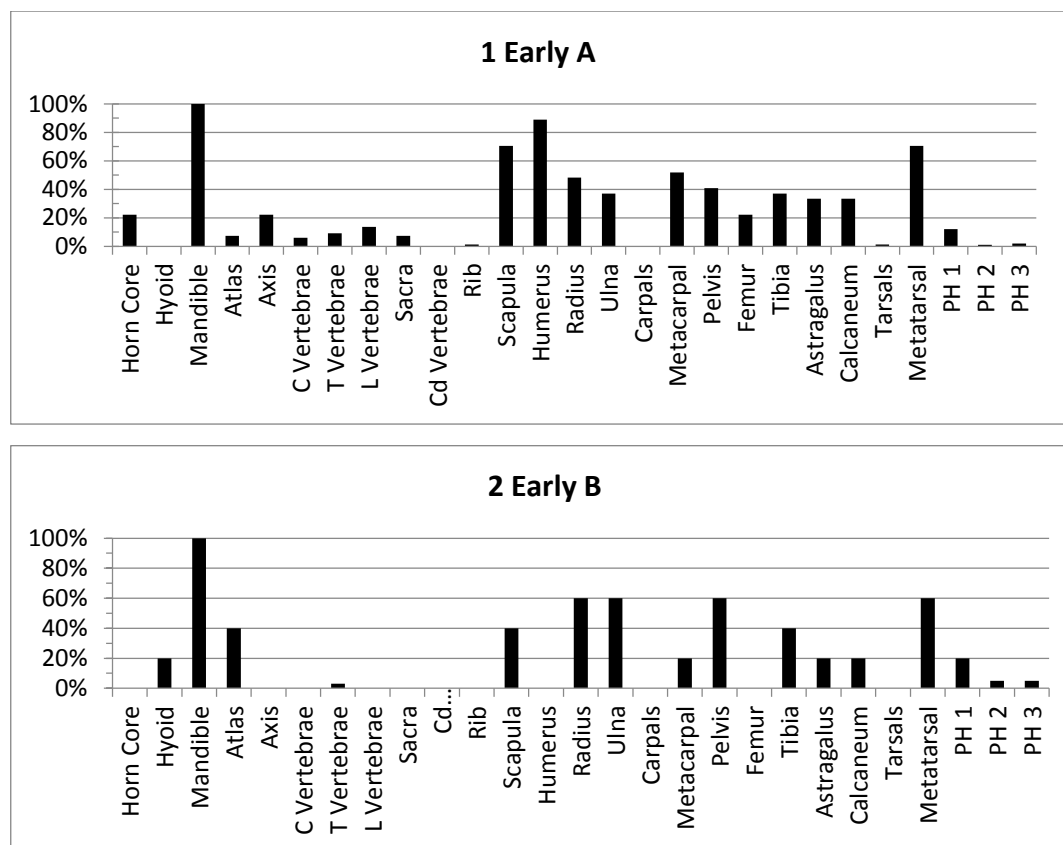
To look at individual element presence on a more precise scale, MNE and MAU values are of use. Removing bias for large, easily broken elements, which can unduly influence NISP, %MAU allows for an examination of which elements were most common in an assemblage (Figure 4-8 below). All periods show a predominance of forelimbs over hindlimbs. It seems that Ashton residents were more likely to consume the foreshank of beef than any other part. The presence of shoulder blades also suggests that these cuts were relatively common. Today, these are not considered the highest value or most tender cuts from beef, and it is uncertain whether the superior cuts of

meat were being consumed and deposited elsewhere or whether they were perhaps being preserved or sent on to other sites.

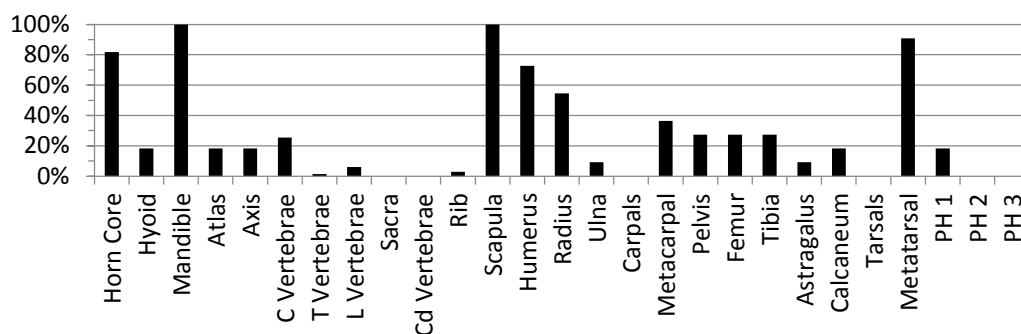
The notable increase in horn cores from Phase 3 Middle A to 5 Late A (the late 1st to late 3rd centuries) shows a potential increase in horn-working. By Phase 4 Middle B (early 2nd to late 3rd century), horn cores are the most common element in the assemblage, and are present across 22 contexts and all areas of the site. This cannot be easily separated out as a single large dump of horn-working waste, but seems to represent a change that occurs somewhere just before the 3rd century, as most of these horn cores come from contexts with pottery dating from the mid-2nd and into the 3rd centuries AD.

The low numbers of phalanges from all periods is also notable. They are relatively small, but they are also a very dense element. It is possible that they could have been discarded in another area during primary butcher, or they could have been included along with removed skins for leather-working that were transported elsewhere. Metapodia seem to have been retained for their use in bone-working and marrow extraction.

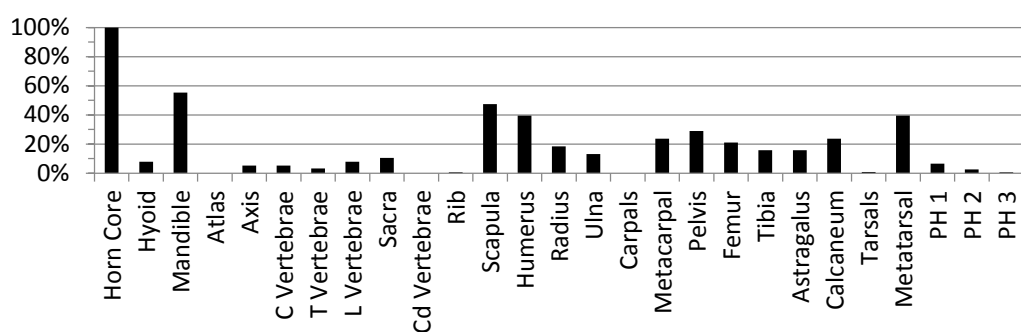
Figure 4-8: %MAU for elements by phase in non-well contexts



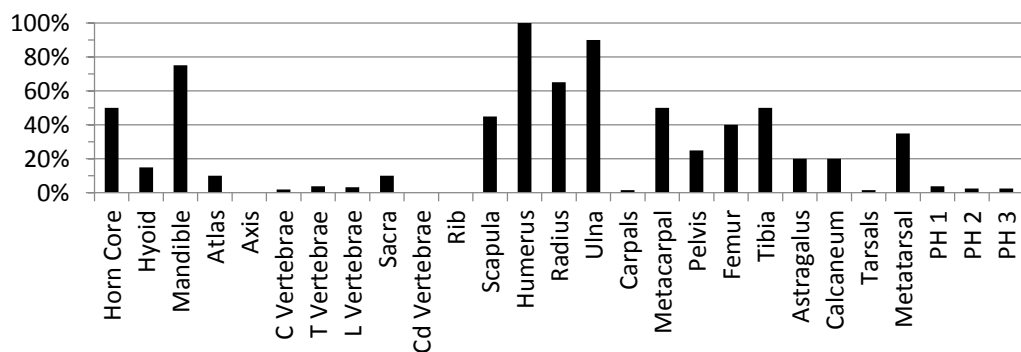
3 Middle A



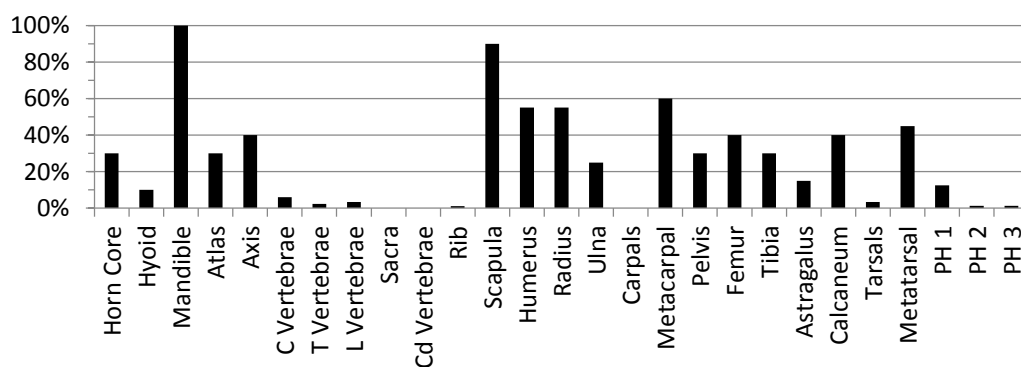
4 Middle B



5 Late A



6 Late B



Butchery in Cattle

Butchery of cattle remains varies slightly over time, with some periods of unique butchery practices appearing, especially in the large dump of butchered cattle remains from pit F1365 (Figure 4-9). The prevalence of butchered bones generally increases over time until Phase 6 Late B (late 3rd to early 5th century), when it dramatically decreases.

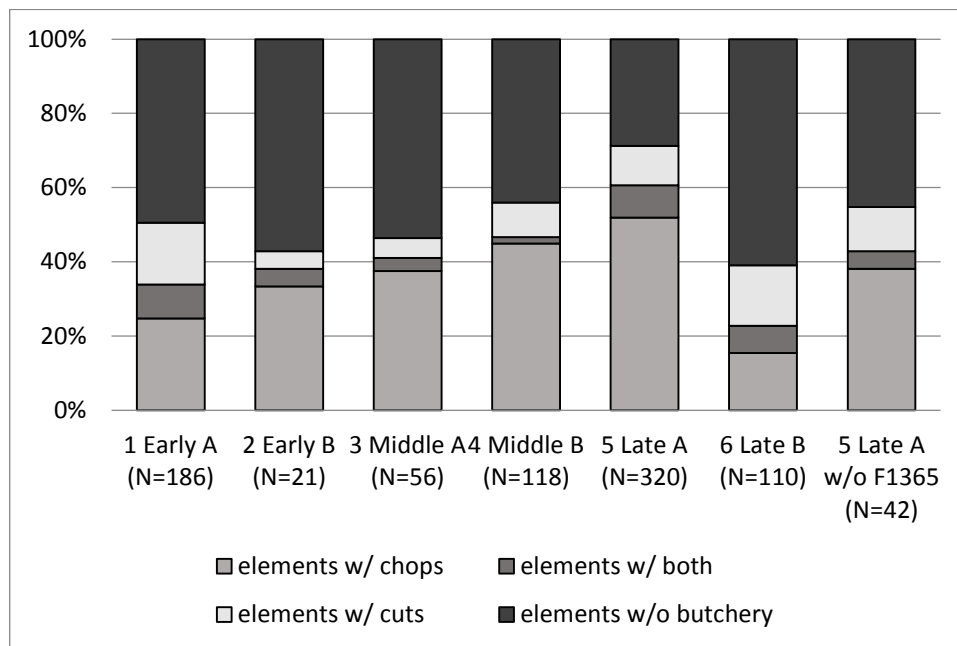


Figure 4-9: Butchery prevalence over time for cattle remains in non-well contexts

For simplicity, I have here examined major limb bones (humerus, radius, ulna, pelvis, and tibia) together, with data displayed in Figure 4-10. The scapula was excluded from this group due to the complexity of butchery involving the glenoid, spina, and blade. The earliest phase (mid- to late 1st century AD) and the latest phase (late 3rd to early 5th century AD) both show a much higher percentage of cuts compared with chops. This is not surprising for the early phases, as Iron Age butchery is largely associated with knives used to disarticulate and portion the carcasses, whereas the established pattern of urban Roman butchery involves the use of heavy cleavers (Grant 2004; Maltby 1989, 2007; Seetah 2006). As the town expanded, cut marks decreased, with very few cuts and cuts/chops by Phase 4 Middle B (early 2nd to late 3rd), when we see the development of stone houses in Area A and other signs of increasing industrial activity and connection with the wider world. What is notable is the return to knives as an increasingly common instrument of butchery in Phase 6 Late B. Even though material for wells has been excluded, it is clear that there is a significant change in husbandry patterns occurring at the end of the site's occupation. The change in butchery

cannot be fully assessed for Phase 5 Late A without removing the large context of butchered cattle remains from pit F1365. When one examines the bones from 5 Late A not in this pit, it appears that the increasing prevalence of cuts is beginning somewhere in the early 3rd century.

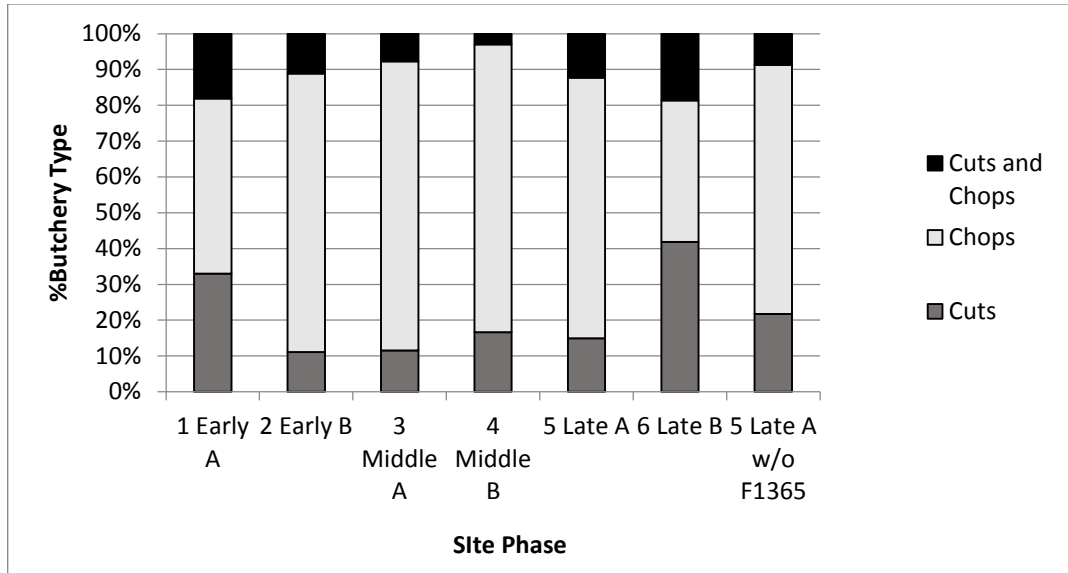


Figure 4-10: Butchery type for major long bones in cattle

No definite patterns were identified in the frequency of butchery marks on bones (Figure 4-11). For each butchered bone, the number of unique butchery marks were counted and tallied to examine the intensity of butchery. Later periods are more likely to have more than one butchery mark per specimen. Phase 1 Early A has the highest percentage of bones with only a single butchery mark. No information can be gleaned from Phase 2 Early B, as only nine specimens with butchery marks were present. However, discounting this, it is clear that bones with multiple butchery marks increased throughout the later phases, with as many as five or more different types of mark on several bones. The intensity of butchery is also greater in Phase 5 Late A when the material from F1365 is included, which can be seen in comparisons with the non-pit material.

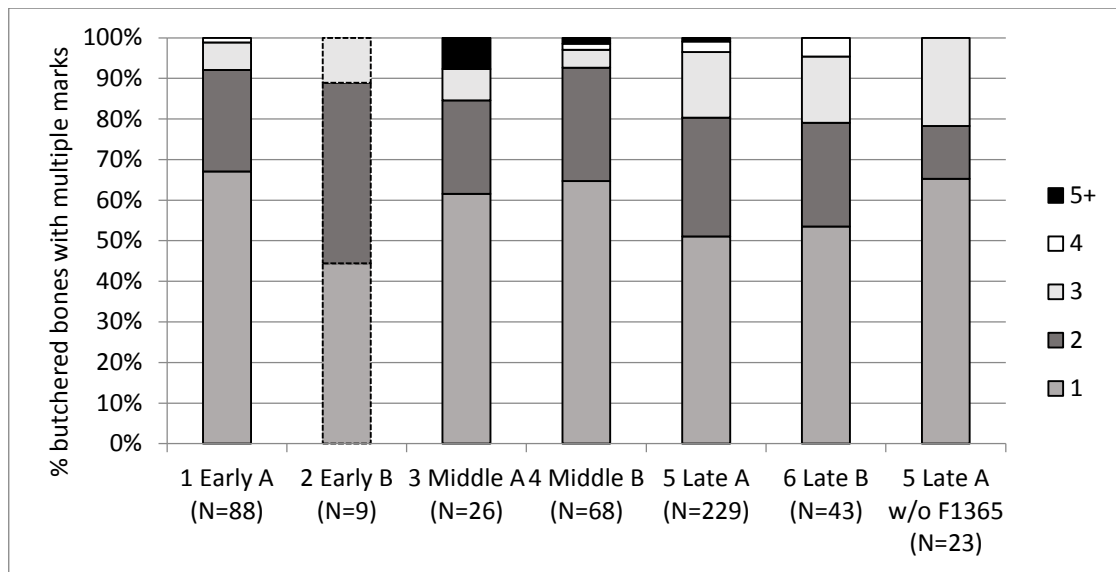


Figure 4-11: Number of butchery marks per bone in cattle

In order to summarise the various types and locations of butchery for long bones, the butchery codes used were divided up into their type (chopped, cut, chopped through, and shaved) as well as whether the marks were present on the diaphysis or epiphyses (Table 4-10). Marks on the epiphyses were most common in Phase 1 Early A, and coincide with the higher prevalence of cut marks compared with chops. When disarticulating a carcass with knives, this often requires the insertion of the blade into the joints to separate elements, which would result in more butchery marks on the epiphyses. In Phases 2 Early B through 4 Middle B, a consistent pattern of butchery type and locations shows that the most common types of butchery mark were chops on and through the diaphysis; these would have been useful in dismembering the animal for consumption. Shaving was relatively uncommon, although it increased in later periods. Pit F1365 affected the butchery pattern somewhat, elevating the number of butchery marks through epiphyses and the amount of shaving. This is likely due to excessive use of a large cleaver to quickly process a large amount of cattle; when the data from F1365 is removed, more cuts are present and fewer chops through epiphyses. Phase 6 Late B (late 3rd to early 5th century) returns to a pattern of butchery that focuses on the diaphyses. Very few chops were present on epiphyses compared to cuts on the piphyses. However, cuts to the diaphysis and chops through were the most common butchery mark types. Unlike Phase 1 Early A, however, there were fewer cuts on the epiphyses.

	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	5 w/o F1365
chop diaphysis	27	7	13	26	82	9	6
chop epiphysis	4	2	3	7	25	1	5
cut diaphysis	31	4	3	10	48	25	6
cut epiphysis	29	0	5	4	14	10	4
through diaphysis	38	4	12	30	103	20	12
through epiphysis	15	2	6	11	75	12	1
shave diaphysis	3	0	4	6	32	6	2
shave epiphysis	0	0	1	2	4	1	1
Total	147	19	47	96	383	84	37

Table 4-10: Butchery of non-well cattle remains by type and location

Age and Sex Distribution in Cattle

Over time, there are slight changes to be observed in the age at slaughter for cattle (Figure 4-12 below). The mandibular tooth wear data shows that during the 1st and 2nd centuries, there are no individuals slaughtered before 8 months, followed by a steep slaughter peak with 50% slaughtered by 30 months of age, and a small number surviving past old adulthood. In the mid-2nd century, there is a shift towards a more gradual slaughter pattern, with all surviving until at least 8 months of age, and approximately 50% of individuals surviving well into adulthood. As the 2nd century continues, a steeper kill off appears, with only 33% of individuals surviving past 30 months of age. In the third and fourth centuries, an increase in mortality for very young cattle can be seen. At the same time, more cattle are surviving into at least young adulthood, with two thirds reaching adulthood. Patterns of epiphyseal fusion confirm this trend (Figure 4-13). Small sample sizes for some phases limit the utility of these data, but overall, the pattern suggests a largely meat-driven usage of cattle in Ashton. Keeping older animals for secondary products appears to be more prevalent in later periods.

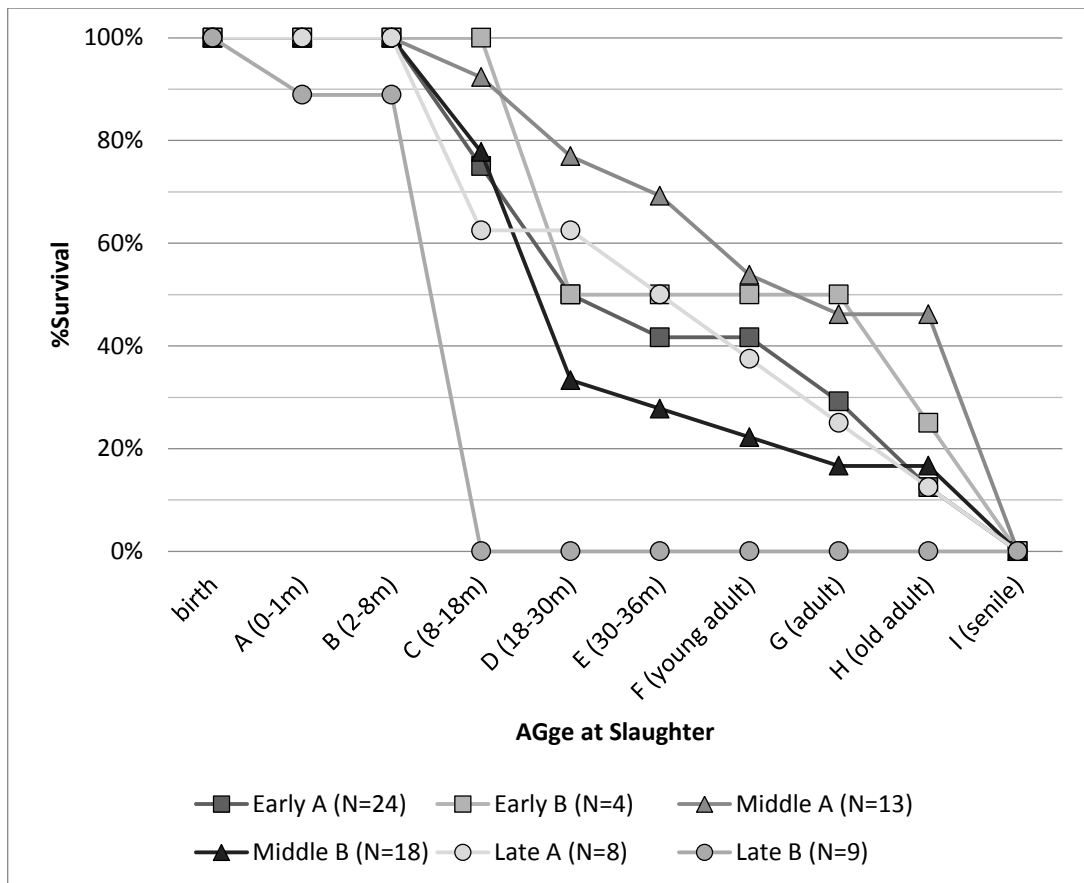


Figure 4-12: Cattle Ageing by Mandibular Wear (N=76)

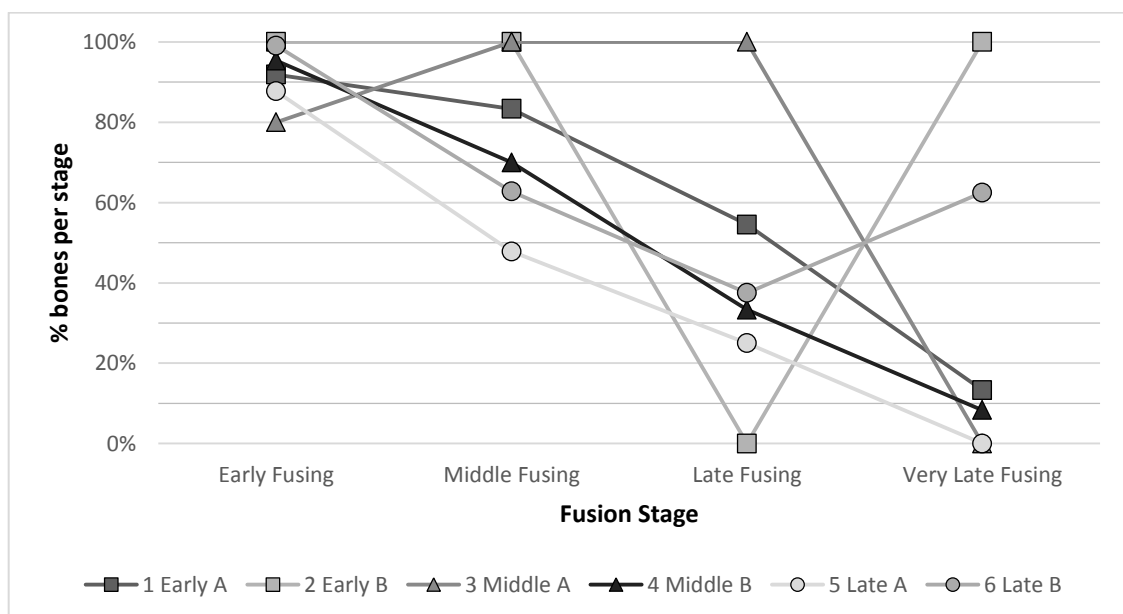


Figure 4-13: Ageing by epiphyseal fusion in cattle

Determining sex ratios based on pelvises is difficult for Ashton due to the butchery practices (data summarised in Table 4-11). Pelvises were often chopped through the acetabulum, preventing accurate determination of sex based on morphology and

measurements. Only 20 pelves from securely dated phases could be assessed based on a combination of morphology and H1 values, as described in (Greenfield 2006). An additional two pelves from the mid-2nd to late 4th century midden could also be sexed. In the case of the midden, both pelves were from a male individual, with large H1 values (16.0 and 17.9 millimetres). Of the pelves from the various phases, most were female. Low sample sizes prevent any definite determination of sex ratios.

	Male	Female	Total
Early (N=7)	14%	86%	7
Middle (N=8)	25%	75%	8
Late (N=5)	20%	80%	5
Mid to Late	67%	33%	3

Table 4-11: Pelvis sexing based on Greenfield (2006)

Sexing based on horn cores (Table 4-12) provides larger sample sizes, but is also complicated by potential bias in the selection of larger horn cores for craft-working. It is possible that males with larger horns were preferentially chosen, thus over-representing their presence in the sample. The presence of horn cores that were sufficiently complete for measurement was not distributed uniformly across all periods. Most seem to date to approximately the mid-2nd to 3rd centuries.

Period	Number of Horn Cores	Average Basal Circumference (BC)	Min. BC	Max. BC	Average Basal Minimum Diameter (BB)	Min. BB	Max. BB
1 Early A	1	172.0	172.0	172.0	43.20	43.2	43.2
2 Early B	0	n/a	n/a	n/a	n/a	n/a	n/a
3 Middle A	2	168.5	165.0	172.0	42.95	41.5	44.4
4 Middle B	20	164.6	114.0	210.0	39.28	27.4	51.1
5 Late A	8	159.8	112.0	220.0	36.31	28.0	48.0
6 Late B	6	124.5	77.0	171.0	32.17	23.8	42.4
7 Mid to Late (midden)	15	157.3	125.0	218.0	37.51	30.0	54.4

Table 4-12: Horn core measurement data for cattle

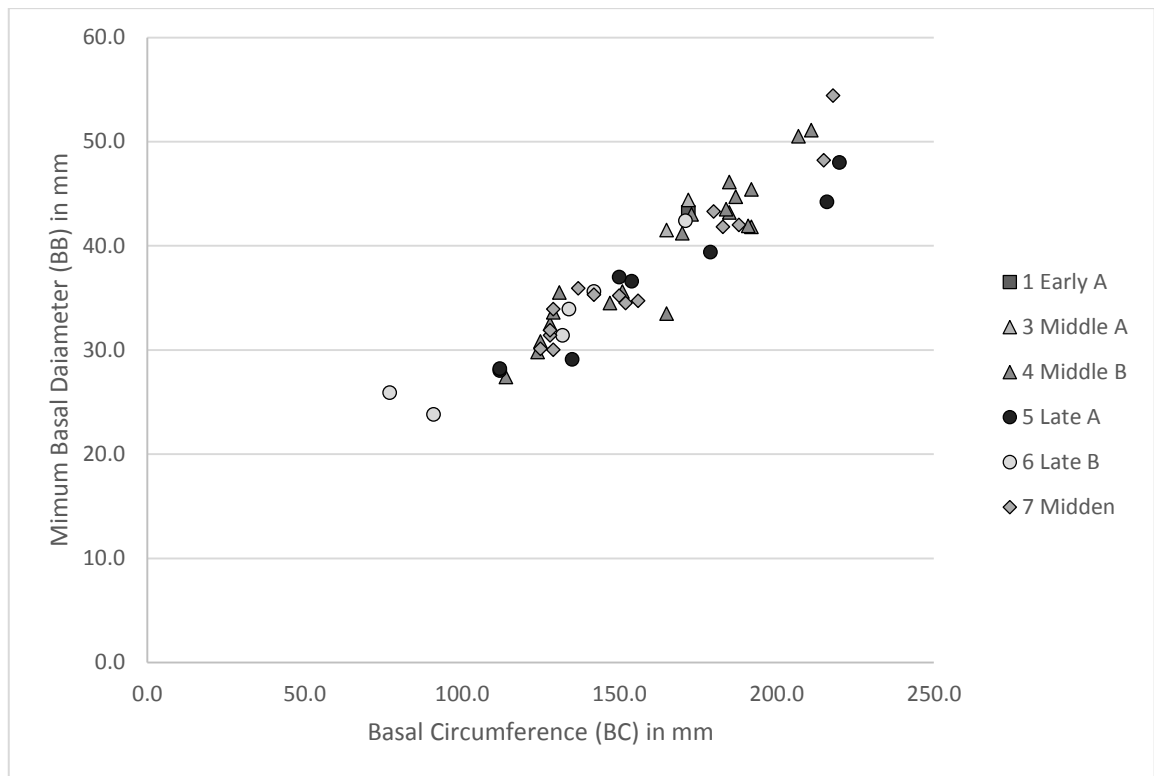


Figure 4-14: Cattle horn core measurements for short-horn cattle

The ability to define where the line should be drawn to separate sexing groups is highly subjective. Sykes and Symmons (2007) define short-horn cattle as those with outer curve measurements below 145-195mm, medium-horn cattle with outer curves of 195-350mm, and long-horn cattle with outer curves of more than 360mm; only medium- and long-horn cattle could be successfully assessed for sex differences. Of the 37 horn cores with a measurable outer curve, the largest was only 187.0mm long, putting them all firmly in the short horn category. Although the data may seem to cluster in groups, there can be no confidence in the separation of groupings (see Figure 4-14 above).

Biometrics for Cattle

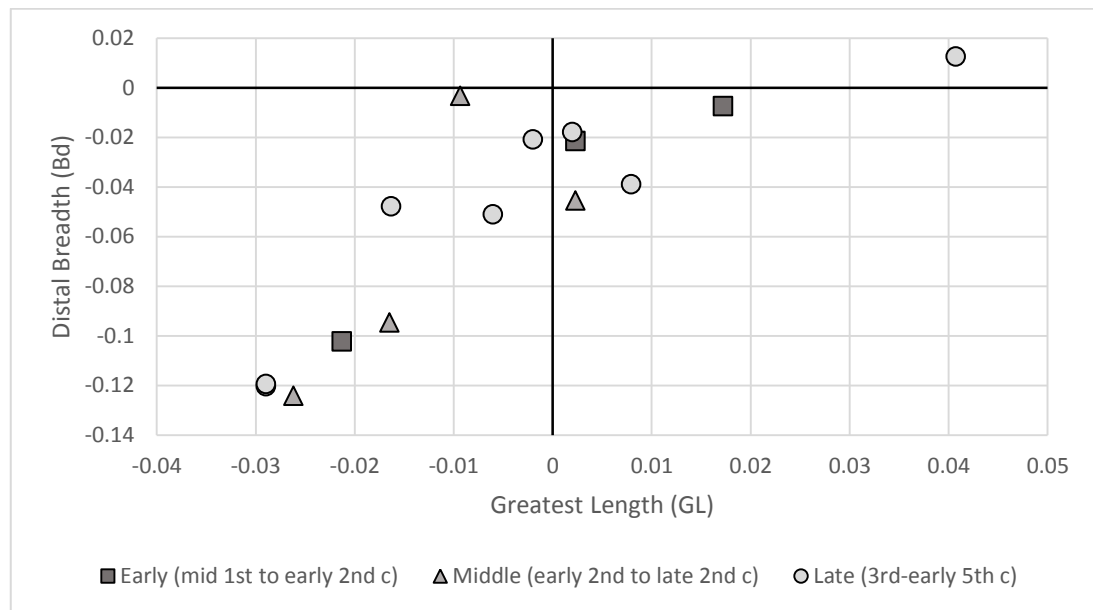


Figure 4-15: Log-scaled length by width for cattle elements

One of the most interesting aspects of the cattle population from Ashton was the presence of exceptionally large individuals. Some of the elements were comparable with those from modern improved draught oxen rather than the relatively smaller cattle common in the Roman period. Due to butchery practices, there were few complete elements that could be measured for length, which makes comparison of changes across several dimensions more difficult.

For those elements that had both Greatest Length (GL) and Distal Breadth (Bd) measurements available, the values were log scaled using one of the Chillingham bull individuals in the collection at the University of Leicester to compare several different elements on the same scale (see Figure 4-15). There were only a few measurements for the Early and Middle periods, and considerably more for the Late period.

Most of the datapoints show that although some of the elements were longer than those for the Chillingham bull, only one had a greater breadth. Variation in breadth was also greater than variation in length. In terms of temporal trends, the Late phase has the greatest variation in size; it is during this period that the only element to exceed both the length and breadth of the Chillingham bull can be found. However, the early period also has a few large individuals. Low sample sizes prevent significant conclusions from being drawn from this data.

There were many more breadth measurements available for cattle (Figure 4-16). A log-scaling measure of proximal and distal breadth produced 35 measurements for

Early period cattle, 24 measurements for Middle period cattle, and 34 measurements for Late phase cattle. A trend towards increasing size and increasing size variability from the Early into the Late period can be more clearly seen with this data. However, only the Middle and Late period showed normal distributions, and the difference was not statistically significant.

The Early period has only a single individual larger than the Chillingham bull. There is some evidence of size increase into the Middle period, which begins around the early 2nd century, at the same time as the town is going through a change in layout with the construction of the rectangular buildings in Area A. This population has more individuals clustering around the middle of the distribution, with very few outliers, representing a more homogenous group of animals. By the Late period, there is a greater range of variation, with the largest individuals dating to this time as well as some of the smallest. The lack of sexing data makes it difficult to determine whether changing sexual composition of the herd was responsible for this trend.

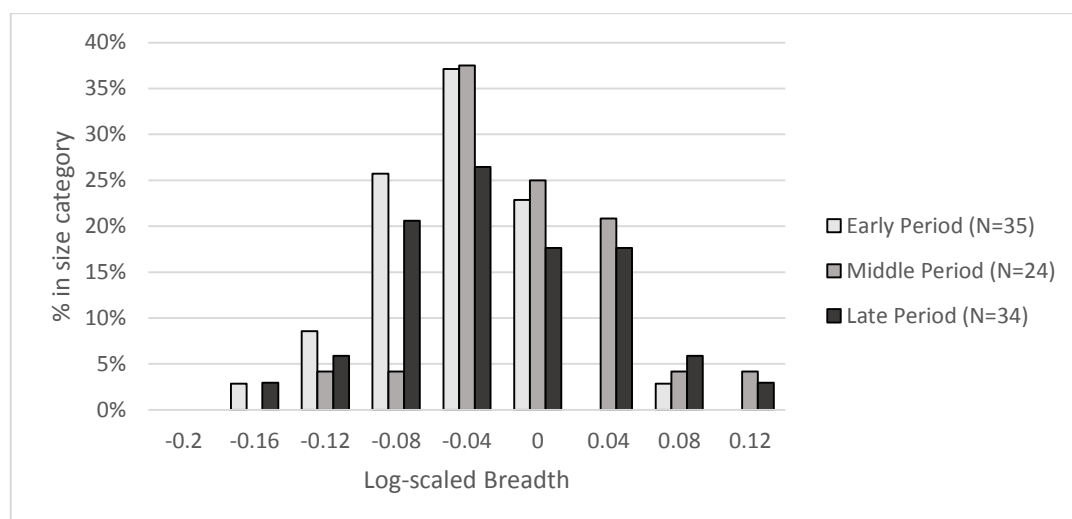


Figure 4-16: Breadth change by phase for cattle, change visible but not significant ($p>0.05$)

Pathologies in Cattle

For cattle, many of pathologies observed were present in the feet. However, a number of other types of lesion were also observed, including calluses, nodules, periostosis, articular depressions, articular destruction, osteophytes, necrosis, and interossesus bone growth (for a summary of pathologies, see Table 4-15). The growth of a thin film of periosteal new bone formation along both the exterior and interior surfaces of the bone was noted in a large number of bones from all phases across the site. The

presence and absence of these conditions give us a picture of the health of the cattle population at Ashton over time.

	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B
Callus	2	0	0	0	0	2
Nodule	1	0	0	0	0	0
Articular Depression	12	3	1	11	3	5
Articular Destruction	1	0	1	0	0	0
Osteophytes	0	0	3	0	1	2
Necrosis	0	0	0	0	0	1
Interosseus bone growth	1	0	0	0	1	0
Other	0	0	0	0	0	4
Foot Pathology Scores	14	5	2	20	5	30
Periostosis	18	3	3	20	123	9
TOTAL Cattle elements	506	71	203	439	298	640

Table 4-13: Pathologies in cattle at Ashton

Cattle elements occasionally showed depressions of various types in the articular surfaces. The most common elements with these deformations were first phalanges and scapulae, followed by metapodials. In phalanges and metapodials, this phenomenon has been previously studied by Thomas and Johannsen (2011), and in scapulae by Lawler (Thomas, pers. comm.). Scapulae show a low frequency of articular deformations over time, with a handful of instances in most periods. They do not appear to be dependent on size, as can be seen when scapulae with and without the depressions are mapped in relation to the breadth and length of the glenoid (Figure 4-17). However, the prevalence of these deformations appears to decrease over time (Figure 4-18), whereas the prevalence is above 40% for glenoids from the material up to the late 3rd century (Phases 1 Early A through 4 Middle B), this sharply declines to 18% by the late 3rd to early 5th century (Phase 6 Late B). These defects are believed to be caused by defects in the ossification of the cartilage during development, although if they have a genetic component, the shifting prevalence in the 3rd century could support the conclusion that new stock was being brought in (Thomas and Johannsen 2011). For examples, see Figure 4-19.

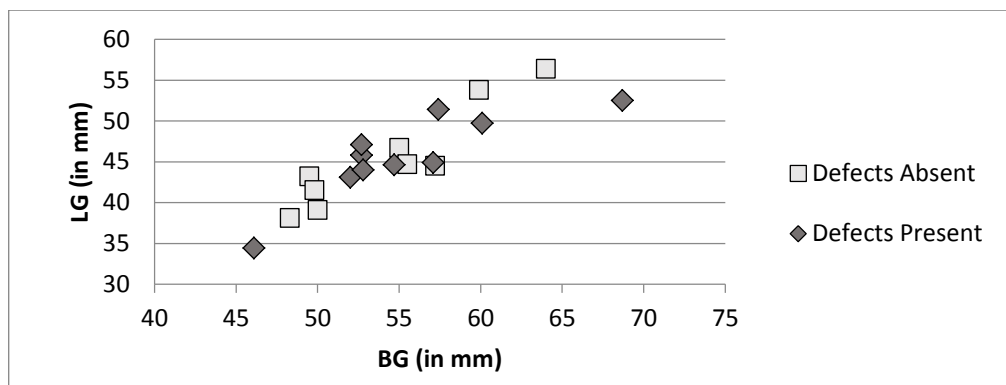


Figure 4-17: Articular defects in cattle scapulae compared to size and shape

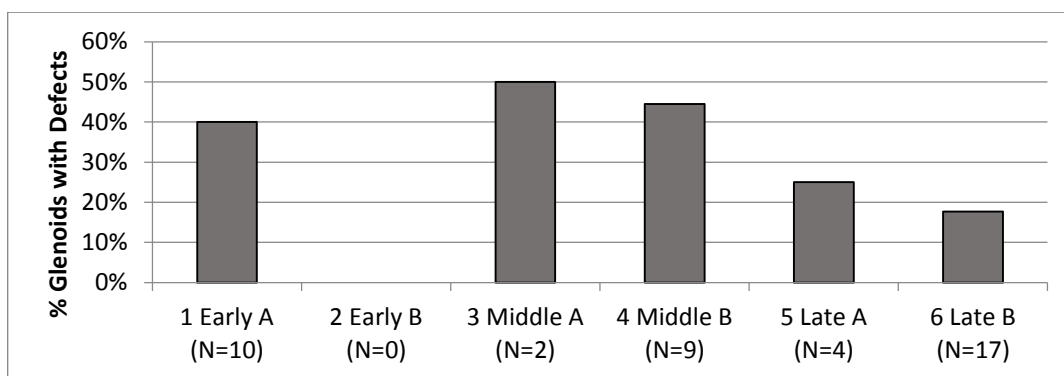


Figure 4-18: Percentage of cattle scapula glenoids with articular defects

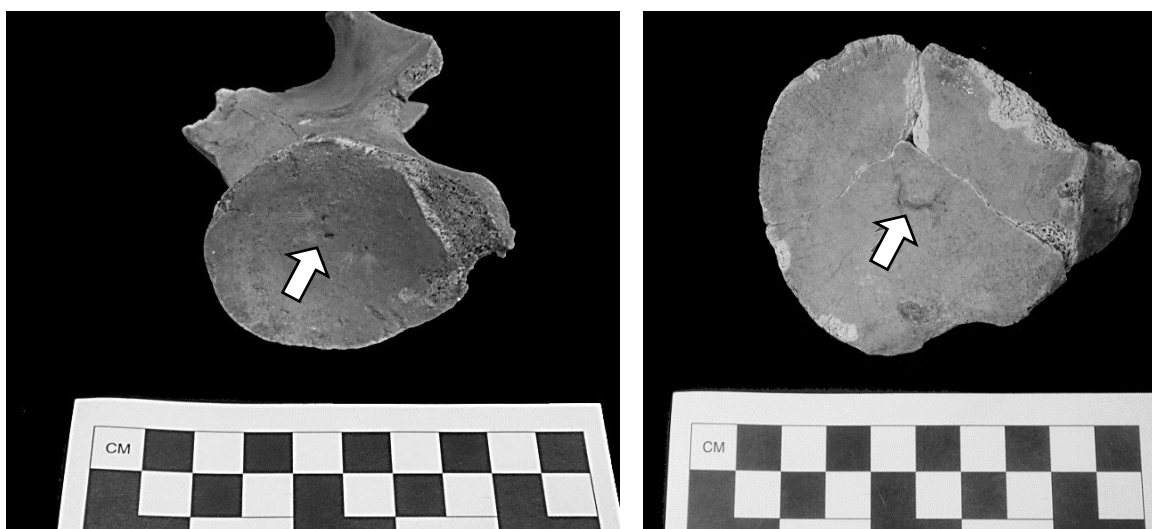


Figure 4-19: Type 4 (pinprick) and Type 5 (irregular) defects in cattle scapulae

Articular defects in feet are better studied (Baker and Brothwell 1980; Thomas and Johannsen 2011; Telldahl 2005), and were observed in several specimens from Ashton. For a summary of specific articular defect types, see table 4-15. Several different types of defects were observed in the metapodials and phalanges, as well as a few in carpals and tarsals. In proximal metapodials, articular deformations were mostly

oval-shaped indentations (Type 1), with isolated pinprick lesions (Type 4) and irregular lesions (Type 5). The distal condyles of the metapodials showed only linear lesions (Type 2). These lesions occurred infrequently in metapodials, with only a few cases in each period. The number of metapodials with articular defects generally declined over time, with the larger samples from phase 1 Early A (mid- to late 1st century) showing consistently higher scores than the 6 Late B (late 3rd to early 5th century) material.

	Proximal MP (Zone 1-2 NISP)	Proximal MP % Affected	Distal MP (Zone 7-8 NISP)	Distal MP % Affected	Proximal Ph1 (Zone 1-2 NISP)	Proximal Ph1 % Affected	Distal Ph1 (Zone 7-8 NISP)	Distal Ph1 % Affected
1 Early A	22	14%	6	17%	13	0%	11	36%
2 Early B	4	0%	1	100%	3	0%	3	33%
3 Middle A	4	0%	1	0%	8	0%	8	13%
4 Middle B	19	11%	4	25%	11	36%	11	27%
5 Late A	14	0%	7	14%	4	25%	4	0%
6 Late B	33	3%	19	0%	20	5%	20	10%

Table 4-14: Articular deformations in metapodials and first phalanges of cattle from all contexts

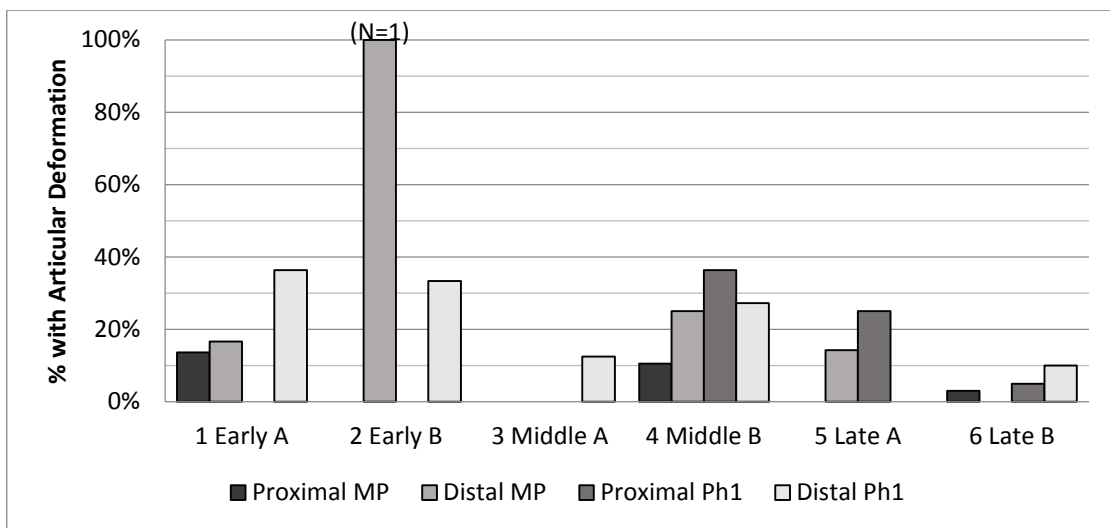


Figure 4-20: Articular deformations in cattle metapodials and first phalanges

The first phalanx showed a slightly different pattern of articular deformation than the metapodials (Figure 4-20). As with the metapodials, most of the distal ends were affected only by the Type 2 linear lesions, with the exception of a single 6 Late B element that also had a pinprick (Type 4) lesion. A spike in articular defects occurs in Phase 4 Late B (early 2nd to late 3rd century), which then decreases in the final phase. Proximal ends do not appear to be much affected by articular defects until Phase 4 Middle B, which also experiences a spike that then rapidly declines again in later

phases. The variation in lesion type is much greater on proximal first phalanges, with ovate, linear, and pinprick lesions all present (see Table 4-16).

Metapodials, proximal	Total	T1	T2	T3	T4	T5	Pathological elements	% affected
1 Early A	22	2	0	0	1	0	3	13.6%
2 Early B	4	0	0	0	0	0	0	0.0%
3 Middle A	4	0	0	0	0	0	0	0.0%
4 Middle B	19	2	0	0	0	0	2	10.5%
5 Late A	14	0	0	0	0	0	0	0.0%
6 Late B	33	0	0	0	0	1	1	3.0%
Metapodials, distal	Total	T1	T2	T3	T4	T5	Pathological elements	% affected
1 Early A	6	0	1	0	0	0	1	16.7%
2 Early B	1	0	1	0	0	0	1	100.0%
3 Middle A	1	0	0	0	0	0	0	0.0%
4 Middle B	4	0	1	0	0	0	1	25.0%
5 Late A	7	0	1	0	0	0	1	14.3%
6 Late B	19	0	0	0	0	0	0	0.0%
Ph1, Proximal	Total	T1	T2	T3	T4	T5	Pathological elements s	% affected
1 Early A	13	0	0	0	0	0	0	0.0%
2 Early B	3	0	0	0	0	0	0	0.0%
3 Middle A	8	0	0	0	0	0	0	0.0%
4 Middle B	11	1	2	0	1	0	4	36.4%
5 Late A	4	0	0	1	0	0	1	25.0%
6 Late B	20	0	0	0	1	0	1	5.0%
Ph1, Distal	Total	T1	T2	T3	T4	T5	Pathological elements	% affected
1 Early A	11	0	4	0	0	0	4	36.4%
2 Early B	3	0	1	0	0	0	1	33.3%
3 Middle A	8	0	1	0	0	0	1	12.5%
4 Middle B	11	0	3	0	0	0	3	27.3%
5 Late A	4	0	0	0	0	0	0	0.0%
6 Late B	20	2	1	0	0	0	2	10.0%

Table 4-15: Articular Deformations in Cattle Feet by Lesions Type

It is useful to consider the data for articular deformations in conjunction with the pathological index for cattle foot bones developed by Bartosiewicz et al. (1997). The Pathological Index values for cattle phalanges and metapodials, show a similar decrease from higher levels of pathology in the earliest phase of 1st century material, then a jump in the pathological indicators for Phase 4 Middle B (early 3rd to late 3rd century), which declines again to lower levels in Phase 6 Late A (late 3rd to early 5th century). Ylva Telldahl's work with horses and cattle suggests a link between these two osteological phenomena (2005).

The pathological index is often used to examine the intensity of use of oxen in ploughing (Cupere et al 2000), for a summary of the Ashton data, see Figure 4-21 below. Data suggest that Roman sites often have higher PI values than early medieval sites (Cupere et al 2000). The high PI value for Phase 1 Early A is largely due to the presence of a massively pathological metatarsal (scoring 18/24, PI value of 0.625) as well as the small sample size. The pattern of decreasing intensity of pathologies, followed by a spike in Phase 4 middle B and then another decline matches up with other patterns of pathology as well as changes in size and shape and changes in age-at-slaughter.

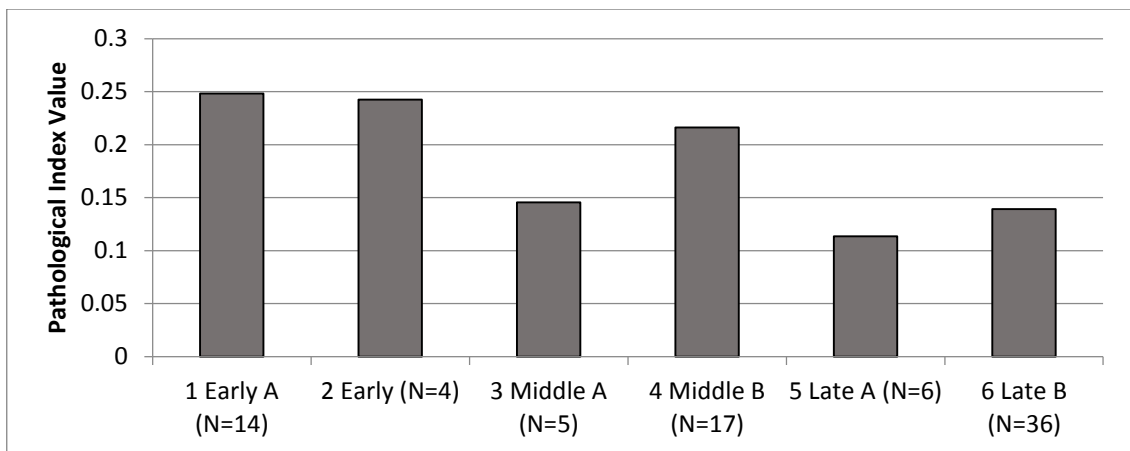


Figure 4-21: Average Pathological Index (PI) values for cattle foot elements from all contexts

Another commonly observed pathology was the presence of localised periosteal new bone formation, often in patches (Figures 4-22, 4-23, 4-24). It was observed on the outer cortex of elements from the three main domestic species, and on the inside of bones in cattle. The plaque mainly appeared on the major long bones and on rib fragments. This could result from inflammation of the periosteum, the lining around the outside of the bone. Such prevalence of low-level infection could indicate issues with herd health at Ashton and exposure to infectious agents. Again, we see a pattern of high prevalence in the earliest phases, reduced prevalence in Phase 3 Middle A, followed by a spike in the 2nd to 3rd century material and a decrease in the 4th century. The material from F1365 was particularly affected by this condition, as will be discussed later.

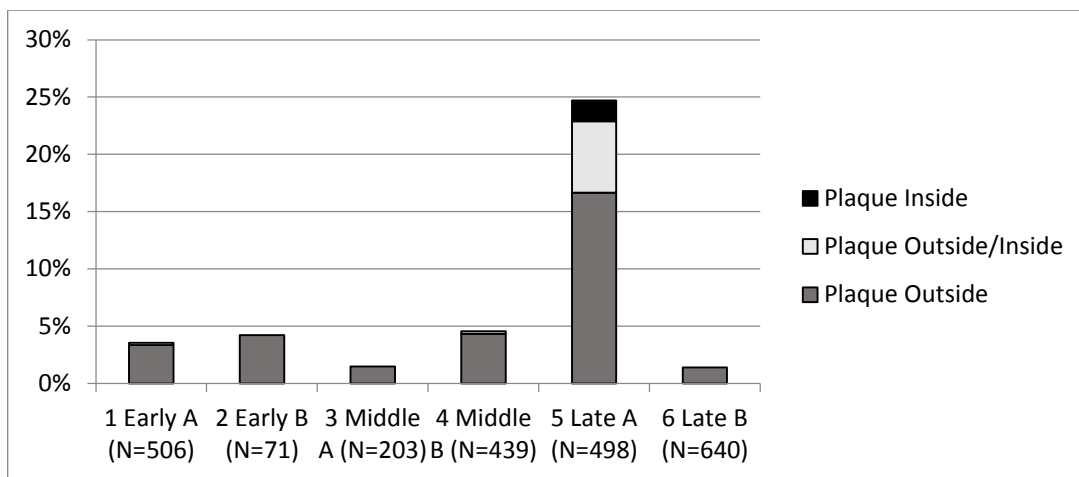


Figure 4-22: Periostosis in cattle bones from all contexts

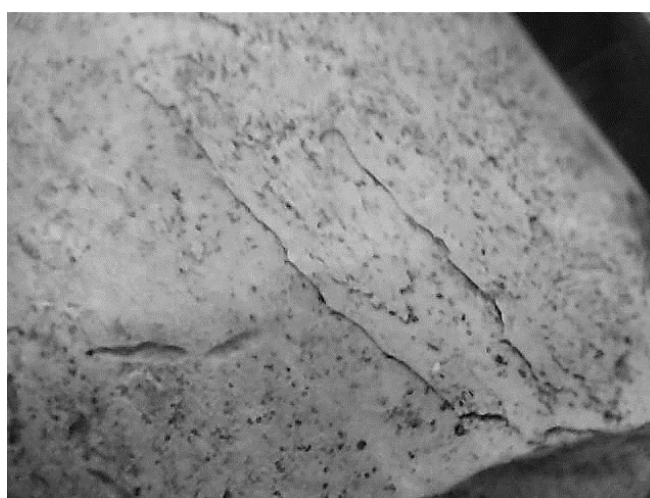


Figure 4-23: Grey, porous bone growth on cattle element

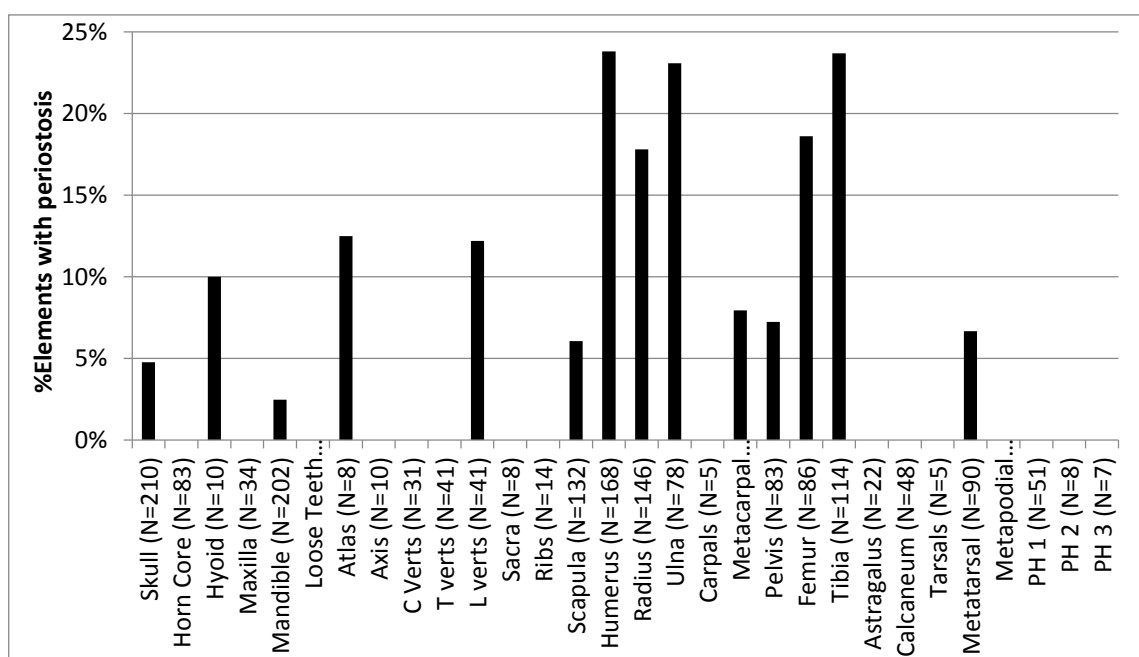


Figure 4-24: Periostosis by element in cattle from all contexts

Other conditions were observed in isolated elements across the assemblage. Cattle did not show evidence for fractures, and it may be that those who had noticeable bone fractures or difficulties with locomotion were slaughtered for meat and other products. However, several did have potential ossified haematomas, which presented as large remodelled calluses on the shaft of long bones (summarised in Table 4-17). These occur almost exclusively on metatarsals, although there is a callus on the labial surface of a mandible as well. Where the bones are broken postmortem, as with one element from 1 Early A, buildup of additional bone occurs on the inside of the site of the trauma as well. These calluses always seem to occur on the right side of the metatarsals. Thomas noted similar ossified growths on the metatarsals of deer at Dudley Castle, although these lesions always appeared on the medial side of the intermetatarsal groove, whereas the right metatarsals from Ashton have the lesions lateral to the groove (Thomas 2001: 290). As the sample size is small, this may be coincidental, but it makes more sense for traumatic damage to occur on the lateral side of an element, as that is the part of the animal most likely to come into contact with obstacles in the environment, even though the medial side of the ridge is more pronounced (Thomas 2001: 290).

Context number	Feature	Feature Type	CP date/ Phase	Element	S i d e	Z o n e	Size (HxW) in mm	Notes
1984	F1983	ditch	CP1-2 1 Early A	MAND	L	7	100x 50	slight depression around lump, surface of lump slightly porous
703	F1002	ditch	CP1-2 1 Early A	MT	L	5	132x 89	striated and porous buildup of bone on inside of shaft opposite lump
342	F1102	ditch	CP1-2 1 Early A	MT	R	6	35x 15	large lump
83	F414	pit	CP7b 6 Late B	MT	R	4	n/a	lump raised and bumpy, approximately 2 cm below articular lip
497	F514	robber trench	CP7a-b 6 Late B	MT	R	4	n/a	very slightly raised, element also has irregular articular depression

Table 4-16: Remodelled calluses on cattle long bones

Other lesions were observed in and around the joint surfaces. Most of these lesions were present on elements from the tarsals, metapodia, and phalanges.

Discussion of cattle

The cattle population at Ashton appears to have undergone a major change in exploitation somewhere in the 2nd century, as major changes occur across the site. It is possible that this pattern can be explained as a shift from a site that focused on production of food resources for the growing urban and military markets beyond the town into a site that was able to focus more on industrial pursuits and take advantage of the growing networks in the region as the road surface was formalised and it experienced increasing prosperity. However, a shift also occurs towards the end of occupation in the 4th century, when a return to cattle husbandry more like that seen in the 1st century occurs.

4.3.2 Sheep and Goats

Owing to the difficult nature of distinguishing sheep and goats based on osteological remains, the first step in assessing the prevalence of sheep at Ashton was looking for any possible species distinctions between the two. Using the visual criteria for distinction detailed by Boessneck 1969 and the methodology established in section 3.4.1, distinctions were made based on morphology, where possible (Table 4-18). The results showed that goats were either far more rare than sheep, or were less recognisable. In well-dated contexts, only three horncores were identified as goat of all the postcranial material that could be identified to species. When examining dP4 morphology, pillars indicating a possible goat were only present on a single tooth.

	Sheep postcrania	Goat postcrania	Sheep dP4	Goat dP4
1 Early A	10	3	44	0
2 Early B	1	0	8	0
3 Middle A	0	0	5	0
4 Middle B	3	0	5	0
5 Late A	5	0	5	0
6 Late B	14	0	16	1
7 Mid to Late	5	0	5	0

Table 4-17: Species distinction for sheep and goats based on morphology (Boessneck 1969)

In general, the representation of sheep, both over-all and in non-well contexts follows the expected pattern for the first several centuries of Ashton's history; a rural Iron Age pattern of greater sheep numbers gives way to an increased ratio of cattle as Roman influences take hold (Grant 2004; King 1999; *etc.*). When numbers of cattle, sheep, and pigs are compared, sheep make up approximately 50% of the non-well assemblage up until the mid-2nd century AD (Figure 4-5). After that, the number of sheep relative to cattle gradually decreases over the 2nd and 3rd centuries AD. A shift seems to occur in the 4th century, as sheep begin increasing again, in both well and non-well contexts. In well contexts, sheep make up 60.9% of the remains of cattle, sheep and pigs. In non-well contexts, sheep do not overtake cattle as the most common species, but they jump from only representing about 25% of the cattle, sheep and pig elements up to around 35%.

Body Part Representation in Sheep/Goats

Consistently throughout most periods, meat-bearing elements are the most commonly represented parts of the sheep, followed by heads and mandibles, then non-meat-bearing limb bones such as phalanges and metapodia, and then vertebrae and ribs (Figure 4-25). The low number of vertebrae and ribs is most likely due to the difficulty in speciating these elements between medium-sized mammals such as sheep, goats, pigs, and dogs.

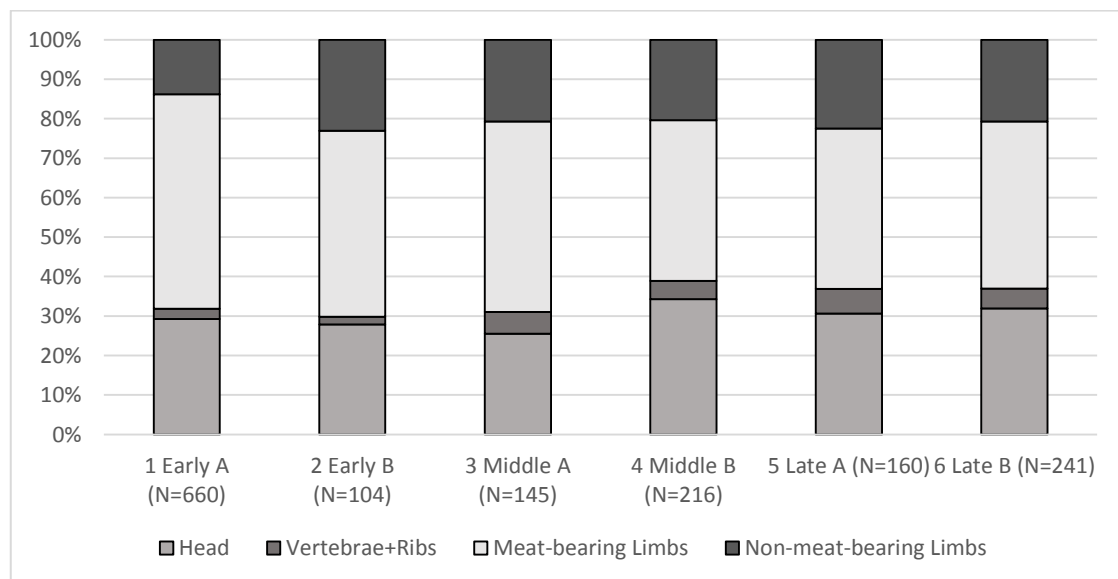


Figure 4-25: Element representation for sheep/goat from non-well contexts

Over time, the number of meat-bearing elements generally decreases, until the Late B phase, which lasts from the late 3rd into the early 5th century AD, when the change in sheep prevalence is also increasing. The elements of the head do not vary in any distinctive fashion. They vary from 25-35% of the NISP over time, with the largest occurrence of skulls, mandibles, and teeth in the 4 Middle B phase, when both autopodia and heads increase while meat-bearing elements decrease.

When MNE is calculated for sheep elements, the prevalence of mandibles and tibiae is further revealed (Figure 4-26). For all phases except 3 Middle A and 6 Late B, these are always the two most abundant elements. The tibia is most commonly represented by Zones 5-6, the distal end just above the epiphysis. This is not simply a factor of density, as other elements such as the distal astragalus, distal metapodials, and distal shaft of the humerus are all equally or more dense than the distal tibia shaft (Lyman 1994: Table 7.6). There does seem to be a genuine preference for hind shanks over foreshanks when consuming sheep. However, the upper limbs show the opposite pattern, with shoulders of mutton or lamb preferred to rump cuts including the proximal femur and pelvis.

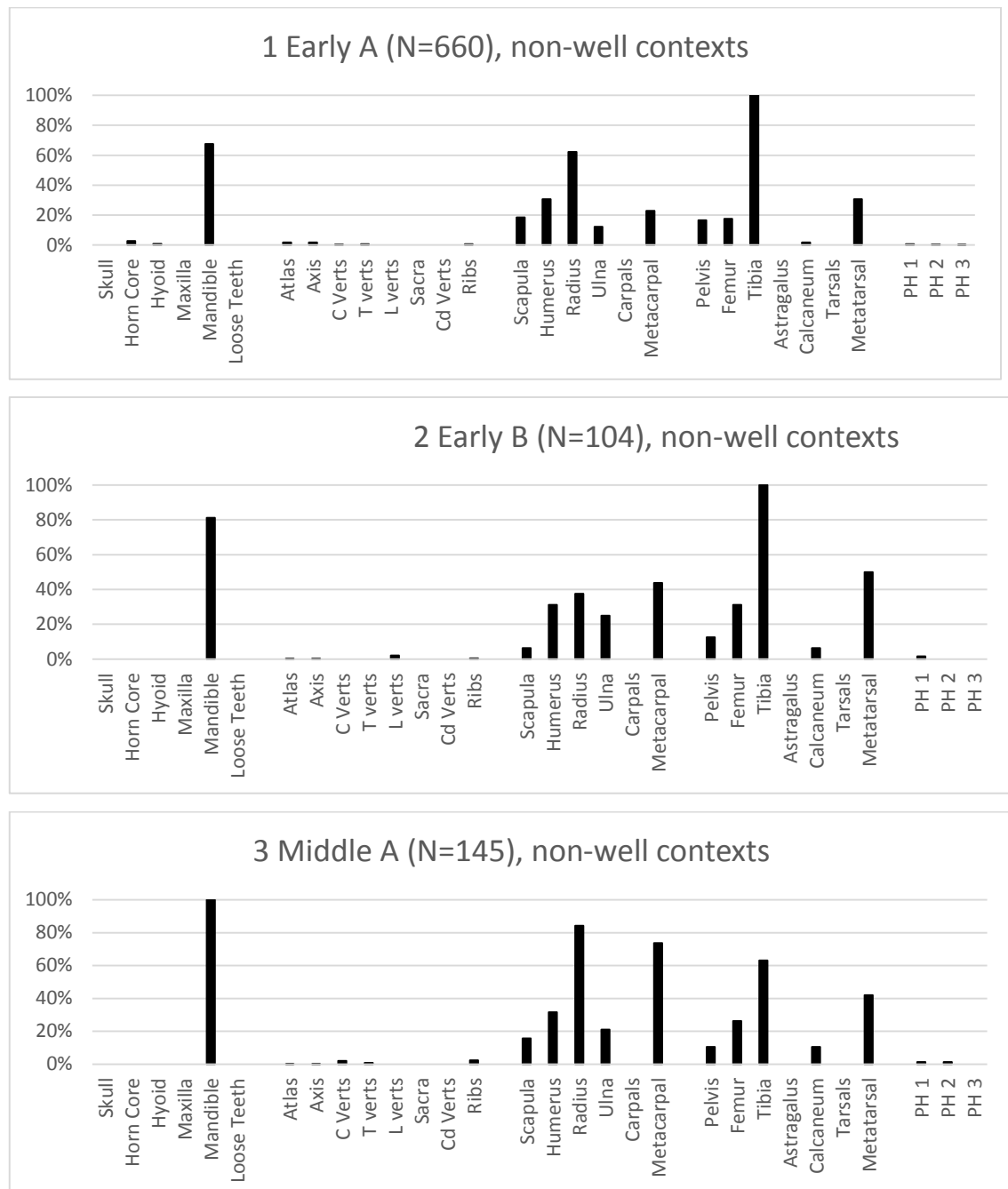
Skulls and feet are poorly represented in MNE counts, which suggest that although density may be in issue in these absences, it is also likely that we are viewing mainly the waste of consumption products. It is also possible that these elements could have been removed and deposited elsewhere. Indeed, the presence of a large deposit of juvenile sheep feet in one of the wells shows that these elements were used in producing various products, and might have been handled in a different way from other bone waste.

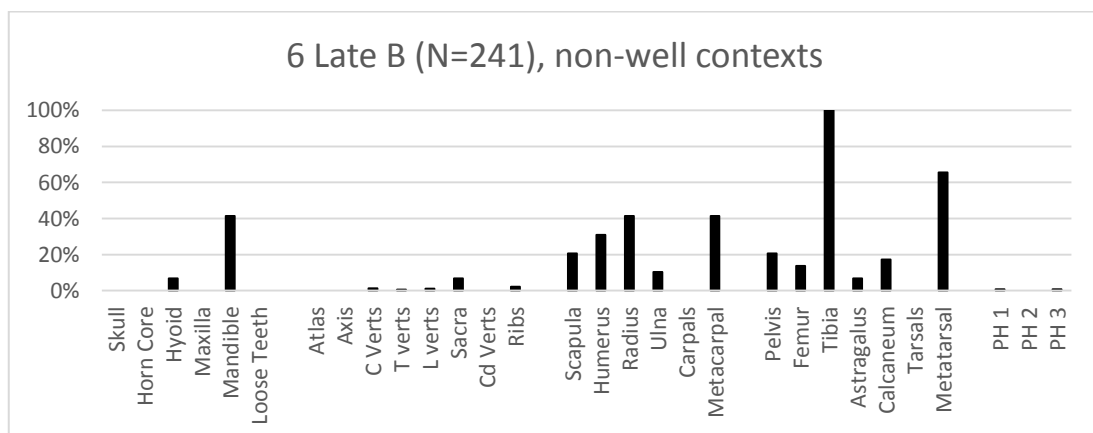
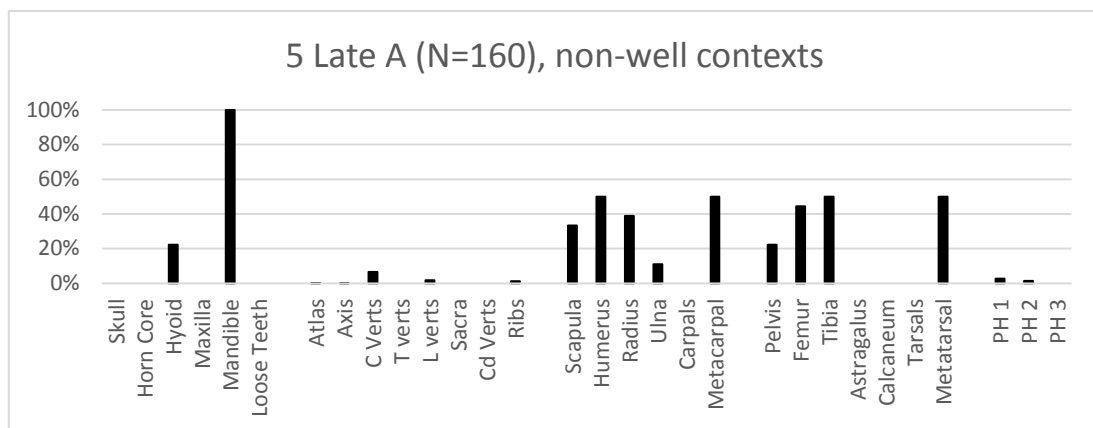
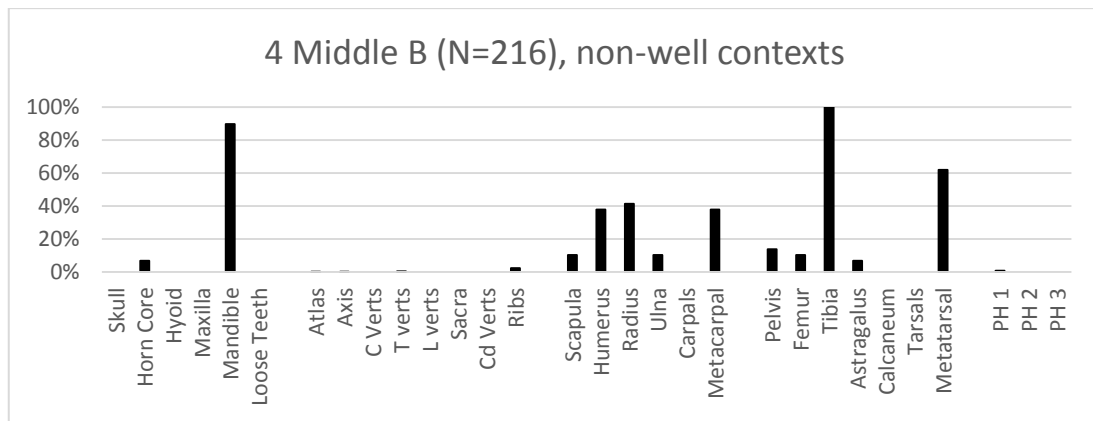
Metapodials, however, are present in greater numbers than many other bones. Metapodials are extremely useful long bones to use in bone working, given their high density and hollow structure, and the marrow inside would also be a useful resource. It is possible that these features result in different treatment from the rest of the foot. Metapodials are also much larger than other foot elements, which could have been lost before deposition.

The overall favour towards long bones and larger elements does suggest that much of this material comes from secondary deposition. There seems to be an increase in the presence of bones especially susceptible to loss in poor preservation conditions that occurs in the later phases. The hyoid bone is only present in significant numbers in the 3rd century and after (Phase 5 Late A and 6 Late B).

The Phase 6 Late B (late 3rd to early 5th c) material from non-well contexts has a different element representation style than the earlier Phase 5 Late A (early 3rd to late 3rd c). There are fewer mandibles and hyoids present, and upper forelimb elements decrease in favour of lower hindlimb elements. Tibiae once again become the most commonly represented element, with metatarsals being the second most common. A shift away from the prevalence of meatier elements might indicate that either these joints are going elsewhere, or that the bones that were most useful for craft working were being retained and then deposited together in various areas across Ashton.

Figure 4-26: MNE for sheep/goats from non-well contexts





Butchery of Sheep/Goats

At Ashton, butchery of sheep was less intense than that for cattle. With the exception of Phase 5 Late A, the prevalence of butchery remained at 20% or less. The proportion of cuts and chops mostly varied inversely (see Figure 4-27).

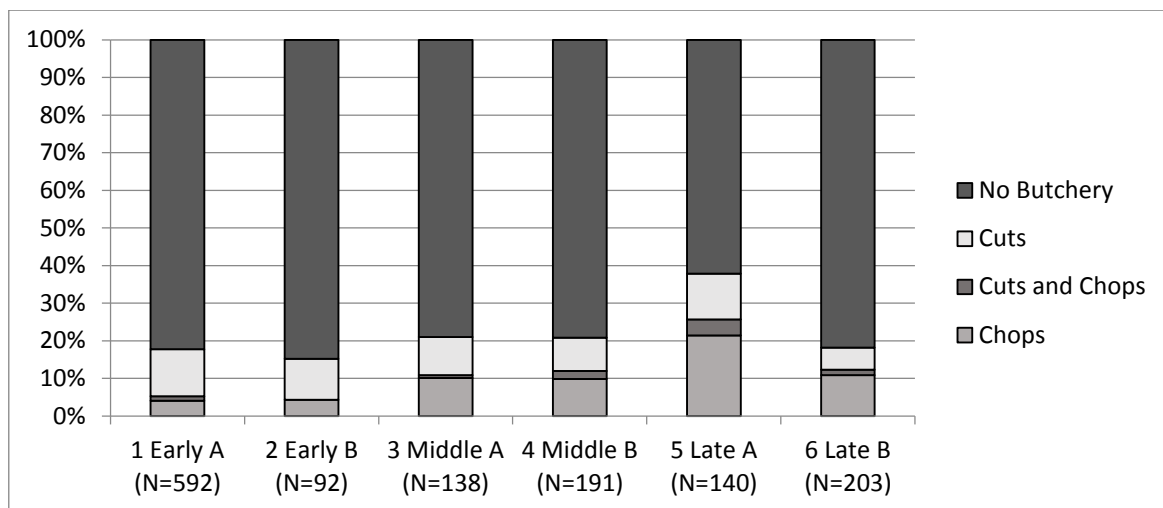


Figure 4-27: Butchery prevalence in sheep for non-well contexts

In the earliest periods, the majority of butchery marks were cuts. Of all bones with butchery marks, fewer than 30% had chops in Phases 1 Early A and 2 Early B (1st century AD). Most cuts on long bones were occurring on the diaphysis, with some cuts to the epiphyses of upper forelimb bones that likely occurred during disarticulation. In this early period, chops through the diaphysis were less common, but some bones were chopped through the epiphysis. This suggests a focus on initial disarticulation, as well as a preference for working with knives in a more precise butchery style.

A sharp increase in chop marks occurs in Phases 3 Middle A and 4 Middle B, and more elements in those phases also have butchery marks. The intensity of butchery (Figure 4-29) also increases during this period, with bones more likely to show multiple butcher marks per element. This is probably not a factor of

	Element Completeness	Average Zones Per Bone
1 Early A	38%	3.0
2 Early B	32%	2.6
3 Middle A	36%	2.8
4 Middle B	34%	2.7
5 Late A	35%	2.8
6 Late B	34%	2.7

increasing completeness of bones (Figure 4-28), since the average number of zones per bone was higher for Phase 1 Early A than in all other phases. Patterns remain fairly homogenous between Phases 3 Middle A and 4 Middle B, except for an increase in the number of butchery marks per bone.

Figure 4-28: Element completeness for sheep/goat from non-well contexts

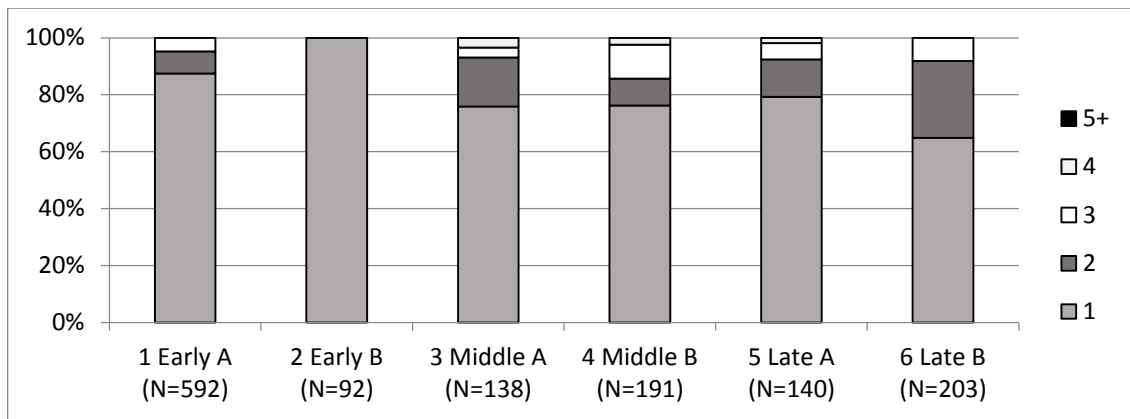


Figure 4-29: Intensity of butchery in sheep/goat from non-well contexts

The biggest change in butchery patterns occurs in Phase 5 Late A, which covers the third century. The percentage of butchered bones increases to 38% of the total NISP, and the proportion of chops compared to cuts also increases. This matches the switch to heavier butchery of cattle remains that occurs in other parts of the site in this phase. It is possible that this represents an intensification of food production at Ashton during this time, as the town was expanding and new buildings were being added.

In Phase 6 Late B, a decrease in butchery prevalence occurs, although the intensity of butchery marks on each bone remains high. Chops are still more common than cut marks, indicating that the new practice was maintained even as needs changed across the site. For the humerus and femur, the number of cuts along the diaphysis decrease, while chops on and through the diaphysis both increase, indicating a shift towards disarticulation-oriented butchery. The middle forelimbs (radius and tibia), however, show fewer chops to the diaphysis and epiphysis, and more cuts along the diaphysis or through the epiphysis. It is possible that these became more important elements for consumption in this period. The number of butchery marks on metapodials also declined at this time, with the only major butchery marks consisting of chops through the diaphysis. It is possible that the importance of bone-working at Ashton declined over this period, although marrow extraction still seems to have been important.

Ageing and Sexing for Sheep/Goats

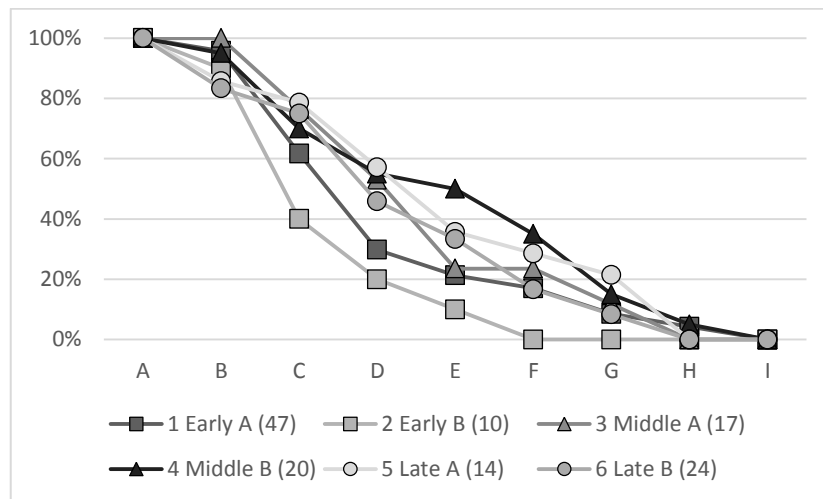


Figure 4-30: Mandibular wear stages for sheep/goats

Slaughter patterns mirror the patterns in sheep prevalence and meat-bearing-element dominance (Figure 4-30). In the phases from the mid-1st to the mid-2nd century, we see the earliest ages for slaughter. In the large sample from the earliest phase of the site, dating to the mid- to late-1st century AD, over half the sheep have been slaughtered before Phase D (1-2 years). Fewer than 20% of individuals are surviving into full adulthood. The animals from the middle phases of the site, dating from the early to the late 2nd century AD, are comparatively older, with over 50% of animals surviving beyond Phase F (3-4 years). It is possible that this change is partially driven by an increasing use of sheep for secondary products such as wool and dairying. The higher percentage of older sheep continues until the last phase in the late-3rd to the early-5th century AD, when we see a shift to a younger age-at-slaughter again. As this coincides with the rise in meat-bearing element counts, it is possible that this could represent a shift back to using sheep mainly for their primary products.

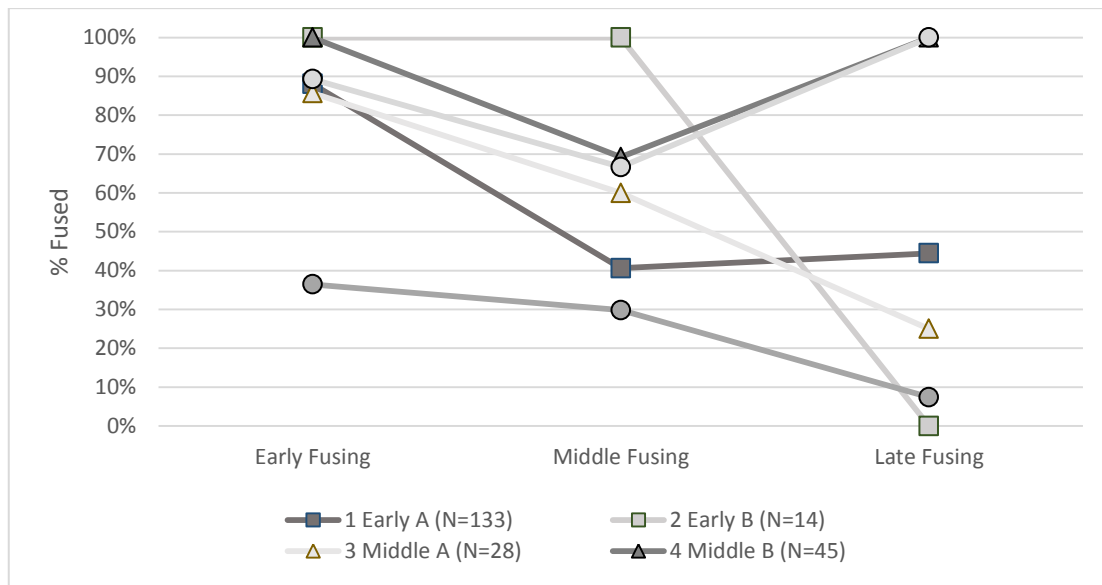


Figure 4-31: Epiphyseal ageing for sheep, all contexts

Epiphyseal ageing for sheep shows a broadly similar pattern (see Figure 4-31). When well and non-well contexts are considered together, the lowest survival rates for animals in their late-fusing years, approximately 26-42 months in sheep, are during the earlier phases and in the last phase at Ashton. However, once this is broken down by well and non-well contexts and structured deposits, certain biases are evident.

Most of the sheep elements available for epiphyseal ageing in the 6 Late B phase come from a single well context, 2125 (summarised in Table 4-19), which contains mostly unfused sheep metapodia and phalanges. This may represent a deposit resulting from the processing of lambskins, but it is distinctive from all other deposits in this phase. Context 2125 contains sheep of a much younger age than those in all other contexts. Whereas only about 7% of elements in the middle fusing group show signs of fusion in Context 2125, over 50% of elements in other contexts from Phase 6 Late B do show survival beyond the 20-29 month age group. When wells are separated out from non-wells, the age data can be further refined.

Fusion Group	All 6b	2125 only	without 2125
Early Fusing (5-20 mo.)	36.4%	27.2%	73.1%
Middle Fusing (20-29 mo.)	29.8%	7.1%	51.7%
Late Fusing (26-42 mo.)	7.4%	0.0%	7.7%

Table 4-18: Epiphyseal fusion data for sheep/goat in context 2125 and contemporary contexts

As with cattle, sexing of sheep elements was complicated by the relative fragility of the pelvis and the Roman practice of butchering through the hip joint. This resulted in a very low sample for sexing by pelvis morphology and measurement (Table

4-20). Only four H1 measurements were available for all contexts, and 16 pelves from all contexts were able to be used for sex determination based on morphology, following Greenfield (2006). From this limited data, a predominance of female sheep appears to be the consistent norm. Female sheep would have been useful for their milk and for breeding; there would have been little need for many of the more aggressive male sheep. However, the paucity of the data prevents any significant conclusions from being reached.

Phase	Males	Females
Early (N=10)	3	7
Middle (N=2)	0	2
Late (N=4)	1	3

Table 4-19: Sexing by Pelvis Morphology for Sheep

Biometry for Sheep/Goats

As with cattle, very few elements were entirely complete and measurable for Greatest Length. From the Early, Middle, and Late Phases, only six elements had both Greatest Length (GL) measurements and Distal Breadth (Bd), as depicted in Figure 4-32. It does seem that some size increase probably occurred amongst the sheep at Ashton, as the smallest individual is from the earliest phase, while the largest individuals come from the latest phase. Excepting the outlier, breadth seems to vary far more than length measurements.

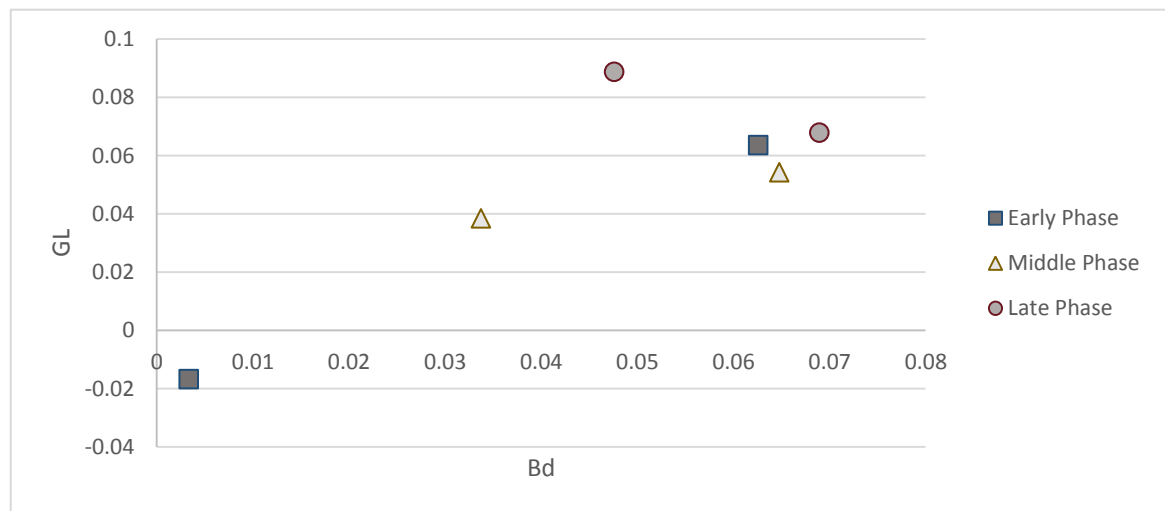


Figure 4-32: Log-scaled Length (GL) and Breadth (Bd) change in sheep/goat

There were more breadth measurements available (Figure 4-33), creating a large enough sample for analysis. The data show an increase in breadth over time. Although the broadest individual does belong to the middle phase from the 2nd-3rd century, the late phase 4th-5th century sheep have a higher percentage of larger individuals.

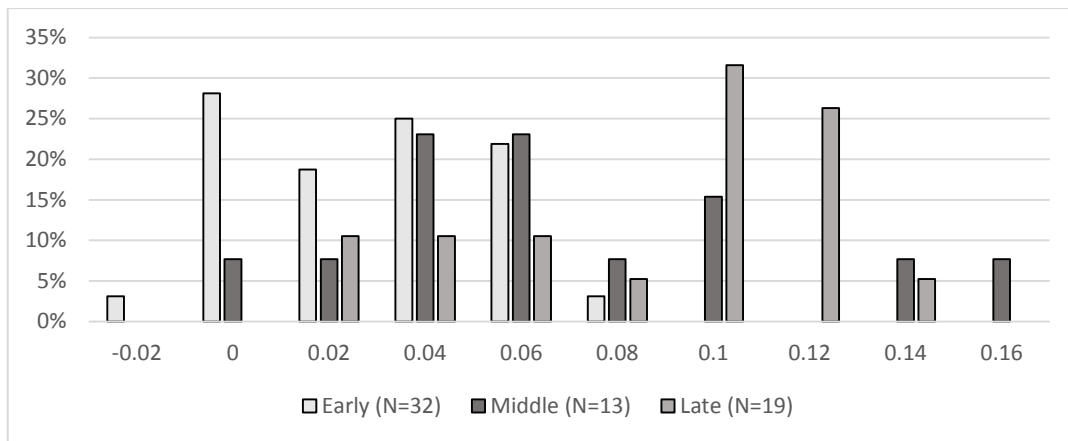


Figure 4-33: Log-scaled breadth change in sheep/goat

Pathologies in Sheep/Goats

Pathologies in sheep/goat elements were much rarer than in other domesticated species. Only a handful of pathologies were observed in well-dated contexts. Overall, it appears that any health issues affecting the sheep population at Ashton were either not serious enough to manifest in the bones, or killed the animal before it affected the bone. Besides the presence of low-level periostitis, there is very little pathology observed in sheep/goats. Four elements with lesions were observed, one of which came from the midden and will be discussed in that section (Section 5-3).

The presence and absence of thin layers of grey, porous plaque were noted for most elements except loose teeth and mandibles/maxillae containing teeth (Figure 4-34). In the early phases (mid-1st to early 2nd century), the proportion of bones displaying the plaque is between 10-15%, higher than that for cattle from the same date. However, the plaque does not appear on any sheep from the middle period (late 1st to late 3rd century), and reappears in high proportions of elements in Phase 5 Late A (early to late 3rd century) before dropping off again in Phase 6 Late B (late 3rd to early 5th century). This curious absence of the pathology in the middle period may indicate a shift in sheep population health as a whole. It is possible that some sort of change in sheep herd management occurred at this time. The shift toward intensifying meat production around Phase 5 Late A, however, seems to bring back whatever conditions led to this plaque forming. When the distribution of periostitis presence is mapped by element (Figure 4-35), it appears that the most affected elements are the mandible and the upper limb bones of the hind and forelimb.

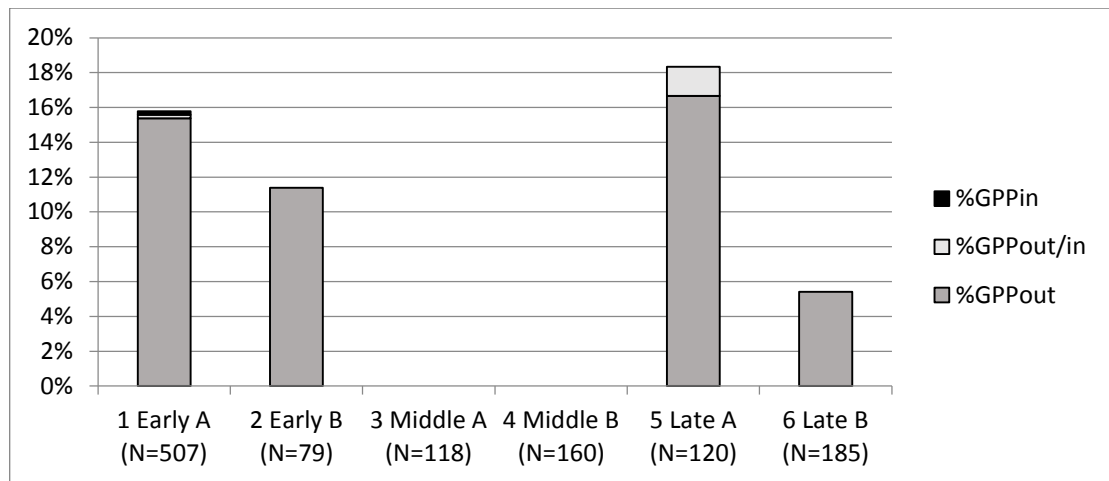


Figure 4-34: Presence of periostitis in sheep/goat from non-well contexts

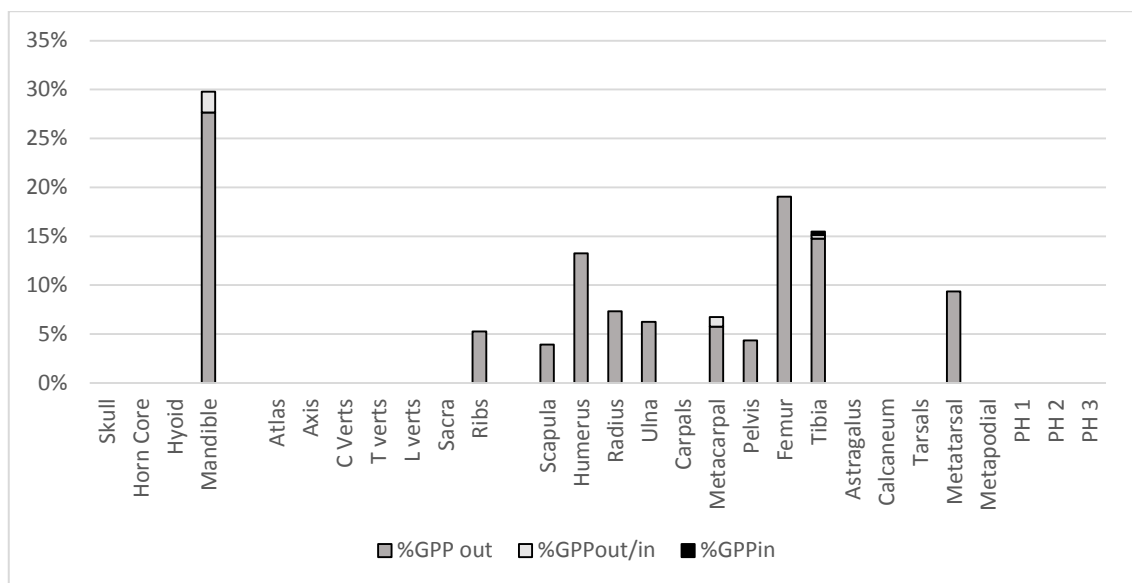


Figure 4-35: Periostitis in sheep/goat from non-well contexts by element

Only one of the 660 elements from Phase 1 Early A (mid- to late 1st century) shows a pathological lesion. An oval lump of new bone growth was identified on the lateral edge of the iliac branch of a pelvis from an enclosure ditch context dating to the mid- to late 1st century (F1983, Enclosure I c). The lump occurs over a patch of grey, porous plaque and is smooth in appearance. This could be an ossified haematoma, similar to those observed in cattle, resulting from a trauma to the hip.

In keeping with data for periostitis prevalence, there are no pathologies presence for the middle phases of the site. The only other pathologies come from the later periods. A metacarpal from a well fill that dates broadly from the early 3rd to the early 5th century (Phase Late AB) appears to have both a transverse fracture as well as additional bone growth in several locations. The fracture was fully healed by the time of

the animal's death, and went through the proximal shaft at approximately a 10 degree angle. A callus formed, and shows signs of several foramina supplying blood to the area. Rounded lumps of extra bone growth also appear on the back of the proximal epiphysis, which appears to have been slightly displaced by the fracture. There is also a sharp ridge of extra bone growth on the medial edge of the shaft, with a channel-like striation running down the site.

The other late period lesion observed is also on a metacarpal coming from a pit inside Building 7 in Area A that dates closely to the mid-4th to early 5th century AD (context 1338, F1340). A small, sharp pointed sliver of bone was fused to the medial side of the proximal shaft behind the proximal epiphysis. This could be either an ossified ligament (enthesophyte) or a bit of vestigial lateral metacarpal.

Associated Bone Groups of Sheep/Goats

Several associated groups of sheep bones were identified, all of which were from juveniles. Two of these were from well contexts dating to the mid-4th to the early 5th century, and will be discussed further in the Spatial chapter discussing the wells (also summarised in Tables 4-21, 4-22). Neither of the foetal sheep from wells showed any signs of butchery, although one element from Context 2065 showed burning to the point of becoming calcined.

Element	Side	Zone	PFus	DFus	Burning	Foetal length	Comments
RIB	Indt	5	N/A	N/A	none		tiny rib, similar in size and composition to other foetal bone
SCAP	R	1-4	Unfused Metaph.	N/A	none		foetal
SCAP	L	8	Unfused Metaph.	N/A	none		foetal, bit of proximal scapular border
SCAP	Indt	4	N/A	N/A	none		foetal
HUM	R	5-8	N/A	Unfused Metaph.	none		foetal
RAD	R	1-8	Unfused Metaph.	Unfused Metaph.	none	392	foetal
ULN	R	1-8	Unfused Metaph.	Unfused Metaph.	none	477	foetal
FEM	L	1-8	Unfused Metaph.	Unfused Metaph.	none	479	foetal
TIB	R	1-4	Unfused Metaph.	N/A	Calcined		foetal
CALC	R	3-8	Unfused Metaph.	Unfused Metaph.	none		foetal, a little older than other foetal bones? Same size as Kid in collection

Table 4-20: Foetal sheep ABG in well context 2065 (F1012)

Element	Side	Zone	PFus	DFus	Burning	Foetal length	Comments
MC	L	1-8	Unfused Metaph.	Unfused Metaph.	none	796	proximal surface still ripply, foetal
HUM	L	5-8	n/a	Unfused Metaph.	none		foetal
FEM	R	1-8	Unfused Metaph.	Unfused Metaph.	none	352	foetal
TIB	R	1-8	Unfused Metaph.	Unfused Metaph.	none	435	foetal
RAD	L	1-7	Unfused Metaph.	Unfused Metaph.	none	394	foetal
RIB	L	1-8	Unfused Metaph.	Unfused Metaph.	none		foetal

Table 4-21: Foetal sheep ABG in well context 2066 (F1012)

The other two associated bone groups were found in pits underneath Building 1 in Area A, but they were not present in a context well-dated with pottery remains. They will be further elaborated upon below, as these represent a unique deposit type with other possible parallels observed at various other Romano-British sites.

4.3.3 Pigs

The number of pigs at Ashton remained fairly low over time, with the highest percentages of pigs as a proportion of the total assemblage occurring in the early phases from the mid-1st century to the mid-2nd century AD, then rising again in the last phase at the site from the late-3rd to early-5th century AD (Table 4-23).

As well as domestic pigs, some elements of wild boar were present. These elements were sometimes difficult to distinguish from the remains of large domestic pigs. It is assumed that most suid remains were from domesticated animals, but biometry and morphology reveal at least a few wild individuals. These will be discussed below in the section on wild mammals.

	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Pig	202	31	24	44	25	106	28	2
Pig/Boar	0	0	0	4	0	5	0	0
Wild Boar?	0	0	0	0	0	0	2	0

Table 4-22: NISP values for suids from non-well contexts

Body Part Representation for Pigs

As the sample sizes for pigs from each period was smaller compared to those for cattle and sheep, it is harder to be certain about patterns of body part representation (Table 4-36, Figure 4-37). However, the prevalence of mainly meat-bearing elements does suggest that the key purpose of pigs at Ashton was for meat, and most of their remains from non-well contexts likely represent butchered food remains.

There are very few non-meat-bearing elements present for pigs from any period. Primary butchery waste may have been deposited elsewhere, or portions of pigs may have been imported into the site from the surrounding countryside. The early period (1 Early A) shows a predominance of the extremely dense mandibles, which in addition to having a taphonomic bias towards preservation, would have accompanied the skull if people were eating the head of the pig. There also seems to be a preferences for the forelimbs over hind limbs, with scapulae and humeri being the next most prevalent elements by %MAU. It is possible that axial elements such as the rib and vertebrae could either have been too butchered to be fully identified to species, or perhaps these were kept and consumed elsewhere.

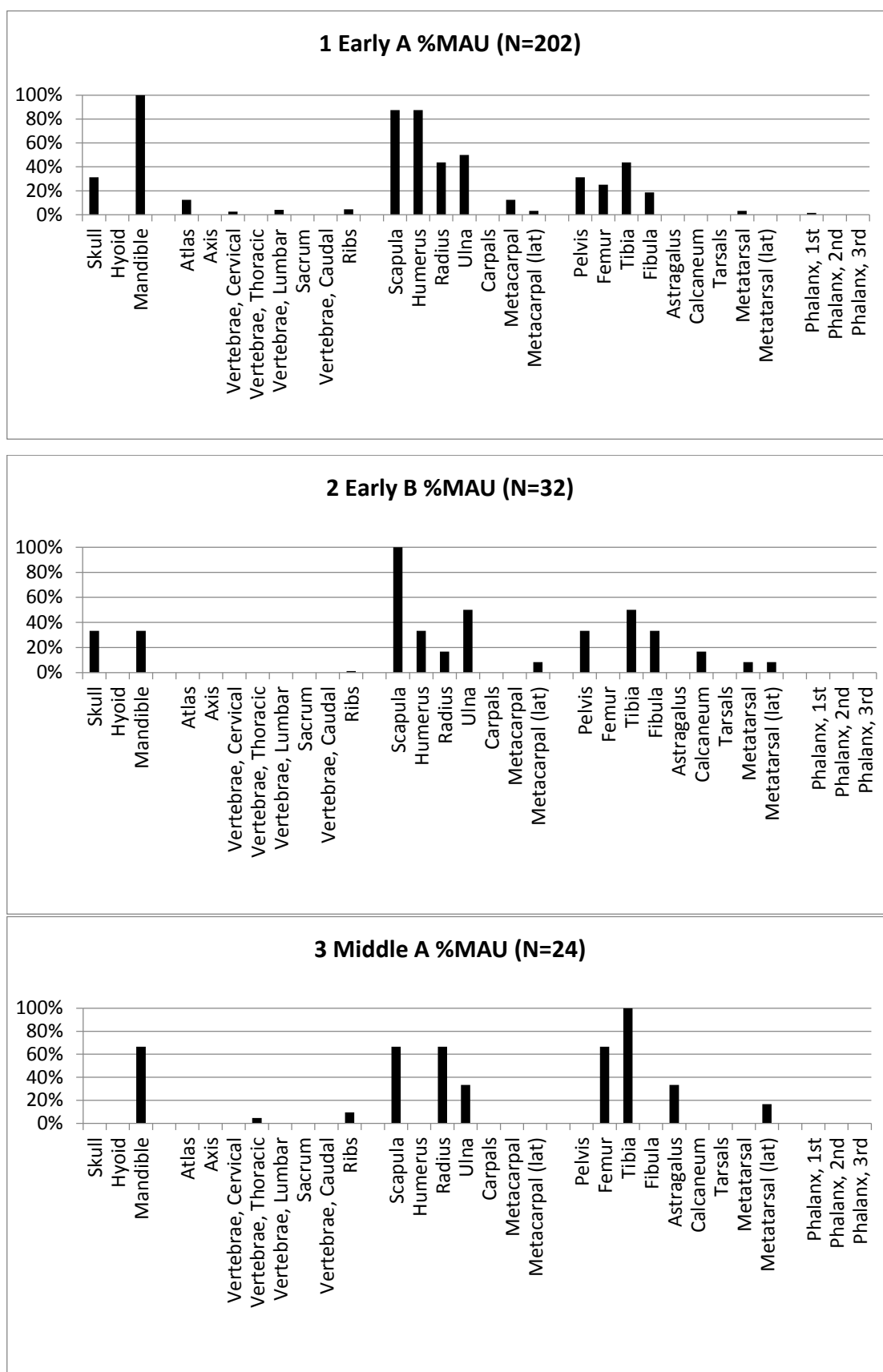
In Phase 2 Early B (mid/late 1st to early 2nd c), fewer mandibles are represented in the sample, and by Phase 3 Middle A (late 1st to late 2nd c), the number of hind limbs compared to forelimbs is increasing. Mandibles increase again in Phase 4 Middle B (early 2nd to late 3rd), with hindlimbs remaining common.

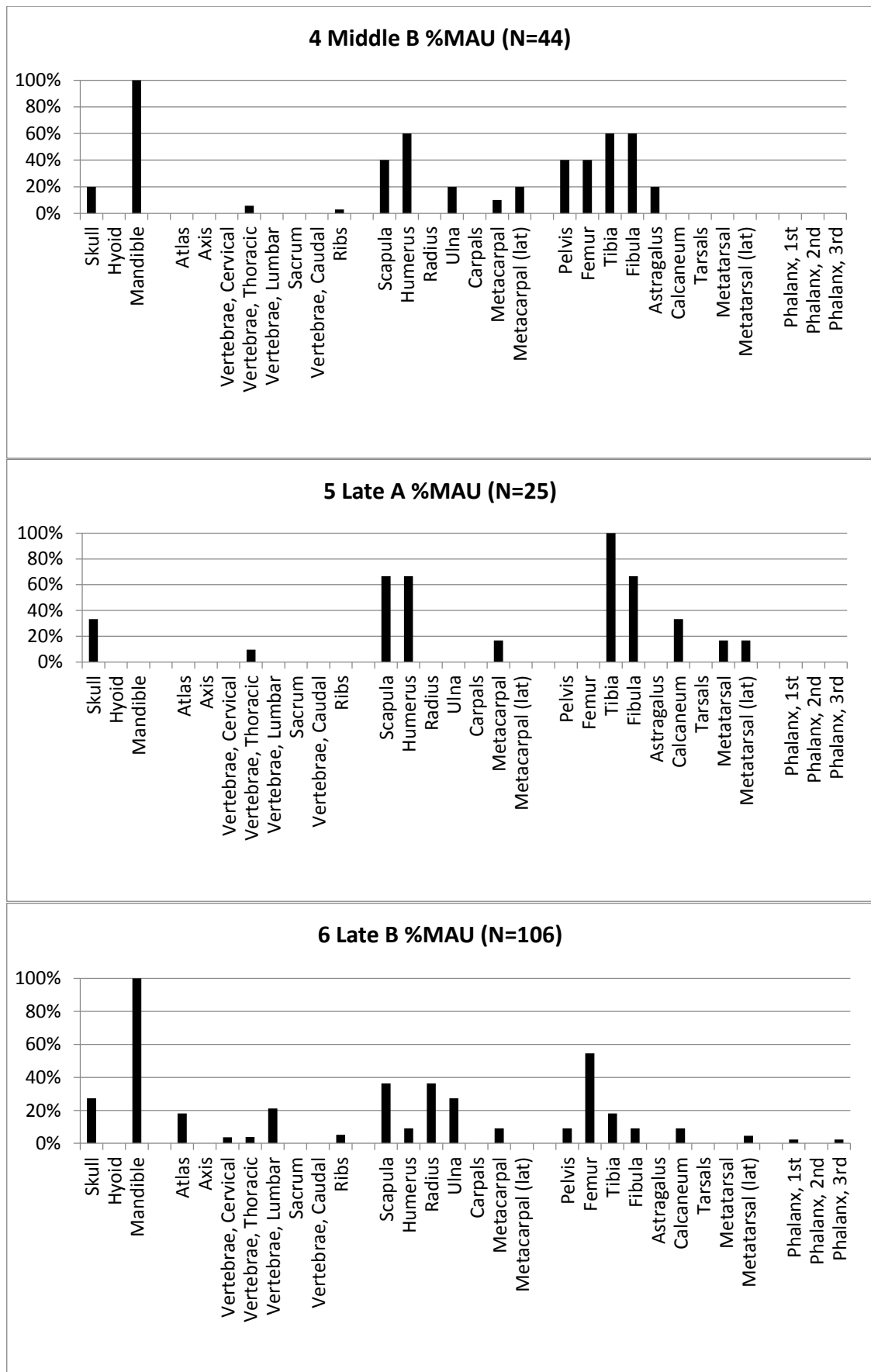
Phase 5 Late A (early to late 3rd c) has very few pig elements present, but where present, they were mostly upper forelimb elements or lower hind limb elements, with a few skull fragments. The number of pig elements increases dramatically toward the end of the site's occupation. More vertebrae and mandibles are present in this phase than previously. The ratio of humeri to scapula also drops, as does the ratio of pelves to femora; it appears these were no longer being deposited as a unit, as fairly even representation from other periods seems to suggest.

non-wells	1 Early A (N=202)	2 Early B (N=32)	3 Middle A (N=24)	4 Middle B (N=44)	5 Late A (N=25)	6 Late B (N=106)
Skull	18	3	0	2	2	8
Hyoid	0	0	0	0	0	0
Mandible	44	3	2	9	0	20
Maxilla	18	0	1	5	0	3
Loose Teeth, Mand.	1	0	2	6	4	14
Loose Teeth, Max.	17	0	0	0	1	2
Loose Teeth, Indt.	5	0	0	0	0	0
Atlas	1	0	0	0	0	1
Axis	0	0	0	0	0	0
Vertebrae, Cervical	1	0	0	0	0	1
Vertebrae, Thoracic	0	0	1	2	3	5
Vertebrae, Lumbar	2	0	0	0	0	10
Sacrum	0	0	0	0	0	0
Vertebrae, Caudal		0	0	0	0	0
Ribs	10	1	4	2	0	8
Scapula	15	6	2	1	4	4
Humerus	15	2	0	3	2	3
Radius	8	1	2	0	0	4
Ulna	8	3	1	1	0	3
Carpals	0	0	0	0	0	0
Metacarpal	4	0	0	1	1	2
Metacarpal (lat)	1	1	0	0	0	0
Pelvis	7	3	0	2	0	1
Femur	7	0	2	2	0	8
Tibia	15	3	3	6	4	3
Fibula	3	0	1	1	1	2
Astragalus	0	0	1	1	0	0
Calcaneum	0	1	0	0	1	1
Tarsals	0	0	0	0	0	0
Metatarsal	1	1	0	0	1	0
Metatarsal (lat)	0	1	1	0	1	1
Phalanx, 1st	1	1	0	0	0	1
Phalanx, 2nd	0	1	0	0	0	0
Phalanx, 3rd	0	1	0	0	0	1
Metapodial	0	0	0	0	0	0
Metapodial, lateral	0	0	1	0	0	0
Carpals/Tarsals	0	0	0	0	0	0
Vertebrae, unidentified	0	0	0	0	0	0

Figure 4-36: Body part representation for pigs in non-well contexts

Figure 4-37: %MAU for pig remains from non-well contexts





Butchery in Pigs

Most pigs in wells were unbutchered neonates in structured deposits. The butchery patterns for pigs in non-well contexts are fairly consistent with a pattern of intensifying exploitation, then a change in Phases 4 Middle A and 5 Late A (early 2nd to late 3rd c) and another shift in the late 3rd century (Figure 4-38). The ratio of chops compared to cuts increases over time until Phase 4 Middle A (early 2nd to late 3rd c), when the percentage of butchered bones also drops. By the last phase (late 3rd to early 5th c), over 20% of pig remains show some sign of butchery, and the majority of this is chopping. There is no definite pattern in changing intensity of chops per element over time (Figure 4-39).

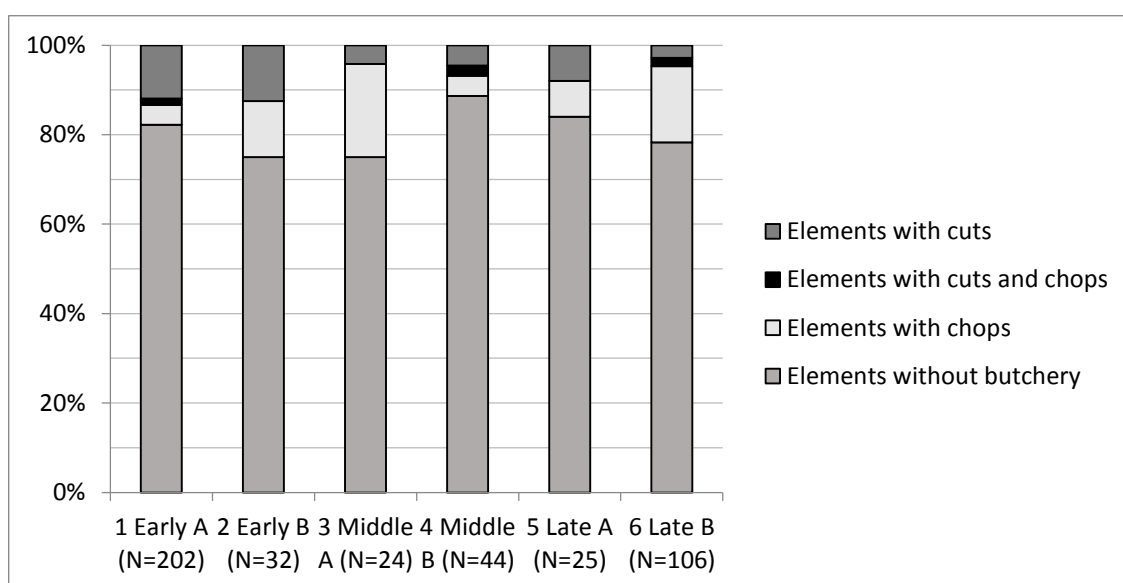


Figure 4-38: Butchery types for pigs in non-well contexts

	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B
1	25	6	4	4	0	15
2	8	2	0	1	0	6
3	3	0	2	0	0	2
4	0	0	0	0	0	0
5+	0	0	0	0	0	0
total with butchery	36	8	6	5	0	23

Figure 4-39: Butchery marks per element for pigs from non-well contexts

Ageing and Sexing for Pigs

With the small sample for pigs, only 35 mandibles from reliably dated contexts were complete enough for ageing (Table 4-24, Figure 4-40). The largest number of

these came from the earliest and latest phases of the site. Sample sizes for other phases are negligible, and do not contain enough data to show any patterns. Of the 16 mandibles from the mid- to late-1st century AD, there are no signs of slaughter before about 7-14 months of age, but all animals appear to have been slaughtered before 27-36 months of age. Keeping pigs into adulthood does not appear to have been common practice in 1st century Ashton. By the late-3rd to early-5th century AD, the slaughter age appears to have decreased. All animals were slaughtered before the 21-27 months of age, almost half of the animals were slaughtered in the first few months of life.

	0-2 mo	2-7 mo	7-14 mo	14-21 mo	21-27 mo	27-36 mo	adult	old adult	senile	TOTAL
1 Early A	0	0	6	7	3	0	0	0	0	16
2 Early B	0	0	0	0	0	0	0	0	0	0
3 Middle A	0	0	1	0	0	0	0	0	0	1
4 Middle B	1	3	0	0	0	0	0	0	0	4
5 Late A	0	0	0	1	0	0	0	0	0	1
6 Late B	5	1	2	5	0	0	0	0	0	13
										35

Table 4-23: Mandibular ageing for pigs from non-well contexts

Only four of the mandibles suitable for ageing came from well contexts. One came from the 4 Middle B phase, representing the early 2nd to late 2nd century AD, and the other three came from the large well contexts from the mid 3rd to late 5th century AD. These mandibles do not show significant differences in age profiles from non-well contexts.

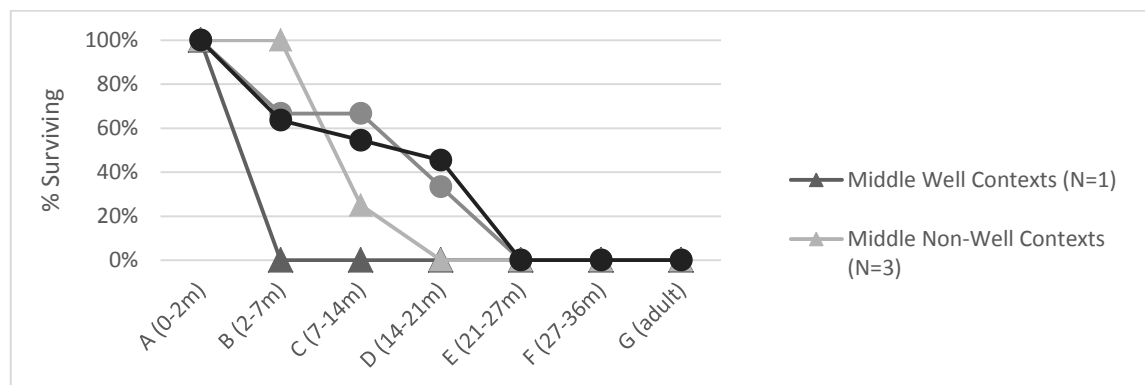


Figure 4-40: Age at slaughter for pigs in non-well contexts

For pigs, sexing is easiest using canine morphology, as established in (Hilson 2005: 131). Both alveolar morphology and loose tooth morphology were recorded, but to avoid redundancy, only tooth morphology will be considered here, as inclusion of alveoli without canines present did not add many additional data points. When mandibular canine morphology was compared, a predominance of male individuals

appears in the Early (mid 1st to mid 2nd centuries AD) and Late (early 3rd to early 5th centuries AD) phases. It is likely that males outnumbered females in the Middle phase as well, but only four mandibular canines were available for sexing. Small samples prevent significant conclusions from being drawn, but it seems that preferential slaughter and deposition of male animals was occurring.

Biometry for Pigs

As many bones were either unfused, heavily butchered, or both, there were few bones that could be measured to examine size change. However, there are a few measurements that could be taken to distinguish wild boar from domestic pigs. The height of the trochlea (HTC) is the best of these, as described by Payne and Bull (1988) and summarised in Table 4-24. All three HTC measurements came from elements identified as likely to be from pig rather than boar, and all of them were smaller than the HTC measurement given by Legge (2009) for a domestic feral sow.

Context Number	Feature	Area	Specific Phase	Element	Taxon	Side	HTC	Control
339	F3370	B	1 Early A	HUM	PIG	Right	165	281
2257	F2375	A	2 Early B	HUM	PIG	Right	176	281
733	F839	A	4 Middle B	HUM	PIG	Left	153	281

Table 4-24 HTC measurements for distinction of wild boar (after Bull and Payne 1988)

The early slaughter of pigs prevents good measurement of greatest length, so breadth measurements were taken and log-scaled in order to compare the few fragments for which these metrics were available. Only seven elements had measurable breadths (Figure 4-42). All are slightly larger than the control measurements, with two outliers. One pig tibia from a ditch in Phase 1 Early A is much smaller than the rest, although it must be noted that this element has its distal end still fusing and its proximal end unfused, which indicates that it was still achieving its maximum size. The other outlier is a large distal tibia from a Phase 4 Middle B ditch context. Some elements in Phase 4 Middle B were identified as potential wild boar due to their qualitative size, so this could be either a very large pig or potentially the remains of wild boar.

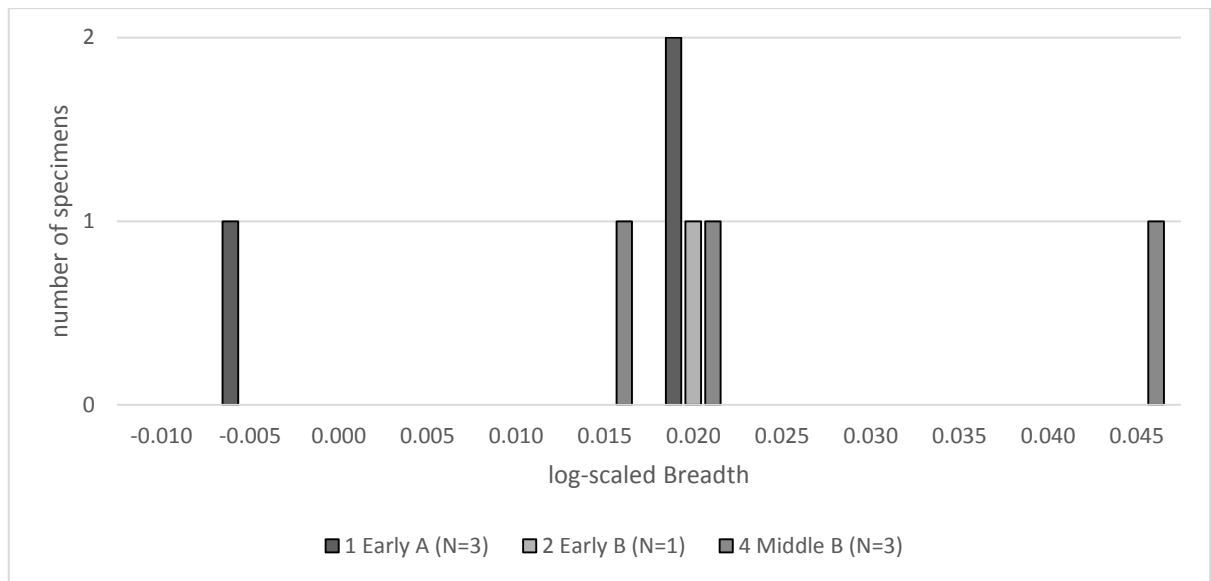


Figure 4-41: Breadth change in pigs (log-scaled)

Pathology in Pigs

Five elements from well-dated contexts showed evidence of pathological lesions. Two are from Phase 1 Early A (approximately 1% of the material). Both of these are humeri. The only pathology on one was a Type 2 lesion down the middle of the distal trochlea. The other humerus had a healed impacted fracture of the medial epicondyle. Both bone growth and bone destruction occurred around the fracture site, with the medial epicondyle slightly displaced inward and a built-up lump of pitted bone with visible trabeculae around it. The outside of the callus that built around the fracture site also showed signs of eburnation. Thickening of the shaft also occurred, as well as branch-like new bone growth along the edges of the callus.

A notable build up of grey porous new bone growth occurred on the inside of one juvenile pig skull. This was the only pathology present for the middle phases of the site (late 1st to late 3rd century).

Two additional fractures were noted in material from Phase 6 Late B (approximately 1.9% of elements from this phase). The first was definitely a fracture, and was observed on a second metatarsal, mid-shaft. The bone appears to have fractured straight across and formed an oval callus, with a small pointed spike of bone coming off the callus on the interior side where it would sit alongside the third metatarsal. The fracture was well-healed by the time of the animal's death, and was likely splinted by the inner metatarsals. The other fracture on the proximal shaft of a right radius was not as easily defined, as there was no clear fracture line visible. Instead, there was a thick, built-up area of well-remodelled bone on the medial shaft just under the proximal

epiphysis. Thickening of the shaft on the anterior part and a bony callus on the front suggest some sort of trauma which resulted in bone build up to repair the damage.

The low presence of pathology suggests that although pigs were prone to trauma and accidents, the prevalence of infection and other pathology types remained low over time.

Animal Burial Groups for Pigs

The remains of a semi-complete foetal or neonatal pig were discovered in the well fill of Well F1012, and given the number 2602. 33 elements were present from what appeared to be a single individual (Figure 4-43). Most parts of the body were represented, although the mandible and teeth were missing, as were the feet and the majority of the skull. There were no signs of butchery or burning present on any elements. It does not appear to have been disarticulated for consumption purposes, although there is no indication of whether the remains were noted as being found in articulation.

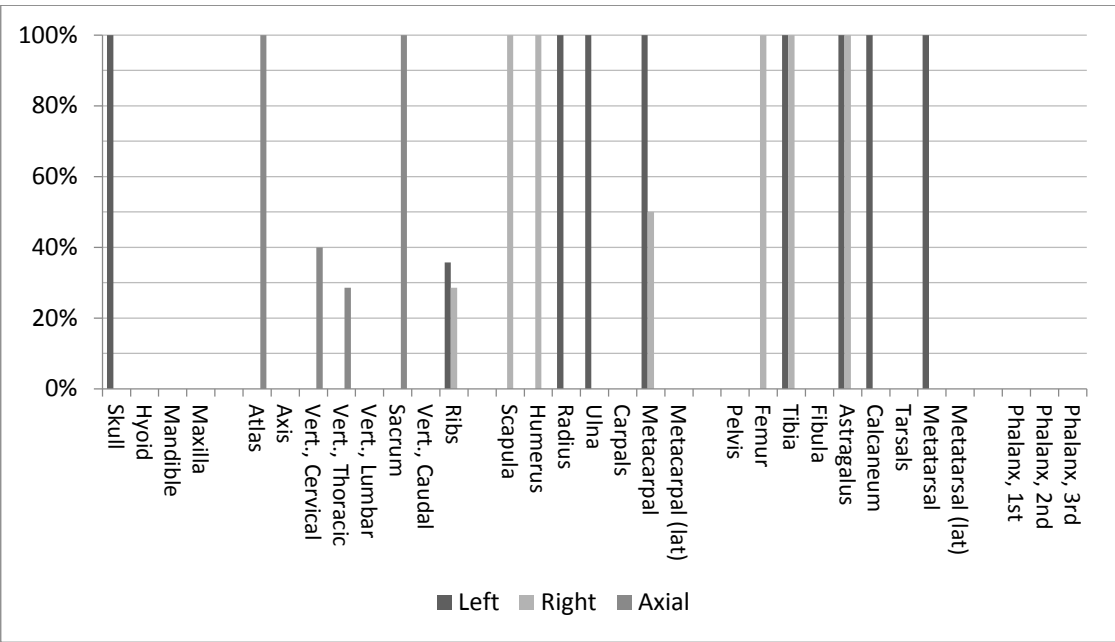


Figure 4-42: Presence of neonatal pig elements in ABG context 2602

4.3.4 Dogs

Dogs made up only a small percentage of the identified taxa from Ashton, with one key exception (Tables 4-25, 4-26, 4-27). Throughout the first phases of the site, they made up less than 2% of the total NISP. However, there is an increase in

prevalence in Phase 6 Late B, dating to the late 3rd to early 5th centuries AD, which can be seen in both well and non-well contexts.

	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B
Dog	0.64%	0.00%	1.86%	1.94%	1.09%	5.13%
Dog/fox	0.13%	0.00%	0.00%	0.10%	0.00%	2.21%
Red Fox	0.06%	0.00%	0.00%	0.00%	0.00%	1.31%

Table 4-25: Dogs and Canids as % NISP from ALL contexts

Dogs alone make up nearly 6% of the bones identified to taxon from Phase 6 Late B well contexts. When one considers that an additional 2.35% of the NISP comes from very small canids that could be either dogs or foxes, the resulting number shows that dogs are unusually prevalent in these well features compared to both other feature types and to other phases from the site. The number of dogs in non-well contexts also increases at this time, although it remains at less than 4% of the total assemblage.

	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B
Dog	n/a	0.00%	0.00%	1.03%	0.00%	5.95%
Dog/fox	n/a	0.00%	0.00%	0.00%	0.00%	2.35%
Red Fox	n/a	0.00%	0.00%	0.00%	0.00%	2.13%

Table 4-26: Dogs and Canids as %NISP from WELL contexts

	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B
Dog	0.64%	0.00%	1.89%	2.03%	1.25%	3.84%
Dog/fox	0.13%	0.00%	0.00%	0.11%	0.00%	1.98%
Red Fox	0.06%	0.00%	0.00%	0.00%	0.00%	0.00%

Table 4-27: Dogs and Canids as %NISP from NON-WELL contexts

This higher NISP represents a number of ABGs. Amongst the non-well contexts, there is a set of four articulating metacarpals from the right paw of a small dog or fox as well as the matching second metacarpal from the left paw coming from the series of pit fills in area B (Context 83, F414) that date to the late 4th to early 5th century. Another pit in structure SG202 contains at least two individuals, one from a larger dog and the other from a smaller canid that could not be definitively identified to species level, although it was noted that some elements looked more like dog than fox. Both of these individuals displayed butchery marks.

In well contexts, several more ABGs, or Associated Bone Groups, were present, although it is more difficult to sort out the pieces into discrete individuals. Well context 2066, dated from the late 3rd to early 5th century, contains the remains of at least three

individuals, some of which were semi-complete. No skulls or autopodia were recovered from this context, and butchery marks were present on several elements; this might suggest that the remains were from dogs whose skins had been removed. MNI was derived from the count of right femora, each of which had a distinctly different morphology, with varying levels of length and curvature. Dog remains recovered from well context 2125 represent all parts of the body, and may be part of a single small individual, if the elements identified as dog/fox belong to the same individual as those identified to small domestic dog.

	Non-Well NISP	Non-Well MNI	Well NISP	Well MNI
1 Early A	12	4	0	0
2 Early B	0	0	0	0
3 Middle A	8	1	0	0
4 Middle B	20	3	1	1
5 Late A	9	1	0	0
6 Late B	49	6	114	4
7 mid to Late	6	1	0	0

Table 4-28: Dog +Dog/Fox NISP and MNI values

The MNI and NISP values for dog and dog/fox are listed in Table 4-28 above. The higher MNI values and lower NISP values in the non-well contexts is due to the lower number of ABGs in these context types; ditch fills, which make up a large bulk of the non-well context material, tend to include disarticulated elements. A summary of element representation also shows the difference in dog representation between the two context types.

Ageing based on dentition was carried out using Silver (1969) and summarised in Table 4-29. For Phase 1 Early A, ageing was possible for five left mandibles. An additional right mandible could also be aged, but was articulated with one of the left mandibles, and thus was exempted. Of these, one was broken off behind the M1, but three of them had alveoli for a fully-developed M3, as well as present adult molars or premolars; these animals would have been older than 6-7months. One mandible showed M2 just erupting, putting the age at around 5-6 months. The next phase with ageable mandibles was Phase 4 Middle B, with one set of paired elements and an additional right mandible; all mandibles were from non-well contexts. In the paired set, the M1 was just erupting, putting the age at approximately 4-5 months, while the lone right

mandible had fully erupted and developed M1 and M2, with M3 having been lost post-mortem, indicating that the animal was likely a full adult. Only a single mandible was available from a non-well context in Phase 5 Late A, and no molars were available, although an adult P4 was present indicating that the animal was older than 5-6 months of age.

For Phase 6 Late B, mandibles were divided into well and non-well groups. The non-well mandibles all came from the F414 series of pits in the latest phase of the site. These four mandibles come from at least 3 or 4 individuals, as they were not able to be paired. All appeared to have their full adult dentition. One mandible showed signs of pre-mortem tooth loss; both the P2 and P4 were lost and complete resorption of the alveolus had occurred by the time of death. Alveoli for P1 and P3 were present but not resorbed, so it is difficult to tell whether these teeth were missing pre- or post-mortem. Dogs from the dated well contexts seem to have largely had their full adult dentition where observable. The exception comes from Well F1012 in area C, from Context 2065; two paired mandibles from an ABG show M1 just erupting, putting the age at somewhere around 4-5 months of age.

Phase	Feature Type	Side	dp2	dp3	dp3	P1	P2	P3	P4	M1	M2	M3	Estimated Age
1	ditch	L				-	(A)	(A)	(A)	P	-	-	older than 4-5 months
1	ditch	L									(A)	(A)	older than 6-7 months
1	ditch	L				(A)	P	(A)	(A)	(A)	P	P	older than 6-7 months
1	ditch	L	P	(A)	P					(A)	E		around 5-6 months
1	ditch	R	P	P	(A)					1/2	E		around 5-6 months
1	pit	L				(A)	P	P	P	P	P	(A)	older than 6-7 months
4	gully	R	(A)	(A)	(A)					E			around 4-5 months
4	gully	L	(A)	(A)	(A)					E			around 4-5 months
4	ditch	R				(A)	(A)	(A)	(A)	P	P	(A)	older than 6-7 months
5	ditch	R				(A)	P	(A)	P				older than 5-6 months
6	pit	L				-	-	-	(A)	(A)	(A)	(A)	older than 6-7 months
6	pit	R				-	(A)	(A)	(A)	P	P	(A)	older than 6-7 months
6	pit	R				-	(A)	P	P	P	P	(A)	older than 6-7 months
6	pit	L				(A)	(R)	(A)	(R)	(A)	P	(A)	older than 6-7 months
6	well	R		(A)	(A)					E			around 4-5 months, ABG
6	well	L	(A)	(A)	(A)					E			around 4-5 months, ABG
6	well	L				(A)	(A)	(A)	P	(A)	(A)	(A)	older than 5-6 months
6	well	L				(A)	P	(A)	P	P	-	-	older than 5-6 months
6	well	R				(A)	P	P	P	P	-	-	older than 5-6 months
6	well	R				(A)	(A)	(A)	P	(A)	(A)	(A)	older than 6-7 months
6	well	L				(A)	P	P	P	(A)	P	(A)	older than 6-7 months

Table 4-29: Dog mandibles used in ageing

Key: “(A)”=alveolus present, tooth lost post-mortem, “P”=tooth present, “-”= broken off, neither tooth nor alveolus available, “(R)”= tooth lost pre-mortem and alveolus resorbed

The epiphyseal fusion data (Table 4-30) shows a similar pattern. Of the two elements available in Phase 1 Early A, one has a fully fused scapula and the other is from a juvenile of less than 6-7 months, which could belong to the same individual as the mandibles with the erupting second molars. For Phase 3 Middle A, two elements were available, and both were fully fused. In Phase 4 Middle B, several elements from pits and ditches were available. All elements were fused with the exception of a ditch context from an enclosure in Area C, where all 5 identified elements were unfused, including at least one foetal element. Both ageable elements from Phase 5 Late A were from the large pit feature containing mostly butchered cattle remains, and both were fully fused.

Phase	Feature Type	Feature	Element	Proximal Fusion	Distal Fusion	Age Estimate
1	ditch	F465	Scapula	n/a	Fused	6-7+ months
1	ditch	F1738	Scapula	Unfused	Unfused	< 6-7 months
3	ditch	F178	MC II	Fused	n/a	0+ months
3	ditch	F3381	Scapula	Fused	Fused	6-7+ months
4	pit	F1497	Tibia	n/a	Fused	13-16+ months
4	ditch	F1808	Radius	Fused	n/a	11-12+ months
4	ditch	F2193	Humerus	n/a	Fused	8-9+ months
4	ditch	F2193	MC II	Fused	Fused	8+ months
4	ditch	F2193	MC III	Fused	Fused	8+ months
4	pit	F2515	Scapula	n/a	Fused	6-7+ months
4	pit	F2515	Tibia	n/a	Fused	13-16+ months
4	ditch	F2823	MC IV	Fused	Fused	8+ months
4	ditch	F3359	Humerus	Unfused	Unfused	< 8-9 months
4	ditch	F3359	Radius	n/a	Unfused	< 11-12 months
4	ditch	F3359	Tibia	Unfused	Unfused	Foetal
4	ditch	F3359	Ulna	n/a	Unfused	< 11-12 months
4	ditch	F3359	Ulna	Fused	n/a	9-10+ months
5	pit	F1365	MC V	Fused	Fused	8+ months
5	pit	F1365	Scapula	n/a	Fused	6-7+ months

Table 4-30: Epiphyseal Fusion in Dogs for Phases 1-5

Ageing the dogs from the Phase 6 Late B contexts is somewhat more difficult, due to the higher presence of ABGs (Table 4-31). It is probably easiest to consider these contexts individually. For the non-well contexts without ABGs, both elements available for epiphyseal fusion determination were fully fused. There were no mandibles available for more precise determination of age.

Context	Feature	Feature Type	Area	CP Date	ABGs?	NISP	Epiphyseal Fusion	Mandible Ageing	MNI	Ages
83	F414	Pit	B	7b	Yes	21	11	4	2-3	*
877	F977	Pit	A	7b	No	1	1	0	1	fused Humerus, 15+ months
1015	F1014	pit	C	7b	Yes	20	15	0	2	*
1225	F1134	pit	C	7a(-b)	No	1	0	0	1	n/a
1236	F1133	Pit	C	7a	No	1	1	0	1	fused Radius, 11-12+ months
1338	F1340	pit	A	7b	No	4	0	0	1	n/a
445	F514	robber trench	A	7a-b	No	1	0	0	1	n/a
2065	F1012	well	C	7b	No	5	1	3	2	
2066	F1012	well	C	7b	Yes	65	24	4	3	
2125	F1012	well	C	7b	Yes	44	18	0	2	

Table 4-31: Epiphyseal Fusion in Dogs for Phase 6

Canids from the large pit series F414 (Context 83) all show full fusion of elements, where fusion was observable. Although quantification based on the zoning system returns an MNI of 2, observation of matching elements including ulnae and mandibles suggests that at least three different individuals contributed to this assemblage: one small and gracile dog/fox, one dog roughly the size of the Greyhound (R42) in the University of Leicester's collection, and one slightly larger dog.

Almost all dog elements that were complete enough for reliable measurement were from the later periods of the site, mostly from the mid-4th to the early 5th century (Table 4-32). Among the larger, more robust dogs were included smaller individuals with a curved or twisted appearance to the shafts of the bone (Figure 4-44). This was particularly notable for an individual from well context 2066 in Area C (Well F1012). This dog was similar in size and morphology to those noted by Harcourt (1974) as small breeds of lapdog introduced by the Romans.



Figure 4-43: Small dog from Well F1012 with short, curved limbs

Context	Feature Type	CP date	Element	GL (mm)	Bd (mm)	SD (mm)	Bp (mm)
1015	pit	7b	Femur	n/a	n/a	13.4	n/a
1015	pit	7b	Femur	n/a	n/a	9.3	27.3
2066	well	7b	Femur	99.3	20.3	8.8	24.9
2066	well	7b	Femur	n/a	n/a	8.9	26.0
2066	well	7b	Femur	90.5	24.0	9.8	36.0
2066	well	7b	Femur	94.7	19.2	8.5	23.9
2199	ditch	5-6	Humerus	n/a	39.4	16.0	n/a
1015	pit	7b	Humerus	n/a	23.0	n	n/a
2125	well	7b	Humerus	126.7	18.4	8.0	n/a
2066	well	7b	Humerus	n/a	n/a	7.2	n/a
2066	well	7b	Humerus	93.7	25.5	9.5	n/a
2066	well	7b	Humerus	93.5	25.0	9.5	n/a
1015	pit	7b	Radius	n/a	n/a	13.0	n/a
1236	pit	7a	Radius	n/a	n/a	12.2	18.5
2066	well	7b	Radius	79.8	15.7	8.0	11.5
2066	well	7b	Radius	80.1	15.5	7.7	11.6
559	ditch	4(-5?)	Tibia	97.5	n/a	n	n/a
1545	pit	5-6	Tibia	n/a	13.2	8.4	n/a
1015	pit	7b	Tibia	n/a	23.3	12.7	n/a
2066	well	7b	Tibia	n/a	13.2	n	n/a
1015	pit	7b	Tibia	17.3	16.3	9.4	22.9
2066	well	7b	Tibia	138.8	14.8	8.1	22.5

Table 4-32: Major long bone measurements for dogs from all contexts

4.3.5 Horses and other Equids

Domestic equids make up a small percentage of the overall NISP for Ashton, in both well and non-well contexts (Tables 4-33 and 4-34). The change in prevalence in equids over time does not appear to follow any consistent pattern. The relatively low percentage of remains in Phase 5 Late A could be due to the large assemblage of butchered cattle remains that would depress the abundance of other taxa. In general, it seems that for most phases, equids from non-well contexts make up around 5% of the taxa at Ashton, with the exception of the early to late 2nd century (Phase 4 Middle B), which has an elevated number of equids compared to other taxa.

Taxon	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B
Equus spp.	70	12	14	57	17	41
Horse	31	1	8	18	1	5
Donkey	0	0	0	0	0	0
Total Equus	101	13	22	75	18	46
% Equids	6.5%	5.5%	5.2%	8.0%	2.5%	5.3%

Table 4-33: NISP values for equids in non-well contexts

In wells, the equid remains show a different pattern. There are no equids in the wells dated before the early 2nd century. In Phase 4 Middle B and 6 Late B, the percentage of equid remains in wells is much smaller than their percentage in non-well contexts. The opposite is true for wells from Phase 5 Late A, in which nearly 15% of the 101 elements from that phase come from equids. The low sample size from the wells for this period in combination with a number of loose teeth from a broken mandible may account for this high percentage.

Taxon	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B
Equus spp.	0	0	0	1	10	11
Horse	0	0	0	1	5	10
Donkey	0	0	0	0	0	0
Total Equus	0	0	0	2	15	21
% Equids	0.0%	0.0%	0.0%	2.1%	14.9%	1.5%

Table 4-34: NISP values for equids in well contexts

The MNI values (Table 4-35) tend to vary roughly in proportion to the NISP values for each phase. The largest MNI value corresponds to the phase with the largest NISP count, with at least 7 individuals based on counts of the right distal radius. Although some cases of ABGs inflating MNI counts are possible for some phases, the most definite cases occur in Phase 1 Early A, and will be discussed below.

Non-Wells	NISP	MNI	Wells	NISP	MNI
1 Early A	102	7	1 Early A	n/a	n/a
2 Early B	13	1	2 Early B	0	0
3 Middle A	22	2	3 Middle A	0	0
4 Middle B	75	3	4 Middle B	2	1
5 Late A	18	2	5 Late A	15	1
6 Late B	46	3	6 Late B	21	2

Table 4-35: NISP and MNI from non-well and well contexts

All teeth were examined for the differences in occlusal enamel folds, both mandibular and maxillary. In all cases, these teeth were determined to be from domestic *Equus caballus*. In the above table, all elements positively identified to horse are from these teeth.

Of the five first phalanges suitable for species distinction, all fall closer to the horse group than the donkey group, particularly in terms of Variable I (Figure 4-44). The elements were generally broader and larger than those for donkeys and mules. Some of the discrepancies may be due to the differences between anterior and posterior phalanges, as well as differences in horse types.

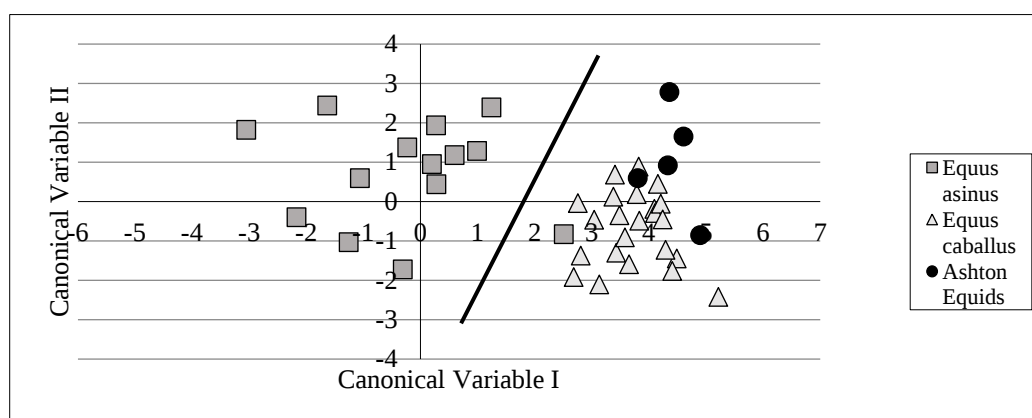


Figure 4-44: Discrimination of horse and donkey based on first phalanx measurements (following Davis 1982, data for *E. asinus* and *E. caballus* taken from Thomas 2005)

Although donkeys and mules are known from Roman Britain, they are difficult to distinguish based on morphology alone. Using the distinction criteria for first phalanges by Davis (1982) and the occlusal enamel folds by Johnstone (2004: 164-6), elements were identified to species where possible. In all cases where species distinction was possible, the elements were from domestic horses. Given this, we can assume that most or all equid remains at Ashton were from horses rather than mules or donkeys, although the low NISP values prevent any definite conclusions.

In several cases, the articulating remains of a partial or near-complete individual horses were present. In a ditch F1920 in Area C, dating to the mid- to late-first century, the remains of an adult horse's right forelimb, left hindlimb, and a fragmentary mandible and loose tooth. Carnivore gnawing on the radius suggests that these elements were exposed for some period of time. Another ditch in Area B (F1102) dating to the same period has the remains of a right forelimb and a skull fragment, and a cut on the medial side of the distal trochlea of the humerus. These forelimb elements are all fully fused and all except the skull fragment display carnivore gnawing. Both of these ditches are part of the enclosure systems in their respective areas.

A complete right hindlimb was also identified as an Associated Bone Group in the midden in Area A, which contained material from the mid-2nd to early 5th centuries AD. It contained 11 elements, including the tibia, metatarsal, all tarsals with the exception of the T1/2, the first and second phalanges, and a sesamoid bone. These elements show some carnivore gnawing on the proximal end of the tibia diaphysis, suggesting that the proximal epiphysis may have protruded and been chewed off by dogs. Some chewing on the calcaneum was also present. There were also heavy chops delivered to the back of the lateral fourth metacarpal, resulting in significant chunks of bone removed from the shaft. The dimensions of the first phalanx mostly fit with those of horse rather than donkey. All elements were fully fused, and likely came from a fully adult animal.

Element representation for horses shows an extremely high number of loose teeth, likely due to taphonomic factors. In all phases except the latest two, loose teeth have the highest %NISP of any element. In Phase 1 Early A, which is the only period with over 100 elements from non-well contexts, we can see that the most prevalent body part present is the upper and middle forelimb. All parts of the body are present. Low numbers of axial elements are more likely due to the difficulties with identifiability and their vulnerability to taphonomic destruction than complete absence. Although upper and middle limb bone such as the humerus, femur, radius, ulna, and tibia show higher NISP counts, this may be due to their lower density compared with metapodia, which are less likely to fragment.

Phases 2 Early B and 3 Middle A are small, each with less than 25 elements, and thus their element representation patterns are difficult to interpret. The 75 elements from Phase 4 Middle B shows a somewhat different pattern to previous periods, in that it has a higher percentage of skull remains, and a larger number of hindlimbs than forelimbs.

It also lacks the range of elements of the earliest phase, with fewer vertebrae and no phalanges present.

Phase 5 is similarly small, with only 18 elements. Phase 6 has 46 elements, and shows a lack of skull elements compared to Phases 1 and 4. Most elements are from the main bones of the forelimb and hindlimb, with most fragments coming from the larger, less dense bones such as the scapula and femur.

Overall, the pattern of horse remains at Ashton suggests the presence of complete horses on the site, with all parts of the body present over most periods. Where certain body parts are absent, these are usually the smaller and less dense elements that were likely to be lost due to taphonomic processes or recovery bias.

When assessing the age of horses from Ashton, both epiphyseal fusion and tooth eruption data were considered. Phase 1 Early A shows that most horses were adults, although some juveniles were also present. Of the five distal radii present in this phase, all five were completely fused, indicating individuals older than approximately three and a half years of age (Silver 1969). Four left distal radii were also present, of which all were fused except one that was still fusing. The presence of the fusing distal radius as well as a fusing proximal tibia, and several fusing and unfused vertebrae indicates that at least one individual seems to be in the range of 3-5 years old at death. One left distal tibia has an unfused metaphysis, suggesting an age of less than 2 years; this appears to be the earliest age estimate for elements from this assemblage.

Corroborating the presence of juveniles, the tooth patterns and eruption for horses from Phase 1 Early A also show the presence of young individuals. A connecting set of teeth without a jaw from F995 shows a fully adult animal, and of the loose mandibular molars and premolars counted, 8 out of 11 were fully adult. However, two loose teeth were present that were clearly still forming, having no defined root structure and only possessing the basic enamel structure without dentine in-fill. Additionally, a maxillary arcade from F1983 was present in four fragments, showing deciduous incisors as well as deciduous premolars with no sign of permanent molars behind them. As the first molar usually erupts anywhere between 7 and 14 months and the corner incisors have come in by 5-9 months of age, this would indicate that at least one horse making up the assemblage is a few months on either side of one year old.

In Phase 2 Early B, all five elements for which fusion data is available show full fusion. Five loose teeth are also present, of which one is an adult incisor and three are

adult premolars or molars. Additionally, there is a single tooth bud from F3158, as well as a mandible containing deciduous premolars from the same context.

The small sample of Phase 3 Middle A horses also indicates the presence of young individuals. Of the six elements with usable fusion data, two are left femora. One of these is an unfused epiphysis without the accompanying metaphysis, putting the age at less than three to three and a half years old. The femur element shows the distal epiphysis fusing to the metaphysis, while the proximal metaphysis remains unfused; using Silver's estimates, this would put the animal somewhere around three to three and a half years old. Of the other elements with fusion data, the distal articulation of a scapula and the acetabulum of a pelvis are both fully fused, indicating animals older than 1 and 2 years, respectively. A right humerus also has an unfused proximal metaphysis, which fuses at about the same time as the femoral epiphyses. Although each unfused element comes from a different feature, all elements are from Area A with the exception of the unfused and fusing left horse femur.

The tooth data from Phase 3 Middle A confirms the presence of a young horse, with a paired set of mandibles that have erupting third incisors, which Silver estimates as erupting around four and a half to five years of age (1969). Another mandible contains full adult premolars and molars. Of the loose mandibular teeth, only one out of the five does not have a well-formed root structure.

Age at Fusion	% Fused	%Fusing	Number of Elements
0-12 months	100%	0%	4
13-24 months	93%	7%	15
2-4 years	33%	0%	3
4-5 years	20%	80%	5

Table 4-36: % Epiphyseal Fusion by Age Category for Equids from Phase 4 Middle B

During phase 4 Middle A, 27 separate elements from non-well contexts could be assigned age estimates, as well as one element from a well (Table 4-36). All elements show fusion in the 0-12 month category, but the presence of a fusing distal tibia indicates at least one animal around 20-24 months of age. By the 2-4 year age category, only 33% of animals show fusion, and 80% of all elements with epiphyses fusing between four and five years show the fusion is just beginning. When examined on an individual context basis, ditch F1808 stands out as unique. Two right radii, two left pelvises, and two left metatarsals all have age data, as well as an extra thoracic vertebra. The presence of an unfused distal metatarsal suggests that one of these horses was

younger than approximately two years of age at death, which fits with the pelvis fusions data as well as the radius with the proximal metaphysis fused somewhere around 15-18 months old but the distal end still unfused before it reached approximately three and a half years of age. Assuming these estimates are both correct and that these elements come from a single individual, that would age the horse at somewhere around a year and half. Chops to the medial diaphysis usually associated with meat removal are also present on a femur diaphysis from this same context.

Element	Side	Proximal Fusion	Distal Fusion	Age Estimate
MT	Left	N/A	Unfused Metaphysis	<16-20 mo
MT	Left	Fused	Fused	>16-20 mo
PELV	Left	Fused	N/A	>18-24 mo
PELV	Left	Fused	N/A	>18-24 mo
RAD	Right	Fused	N/A	>15-18 mo
RAD	Right	Fused	Unfus Metaphysis	15-18 mo-3.5 yr
TVERT	Axial	Fused	Fusing	c. 5 yr?

Table 4-37: Ageing of horse remains based on postcranial elements

Again, tooth eruption data confirms the high prevalence of juvenile horses. An articulating tooth row without the jaw present from F3359 in Area A shows a horse with almost completely worn down deciduous premolars and M3 not yet in wear, suggesting an animal somewhere between two and a half and three and a half years of age, following Silver (1969). Two incisors that fit together and are also from the same context, and may belong to this same set of teeth. Additionally, there is a maxilla with a juvenile canine and deciduous premolars, with M1 not yet erupted. The only other teeth from Phase 4 Middle B were an adult premolar or molar and an adult incisor from a well context.

Age at Fusion	% Fused	%Fusing	Number of Elements
0-12 mo	100%	0%	3
13-24 mo	100%	0%	3
2-4 yr	100%	0%	3
4-5 yr	0%	100%	4

Table 4-38: % Epiphyseal Fusion by Age Category for Equids from Phase 5 Late A

For Phase 5 Late A, only 12 elements from non-well contexts had epiphyseal fusion data (Table 4-38). Of these, all showed complete fusion of epiphyses with the exception of three fusing vertebral epiphyses from a set of articulating cervical vertebrae. In well contexts, there were nine skull fragments with unfused sutures as well as a fused distal scapula from a horse of at least one year old. Non-well contexts only

provided a single loose adult mandibular premolar or molar. The wells contained teeth from a younger animal, with a set of loose but articulating mandibular teeth including a deciduous second premolar, a forming premolar, and the M1 and M2. Additionally, the well produced a maxilla with the deciduous third and fourth premolar and the adult M1, which had come into wear. As this comes in somewhere on either side of a year of age, this data matches the fusion data from the same well context.

6 Late B	% Fused	%Fusing	Number of Elements
0-12 mo	86%	0%	7
13-24 mo	100%	0%	5
2-4 yr	57%	0%	7
4-5 yr	0%	0%	1

Table 4-39: % Epiphyseal Fusion by Age Category for Equids from Phase 6 Late A

Elements with epiphyseal fusion data in Phase 6 Late B's non-well contexts largely came from pit F414 and pit F977 (Table 4-39). There was evidence for an unfused distal scapula, suggesting a foal younger than a year. An unfused left proximal humerus and right distal femur indicate animals that died before around the age of three to three and a half years. A left radius from pit F414 also shows a fused proximal end and an unfused distal end, putting the age of the horse somewhere between 15-18 months and three and a half years old, according to Silver (1969). Ageing data from teeth does not confirm the presence of very young juveniles for non-well contexts, as all loose mandibular teeth were fully adult and in wear. Additionally, a pair of mandibles contained an adult M3 fully in wear. The wells from the same phase also contained only fully adult loose teeth, as well as adult teeth in a mandible and maxilla.

The consistent presence of juvenile horses at Ashton, especially very young animals might suggest that some horse-raising may have occurred on-site. In *Re Rustica*, Varro does not recommend training horses to take riders until at least two years of age, and it is probably that the juvenile animals at Ashton were not all of working age (II, 7, 12-13). Horse and mule breeding was a highly profitable industry in the Roman world, where horses were valuable both for the army and for general transportation.

Sexing of horse remains was achieved by examining the presence or absence of canine teeth. Two sets of mandibles with symphysis/diastema could be assessed for the presence or absence of canines. One horse from Phase 3 Middle A had adult canines present. The mandibles from Phase 6 Late B did show either a canine or an alveolus. Of the maxillae with that portion of the face, a pair of maxillae in 1 Early A have no canine

present, and a juvenile canine is present in a maxilla from Phase 4 Middle C. Although data is too sparse to draw any definitive conclusions, it seems that both males and females are present.

	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late
Cut	4	1	2	0	1	0	2
Chop	0	0	0	5	1	0	2
Saw	0	0	0	0	0	0	1
No butchery	98	12	20	70	16	46	28
%Butchered	3.9%	7.7%	9.1%	6.7%	11.1%	0.0%	15.2%

Table 4-40: Butchery on Horse Elements from Non-Well Contexts

Butchery is present on a small percentage of horse remains from Ashton (Table 4-40 for non-well contexts, 4-41 for well contexts). Cuts are the most common type of mark present. Eight elements show cuts on the diaphysis, and two have cuts on the articular ends of the bones. Chops show a different pattern, with four on articular ends of bones and four on the diaphysis. This is likely due to the use of heavier chopping instruments for dismemberment of the body, which is more likely to be done through the joints. The presence of a neatly sawn distal horse tibia is one of the rare instances of sawing present at Ashton. It is possible that the shaft of the bone could have been used in bone-working, which was a known industry in the town. The small number of horses from wells also show some butchery marks in the small samples. One scapula from Phase 5 shows three different areas of chops around the distal articulation. Additionally, two pelves have cut and chop marks on the ventral ischia in Phase 6 well contexts.

	4 Middle B	5 Late A	6 Late B
Cut	0	0	1
Chop	0	1	1
Saw	0	0	0
No butchery	2	14	19
%Butchered	0.0%	6.7%	9.5%

Table 4-41: Butchery on Horse Elements from Well Contexts

Whether horses were exploited for meat in the Northwest Provinces during the Roman period is controversial (Groot 2008: 19, Lauwerier 1999: 107-109). The butchery evidence shows both disarticulation marks as well as marks associated with meat removal. It is possible that this meat could have been for human consumption, although this does not seem to have been a common part of the diet of people in Roman Britain. The need to disarticulate a large dead animal for disposal and the removal of

valuable skins for tanning would also leave butchery marks on bones. Processing for these purposes is seen on other animals in Ashton. Lastly, the potential of using horse bone for the creation of various items is suggested by the presence of the sawn tibia from the midden.

Pathology rates for horses were low, with the exception of the ABG in midden 300. Pathologies in horses only appear in non-well contexts (Tables 4-42, 4-43), with many involving articulating elements. Phases 3 Middle A, 5 Late A, and 6 Late B contained no pathological elements.

	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late
Total Elements	102	13	22	75	18	46	33
%Pathological	3.9%	0.0%	0.0%	4.0%	0.0%	0.0%	36.4%

Table 4-42: Pathological Equid Elements in Non-Well Contexts

	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late
Articular depressions	1	0	0	2	0	0	4
Enthesophytes	2	0	0	0	0	0	0
Osteophytes	1	0	0	0	0	0	4
Eburnation	0	0	0	0	0	0	10
Exostoses	0	0	0	0	0	0	2
Extension of bone ridge	0	0	0	1	0	0	0
Necrosis	1	0	0	0	0	0	0

Table 4-43: Number of Equid Pathology Types by Phase



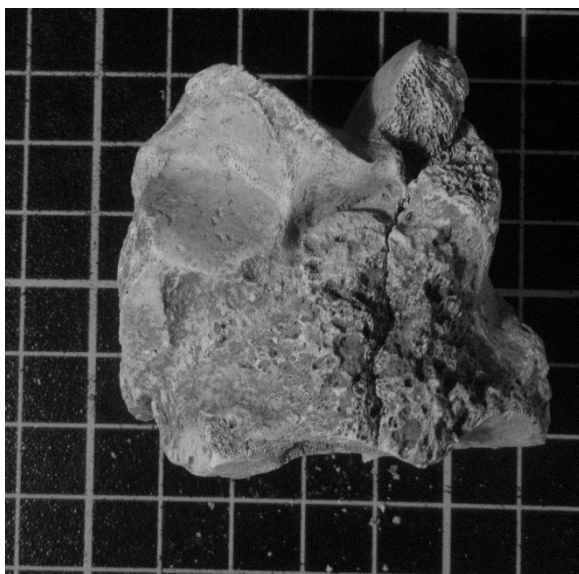


Figure 4-44: 1921 Equid calcaneum and astragalus pathologies

Of the 102 elements from Phase 1 Early A, four showed pathological changes to the bone. An articulating astragalus and calcaneum both showed signs of raised nodules around the edges of the articulation, possibly enthesophytes (see Figure 4-45). These elements come from a ditch belonging to Enclosure I c. The astragalus showed signs of potential necrosis, both on the plantar articulation with the calcaneum and on the distal articulation with the central tarsal; the bones have a pitted, lumpy appearance on the affected articular surfaces, as shown in Figure 4-45. The other two pathologies also affect the joints and come from F1983, which is also a ditch belonging to Enclosure I c in Area C. There is an irregularly shaped articular depression in the centre of the proximal epiphysis of a right metacarpal, as well as some lipping on the front of the epiphyseal rim. One second phalanx also has distal exostoses, which are comparable to Phase 2 of the Bartosiewicz et al. scale for cattle foot deformations (1997).

Phases 2 Early B and 3 Middle A have few or no observed pathologies. One out of the thirteen elements from Phase 2 shows pathological deformation. A small roughened knob at the top of the medial supracondyloid crest may represent an enthesophyte. None of the 22 elements from Phase 3 show any pathology.

Phase 4 has three pathological elements, out of the 75 elements from non-well context and the 2 from well contexts. Both these are from non-wells, and two are cervical vertebrae that are part of an articulating sequence of three. The first cervical vertebra has three “pinprick” articular deformations on the unfused posterior epiphysis similar to the Type 4 articular depressions identified in cattle phalanges, as described by Baker and Brothwell (1980:109-114). The second has a lunate depression

approximately 13mm long and 1.5mm thick, centered at the top of the anterior fusing epiphysis. The rounded edges and ovoid shape of the depression is consistent with Baker and Brothwell's Type 1 depressions (1980: 109-112). The presence of articular deformations on articulating surfaces of two elements but not on any of the other articular surfaces is notable, but the lack of a match between the two depression types and sizes does not provide further evidence for osteochondrosis (Thomas and Johannsen 2011: 53). The other noted pathology is on the right pelvis, which shows spongy bone buildup along the crest for the attachment of the lateral tendon of the rectus femoris and capsularis; it is possible that this could be related to age or robusticity.

Horse remains from the midden showed the highest prevalence and degree of pathological deformation. One from the main midden context, 300, showed the presence of osteophytes along the lip of the proximal articular surface, with an extension of this lip on the antero-lateral side. There was also a spongy build-up of bone just below the articular surface.

The horse ABG from context 521 shows significant joint disease on all of the 11 elements excepting the sesamoid bone (Table 4-44). Significant patches of eburnation were present on the articular surfaces of all pathology elements from this ABG with the exception of the second phalanx. Additionally, three of the tarsals show destruction of the joint surface and exposure of pitted cortical bone. In order to diagnose osteoarthritis in an individual, Baker and Brothwell require the presence of at least three observations from the following list: grooving of the articular surface, eburnation, the extension of the articulations due to new bone formation, and the presence of exostoses around the periphery of the articulation (1980: 115) Although none of the elements display articular grooving, the hindlimb as a whole shows signs of the last three criteria. Baker and Brothwell ascribe the causes of osteoarthritis to doing heavy work on hard surfaces, which jolts the limbs. It is possible that the horse from which this limb came could have been exploited for transportation or draught labour its deposition in the midden appears to have occurred after a life of extensive use.

Element	Osteophytes	Exostoses	Lipping	Eburnation	Articular depression	Articular destruction
Tibia		X		X		
Metatarsal III			X	X	X	
Astragalus				X		

Calcaneum				X		X
Central Tarsal			X	X		X
Lateral Cuneiform			X	X		X
Cuboid				X		
Metatarsal IV			X	X	X	
1st Phalanx	X			X		
2nd Phalanx	X					

Table 4-44: Pathological Elements in Horse ABG 521 (midden F300)

4.3.6 Cats

Domestic cats were known from Roman Britain, although they are rarely found in the bone assemblage (O'Connor 1992: 110). All cat remains from Ashton come from the latest phase of the site. Three elements come from Phase 6 Late B ditches and pits in Area C, and two from Area C wells. An additional element is present in the more broadly dated Phase 8 Late AB.

The non-well cat elements from Phase 6 include a left metatarsal with an unfused distal metaphysis and a left tibia with an unfused distal metaphysis from pit F1134, and the proximal half of a fused left femur from pit F1014. None of these elements show any signs of burning, gnawing, or butchery, and all are in Good condition. Phase 8 adds a left humerus to the collection of cat remains, and this is also from a juvenile animal with an unfused proximal metaphysis and a fusing distal epiphysis.

The two cat elements from the well, an entirely unfused ischium and a small jaw containing the third and fourth deciduous premolars and first molar just barely visible in its crypt, also come from a very young animal. They are also lacking in taphonomic modification, having no gnawing, burning, or butchery.

Cats do not seem to have been a common part of the animal assemblage at Ashton. In the hand-collected non-well contexts, they appear only rarely in the latest phase. There might have been some cats in Ashton during the earlier phases of the site, but taphonomic bias against small animals prevents solid conclusions from being drawn. However, if these biases can be taken as constant over the life of the site, it would seem that cats become more common towards the end of the site's occupation. Almost all of the animals that entered the archaeological assemblage are juveniles, possibly representing an attempt at reducing the cat population by humans or natural

mortality common to young animals not under direct human care. The lack of fully adult cat remains may hint that adult cats were either treated differently in terms of burial, or perhaps were sent for processing of their skins to another location. However, the sample is too small for definitive conclusions.

4.4 Wild Mammal Food Species

4.4.1 Red Deer

Context Number	Feature	Area	Type	CP date	Phase	Element	Side	Butchery type
1361	F1360	C	ditch	1-2	1 Early A	MC	L	Chop?
2268	F2269	B	ditch	5-6	4 Middle B	TIB	R	none
2066	F1012	C	well	7b	6 Late B	ANTLER	Indt	Chop and saw
83	F414	B	pit	7b	6 Late B	SKULL	L	Saw
1991	F1992	B	ditch	7b	6 Late B	PH1	Indt	Cut
1991	F1992	B	ditch	7b	6 Late B	SKULL	R	Chop
1991	F1992	B	ditch	7b	6 Late B	PELV	R	none

Table 4-45: Red deer elements from well-dated contexts

A small number of red deer were present at Ashton, mostly from later non-well contexts (Table 4-45). These elements are summarised in the table below. Most elements are from the latest phases of the site. One metacarpal was identified from the ditch material in Phase 1 Early A, dating to the mid- to late 1st century AD. The bone was potentially split axially prior to deposition in the ditch. Another element, a tibia, came from a ditch from the mid-2nd to late 3rd century and showed no signs of butchery. Both of these elements were fully fused.

The material from the last phase at the site consisted of one element from a well, one element from a pit, and three from the same ditch context. The element in the well was a piece of antler with several different chop and saw marks. It is an excellent example of antler-working, with branches sawn off, with multiple parallel chops and saw marks where one of the tines was removed. The pedicle was not present, so it cannot be determined if this antler was shed naturally and collected or from an animal that was hunted by the local residents. A portion of skull with an attached antler base was found in the late 4th to early 5th century pits (F414); although it could have been

collected from a deceased animal, it is likely to have been hunted (Figure 4-45). The antler core itself has been sawn through from both sides, leaving an island of antler in the middle where the main branch was snapped off.

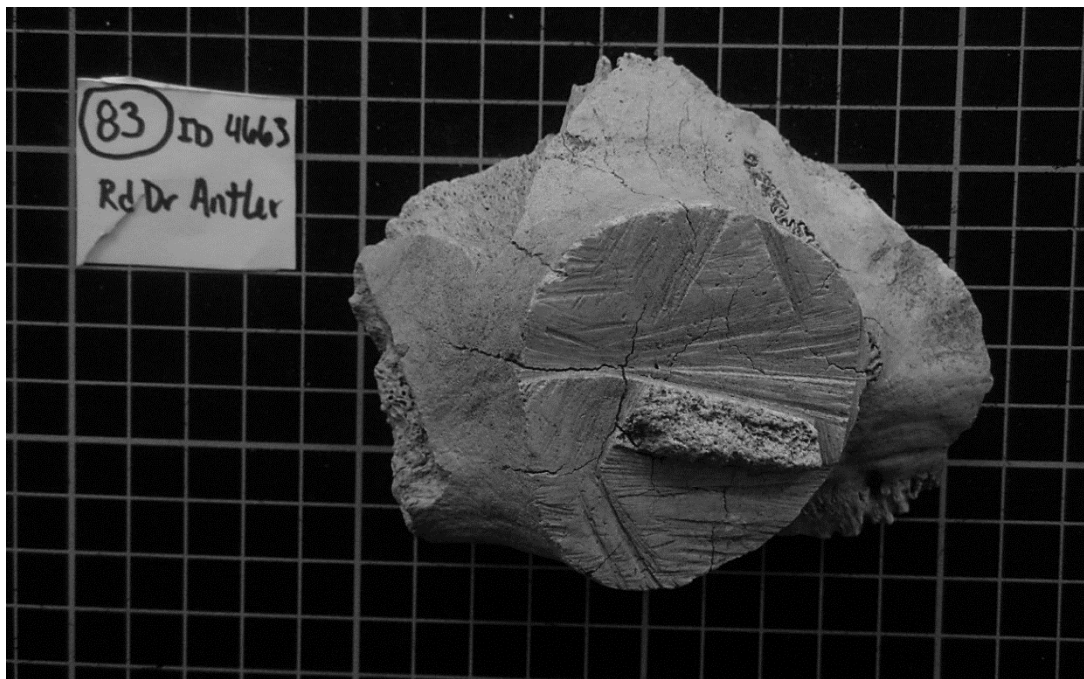


Figure 4-45: Sawn red deer antler from Feature F414

The three elements from a ditch in Area B could potentially come from the same individual. They include a first phalanx, section of the right pelvis, and part of the skull. The phalanx and skull both showed signs of butchery, with a cut on the back of the proximal side of the phalanx and a possible chop down the middle of the skull fragment. This butchery may indicate the skinning and dismemberment of the carcass; a large red deer not only would have provided a significant amount of meat, but also bone and antler for working and skins for tanning.

Although hunting wild animals like red deer never seemed to make up a significant contribution to the diet of people at Ashton, occasional hunting seems to have both supplemented the diet and contributed useful raw materials. As the minimum number of individuals for each phase is only one red deer, it is hard to comment on any change in hunting over time. However, the increased presence of antler fragments in the later phases, compared with limb elements present earlier may suggest that antler-working may have been more prevalent in later phases.

4.4.2 Roe Deer

A single element of roe deer (*Capreolus capreolus*) was identified from an enclosure ditch in Area C. The element was a distal tibia without any visible butchery marks. It was fully fused and did not have any signs of gnawing. It did not appear to have been as valued as the larger red deer, and would have produced much less antler for tool-working.

4.4.3 Rabbit and Hare

One dated context contained remains of a leporid. A rabbit (*Oryctolagus cuniculus*) femur with an unfused distal epiphysis came from a well deposit dated to the early to late 3rd century. As it is from a juvenile rabbit, it is likely that this element came from an invasive burrow in later period. Rabbits are present on several Romano-British sites, but only a handful are considered to be reliably dated to that period, and these were usually on sites with elite hunting and game-keeping practices (Sykes and Curl 2010: 119). They are not a native species in Britain; mountain hares (*Lepus timidus*) are native, but no hare bones were discovered from securely dated contexts.

4.4.4 Wild Boar

Based on qualitative size considerations, two elements from the midden (mid-2nd to early 5th century), were certainly from wild boar (*S. scrofa*) rather than domestic pig (*S. scrofa domesticus*). A distal radius and the proximal shaft of a humerus were both much larger than even the modern domestic pigs in the Bone Lab collection, and had more robust muscle attachments than domestic animals. A further 10 elements were identified as belonging either to genus of *Sus*. Carnivore gnawing and the Roman practice of butchering through the ends of the long bones and splitting shafts complicated the use of measurements in determining species. None of the elements identified as wild boar or as *Sus*. species were able to be measured due to these complications. However, photography of the elements next to those from modern domestic specimens shows the superior size of the wild boar.

4.5 Non-food Wild Mammals

Several species of wild mammal that were unlikely to have been hunted for their food value were also present. Two of these, the red fox and ermine, or stoat, might have been hunted for their fur. If they were not brought in intentionally by the human inhabitants, it is possible that these could also represent scavengers or animals killed as pests.

4.5.1 Foxes

Foxes were present in small numbers in Ashton. Some bones were indistinguishable from those of small dogs. Of the 31 elements definitively identified as red fox (*Vulpes vulpes*), 29 were from a single well context and probably represent an ABG. A proximal femur from a Phase 1 Early A gully and a phalanx from a well context broadly dated to the mid-2nd to early 5th century were also present.

The probably ABG was found in context 2125 of well F1012 in Area C, the fill of which was dated from the late 3rd to the early 5th century. Almost all of these were limb elements, with a few loose teeth and part of a maxilla containing teeth also present. None of the elements showed any signs of cut or chop marks, and a three had some carnivore gnawing. It is possible that this deposit could be from an animal killed for its fur, with the phalanges and most of the skull removed during the skinning process. The rarity of foxes and other wild animals at the site makes its deposition in the well a point of interest, and will be discussed further in the following chapter.

4.5.2 Mustelids

The complete femur of an ermine, or stoat (*Mustela erminea*) came from midden F300 in Area A, which contained material from the mid-2nd to early 5th century AD. There were no cut marks present on the bone, and no carnivore gnawing. Due to the lack of human modification, it is possible that this could represent the natural death of a scavenger, an animal killed as a pest, or hunting for fur. The element was fully fused, and likely from an adult.

4.5.3 Rodents

A small number of rodents were recovered, mostly from sieved well fills. The dense mandibles were the most commonly surviving element, along with loose teeth

which could mostly be refitted into the jaw. There were only two elements found in non-sieved contexts; the mandible of a water vole and a small rib from a *Microtus* species were found in ditch fills in Areas C and B, respectively.

Most of the rodent remains from the Phase Late 6 B wells came from a single context, 2130 in well F1012. This was a usage deposit that was open during the life of the well, and it is likely that the remains represent pitfall victims. 10 of the 11 elements from this context were identified as Field vole (*Microtus agrestis*), and the other came from a small unidentified rodent. A count of left mandibles shows at least four individuals were present.

The presence of rodents is not surprising in a town where grain was being produced and stored. It is, however, interesting to note the complete absence of rats. Water voles would have had sufficient habitat around the nearby River Nene, and all would have benefitted from the waste and stores left by Ashton's inhabitants.

4.6 Domestic and Potentially-Tamed Birds

4.6.1 Domestic Fowl (and related species)

Chickens, or domesticated fowl, were present throughout all phases in Ashton, although as with other birds, the largest number were present in the later periods (Table 4-46). The majority come from wells dating to Phase 6 Late B, especially Well F1012 in Area C. Although most bones could be identified to chicken using the criteria set out by Tomek and Bochenski and the use of comparative specimens (*Gallus gallus domesticus*), some elements were more difficult to speciate. Pheasants and possibly guinea fowl were also known to be kept by the Romans (Parker 1988: 203). The remains of a chicken ABG from well context 1363 were smaller than other domestic fowl, with slightly sharper morphology, and it was not possible to determine whether they belonged to pheasant or chicken. A tibia from a Phase 2 Early B ditch was also small and slightly different in morphology than the other chicken elements. Several sacra from a ditch context and a humerus from a midden could also not be determined to species, and seem to have characteristics somewhere between a domesticated chicken and a guinea fowl. Given the rarity of these more exotic birds in Britain during Roman times and the wide variety of chicken morphology, it is more likely than not that these bones represent those of domestic chickens.

Feature Type	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Non-Well Contexts	2	3	4	12	3	4	8	1
Well Contexts	0	0	0	1	2	50	0	28

Table 4-46: NISP of Domestic Fowl remains by Phase

For the earliest three phases at Ashton, chicken remains do not seem to follow any consistent pattern. Incomplete elements from various body parts are present, including both axial elements and limb bones. Of the seven elements for which epiphyseal ends were present, two were juvenile and five were fully ossified. The juvenile elements included a distal tibia from a pit in Area A and a distal tarsometatarsus in a ditch in area A.

Phase 4 Middle A continues the pattern of isolated elements present in varied contexts, with some exceptions. Three are articulating sacral vertebrae from a single ditch context, with no other elements from chicken in the context. The single bone from a Phase 4 Middle B well is a tarsometatarsus without a spur or scar. The unique deposit from this phase comes from pit F1476, which includes four complete tarsometatarsi. Although there are two rights and two lefts, they do not appear to come from two animals. One of the left elements is porous at both ends, indicating a juvenile. None of the bones have a sign of spurs or scars for spurs, suggesting that these animals might be female. The fused left tarsometatarsus has a possible healed fracture across the antero-medial shaft above the condyle.

Phase 5 Late A has too few bones to draw any meaningful conclusions as well, but Phase 6 Late B contains several interesting well fills. The non-well contexts contain one or two fragmented elements from varying parts of the body, in keeping with the patterns of earlier periods. Five contexts from Well F1012 in Area C and one context from Well F2103 in Area A contained multiple bones from domestic fowl (Table 4-47).

	2065	2066	2125	2128	2129	2130
NISP	3	1	8	23	6	1

Table 4-47: NISP for Well F1012 Chickens

Context 2065 contained a skull complete up to the beak attachment, a complete right tarsometatarsus, and a distal left tarsometatarsus. The pair has similar dimensions, and both were without spurs or scars. The tarsometatarsus from context 2066 did have a large spur measuring about 21.3mm from base to point. The selection of tarsometatarsi

and skull elements may be deliberate, as these would have been the animal's key weapons if used for cockfighting.

Contexts 2125, 2128, and 2129 represent more complete birds. Context 2128 contained the most elements, with at least two individuals present based on a count of right wings and thighs. Unlike other chicken contexts, thoracic vertebrae as well as cervical vertebrae were present. Feet and skulls were each represented by a single element, with most bones coming from the wing and legs. Five elements were from a juvenile: a right coracoid, a left proximal femur, a right proximal scapula, a left tibia, and a right distal ulna. At least one adult and one juvenile chicken appear to have been present across these contexts. All bones are fragmentary with the exception of one thoracic vertebra and one carpometacarpus, and thus it is difficult to arrange bones into matching pairs.

A well context from Well F1362 in area C was more broadly dated to the later phases at Ashton (Phases 5 Late A and 6 Late B, combined together into Late AB), and contained the apparent remains of a single individual. Several paired elements with nearly identical measurements were identified, as well as articulations between the elements. The bones showed no signs of butchery, burning, or gnawing. One of the broken elements, the left femur, did show evidence of medullary bone forming along the inside of the shaft, indicating that this was a hen in lay. Although it was missing its feet and most of the axial skeleton, all other parts of the body seem to have been represented. It is possible that this was a nearly whole animal deposited in one of the well fills.

The presence of juvenile chickens is confirmed throughout Ashton's history (Table 4-48). Although small sample sizes preclude solid conclusions, it is clear that both juvenile and adult chickens were being slaughtered, although the preference seems to be for older animals. It is likely that adult females were kept for at least a few years as laying hens before they were eaten.

% Adult	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Non-Well Contexts	100%	67%	50%	75%	100%	n/a	83%	100%
Well Contexts	n/a	n/a	n/a	n/a	100%	89%	n/a	100%

Table 4-48: %Adult in chickens for well and non-well contexts

Determining sex from chicken bones is assisted by the presence or absence of spurs and medullary bone. Although birds with spurs are not definitely male and birds without are not definitely female, the presence or absence of these features can suggest possible sex ratios. Eight tarsometatarsi each from the right and left side were observed for the presence or absence of either spurs or the scar where a spur might form. No scars were observed, but one right element and one left element from wells in separate areas of the site showed spurs. The spur on the element from well F1362 in Area A was nearly half the size of the one discussed above from well F1012 in Area C, measuring around 11.0mm from base to tip. This suggests that although they come from opposite sides, these spurs likely belonged to two different male individuals. The presence of more females than males is not surprising; roosters are notoriously aggressive and cannot be used for eggs. However, their importance for sports such as cockfighting and their possible association with Mercury as well as their breeding potential obviously necessitated the keeping of a few males.

Where limb bones (humerus, radius, ulna, carpometacarpus, femur, tibia, tibiotarsus, tarsometatarsus) were broken with their interior cavities visible, they were assessed for medullary bone. Of the 46 elements across various phases, only 5 showed evidence of medullary bone formation (Table 4-49). This shows that at least 10% or more of hens were likely in lay at the time of death. The presence of eggshell at Ashton confirms the use of domestic fowl for their egg production.

Phase	Feature Type	Area	Element
2 Early B	ditch	C	L TIB
4 Middle B	well	C	R TMT
5 Late A	pit	A	R TIB
7 Mid to Late	midden	A	R HUM
8 Late AB	well	C	L FEM

Table 4-49: Chicken bones showing medullary bone formation

Although chickens never appear to have been a major part of the diet in Ashton, their remains were found throughout all phases of the site in some quantity.

4.6.2 Ducks

Although chickens are certainly domesticated introductions to Britain, it is possible that ducks present at Ashton could either be hunted in the wild, tamed from the wild and managed, or kept as domesticated animals (Albarella 2005: 254). Given the skeletal similarities between various species of duck with the genus *Anas*, identification was not attempted unless particularly distinctive features were present.

Ducks do not appear to have been present at Ashton until the 3rd century. Birds are generally rare until at least the 2nd century, and the lack of early sieved well contexts does not appear to be a factor in this, as many of the Phase 1 Early A ditch fills have excellent preservation with small bones present and the fact that birds do appear in larger numbers in non-sieved fills in later periods.

Duck remains were present in four separate contexts in Well F1012 in Area C, with each context containing a single element. One of these contexts is dated earlier than the others (the early to late 3rd century); it produced a single portion of left mandible. The large size and shape of the mandible ramus suggests mallard (*A. platyrhynchos*) rather than one of the smaller wild species. Three more well fills dating to the mid-4th to early 5th century also contain singular elements from an *Anas* species. A distal ulna, part of a right pelvic girdle, and a distal left humerus were found. The distal humerus was burnt, the only duck element that showed signs of definite human activity.

Species	Element	Side	%Zones
<i>A. platyrhynchos</i>	Coracoid	Right	100%
<i>A. platyrhynchos</i>	Femur	Left	88%
<i>A. platyrhynchos</i>	Femur	Right	75%
<i>A. platyrhynchos</i>	Femur	Right	63%
<i>A. cf. penelope</i>	Ulna	Left	100%
<i>Anas spp.</i>	Furculum	Axial	100%
<i>Anas spp.</i>	Humerus	Left	100%
<i>Anas spp.</i>	Humerus	Right	38%
<i>Anas spp.</i>	Phalanx 3	Indt.	100%
<i>Anas spp.</i>	Sternum	Axial	13%

Table 4-50: Duck remains from context 1338

Most of the duck remains from 6 Late B came from a pit under Building 7 in Area A dating to the last half century of occupation (Table 4-50). Among these was a small ulna that did not match up with the morphology for mallard, but was morphological comparable to European wigeon (*A. penelope*). Four other bones, three femora and a coracoid, were identified as most likely belonging to mallard based on size and morphology. The other elements were not so easily identified to species. A set of humeri appear to be paired, but there are no other articulating remains or elements that can be definitively matched as belonging to the same individual. The presence of two

mostly complete right femora indicate the presence of at least two individuals. Most of the bones from this pit are from upper wing and upper leg bones, as well as the larger parts of the axial skeleton. Vertebrae, ribs, and skulls could have been lost to taphonomy, although all but two of the ten elements were in Good condition. Alternatively, this could represent the deposit of larger meat-bearing elements discarded as food waste, with most of the carcass deposited elsewhere after dressing. All elements with observable epiphyses were fully mature, suggesting the consumption of adult birds.

Four more duck elements were present in the midden context 300. The only complete element was a phalanx from the left wing. The distal epiphysis humerus, distal half of a radius, and fragment of sternum were also present. Again, all elements appeared to be from adult birds, and none showed signs of burning, butchery, or gnawing.

4.6.3 Geese

Over all well-dated contexts, the NISP for geese was even higher than the NISP for domestic fowl (see Table 4-51). While elements from chicken were present in lower numbers across all phases of the site, several large deposits of semi-complete geese, mostly in later phases, showed that goose was not an uncommon part of the diet of people from Ashton. Although it is uncertain whether geese were fully domesticated in Roman Britain, they were domesticated in other parts of the empire (Albarella 2005: 253). All geese from Ashton appear consistent with the genus *Anser*, although the relative similarities between the wild Greylag Goose (*Anser anser*) and the domestic goose (*Anser anser domesticus*) prevented the distinction between wild and domesticated animals.

Phase	Non-Wells	Wells
1 Early A	1	n/a
2 Early B	0	n/a
3 Middle A	0	n/a
4 Middle B	73	9
5 Late A	4	1
6 Late B	0	97
7 Mid to Late	1	0
8 Late AB	8	0
Total	79	107

Table 4-51: NISP for Geese in Well and Non-Well Contexts

Like other birds, geese are rare throughout the first three phases at Ashton. Only a single element, part of a distal humerus shaft, was identified from the 1st century contexts. The practice of depositing semi-complete geese seems to start in the mid-2nd to late 3rd century, and continues through the later phases in both well and non-well contexts. Geese were comparatively rare in the midden, as well, with a single fragmentary sternum.

Context	2128	2129	1538	1498
Context Type	Well F1012	Well F1012	Pit F1497	Pit F1497
Phase	6 Late B	6 Late B	4 Middle B	4 Middle B
Head	2	0	12	0
Neck	13	25	3	1
Keel	0	0	0	0
Axial torso	0	3	0	0
Wing	4	2	14	15
Leg	7	2	4	7
Digits	8	12	9	3
total NISP	34	44	42	26
%Total Geese	18.3%	23.7%	22.6%	14.0%
MNI	3	2	3	3

Table 4-52: Geese from ABGs

Of the total number of geese, 78.5% came from these ABG groups from four contexts (Table 4-52). These ABGs included most parts of the body, with the exception of the sternum and furcula, and the ribs and post-cervical vertebrae were either unidentifiable to species or absent. The presence of right and left paired elements from multiple parts of the body suggests the deposition of whole animals in some contexts, and the preservation of even the fragile tracheal rings suggests that the contexts were undisturbed after burial. Using tracheal rings as a proxy for disturbance, it seems likely that at least the geese in the wells were purposefully deposited with at least the neck still having soft tissue holding it together.

The geese from the pits have slightly smaller NISPS, but each context has at least three individuals (Table 4-53). The goose from context 1538 (Pit F1498) shows a chop mark on the distal humerus, just above the brachialis depression, but this is the only sign of butchery. This context contains mostly elements from the wing, with few from the upper leg. Although there are several fragmentary skull pieces, there are comparatively few cervical vertebrae and tracheal rings when compared with the well context. It is possible that taphonomic processes could have removed these less-dense elements, or they could have been unattributable to species. Of the three cervical

vertebrae identified, at least two articulate well. The presence of a butchery mark does indicate that some processing of the animals occurred before deposition.

Paired Element	Left (1538)	Right (1538)		Left (1498)	Right (1498)
Coracoid	0	0		0	0
Scapula	0	0		0	0
Humerus	1	0		0	0
Radius	2	1		2	3
Ulna	2	2		3	2
Carpometacarpus	3	2		3	2
Femur	0	0		0	0
Tibia	1	0		0	1
Tarsometatarsus	2	1		3	3

Table 4-53: MNE of Paired Elements for Pit 1498 Geese

Another goose from the same pit feature, in context 1498, shows a similar pattern of element representation. The upper leg is again absent, and now the complete upper wing is also absent. It is possible that these meaty elements could have been removed for consumption, with the rest of the less flesh-covered bones deposited in the pit. Diagonal cut marks on the shaft of a radius and longitudinal knife marks along the body of one of the cervical vertebrae indicate that flesh was removed from the bones, possibly dismembering and fileting it for consumption. No burning was observed that indicated roasting of a whole bird, and there were no gnawing marks from carnivores.

The well contexts show the opposite pattern of element representation. Both 2128 and 2129 show mostly head and neck elements from the axial skeleton, and lower leg and wing elements from the appendicular skeleton. Of the major long bones, 2128 shows two right carpometacarpi, a fragment of radius, and seven fragmentary tarsometatarsi. 2129 contains only a coracoid, a radius, a tibia, and a tarsometatarsus. Although the goose from 2128 does not have any evidence of butchery, the one from 2129 shows two cervical vertebrae with long cut marks along the vertebral body and fine diagonal cut marks on the tibia shaft. It is possible that the animals from the wells were prepared in a similar way, even if the two depositions were very different. The femora, most of the tibiae, and most of the upper wing elements are still missing from these depositions, possibly for consumption at other parts of the site.

Even the secondary products of a goose would have been useful. Geese were used in the Roman period for their feathers (Albarella 2005: 253), and it is possible that these feather-bearing elements that were not as meat-rich as bones closer to the torso were separated off for plucking, while the majority of the axial skeleton and

appendicular elements that remain close to the body were consumed. The deposition of the remains of at least three geese altogether seems to indicate that at least on some occasions, multiple geese were processed at a time in Ashton. In addition to feathers, geese would have produced eggs; domesticated geese would have provided a ready supply, although wild goose eggs could also have been collected. Egg shell was identified at Ashton, but no analysis has been undertaken at the present time to determine whether they were from domestic fowl or other birds.

4.7 Wild Birds

4.7.1 Water Birds

Excepting the bones from geese and ducks which might be from wild rather than domesticated animals, there was only a single element from an aquatic wild bird. The carpometacarpus of a crane was present in a pit dating to Phase 5 Late A. There were no butchery marks present, but it is not unlikely that this could have been a bird killed for food.

4.7.2 Wild Corvids

One of the more common types of birds present at Ashton were corvids, which were the most prevalent group after geese and chickens. Almost all corvid remains were found in non-well contexts. No corvid bones showed any signs of butchery marks or gnawing.

The largest corvid, the raven (*Corvus corone*), is one of the more common birds found on Romano-British sites, and may have been tamed and kept by people (Serjeantson and Morris 2011: 100). Only one element was found from the earliest phases of Ashton, in a ditch from Phase 1 Early A. This single element was a fragment of distal ulna shaft, and was identifiable due to the prominent papillae.

No more raven remains are found until Phase 4 Middle A, which includes ravens from two contexts, both dated from the mid-2nd to late 3rd century. The first was an isolated coracoid from a ditch context. The other context, a ditch from another enclosure system, contained two paired articulating leg bones. These included a right femur, tibiotarsus, and tarsometatarsus as well as a left femur and tibiotarsus. All of these elements were complete and fully fused. It is possible that the legs could have been purposefully deposited in the ditch, or that they could have been discarded after other parts of the bird were selected for special deposition elsewhere.

The rest of the raven remains come from contexts within the midden feature in Area A. The underlying layer (337) contained two elements, a right humerus and a right mandible, and date to the early to late 3rd century. The other bones from the more broadly dated midden are from partial left and right radii. It is not possible to say whether these all came from the same individual.

Other smaller corvids were also present. Owing to the difficulty in distinguishing between crows (*C. corone*) and rooks (*C. frugilegus*), exact species determination was only possible where particular distinguishing features were notable. In each case, there was no indication that the bones came from more than one individual.

One apparent ABG of a crow or rook came from a ditch in Area A dated to the late 1st to mid-2nd century (Phase 3 Middle A), as summarised in

Element	Left	Right
Coracoid	X	X
Scapula		
Humerus	X	
Radius	X	
Ulna	X	X
Carpometacarpus		X
Femur		
Tibia		X
Tarsometatarsus		X

Table 4-54: Crow/Rook ABG Elements

Table 4.54. The presence of elements from both sides as well as the paired nature of the coracoid suggest the deposition of a whole bird, with the more delicate elements having been lost to taphonomic processes. Whether this was a deliberate deposition into the fill of the ditch, the discarded remains of a meal, or the disposal of a scavenger cannot be determined.

In Phase 4 Middle B, a ditch and a well context contained bones identified as rooks. The well contained a single complete humerus, while the ditch contained seven bones from the wing and leg, all of which were complete with the exception of the tarsometatarsus. Although it is possible that these could all come from the same animal, as all were dated to the same ceramic phases (mid-2nd to late 3rd century), this time range is very broad and they were found in different areas of the site. Additionally, it is unlikely that the humerus would have been separated out without any of the attached wing elements accompanying it.

A pit context dated to the mid-4th to early 5th century (Phase 6 Late B) contained another set of bones possibly from the same individual; these were identified as belonging to a carrion crow. Bones from both the right and left wing were present, although no paired elements were found. All elements were fully fused and complete. The selective nature of the deposition may indicate secondary burial of bones picked out

of a prior burial, or it could simply be what remains of the disturbed or decayed burial of an individual.

Due to their small numbers, it is hard to observe any significant change in the presence of corvids over time. Ravens were more likely to be found as isolated elements, whereas the smaller corvids were found with several parts that appeared to be from the same individual. Ravens were also the only birds present in the earliest phases. The most complete corvid remains seem to come from the middle phases of the site. The relative rarity of these birds in wells is notable, as other bird species, such as geese and chickens, were far more prevalent in well contexts than non-well contexts, and the sieving enacted in wells would be expected to turn up more small bird bones. It is possible that either the rubbish contexts used as well fill contained fewer corvid remains, or that corvids were not seen as appropriate deposits to make in well shafts by the people of Ashton.

4.7.3 Birds of Prey

Several raptor species were present at Ashton, including two deposits of birds from the family *Accipitridae* and one species of owl. There was a single femur comparable to that of a rough-legged buzzard (*Buteo lagopus*). Only the proximal half is present, and it appears to be from a fully-grown individual. Another raptorial bird was present in a pit under Building 7 in Area A, including a tarsometatarsus, a fibula, and set of talons (third phalanges). The exact species was unidentified, but the bones appear to belong to a large hawk or small eagle. The absence of all the first and second phalanges and the presence of all four third phalanges makes this appear to be a deliberate deposit. This context also has a relatively large number of bird and pig elements compared to other non-well contexts from Phase 6 Late B, and will be considered below as a potential structured deposit. The presence of eagles and hawks in structured deposits is also attested at other sites, including a well from Leicester (Baxter 1993: 119).

Bones from the right leg of a barn owl were found in the midden context (300). A complete right femur and the majority of a right tibia were both in good condition, with no gnawing, burning, or butchery marks. Given the presence of small rodents at Ashton, the presence of owls is not surprising. Although they are less common in Britain today, they were reported at several Romano-British sites; the land around Ashton likely

provided their preferred habitat of tilled agricultural land to attract rodent prey as well as surrounding woodland for nesting (Parker 1988: 218).

4.8 Amphibians

In sieved well contexts and a single ditch context, the remains of frogs and toads were found. In the wells, these were often found in large numbers. These likely represent pitfall victims, and like the rodent remains, help identify usage deposits, as will be discussed in the detailed analysis of the wells. Their presence in a Phase 1 Early A ditch context also attests to the superior preservation and recovery of bones from these features.

4.9 Fish

Despite sieving and the presence of very small and delicate amphibian and rodent remains, fish remains were rare. Only two elements were present across all well-dated contexts. The dentary of a northern pike (*Esox lucius*) came from a pit below B3 dated to the early to late 3rd century. The dentary is missing its teeth, and is considered Fair in terms of abrasion (25-50% abraded (Harland et al. 2003). The anterior part of a premaxilla from a gadid species, which includes cod, was also discovered in a well context dating from the late 3rd to early 5th century. This indicates access to fish from marine deep water fishing, and is usually only found in towns (Locker 2007: 157). Pike are a more commonly found fish in the region (Locker 2007: 157).

Fish never appear to have been an important part of the diet in the town, which is in keeping with other data from Romano-British sites (Locker 2007: 141-142). The relative absence of fish continues an Iron Age trend, and the Mediterranean taste for fish and seafood does not seem to have extended to the inhabitants of Ashton.

4.10 The changing nature of Ashton

When considered all together, several interesting patterns appear. The earliest phases at Ashton appear consistent with other small sites largely unaffected by the Roman army's campaigns. It is only when the road is formalised and the town is connected to the broader network that major changes are observed. There is a dramatic increase of cattle numbers in comparison to sheep and pigs in the second and third

centuries, culminating in features with systematic butchery debris, as will be discussed further in the next chapter (Figures 4-47, 4-48). However, this increase in size is not completely due to pathological spreading of the joint surfaces, as we can see from the Pathological Index data for feet; larger stock seem to be imported as the town reaches the peak of its activity.

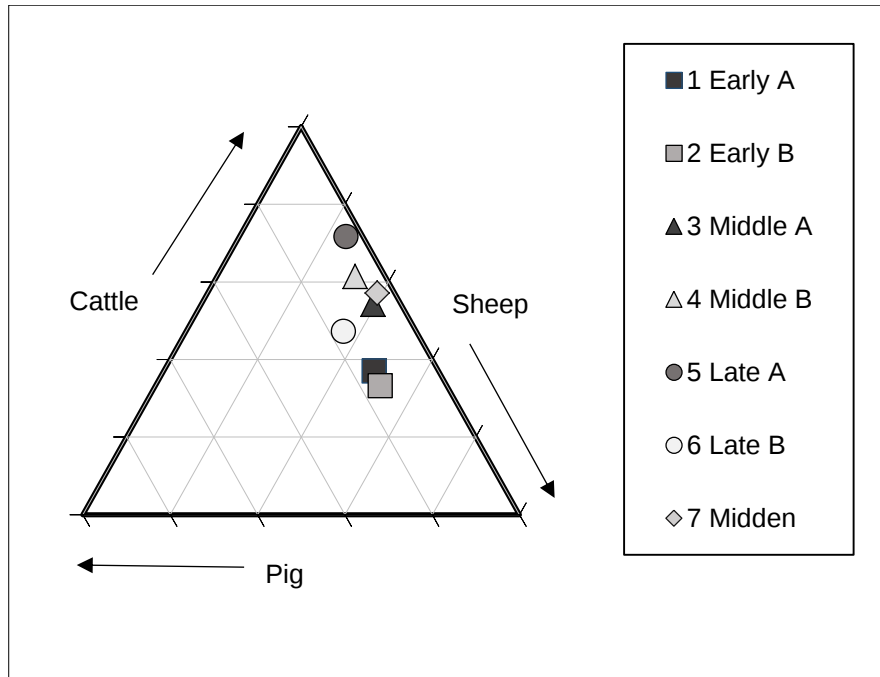


Figure 4-46: Triplot for three main food domesticates from non-well contexts (arrows indicate direction of increasing prevalence)

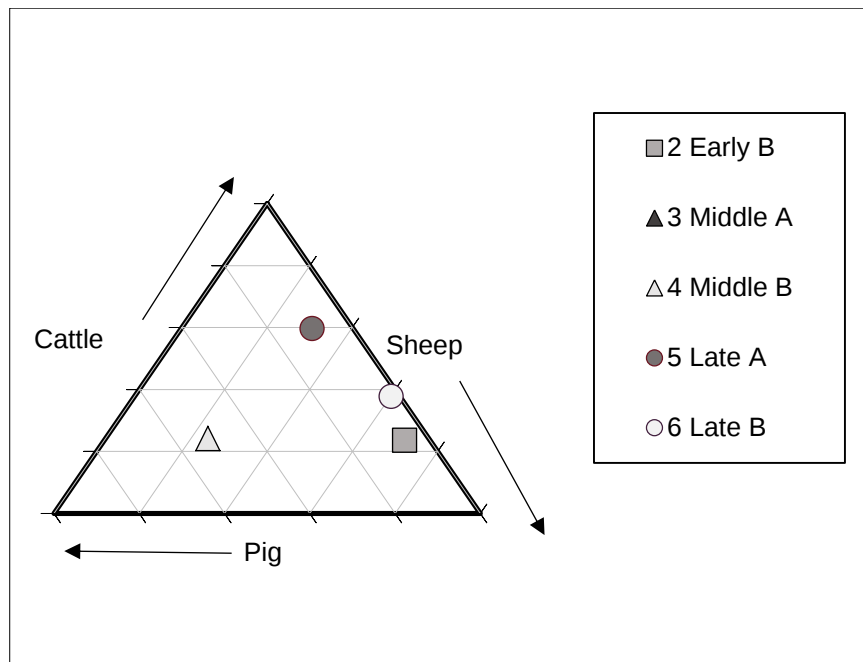


Figure 4-47: Triplot for three main food domesticates from well contexts (arrows indicate direction of increasing prevalence)

The most intriguing trends are those that occur in the fourth and early fifth centuries. The breakdown of the Roman imperial structure and taxation system would have had large effects on economies of supply. A return to a pattern similar to that of the earliest settlement occurs, with a few key exceptions. Cattle decrease in relative proportion, and sheep increase. The number of cut marks compared to chop marks also rises. Pigs also increase in prevalence. However, certain temporal trends like the increase of bird bones continues. Following the suggestion by Mathilda Holmes, it is possible that these data illustrate a return to a self-sufficient economy after the end of taxation structures that motivated the Early to Middle Roman period shift (2014: 12).

5 Spatial Analysis

5.1 Introduction

In addition to understanding how humans interacted with animals over time at Ashton, it is also important to examine the spatial patterns present. The settlement consisted of several distinctive areas, including the more industrial strip buildings in Area A and the more agricultural enclosures of Areas B and C. Beyond the spatial variation of general features across the site, a further examination of specific features of a unique nature also illuminates the intersection of economic and ritual practice in the town. The unique nature of wells, middens, and special pit deposits provides an excellent example of how these two realms of life are intricately interconnected, and must be unpicked carefully using the full context of the deposit.

5.2 Wells

The wells at Ashton constitute a unique opportunity to compare a fully-sieved set of remains against the non-well contexts on the site, which were all hand-collected. The large number of remains recovered from the wells also present us with a detailed look at the use life of wells, and how they accumulate material from their construction, through their usage phase, and as they are filled in.

5.2.1 Well F1949 , Area A

This well in Area A is located south of Building 8 (summarised in Table 5-1). In terms of animal bones, it is one of the smallest well assemblages. Only four elements were identifiable to taxon, and all of those came from cattle. All elements were fragmentary. One of the cattle cervical vertebra fragments showed signs of both cutting and chopping along the sides. In addition to the identified cattle remains, two fragments of medium mammal rib were discovered in context 1917. As these are likely from the two most common taxa found on site, cattle and sheep/goat, this is not an unusual composition for a small assemblage.

The ceramics from the contexts were listed as contaminated, so it is difficult to get an exact date for the well. Like other wells in the area, it is likely from the last half of the site's occupation period. However, without more information and such a small sample size, it is impossible to draw any definite conclusions from this feature.

	Taxon	1569	1917
Identified	Cattle	3	1
Unidentified	Small Mammal	0	0
	Medium Mammal	0	2
	Large Mammal	0	0

Table 5-1: Well F1949 NISP and NSP

5.2.2 Well F2103, Area A

This well in Area A is located in the yard south of Building 5, with metalling around the well head. The pit fill contains material dated to the early to late 3rd century (Phase 5 Late A), with the shaft fills containing material dating variously from the 3rd century to the early 5th century. Of the eight fills, six contain animal bone (summarised in Table 5-2).

	2610	2631	2634	2681	2698
Cattle	12	11	12	8	1
Sheep/Goat	3	6	3	5	1
Pig	1	2	0	1	0
Horse	1	1	0	0	0
Dog	0	0	0	0	0
Rabbit	0	0	0	1	0
Chicken	0	8	1	1	0
Large Anseriformes	0	1	0	0	0
Rodent	0	1	0	1	0
Amphibian	0	2	2	23	0
Identifiable	17	32	18	40	2
Large Mammal	7	101	25	12	0
Medium Mammal	0	4	10	4	0
Small Mammal	0	1	0	0	0
Very Small Mammal	0	0	0	3	0
Bovid	4	22	0	0	0
Unidentified bird	0	4	0	0	0
Unidentified	0	2	48	0	0
Unidentifiable	11	134	83	19	0

Table 5-2: Well F2103 Shaft Fills NSP by Context

The context described as the initial well pit (1503) has 26 fragments of identifiable bone and 25 fragments unidentifiable to taxon. Unlike other pit bottoms, it contained no rodent or amphibian remains. This is not due to a general lack of these taxa, as they are present in other fills in the well. In addition to assorted remains from the three main domesticates, the well pit also contained a fragmented juvenile horse

skull and a horse scapula with chop marks Amongst the unidentified remains, 15 of the 17 unidentified large mammal bones were classified as skull fragments.

The other well shaft fill contexts have small numbers of identifiable bone fragments, although some have large amounts of unidentifiable material. Most of this unidentifiable material comes from large mammals.

The small assemblage from fill 2610 looks like a fairly typical assemblage of domestic mammals. Both 2631 and 2634 have a significant contribution from amphibians and rodents (10% or more), although domestic mammals still make up the majority of identified remains. Context 2681 looks more like other pit base assemblages, with nearly 60% of the fill consisting of rodents and amphibians.

2631 is particularly interesting, as it contains a higher number of bird remains than the other fills. Eight of the thirty-two identified remains came from chicken, which included at least two tarsometarsi. Of the two distal ends present, one had a spur and the other had no spur or scar for spur attachment, which indicates that these could have come from a hen and cockerel. Of the other four chicken elements, three were leg bones and the last was a single cervical vertebra. In addition to chicken, one element from a large anseriforme was also present. None of the bird bones showed any signs of butchery or burning. In addition to the bird elements, all of the pig elements and most of the sheep/goat elements were from juvenile individuals. A foetal pig femur was estimated as being around 83 days old using Prummel's (1987) equations, and a foetal sheep/goat femur was also present, although too broken to measure for an exact age from conception. The cattle present were all either fully-fused or too fragmented to determine. It is possible that this fill could contain everyday food and domestic waste as well as some structured deposits.

5.2.3 Well F2758, Area A

Well F2758 appears to be the earliest of the wells on site, or at least contains the earliest fills. It may have been attached to Building 3 in area A in a small extension (Northamptonshire County Council n.d.: Building Notes 24). Unfortunately, this is another fairly small assemblage, which prevents significant conclusions from being drawn. Only 21 elements were identified to taxon, with an additional 67 unidentified fragments.

	2463	2738	2745	2534
Cattle	4	0	3	0
Sheep/ Goat	12	0	0	0
Pig	1	0	1	0
Medium Mammal	7	0	3	0
Large Mammal	49	1	3	1
Bovid	0	1	0	0
Unidentified	2	0	0	0
Identified to taxon	17	0	4	0
Unidentified	58	2	6	1
TOTAL	75	2	10	1

Table 5-3: NSP for Well F2758

Little information can be drawn from the remains in Well F2758 to compare with later well deposits (Table 5-3). Ageing is approximate for the only mandible available, which is likely from sheep rather than goat due to the lack of pillar on the dp4. Although it is missing teeth behind the dP4, this is still present, which indicates that at least one animal in the assemblage was not fully mature at slaughter. Only fragmented parts of sheep were present, although distal tibiae diaphyses indicate the presence of remains from at least two individuals. For the larger mammals, most of the remains came from flat bones such as the pelvis and scapula; three of the seven identified cattle elements were from pelvises, and 45 of the 58 large mammal fragments were from flat bones. Axial or uppermost limb bones seem to dominate the large mammal assemblage, but with such small sample sizes, more definitive conclusions cannot be reached.

Taphonomy suggests that this was the re-deposition of previously exposed material. 38.1% of bones show signs of carnivore gnawing, and the average weathering score was 2.71, closest to the Fair stage (25-50% abrasion). All species are from the standard suite of meat-producing domesticates, with no smaller taxa or birds present. It is possible that this well was scoured during its life, and then quickly filled when it went out of use. Most of the fill contained material other than animal bone, contrasting with that of other wells.

5.2.4 Well F1000, Area B

Well F1000 is likely the earliest well on the site, and may be associated with the beam-slot structure SG102 (Northamptonshire County Council n.d.: B7.2). Pottery from

the well base contains material from the mid-1st to early 2nd century, although most of the pottery in this area of the site dates to this time period, and there is the possibility of residual elements from earlier periods contaminating the dating; none of the contexts were given solid ceramic phasing dates (*ibid.*: B7.2). However, the well's position and the presence of the early pottery certainly gives a strong suggestion of its association with the earliest phases of occupation in this part of the townscape.

The fills of the well can be divided into three main categories: the linings of the well pit, the well pit fills, and the shaft backfills; there is no suggestion of the order of these fills (Table 5-4). The well pit fills and shaft backfills were both fairly similar in the composition of their bone, with only a few fragments of domesticated animals present. In all of these, the remains of sheep/goat were more numerous than those for cattle, which is in keeping with this well being open from the earliest phase of the site. No Associated Bone Groups could be identified, and there do not appear to have been any structured deposits at the well base or anywhere between the shaft fills. The elements present did not show any pathologies.

Sample sizes were fairly small in nearly all contexts, with the exception of well pit context 2551. This context contained 76 identifiable elements, 64 of which were from frogs and toads. A further two elements came from a mouse and a field vole, likely pitfall victims. This context also contained the site's only incidence of hare (*Lepus* spp.), with one proximal half of a metatarsal. This is more likely to have come from a hunted individual, despite the lack of observed butchery marks.

	Well Pit fills	Shaft Backfills	Linings
contexts:	2331, 2514	2515, 541	2551, 367
Cattle	2	1	2
Sheep/Goat	11	13	6
Pig	1	0	1
Horse	1	0	0
Hare	0	0	1
<i>total non-pitfall taxa</i>	<i>15</i>	<i>14</i>	<i>10</i>
Field Vole	0	0	1
Mouse	0	0	1
Amphibian	0	0	64
<i>total pitfall taxa</i>	<i>0</i>	<i>0</i>	<i>66</i>
TOTAL	15	14	76

Table 5-4: Well F1000 NISP by fill type

The sheep and goats present in the fills are, for the most part, quite young (Table 5-5). Of the 11 bones with epiphyseal fusion data from the shaft backfill contexts, only 50% of the early fusing category, which are fused by around 24 months of age, were fully fused, and the only middle fusing element that fuses by 42 months is unfused. The only jaw with teeth available for ageing shows an animal between one and two years of age, using the system developed by Payne (1976).

	Shaft Backfill	Well Lining	Pit Fill
Early Fusing	5/10	1/1	6/6
Middle Fusing	0/1	0/0	2/3
Late Fusing	0/0	0/0	1/1

Table 5-5: Epiphyseal fusion in sheep elements from Well F1000 (number fused/number of elements)

This well was generally poor in finds, in sharp contrast to several of the well fills from other areas of the site. There were, however, over 100 iron hobnails found in limestone lining context 2551 and in shaft backfill context 2515, which suggests the likely presence of shoes (Northamptonshire County Council n.d.: B7.2). It is possible that most of the backfill did not consist of midden debris or household waste, but rather rocks and soils that did not contain a large amount of human-generated material. All fill types showed less than 25% of material with carnivore gnawing, and the average preservation level was midway between Good (25% or less abrasion) and Fair (25-50% abrasion). This agrees with the interpretation of the animal bone in fills not coming from midden deposits.

This early well seems to have been treated very differently from the later wells at the site. It was not backfilled with large amounts of domestic rubbish containing animal bone, but rather with soil and rock. Contrasting with the finds of Associated Bone Groups common in later wells, the focus of structured deposits in this well focus more on a fusion of iron working with animal products, as the hobnails are likely from leather shoes.

5.2.5 Well F1012, Area C

The largest of the wells in the areas examined, Well F1012 provided nearly 1100 identifiable elements for analysis (summarized in Table 5-6). The shaft was square, with limestone-lined sides and a timber-framed top (Northamptonshire County Council n.d.:

C4.1). Several different fill types have been identified, including the initial pit feature, lining, a basal deposit, a possible usage deposit, initial backfill, and definite post-usage backfill layers.

The structural elements of the well, contexts 2337 and 2338, did not contain any bone for analysis. This is not surprising, as 2337 consists of the timber frame elements of the well-head and 2338 represents the stone lining of the shaft. They also lacked ceramics for assigning a date to these specific well components.

The dating of the well is of interest, as it helps distinguish the type of remains. The basal deposit and usage deposit, which represent the actual use of the well as a source of water, both contain material from the mid-4th to early 5th century AD (Ceramic Phase 7b, part of site temporal phase 6 Late B). The initial backfill contexts and the well fills to the surface also are closely dated to the mid-4th to early 5th centuries. However, the general well pit contexts show a whole range of dates (see Table 5-9). Some are quite broad, like context 2330, which contains material dating from the mid-2nd century through to the early 5th century. Others are more specific, but early, with context 2340 dating to the early to late 2nd century. It is probably that these smaller, early contexts represent fills excavated from earlier features and used to fill the well up to ground level when the current rubbish heaps were used up. We can be certain that this is re-deposited material, as it does not follow a chronological sequence of deposition; late material is present both in lowest usage levels and in levels closer to the top, with early material sandwiched in between.

The basal deposit context (2130) contains pottery dating to Ceramic Phase 7b, which represents the mid-4th to early 5th century AD. Over 80% of the identified animal remains recovered from context 2130 are from frogs and toads or small rodents. These are likely the victims of falling into the open well and not being able to escape. The low number of other animal remains in the well is not surprising, as the residents would not want to contaminate their water source while the well was in use.

The next set of remains includes context 2129, which is a possible usage deposit, and the initial backfill contexts of 2128 and 2125. Mammal bones for 2128 and 2129 were inadequately labelled and had to be quantified together, although birds were separated. The key differences in their makeup seem to be the preservation of organic remains in 2129 (Northamptonshire County Council n.d.: C4.1-2) and the difference in makeup, with 2129 containing loam and silt and 2128 made up of sandy loam with gravel (*ibid.*: C4.2). All deposits date to the mid-4th to early 5th century, which is in

keeping with the well being used and abandoned all during the last period of occupation.

Context	2337	2338	2130	2128- 2129	2125	2066	2067	1887
NISP	0	0	71	159	565	297	0	9
unID	0	0	17	74	606	461	0	11
total NSP	0	0	88	233	1171	758	0	20
Descriptions	timber frame	stones of shaft	basal deposit /loamy sand	usage deposit / initial backfill	initial backfill up to water level	well fill to surface	well fill to surface	well fill to surface
CP	n/a	n/a	7b	7b/7b	7b	7b	n/a	7b
Cattle			0	21	68	156		3
Sheep/Goat			1	15	368	59		3
Pig			1	0	1	1		3
Horse			0	0	2	14		0
Cat			2	0	0	0		0
Dog			0	0	12	64		0
Dog/Fox			0	0	32	0		0
Fox			0	0	29	0		0
Deer			0	0	0	1		0
Chicken			1	29	8	1		0
Geese			1	78	17	0		0
Ducks			0	1	1	0		0
Anseriformes			0	1	0	0		0
Rook			0	0	0	0		0
Rodents			11	0	1	0		0
Amphibians			54	14	25	1		0
Fish			0	0	1	0		0
TOTAL NISP	0	0	71	159	565	297	0	9
VSM			0	2	0	0		0
SM			3	7	41	7		0
MM			1	2	355	54		10
LM			3	1	193	388		1
Sbird			0	0	11	12		0
Mbird			0	2	0	0		0
unID Bird			8	7	6	0		0
Unidentified			2	53	0	0		0
TOTAL UNIDENTIFIED	0	0	17	74	606	461	0	11

Table 5-6: Summary of data for Well F1012: listed in order from bottom of feature to top: frame, shaft, initial usage and fill, and fills to surface

	Chicken 2128	Chicken 2129	Geese 2128	Geese 2129
Skull				
Quadrates			LR	
Mandible				
Atlas				1
Axis			1	2
Cervical V.	5		9	7
Tracheal rings			3	14
Sternum				
Furcula				
Thoracic V.		3		2
Lumbar V.				
Synsacrum				
Unidentified V.				
Ribs				I
Coracoid	LR			L
Scapula	LR	R		
Humerus	L			
Radius	L		LR	R
Ulna	LL	R		
Carpometacarpus	L		RR	
Pelvis				
Femur	LLR			
Tibia	L	L		R
Tarsometatarsus	L		LLRR R	L
Phalanges, Wing			3	4
Phalanges, Foot			5	8

Table 5-7: Element Representation in Geese and Ducks in Usage and Initial Well Fills

Both 2128 and 2129 are characterised by high numbers of bird remains (69% of total identified bones), especially semi-complete chickens and geese. As discussed previously, at least two individual chicken were present in context 2128: a juvenile and an adult. 2129 also contained the remains of at least one chicken, although it is possible that these could be from the same two individuals as those in 2128 (Table 5-7). The most delicate elements are missing; no skulls, sterna, synsacra, or feet were found. It is possible that these could be missing due to taphonomic processes, or the deposit could have consisted only of dressed chicken portions. The presence of such small bones for geese suggests the latter option. No paired chicken elements were identified; where both rights and lefts were present, they usually belonged to clearly different birds as one was adult and the other juvenile. No butchery marks were observed on any of the bones, but

disarticulation without leaving marks on bone is possible. The bones are consistent with meaty portions of the bird.

The geese deposits from 2128 and 2129 represent more complete individuals, with all major body areas except the breast represented. The neck, wings, and lower leg were all well-represented. At least the wing and feet element were able to be fully articulated. Although some meat-bearing limb bones were present for geese, they were not as commonly represented as they were for chickens.

In addition to these species, the pelvis of a duck was also identified, as well as several elements that could not be distinguished to genus level. Fragmentary and juvenile remains resulted in several being classified only as small or medium birds, with the small birds being of a size consistent with a small duck and the medium birds being chicken-sized.

The other 31% of identifiable bone recovered from 2128 and 2129 is limited to frogs and toads, cattle, and sheep/goat. 21 fragments of cattle and 14 fragments of sheep were present, with pigs, horses, and dogs completely absent from these contexts. It would appear that 2128 and 2129 are not large rubbish dumps of domestic refuse, but rather deposits containing very specific species. The idea of closure rituals has been highlighted by Fulford (2001) and others, and the unusual nature of this deposit as well as its position at the bottom of the well support this interpretation.

When the deposit is compared with 2125, another fill described as part of the initial backfilling of the well, it is clear that these are very different types of deposits. Of the 585 bones in context 2125, 368 (62.8%) come from sheep or goat, with most of these being metapodial or feet elements. Of the few sheep/goat elements present in 2128 and 2129, more upper limb elements such as the humerus and tibia were represented.

2125 is a structured deposit in its own right. Though foot and head elements produced the majority of the identifiable bone count (see Figure 5-1), 2125 had a higher level of taxonomic diversity than 2128 and 2129 (Table 5-8). The five main domestic mammal species were all represented by one or more elements, as well as wild species. At least three genera of birds were also present, in addition to one of Ashton's three instances of fish bone. This fish element was identified as being from the family *Gadidae*, which includes cod. Frogs and toads were also present in this material.

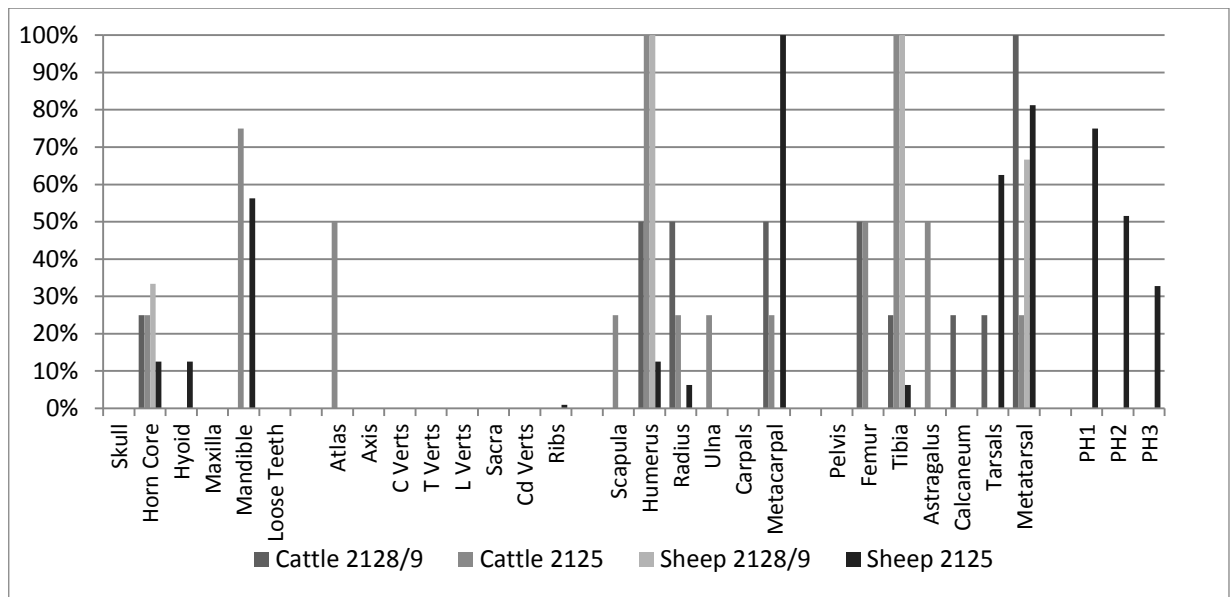


Figure 5-1: %MNE for cattle and sheep/goat in well F1012 contexts 2125, 2128/9

	2128/9 NISP	2128/9 MNI	2125 NISP	2125 MNI
Cattle	21	2	68	3
Sheep/Goat	15	2	368	6
Pig	0	0	1	1
Horse	0	0	2	1
Dog	0	0	44	2
Fox	0	0	29	1
Small Mammal	1	1	0	0
Medium Mammal	2	1	13	1
Large Mammal	1	1	1	1
Chicken	29	2	8	1
Goose	78	3	17	4
Duck	1	1	1	1
Duck/Goose	1	1	0	0
Sbird	2	1	0	0
Mbird	7	1	6	1
unID Bird	2	1	0	0
Frog/Toad	14	4	25	4
Gadids	0	0	1	1
Unidentified	0	0	1	1
Total NISP	174		585	

Table 5-8: NISP and MNI for initial backfilling contexts in Well F1012

It is possible that the high number of juvenile foot elements could be the remains associated with the production of lambskins. As discussed in the temporal chapter,

almost all elements from 2125 were unfused, and the mandibular wear data agrees with this conclusion, with one of the two ageable mandibles showing a dP4 not yet fully erupted and the other with M1 just erupting. It is unknown whether the skins were still attached when they were deposited in the well, or if the bones were removed from the skins and then deposited. The presence of pillars on the dP4 was used as a means of speciation, and one of the four left deciduous fourth premolars had pillars and thus likely came from a goat. As with other contexts where species determination was possible, it is likely that most remains classified as sheep/goat came from sheep, but the presence of goats was a rare possibility.

Another unique feature of F2125 is the presence of several articulating elements from dogs, foxes, and bones not able to be distinguished between the two species (Figure 5-2). The bones identified definitively to fox come from the head, forelimb, and hindlimb including foot elements. The presence of upper limb bones suggests that this is not simply the deposition of skins. No butchery marks are present on any of the fox remains, although a few show signs of carnivore gnawing, suggesting some exposure before burial. No axial elements were identified for foxes, but this is largely due to the difficulty in distinguishing these from those of small dogs. All parts of the vertebral column were represented from the lower cervical vertebrae to the caudal vertebrae, as well as sternal elements. The presence of such a complete suite of elements suggests the deposition of at least one whole animal in the fill.

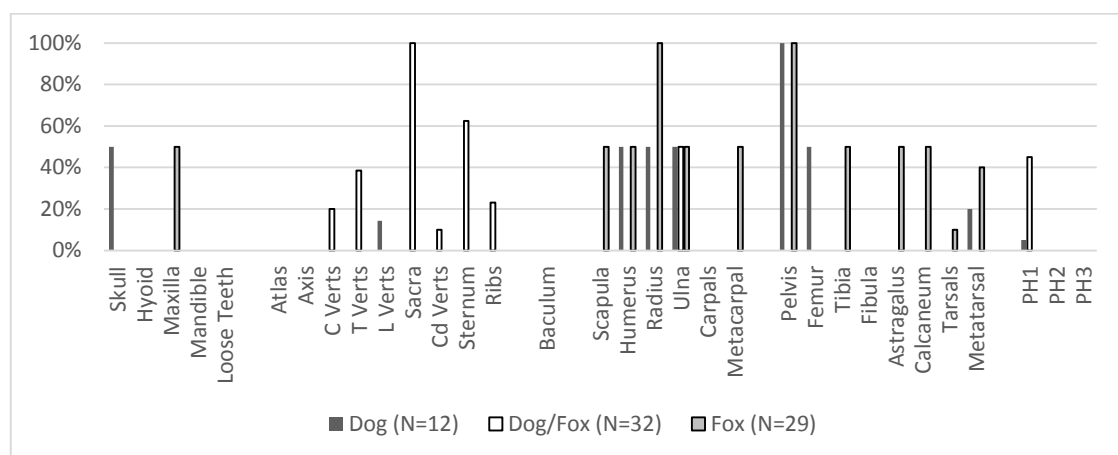


Figure 5-2: Element representation in canid remains from context 2125

Of the twelve elements positively identified as domestic dogs, two of these had signs of trauma. One was a humerus from a medium to large dog with a well-healed oblique fracture in the distal shaft, and the other was a proximal phalanx from a small

dog with extensive bone growth around the fracture site, including a prong of lumpy new bone formation sticking out the side. This suggests a lesser level of trauma and quicker recovery for the larger dog, which was able keep the broken element in place, whether through human agency or the natural splinting provided by the muscles of the forelimb. By contrast, the fracture of the phalanx in the smaller dog was likely aggravated by continued pressure from walking, suggesting either a lower level of care or simply trauma to an area of the body less able to heal successfully. Besides these two pathological elements, several other skull fragments, limb bones, and a single lumbar vertebra were also identified as domestic dog. None of the canid elements showed any signs of butchery or burning. Only one dog element, a metatarsal, showed any sign of carnivore gnawing.

The birds from 2125 also include a large number of geese in addition to chickens and ducks. Based on the right carpometacarpi, at least three geese were present in the assemblage. Although the three proximal ends all showed fully adult formation, one of the two distal ends showed juvenile morphology. None of them showed any signs of butchery, and all were varying sizes, with proximal breadths ranging from 17.6 to 25.1mm. Although two fragments of right radius were also present, it does not appear that whole wings were being deposited in the well. All body parts were present including mandibles, vertebrae, wing, and leg elements. Only the furculum and the radius showed any signs of butchery, with a chop and cuts, respectively. These geese could either have been a source of food, feathers, or both; carpometacarpi are the attachment point for the long, thin primary flight feathers (Serjeantson 2009: 191-2).

The well pit fills, between the pit dug for the well and the square lining, contain material of various dates. The fills date variously from CP4-5, early to late 2nd century, up to the late 4th to early 5th century. For ease of quantification, we will consider these groups in three temporal categories: bones from the early to late 2nd century (2340, NISP=23), bones from the mid-2nd to late 3rd century (1013, 2358, 2600, 2601, NISP=84), and bones from the mid-4th to early 5th century (NISP=137).

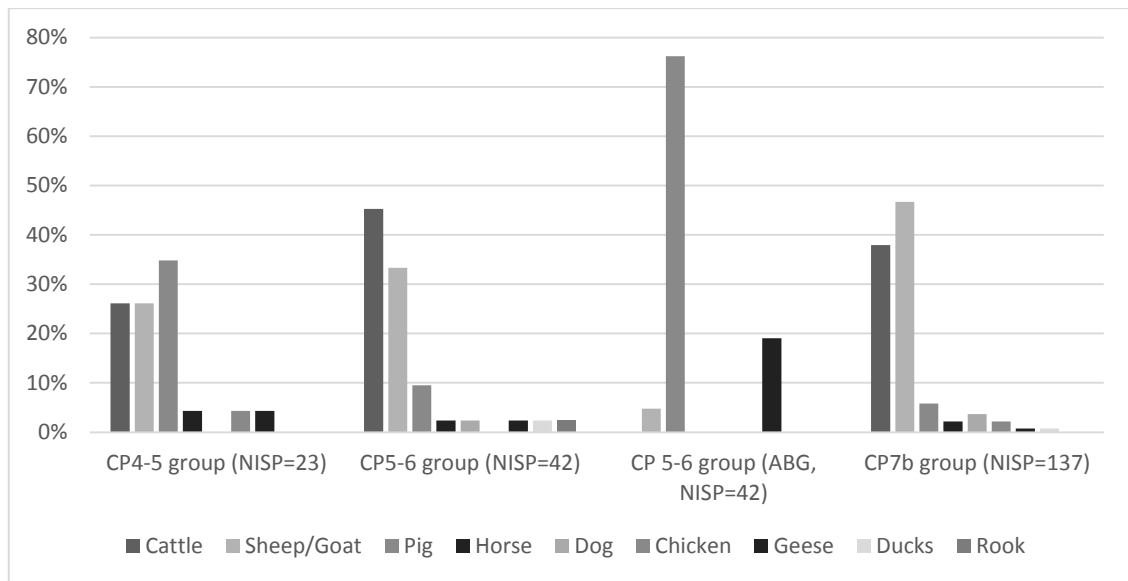


Figure 5-3: Species representation by NISP for F1012 well fills by ceramic phase groups

The key trend observable over time (Figure 5-3) is the decreasing number of pigs in the later fill. 2340 is a relatively small fill, and a good number of the elements from this fill consisted of juvenile pig maxillae and mandibles. The only mandible available for ageing had a dP4 that was just erupted and no M1, putting the age at somewhere around 0-2 months old. Only one of the six maxillae (3 right, 3 left) showed any sign of adult dentition, possessing an erupted M2; the rest all had deciduous teeth present. This fill also contained one element each from a chicken and a goose. Preservation scores were mixed, and some carnivore gnawing was present. With the exception of the pig skulls, this looks like standard domestic waste.

Context	2340	2600	2358	2601	2602	1013	2065	2330	2339
NISP	23	6	12	10	42	14	137	1	0
unID	13	3	20	3	4	40	241	6	0
total NISP	36	9	32	13	46	54	378	7	0
Descriptions	well pit	well pit	well pit	well pit	well pit	well pit	well pit	well pit	well pit
CP	4-5	5	5-6	5-6	5-6	6	7b	5-7b	n/a
Cattle	6	2	6	5	0	6	52	0	
Sheep/Goat	6	4	5	2	2	3	64	0	
Pig	8	0	0	1	32	3	8	0	
Horse	1	0	0	1	0	0	3	0	
Cat	0	0	0	0	0	0	0	0	
Dog	0	0	0	1	0	0	5	0	
Dog/Fox	0	0	0	0	0	0	0	0	
Fox	0	0	0	0	0	0	0	1	
Deer	0	0	0	0	0	0	0	0	
Chicken	1	0	0	0	0	0	3	0	
Geese	1	0	0	0	8	1	1	0	
Ducks	0	0	0	0	0	1	1	0	
Anseriformes	0	0	0	0	0	0	0	0	
Rook	0	0	1	0	0	0	0	0	
Rodents	0	0	0	0	0	0	0	0	
Amphibians	0	0	0	0	0	0	0	0	
Fish	0	0	0	0	0	0	0	0	
TOTAL NISP	23	6	12	10	42	14	137	1	0
VSM	0	0	0	0	0	0	0	0	
SM	0	0	0	0	4	0	4	0	
MM	5	1	4	1	0	13	137	3	
LM	8	2	16	2	0	25	94	3	
Sbird	0	0	0	0	0	2	0	0	
Mbird	0	0	0	0	0	0	0	0	
unID Bird	0	0	0	0	0	0	3	0	
Unidentified	0	0	0	0	0	0	3	0	
TOTAL UNIDENTIFIED	13	3	20	3	4	40	241	6	0

Table 5-9: Summary of data for Well F1012: well pit fills

The CP5-6 group of fills included contexts 1013, 2358, 2600, 2601, and 2602 (see Table 5-9). Most of these were small fills, with the exception of 2602, which contained 42 identifiable elements. Of these, 32 came from a foetal pig and 8 from the head and left wing of a goose. Two fragmentary pieces of sheep bone were the only other animal bones in this context. The skull and toes on the pig were not present,

although the presence of a fragmentary atlas was noted. Limb elements from both sides of the body were noted, as well as vertebral elements from all along the column. Using Prummel's preferred methodology for ageing foetal pigs, based on the dissected diaphyseal lengths of the humerus, the animal can be roughly estimated to be about 113 days old, which is nearing full gestation (1987: 19-20). This ageing is close to the ageing of the mandible in context 2340. The deposition of newborn animals in wells and structured deposits is not unknown; Morris notes that many pig ABGs at the Romano-British rural site of Owslebury are younger than the pigs in general deposits (2011: 75). It is possible that this young piglet could have died naturally around the time of birth, although the repetitive deposition of complete juvenile animals in wells suggests that these sorts of animals were seen as appropriate offerings in opening and closure rituals for important structures like wells (see Fulford 2001: 211-12).

The rest of the CP5-6 group shows a more regular distribution for the time period, with cattle as the dominant species, closely followed by sheep/goat and a small percentage of other animals. Horse, dog, and birds are all present in the contexts, although no elements are articulating. For cattle and sheep/goat, there is no clear pattern of element representation or ageing, and bones show signs of butchery marks and carnivore gnawing, suggesting that they come from domestic waste exposed for a time before deposition.

The CP7b group of well pit fills matches the temporal trend of increasing sheep/goat in comparison to cattle remains. The cattle from the well fills total 49 elements, with an MNI of 3 individuals. Element distribution (Figure 5-4) shows that mandibles and humeri were the most prevalent elements, and that upper forelimbs were one of the most common body portions. Although a few foot and skull bones are present, the majority of remains are meat-bearing elements.

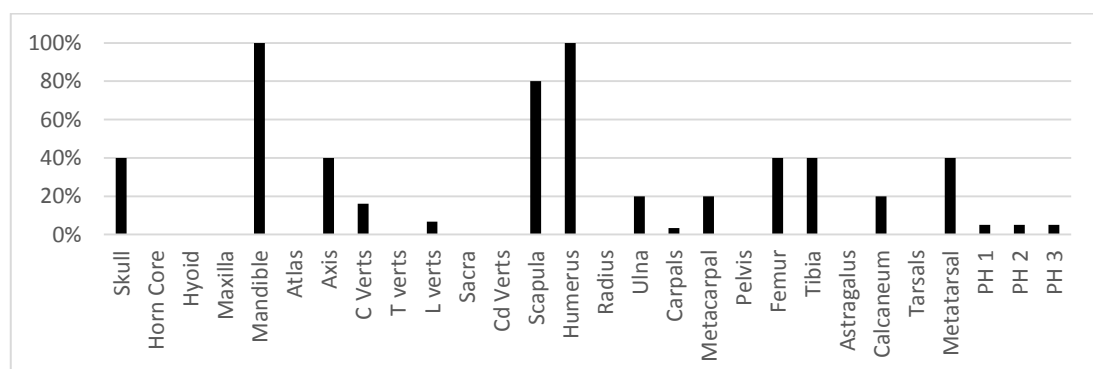


Figure 5-4: Element distribution by MAU for cattle in well F1012

The sheep/goat remains show a slightly different distribution (Figure 5-5). Although mandibles are again one of the most common elements, distal tibias are the other most common element. Metatarsals are also more prevalent, and there are fewer vertebrae. This is in keeping with other sheep assemblages from the non-well contexts dated to CP7b (see Figure 4-25). Ageing is also consistent with the non-well sheep/goats; three mandibles were useful for ageing and showed ages at slaughter of 1-2, 2-3, and 3-4 years (cf. Figure 4-29). Epiphyseal ageing confirms a young age at slaughter, with 50% of bones in the early-fusing category (0-16 months) showing any sign of fusion and 0% fusion for bones the middle- (15-36 months) and late-fusing categories (36-43 months).

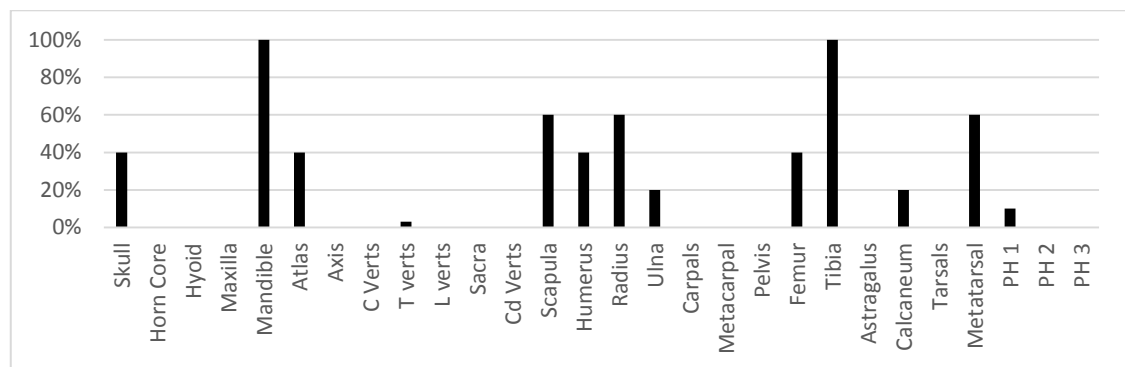


Figure 5-5 Element distribution by MAU for sheep/goat in well F1012

The presence of contexts that fit the profile of domestic waste, possible industrial waste from lambskin processing, and structured deposits of semi-complete animals such as dogs and birds shows the importance of considering each group of contexts individually. The fills of well F1012 involved a number of very different processes, and unpicking each helps to understand the nature of activity in the nearby buildings and enclosures. It also presents a unique opportunity for examining some of the less common species and breeds of animal in greater detail, and starting to understand the nature of ritual deposition at Ashton.

5.2.6 Well F1362

Well F1362 may have been associated with Building SG202 in Area C, although post-medieval ploughing removed the association between the two (C4.3). The well was lined with limestones, likely reused from elsewhere based on the burnt spots observed on some of the stones (C4.3). The key contexts containing animal bone include the dumps between the lining and the well pit (2000), the well shaft (2367), and well fills (2348, 2347, and 1363).

Most contexts were relatively small, and the largest was initial well shaft accumulation 2367, which contained mostly amphibians and rodents. Preservation varied (Table 5-10). All the small animals in 2367 had Good preservation, while preservation in the fills tended to average from Good to Poor. Fills with more small animals tended to have better preservation, as the bones were either well-preserved or simply not present. Overall, where sufficient numbers of mammals are present to assess their preservation, it is clear that mammal preservation is very different than the preservation of smaller species. Both the higher preservation levels and the species present suggest deposits that have lower levels of re-deposited domestic refuse. The amphibians and small rodents are likely pitfall victims in the open well fills. There may have been some time elapsed between fills of the well, time enough for a few small animals to have been lost in the pit.

	2000	2367	2348	2347	1363
Average Preservation (all)	3.71 (7)	2.00 (95)	2.67 (18)	2.09 (22)	2.40 (45)
Average Preservation (mammals)	2.67 (6)	2.00 (1)	3.38 (8)	2.40 (5)	2.00 (1)

Table 5-10: Average preservation by context for Well F1362, where 1=Excellent, 2=Good, 3=Fair, 4=Poor

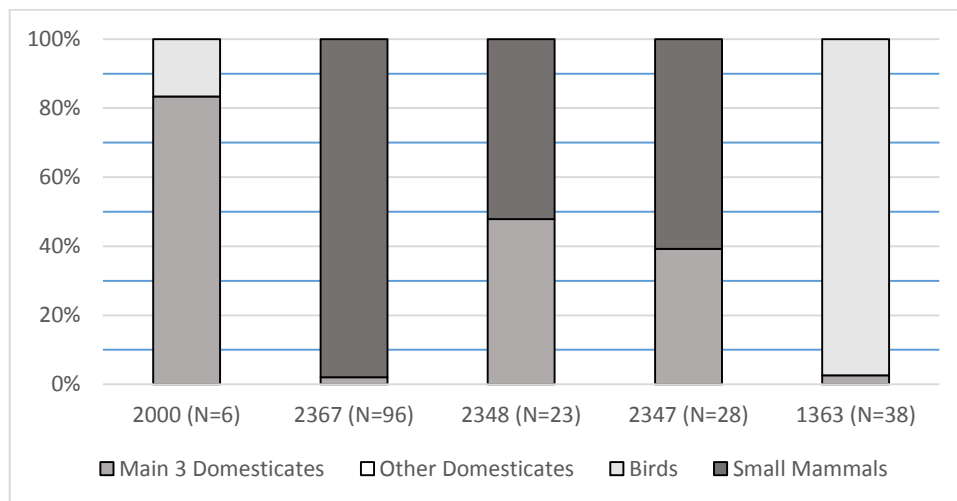


Figure 5-6: NISP by category for well F1362

Despite relatively small NISP counts, some patterns can be observed (Figure 5-6). The fill between the well pit and the well shaft (2000) contains little animal bone material, except for a few fragments likely mixed in with the soils used to fill the void. As expected, the initial shaft accumulations (2367) contain mostly pitfall victims. The next few fills also have few animal remains, but those present are split fairly evenly between pitfall victims and fragments of domesticates. The top fill in the well is unique, as it contains a mostly complete medium-sized galliforme as well as pieces of other

birds. The only non-avian element in the context is a metacarpal from a sheep/goat with signs of a fracture and irregular articular depressions. It is possible that this could be part of a closure deposit for the well.

The bird remains from context 1363 are distinctive. Remains from at least one goose include parts of the right wing, the left foot, and the skull and mandible. A corvid carpometacarpus was also present. Six elements from a juvenile medium-sized bird were also found, but were not distinctive enough to be identified to taxon. In addition to these, there was a mostly complete medium-sized galliforme (elements shown in Figure 5-7). The small size and delicacy of the features prevented distinction between domestic fowl and pheasant. It is possible that the animal could have been deposited either as a whole animal, with the smaller elements later lost to taphonomy, or in joints. There was no observed butchery or burning on any of the bones.

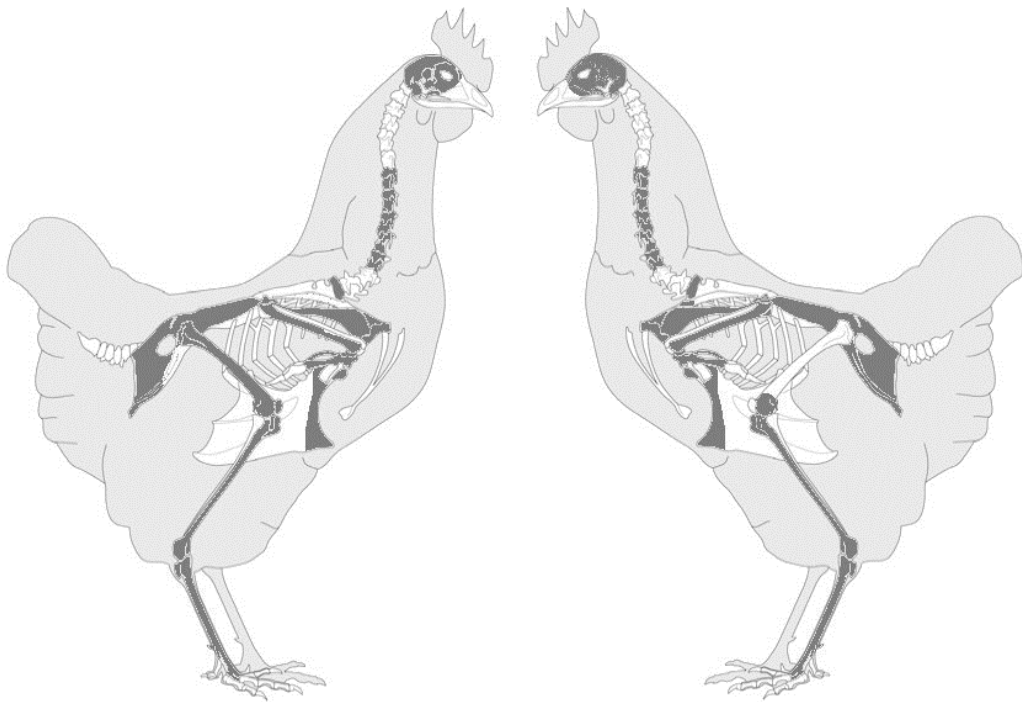


Figure 5-7: Bones present in Chicken/Pheasant ABG from context 1363, well F1362

The chicken or pheasant from 1363 also shows a strip of roughened bone formation on the shaft of the ulnae (see Figure 5-8). The roughened patches are located on the cranial side, about midway down the shaft. The patch is larger and better defined on the left ulna.

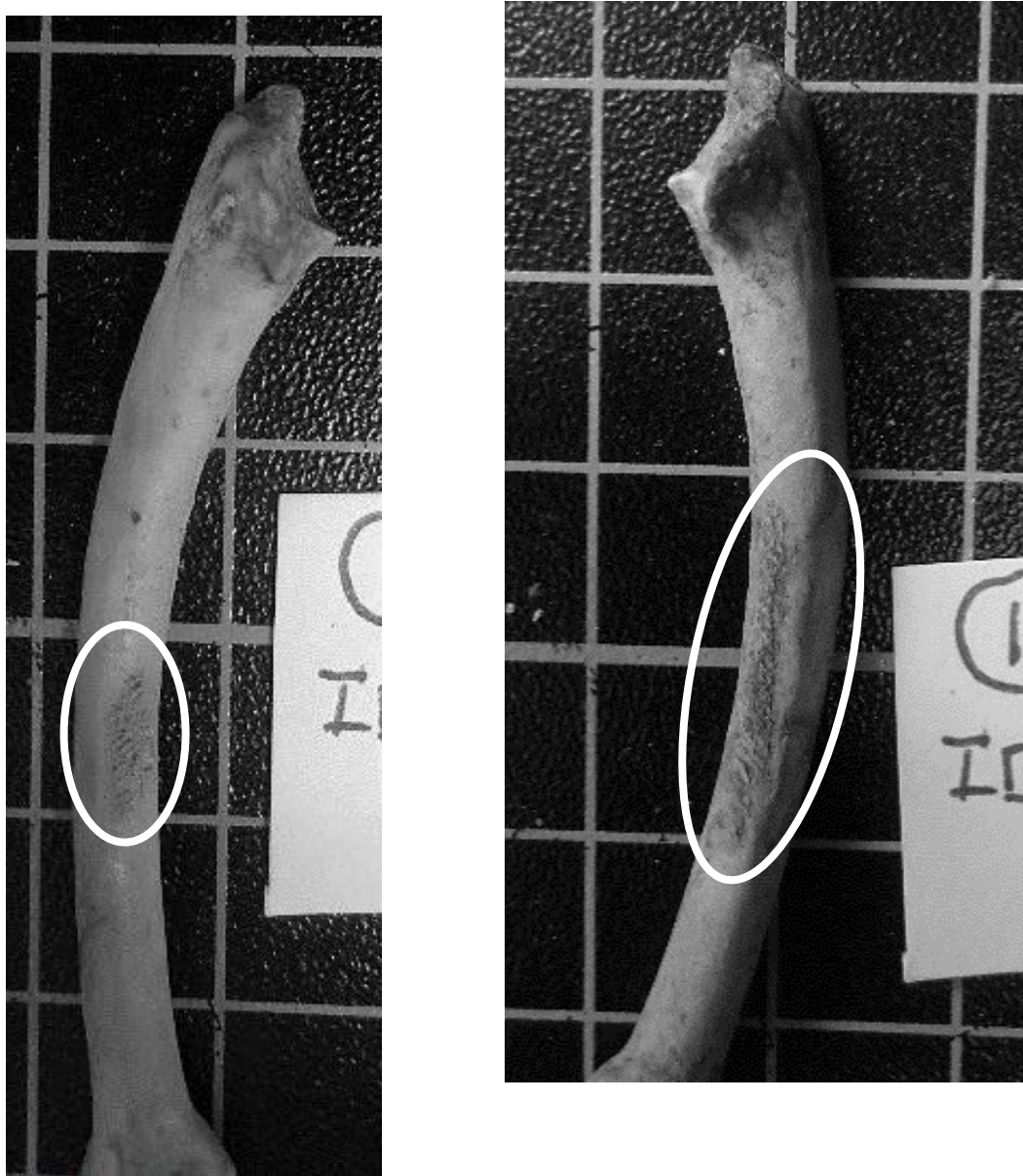


Figure 5-8: Chicken ulnae with new bone formation in well F1362

5.2.7 Wells as Unique Features

The wells at Ashton are not only unique in terms of their recovery strategy, but in the diversity of species. This highlights an important consideration in archaeology. Are people purposefully depositing a wider variety of rare species in these wells, or is this simply a factor of the more intensive recovery strategy of sieving? Although small

mammal, bird, and fish remains have been recovered from the hand-collected areas of excavation, they were usually not present in such great numbers. It is crucial to compare like against like, and thus it is difficult to compare the well and non-well assemblages from Ashton. The taphonomy of the deposit type also affects recovery as much as sieving; wells are often protected, stone-lined shafts dug deep into the ground below the modern plowsoil, and some show waterlogging, which also aids in preservation of organic material such as bone.

However, wells are also important for their crucial life-giving function in the community, and are connected with watery liminal spaces that are often associated with ritual practice. This makes them prime candidates for structured depositions and religious practice, especially during their closure. At Ashton, we see structured deposits of associated bone groups in the bottom fills of the well, and also near the top, two places identified as ritually important (van Haasteren and Groot 2012: 41). The presence of introduced species and breeds, such as chicken and very small dogs, as well as very young animals also argues for the special nature of some of these deposits. When further work has been done on the material culture discovered in these well contexts alongside the bone, further conclusions can be drawn about the nature of these structured deposits.

Wells are not only useful for examining their specialised deposits with possible ritual connections, but also for their comparison with other non-well contexts. Wells require filling when they go out of use, and it is clear that domestic refuse as well as sterile soil was tipped in to bring them up to ground level. Where the fill matches material found in middens and other domestic waste accumulations, it is useful to be able to link these as having similar composition. From the accumulation of sheep foot elements in Well F1012, it is clear that wells also serve as deposits for industrial waste, which provides a great deal of information about activity at nearby locations.

Closer scrutiny on wells as unique feature types has been increasingly common in the archaeology of the northwest provinces (van Haasteren and Groot 2012, Fulford 2001, Maltby 2010). Consideration of more than just a few spectacular finds within is extremely important in progressing discourse on well deposits, and a holistic look at the deposits contained within and their comparison to other deposit types is crucial. Detailed analysis of the Ashton wells will allow for further discussion of their significance in understanding the domestic, industrial, and ritual lives of the people living in the settlement (see Discussion below).

5.2.8 Wells across Roman Britain: a broader comparison

The wells at Ashton are certainly unique when compared to other non-well deposits across the site. With a wider variety of species and differences in faunal makeup, it is tempting to suggest that we are seeing different practices enacted in the filling of wells compared to the filling of features such as ditches. As discussed above, there are suggestions that structured deposition was occurring, as the placement of some of the most anomalous finds were located in the bottom fills of the well and right at the top (Section 5.2.7) However, in order to explore interpretations of ritual practice, one must consider the wells at Ashton in their wider context. Contemporary wells from other sites in Roman Britain can illuminate key differences and similarities that can inform about the practices involved in filling the Ashton wells.

It is perhaps useful to start with the comparative well site closest to Ashton. Baldock (Hertfordshire) is approximately 70 km SW of Ashton, and was also classified as an “undefended settlement in Burnham and Wachter’s review of Romano- British small towns (1990: 281). The site is also similar in that it was located off a major road running between settlements at Braughing and Godmanchester (Fulford 2001: 208). The pits contained the most unusual finds, but one late Roman well on the site contained the remains of at least six to seven horses, while another contained semi-complete juvenile red deer (Chaplin and McCormick 1986: 410, in Fulford 2001: 210). Although these finds are not similar to the wells described for areas A, B, or CD at Ashton, a well from the Hadman area also contained a semi-complete juvenile red deer specimen; this well was also the one in which the lead tank was found. Baldock also had evidence for human bones present in wells, along with complete pottery; these finds have not been indicated for wells at Ashton (*ibid.*). Some limited similarities appear to occur in well depositions between the sites, but largely, Ashton lacks the definitive “ritual” characteristics prescribed by Fulford (2001), Grant (1984), and other authors.

Ashton also appears to have few similarities to wells from larger urban settlements. The site of Greyhound Yard, Dorchester was also excavated in the early 1980s, around the same time as the excavations at Ashton, and they also followed a protocol of sieving well deposits, which allows for a useful comparison that reduces collection bias (Maltby 1990: 1). The well deposits from this site were far more extensive than those at Ashton (sample of over 40,000 bone fragments), the

preservation and sealed nature of deposits is also superior (*ibid.*) These wells produced a much higher number of ABGs, even when considering the higher fragment counts; additionally, these ABGs were considerably more complete than those at Ashton. Dogs were a particularly common choice for whole carcass deposition; 89% of the identified dog remains at Greyhound Yard came from ABGs in wells and pits and accounted for over 76 individual ABGs (*ibid.*: 76, Table 123). When one considers the well and non-well sites for Ashton, particular phase 6 Late B, which contained the most dog remains, only 52% of the total fragments of dog bone came from well contexts, and this comprised only three individuals at low levels of completeness. However, where Greyhound Yard does provide an important comparison is in the presence of dumps of butchered food remains interspersed with the deposits of complete and semi-complete animals (*ibid.*:77). The wells on the site also have a much higher percentage of domestic fowl and other birds than seen on the remainder of the excavation area, as with Well F1012 at Ashton; however, this could be partially due to issues of preservation, as a protected stone-lined cist would protect fragile bird bones far better than an exposed feature subject to weathering (*ibid.*: 79).

For further examples of well deposits, we move to Yorkshire and the rural sites of Heslington East and Rothwell Haigh. The Heslington East well was dug fairly late in the site's history, as the nearby *colonia* at York was experiencing decline (Roskams et al. 2013). The well, which is roughly contemporary to the later phases of Well F1012 at Ashton, is unique in that none of its fills have any close similarity with domestic rubbish as seen elsewhere on the site (*ibid.*). All the fills above the sterile clay layers suggest the deposition of large numbers of whole carcasses dumped very quickly with little exposure to destructive taphonomic processes such as gnawing (*ibid.*). This is completely in opposition to the weathering of well fills at Ashton, which suggest that large amounts of the material in the fill contexts came from middens or other exposed features and was only later deposited in the well shaft (see Figure 4-1). With such striking deposits diverging so strongly from the general patterns on the site, it is far easier to suggest a ritual interpretation for the fills of this well, as Roskams et al. have argued (*ibid.*); however, it does not negate the possibility of smaller scale purposeful, structured activity at Ashton, which may have been on a more limited scale than seen at Heslington East. This site also has deposition of juvenile red deer remains, as at Baldock, London, and Ashton; when individuals of the same species and age group are deposited in wells that are associated with unique finds such as complete pottery,

human bone, or lead tanks, this begins to suggest a wider structure operating on the decision to make that specific deposit (Chaplin and McCormick 1986: 410; Gerrard 2011: 551; Roskams et al. 2013).

The other Yorkshire comparative well at Rothwell Haigh has a welcome similarity to the Ashton material. Another rural site in Yorkshire, its well was one of the main features excavated in an enclosure (Cool and Richardson 2013: 192). The animal bone was deposited in a distinct layer in this well, over finds such as a wooden bucket, remains of leather objects, and a quernstone (*ibid.*: 10). The confinement of animal bone to a specific layer surrounded by fills without bone material is very different from the process of filling the wells at Ashton, which appear to have occurred in several phases, with inclusions of animal bone that suggest both primary and secondary depositions. However, the well at Rothwell Haigh also features a large “head and hooves” deposit of sheep/goat bones (*ibid.* 13). 235 of the 1037 identified animal bone fragments are from this deposit. This is in striking similarity to Context 2125 in Well F1012 at Ashton. Both of the contexts occur above the basal fills and the initial fills after the well has gone out of use but below the large dumps of less symbolic material that filled the shaft to ground level (*ibid.*: 7). There are significant differences in the well fills as well that cannot be ignored, however. The Rothwell Haigh well contains a higher proportion of dog bones and potential ABGs than Ashton’s well F1012, although that well does contain more dog bones than others in the town; additionally, 10 of the 24 remains for which distinction was possible between sheep and goat indicate the definitive presence of goat (*ibid.* 11). The difference between kidskin and lambskin would have been very important, as they were used for different products (Stallibrass, *pers. comm.*). Small similarities in depositions are not enough to make sweeping interpretations, but they do provide promising food for thought when considering wider patterns of behaviour.

All considered, the wells at Ashton largely fail to match Fulford’s structured depositional pattern that necessitates the presence of both a large number of partially or wholly complete dogs and complete pottery (2001: 212). It is clear that deposition in the wells in the areas of Ashton examined here was a more modest affair, with fewer distinctive ABGs or finds. However, it will be interesting to look at the finds and faunal data for the Hadman area wells, and see if this well better fits with Fulford’s criteria for this type of structured deposit. Belief affects practice, which affects deposition, and the distinct similarities between some of these well contexts and the small ‘unique’ deposits at Ashton suggest that there may be some shared ideas operating across the province.

However, the lack of the full suite of characteristics does complicate the definitive interpretation that people at Ashton are necessarily utilising the same structures and practices as those who made the well depositions at other sites across Britain.

5.3 The Area A Midden

Taxon	337	300	521
Cattle	49	337	0
Sheep/Goat	22	222	0
Pig	2	26	0
Horse	3	10	11
Dog	1	5	0
Dog/Fox	0	1	0
Boar	0	2	0
Mustelid	0	1	0
Chicken	0	6	0
Chicken/guinea fowl	0	1	0
Anas spp.	0	4	0
Anser spp.	0	1	0
Crow/Rook	0	1	0
Raven	2	3	0
Barn Owl	0	2	0
TOTAL	79	622	0

Table 5-11: NISP for Midden 300 Contexts

One of the largest features by fragment count was the midden in Area A, between the partial Building 3 and the complete Building 5 (Figure 5-9). The structures of Building 4 were not recovered, although the spacing and fragmented remains suggests that a building was present there at some point. What is clear is that a midden formed here by the later phase of the site, so if Building 4 had been present, it must have gone out of use sometime around the 3rd century AD. This feature has three distinct contexts; a basal layer, Context 337, which directly underlies the larger midden deposit, and has material dating to CP 6, the early to late 3rd century. This layer was stained green due to high phosphate content, and probably contained a large amount of organic remains. Context 300 itself also contained a large amount of domestic refuse. It has a wider range

of dates for ceramics from this layer, with residual material dating from the mid-2nd to the end of the 4th century. The third context, 521, is an Articulated Bone Group dug into the side of the midden, and contains most of the right hindleg of a horse. Data is summarised in Tables 5-11 and 5-12.

Category	337	300	521
LM	80	485	0
MM	27	305	0
SM	0	1	0
VSM	0	0	0
uBOVID	0	8	0
Lbird	0	0	0
Mbird	0	0	0
Sbird	0	0	0
unID	26	89	0
TOTAL	133	888	0

Table 5-12: Unidentified fragments from Midden 300 Contexts

In terms of taphonomy, the midden is an exposed feature in the landscape. As seen in A, more than 40% of the bones were gnawed by carnivores. Gnawing by rodents also occurred, at a higher rate than in other feature types. This indicates that the bones were exposed on the trash heap for some time before their eventual burial. The town dogs may have been able to drag off or gnaw on the animal remains left here, although the possibility of fenced-in yards may have prevented completely free access. With such access by dogs, one must remember that some elements could have been carried off elsewhere for gnawing, an effect that will bias the species and element representation in the midden.

	337 (N=83)	300 (N=640)
Carnivore	34.9%	41.4%
Carnivore and Rodent	0.0%	0.2%
Rodent	0.0%	0.2%

Table 5-13 Carnivore and rodent gnawing in midden F300

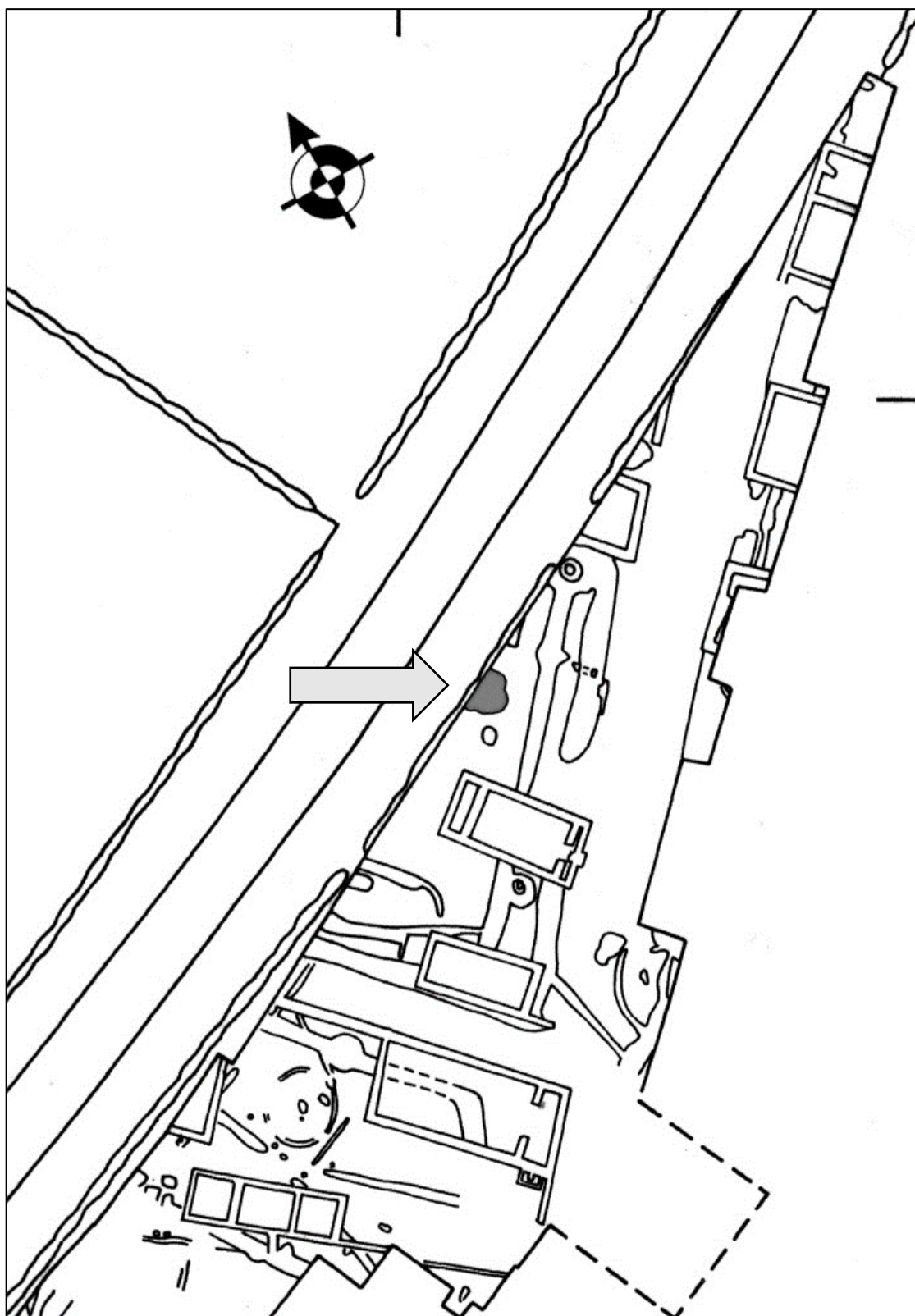


Figure 5-9: Location of Midden Feature 300 within Area A (modified from map by Northamptonshire County Council, n.d., no scale given)

Weathering also would have affected the assemblage left in the midden. Only the wells had a higher percentage of remains that were deemed of “Poor” preservation, with greater than 50% abrasion to the surface of the element. Fewer than 40% of the elements had a Good or better preservation score (<25% abrasion). Exposure to the elements and scavengers would have resulted in the preferential loss of small species, and this is indeed what we see in the assemblage. However, it must be kept in mind that other feature types, such as ditches, wells, and quarry pits, could have been filled up with materials from other midden deposits, and thus not all differences can be attributed to feature-type-dependent taphonomic biases.

Although the later phases generally have a trend towards increased sheep remains, the midden contains a high proportion of cattle bone. This is also mirrored in the number of large mammal fragments compared to those from medium mammals like sheep and pigs. Given the higher rate of weathering and carnivore gnawing in this assemblage, it is possible that smaller elements and smaller taxa could have been selectively destroyed by these processes. However, ditches and robbing contexts have similar levels of carnivore gnawing, and those from the Late Phases in the 3rd century to the end of occupation in the early 5th century show a much higher prevalence of sheep/goat remains, so this cannot be the only factor in the different species representations in the midden compared to the rest of the site..

As can be seen on the triplot (Figure 5-10), the material for 337 clusters nearby its contemporary material from 5 Late A, which also dates tightly to CP Phase 6 (early to late 3rd century). Although this deposit underlies context 300, the material from 300 tends to cluster more towards the material from the middle phases of the site (late 1st to late 2nd century material). It is possible that this is due to the midden’s accumulation over time and the mixing of remains from various periods. However, it is also possible that this could represent a localised difference in deposition. The houses utilising this midden might have been preferentially acquiring cattle rather than sheep for consumption or other practices. If these houses were producing large amounts of iron work for outside consumption, they may have been linked into the wider imperial British system, which is linked to preferences for beef.

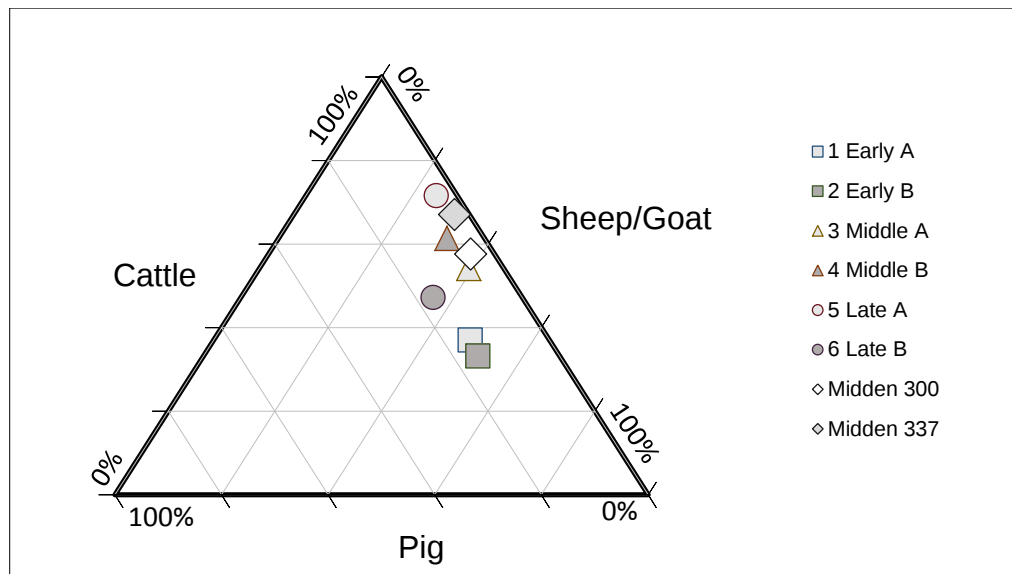


Figure 5-10: Triplot for midden context F300 and other dated non-well material

It does not appear that taxa other than cattle and sheep/goat made up a great deal of the assemblage (Figure 5-11). In both 337 and 300, only around 10% of the NISP came from all other taxa. Of these other taxa, pigs and horses were the most prevalent in both. Dogs were comparatively rare in both assemblages. Context 300 contained a greater variety of bird taxa, which is likely a feature of the larger sample size. The greater breadth of taxa present in context 300 is likely due in part to the exceptionally large NISP count (Lyman 2008: 159). The open nature of the deposit also makes it more likely that wild species, such as the barn owl or ermine, could gain access, die, and become part of the assemblage. These wild species could also be the remains of dead animals from the site that needed to be removed, or animals killed for fur and feathers.

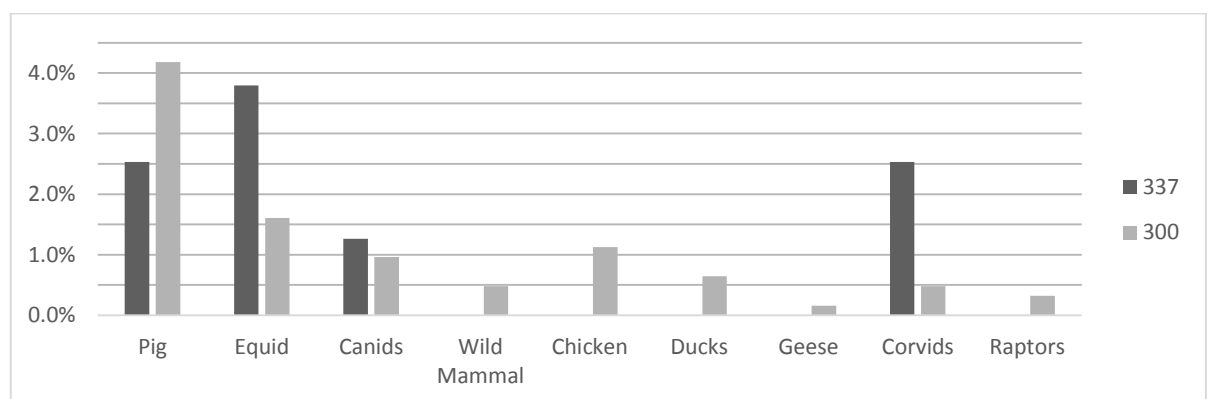


Figure 5-11: Rare species representation by %NISP

The wild mammal species included wild boar, of which a proximal humerus and distal radius were present. No cut marks or burning were observed, although the bones had been gnawed by dogs, indicating exposure for some period of time. The presence of

these meat-bearing upper limb elements suggests that this might be food waste. The other definitively wild animal remains came from an ermine or stoat (*Mustela erminea*), and consisted of a single fully-fused femur. It is possible that this could be from a wild scavenger, although the soft fur of the ermine might have been an attractive resource. However, a single ermine would not have provided much fur, and little is known about the use of such animals for furs in Roman-Britain. Even if ermine were not so attractive to the Romano-British, the proliferation of rodents feeding on grain and waste would be attractive to the ermine; the presence of voles or lemmings is noted by Yalden in most cases where ermine are found on archaeological sites (2010: 2-3). No elements of deer were present in the midden, which is not surprising given their rarity across the site.

Bird remains are present in low numbers. Context 337 contains two elements from a raven: a humerus and a mandible. Both of these appear to be from a fully mature adult, and feature no modification or pathology. Context 300 has a wider array of wild and domestic birds. Of these, chicken is the most common, followed by ducks then corvids, and lastly by raptors. In all cases, these taxa are only represented by a few elements, and all have an MNI of 1.

Chickens are represented by both wing and leg elements, although none are paired or articulating. Only the scapula showed signs of butchery, with a cut mark under the glenoid facet. Skulls and feet were not found, and this evidence taken in conjunction with the cut mark may suggest that this was dressed food waste. Most of the elements appear to have been from fully grown individuals, with the exception of a small juvenile humerus.

The duck was represented by sternum and wing elements, and the humerus shows signs of burning. There was no butchery, and all elements appeared to be from an adult individual. Fragments of goose sternum were also present but showed no signs of modification.

At least two types of corvids were also identified in the midden. A nearly complete carpometacarpus from either a crow or rook was found, but could not be distinguished between these two species. Two partial radii and a partial carpometacarpus were also found to be from a raven, although matching the radii was difficult due to the fragmentary nature. All corvid bones were fully mature, and none showed signs of butchery or burning. They are likely to have been scavengers, although there is some suggestion that ravens might have been kept as tamed companion animals in Roman Britain (Serjeantson and Morris 2011: 100).

The articulating femur and tibia of a barn owl (*Tyto alba*) were also found in the midden. The elements were fully mature, and there were no signs of human modification on the bones. Like the ermine, owls in the area likely benefitted from the rodents attracted to stored grain.

In general, species representation suggests that the midden mainly consists of waste from food animals, with the occasional disposal of other creatures. Non-food animals like horses and dogs were more common in context 337 than in the main midden context, so a more mixed pattern of disposal is possible for that earlier deposit.

However, not all elements from food animals were necessarily parts used exclusively as food. As can be seen from element representation and butchery practices, it is possible that craft waste was deposited in the midden as well, in addition to elements that suggest processing of carcasses in or near the area.

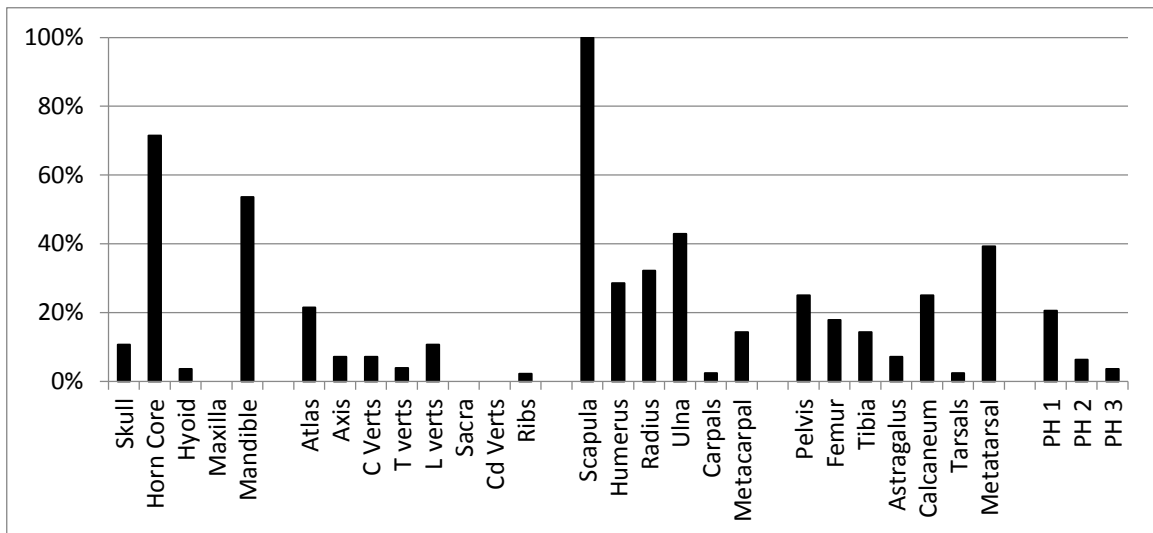


Figure 5-12: Cattle %MAU element representation for midden F300

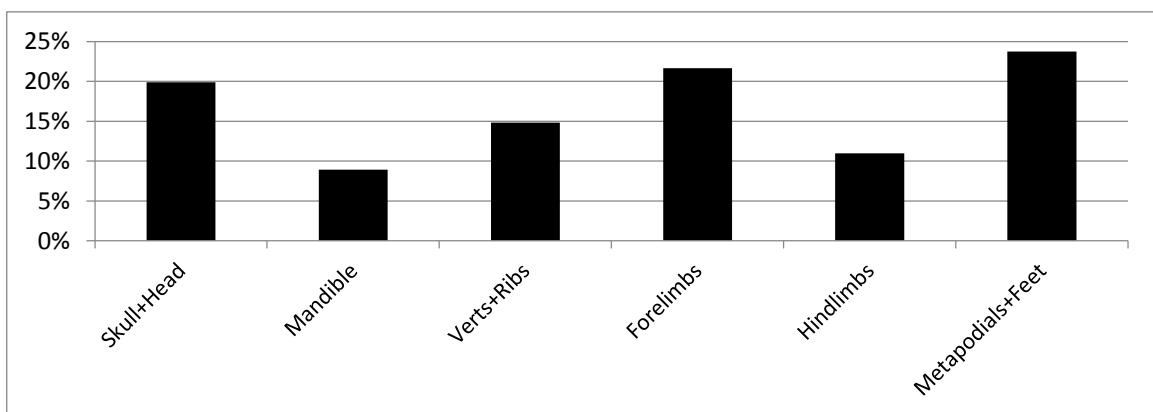


Figure 5-13: Cattle %NISP element representation for midden F300

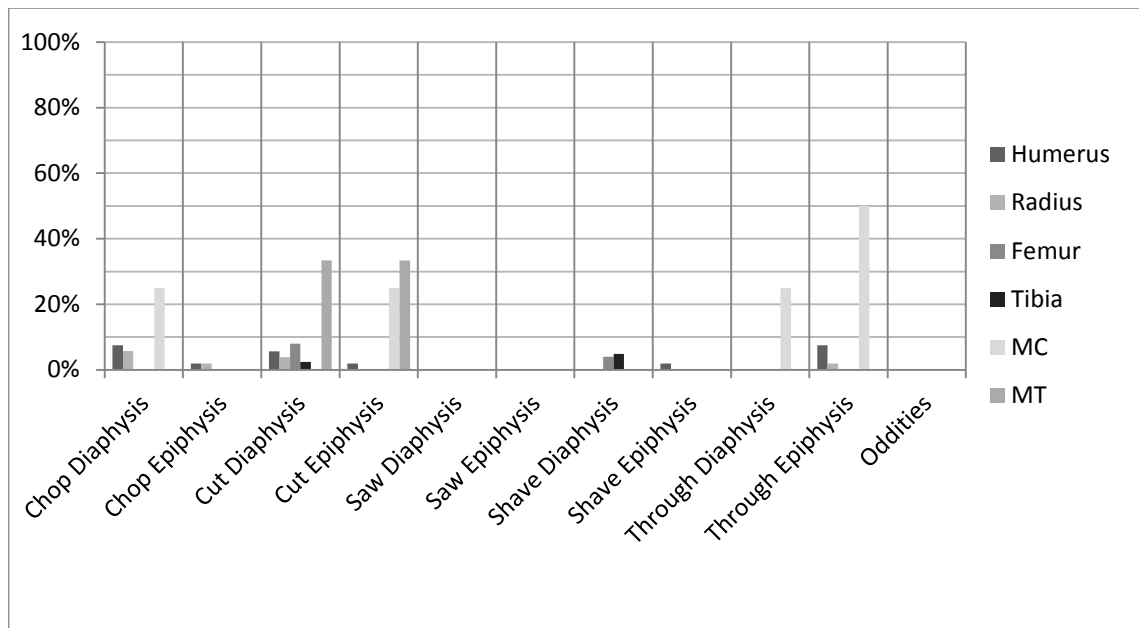


Figure 5-14: Cattle element butchery by type for midden F300

Cattle from the midden show suggest that carcasses were being processed in the area. The presence of fragmented skull remains resulted in a high NISP value, but calculation of the Minimum Animal Units represented by this value was proportionally smaller (Figurea 5-12, 5-13). It is possible that skulls were originally more prevalent but reduced by taphonomic processes. The number of dense horn cores remains high both in terms of raw fragment count and minimum animal units. The elevation of atlases compared to other vertebrae also suggests a higher number of skulls present.

Forelimbs were more common than hindlimbs, with scapulae being the most commonly represented element both in terms of NISP and MAU. They also had a higher percentage of butchered elements than hindlimbs (Figure 5-14). More axial long bones had more butchery marks in general than more appendicular elements, likely due to the concentration of meat on these elements.

Long bones present in the midden were more likely to have cuts or chops on the diaphyses than to be chopped through, suggesting that these were more likely meat elements than heavily-processed elements for craft working or general removal. Epiphyses of long bones were only rarely modified, and when they were, only forelimbs showed this modification. Metapodia, by contrast, were usually chopped through or displayed cuts along both epiphyses and diaphyses. The metacarpal was more likely to be chopped than the metatarsals, which only displayed cut marks. For phalanges, it

appears that cuts and chops on the proximal ends were the most common butchery types.

The exceptional presence of horn cores compared to skulls does suggest stockpiling of these elements, possibly for horn-working. Around 38% of horns showed signs of chopping, with chops through the base of horn core accounting for most of these. It is possible that in addition to iron-working, some of the shops along the street could be doing bone-working or horn-working as well.

	N	Average PI values	Minimum PI values	Maximum PI values
Early Period (mid-1st to early 2nd c AD)	15	0.247014	0.0000	0.6250
Middle Period (early 2nd to late 3rd c AD)	21	0.199357	0.0000	0.5455
Late Period (early 3rd to early 5th c AD)	37	0.136499	0.0000	0.3636
Midden Context (mid 2nd to early 5th c)	34	0.264706	0.0000	0.7273

Table 5-14: Pathological Index values for cattle in Midden 300

In terms of health, there are some small differences in the cattle deposited here and those deposited elsewhere in the later period of the site. The Pathological Index (Table 5-14, Figure 5-15) for feet (Bartosiewicz et al. 1997) is much higher on average than it had been since the early 2nd century, as seen below. This is largely due to some massively pathological phalanges, one of which may have developed an infection, given the presence of a draining cloaca that formed in the exostoses behind the proximal articular surface. 7 of 23 (30%) phalanges also show signs of articular depressions. It is possible that the cattle deposited in this midden could have been either very old individuals or ploughing oxen. The ageing profile for the midden, however, suggests that only 25% of animals lived to full adulthood, which makes the presence of very old animals less likely (Figure 5-16).

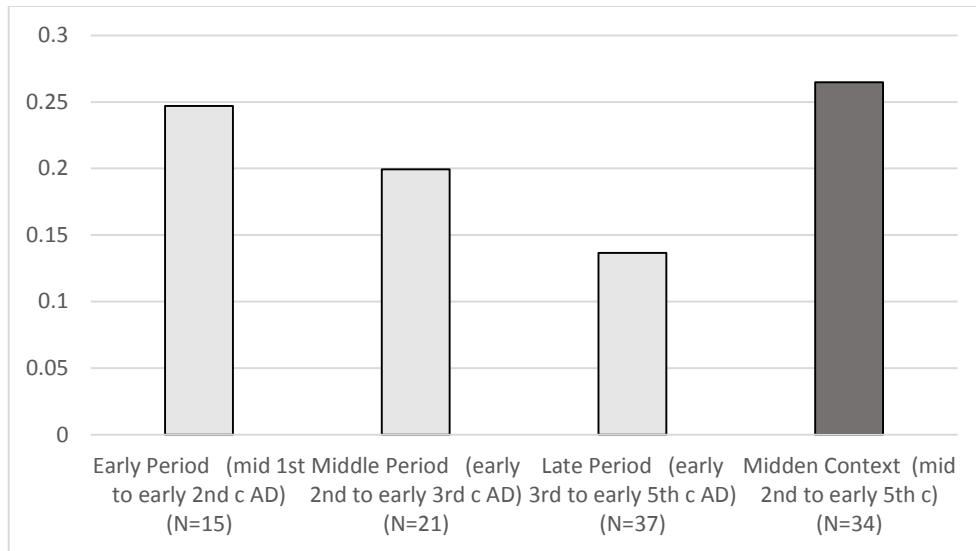


Figure 5-15: Pathological Index values for cattle including Midden 300

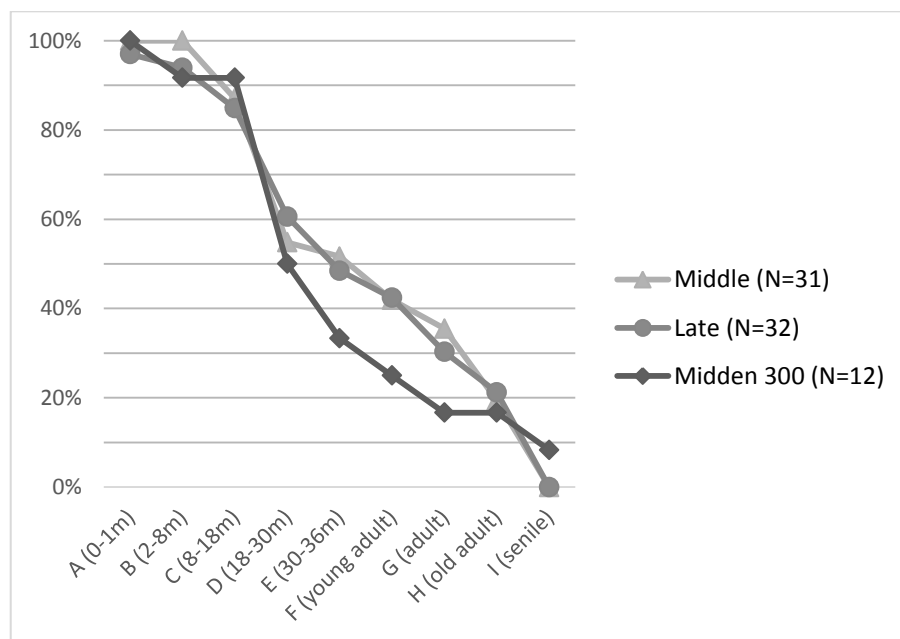


Figure 5-16: Ageing by Mandibular Tooth Wear for Cattle in Midden 300

In terms of other pathologies, the cattle in Midden 300 appear to have had some elbow deformations. Three ulnae showed signs of bone growth along the articulations with the radius and along the side of the semilunar notch, as well as spongy bone buildup in the gaps between articulations. This could be related to age-dependent remodelling, but the lack of older individual suggests that perhaps this could be to strain placed on the animals during their earlier years of life.

A right pelvis also showed signs of exostoses around the acetabulum, with a finely-textured spongy buildup surrounding the joint; additionally, there was degeneration of the joint surface. An astragalus also showed significant eburnation. The prevalence of osteophytes was higher for the midden than for all other temporal groups except Phase 3 Middle A (late 1st to late 2nd c.), suggesting that joint disease was more common amongst the individuals deposited here.



Figure 5-17: Potential cavity for a soft-tissue mass in cattle thoracic vertebra from Midden 300

The midden also had the only example of a possibly cyst in cattle (see Figure 5-17). This was observed in the posterior spine of a thoracic vertebra, just above the posterior articulation. It is probable that the cavity formed around a soft-tissue mass in the bone, with some remodelling around the outside edge.

Midden F300 is a very useful deposit for examining animal husbandry practices and consumption in the later phases of Area A. In this more industrial part of the site, it is important to have large collections of domestic waste that can be contrasted with those found further to the south in the more marginal areas of the site. Generally, the bones here show a mixed deposit of craftworking remains, butchered elements from household-level consumption, and hunted or commensal species. The plentiful pathological information for cattle also gives us a much better picture of the health and effects of human exploitation on domestic stock.

5.4 Unique Deposits

There are several interesting features across the site that merit further discussion here. Some of these have been included because of their size and unique timing like the late 4th century to early 5th century series of pits (F414) or because of their unique contents (the young lamb burials under house floors).

5.4.1 *F414: Late Phase Pit Series*

Feature 414 is located in the northern part of Area B, and consists of a set of pits probably used for sand quarrying and then quickly refilled (location marked on Figures 5-18, 5-19). The fill is recorded as Context 83. Although there is some residual material, coins found in context in combination with ceramics hint at a provisional date of the late 4th to early 5th century, right around the end of the site's occupation. Its lack of respect for earlier features may indicate that the ditches and structures in this area had gone out of use and were filled in, and that the area was most valuable as a source for sand for construction elsewhere on the site (Northamptonshire County Council n.d.: B8.5).

Taphonomy for this pit shows that much of the material was exposed to carnivores and scavengers, and over 50% of the remains have Fair (25-50% abrasion) or worse preservation (Figure 5-20). Few articulated remains could be identified for Context 83, and large species were more common than smaller ones. Identifiability to taxon was approximately 36.7%. Of that material, a further 48.2% could be identified to a size category but not to a taxon or element, and 15.1% was unidentifiable to any category. Element completeness (Table 5-27), as measured by the percentage of zones present, was less than half for most major taxa besides dogs. Surprisingly, larger species tended to be more complete than smaller species, indicating that butchery affected survival.

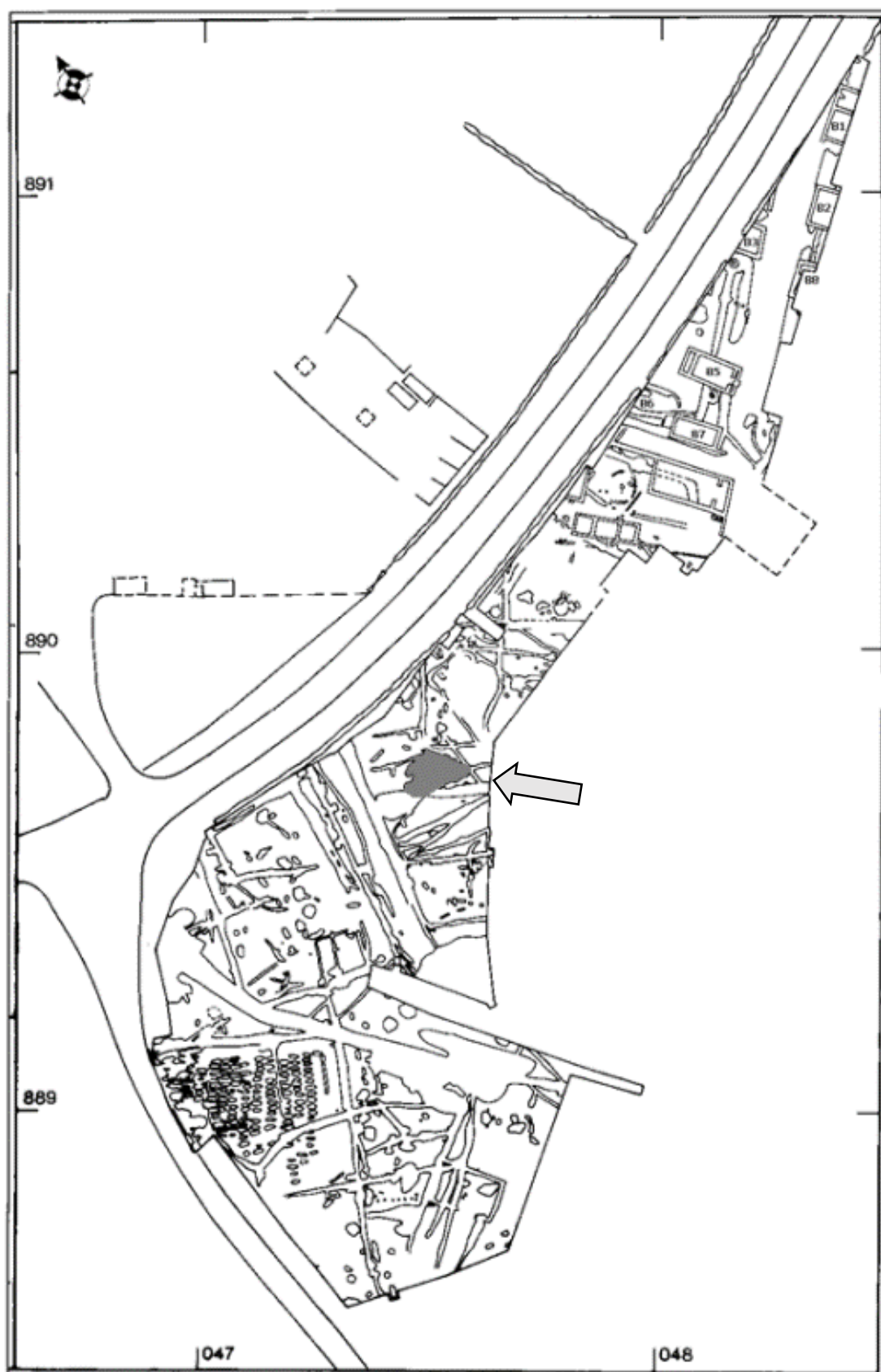


Figure 5-18: Location of Feature 414(83) in Area B (modified from map by Northamptonshire County Council, n.d., no scale given)



Figure 5-19: Detail map of Area B with Feature 414(83) highlighted, Scale 1:100 (map from Northamptonshire County Council, n.d.)

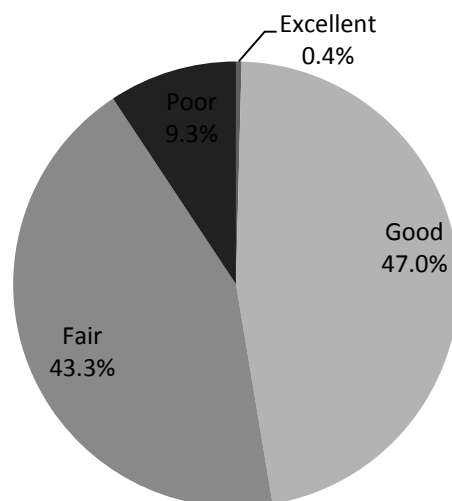


Figure 5-20: Preservation for Context 83

	N Zoned	%Zones
Cattle	104	41.8%
Sheep/Goat	52	34.6%
Pig	18	34.7%
Equids	31	37.9%
Dog	20	66%

Table 5-15: Element completeness by zone for context 83

Taxon	NISP
Cattle	125
Sheep/Goat	63
Pig	25
Dog	11
Dog/Fox	9
Equid	33
Red Deer	1
Chicken	1
TOTAL IDENTIFIED (NISP)	268
Small Mammal	1
Medium Mammal	108
Large Mammal	238
Unidentified Bovidae	4
Unidentified Medium Bird	1
Unidentified Bird	1
Unidentified	110
TOTAL UNIDENTIFIED	463
TOTAL FRAGMENTS (NSP)	731

Table 5-16: NISP and NSP table for Context 83

A very large quantity of domestic waste was recovered from these pits, including 731 fragments of animal bone (Table 5-18). Of these, 268 were identifiable, and most belonged to the main three domestic species. Cattle were the most common taxon, making up over 45% of the assemblage; however the use of MNI shows cattle and sheep in more equal numbers. Pigs were nearly 10% of the total NISP, and an even higher percentage of the Minimum Number of Individuals (see Figure 5-22).

A small number of dogs and horses were also present in context 83, with horses outnumbering dogs. All of these were fragmentary, hinting that these bones were

cleared from another location and dumped in the pits in an incomplete fashion. The large bones of horses were likely more easily gathered up than the bones of smaller, less prevalent animals like pigs and dogs. The only wild animal definitively identified was a portion of red deer skull with the attached antler pedicle; the antler had been sawn in from all ends, leaving a small island in the middle where it was snapped off. The presence of skull along with antler indicates that this involved hunting the animal, not just collecting shed antlers. This later phase of the site does seem to involve increased hunting of wild animals, and their deposition in places of note, as we see in the Hadman area lead tank well.

Birds were extremely rare in this context. A single fragmentary chicken radius was the only bird identified to taxon. Single fragments of medium-sized birds and unidentified birds were also found. This could be due to the selection for larger species that occurred when fill was collected for the pits.

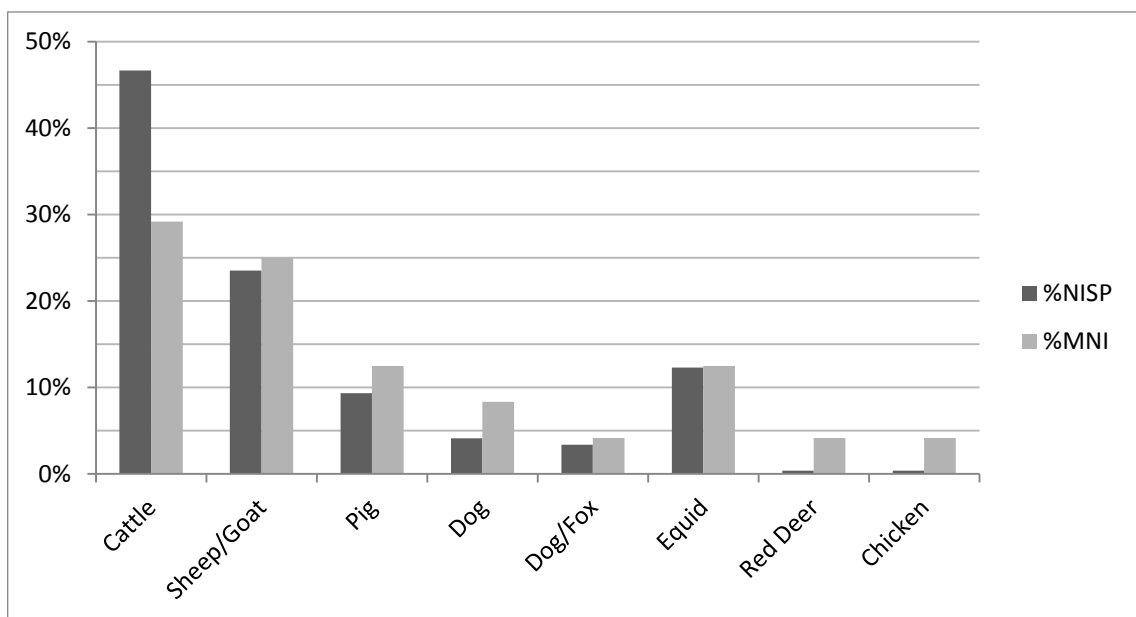


Figure 5-22: %NISP vs %MNI for Context 83

The species representation (Figure 5-22) here is somewhat similar to that of the midden in Area A, with the high percentage of cattle compared to other contemporary deposits. However, 83 has a far greater percentage of pigs and fewer sheep than the main midden context (300). This could be due to the fills for these quarrying pits being rapidly filled with materials from similar middens. Birds and wild mammals may have been treated different in terms of deposition, or more likely, taphonomic factors could prevent their secondary deposition when remains were moved from the site of the animal's death or consumption to the midden to the pit.

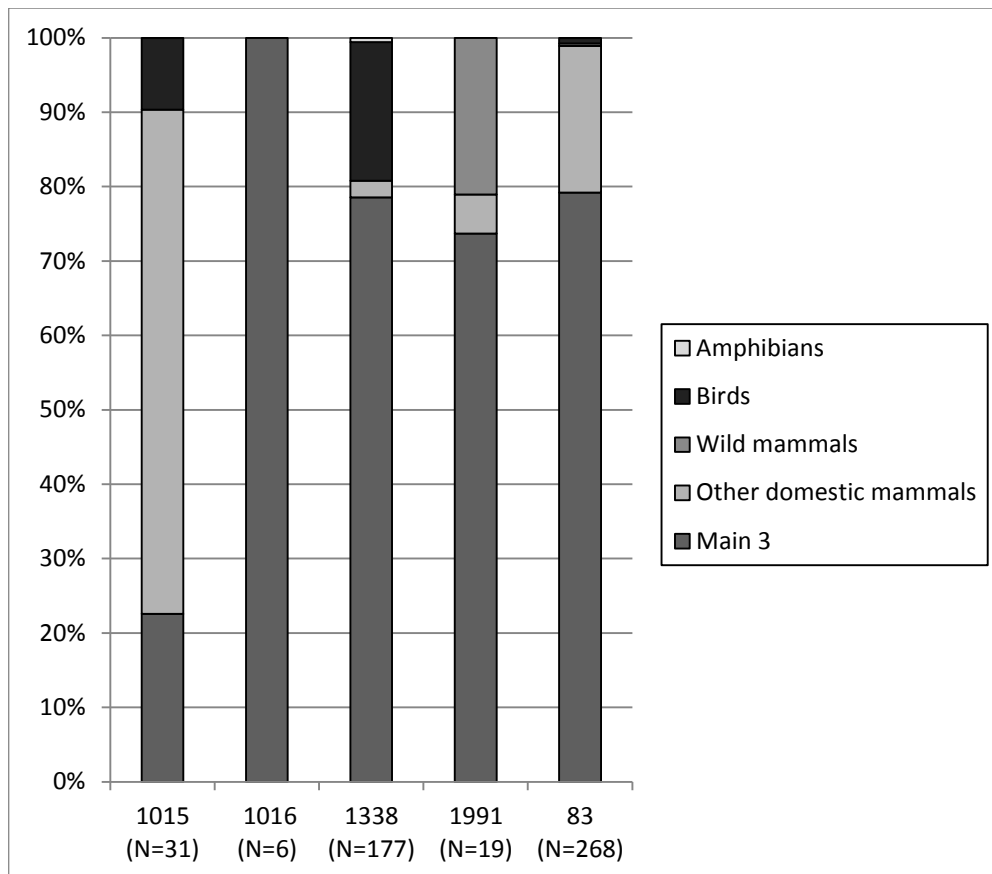


Figure 5-23: Types of taxa for Late Phase non-well contexts (by NISP)

When plotted against other contexts dated to Ceramic Phase 7b (mid-4th to early 5th century) and a general survey of other non-well Late 6 B contexts (which includes late 3rd century to early 5th century material), 83 has the highest percentage of cattle of any of these assemblages (for comparison, see Figure 5-23, triplot Figure 5-24). Although many of the other 7b contexts (eg: 1015, 1016, and 1991) are too small to compare with context 83, pit fill 1338 represents an interesting comparison. This is a single discrete pit in a building in Area A, and contains a very high number of juvenile sheep/goat and pig remains, some of which may be from partially-complete individuals. Perhaps Area B was used for more general rubbish disposal, while the floors of buildings in Area A were kept fairly clean, with only limited deposits. In general, it appears that more cattle were being deposited here; whether this is a difference in consumption in different parts of the site, or whether the remains of different animals were being treated differently requires more investigation.

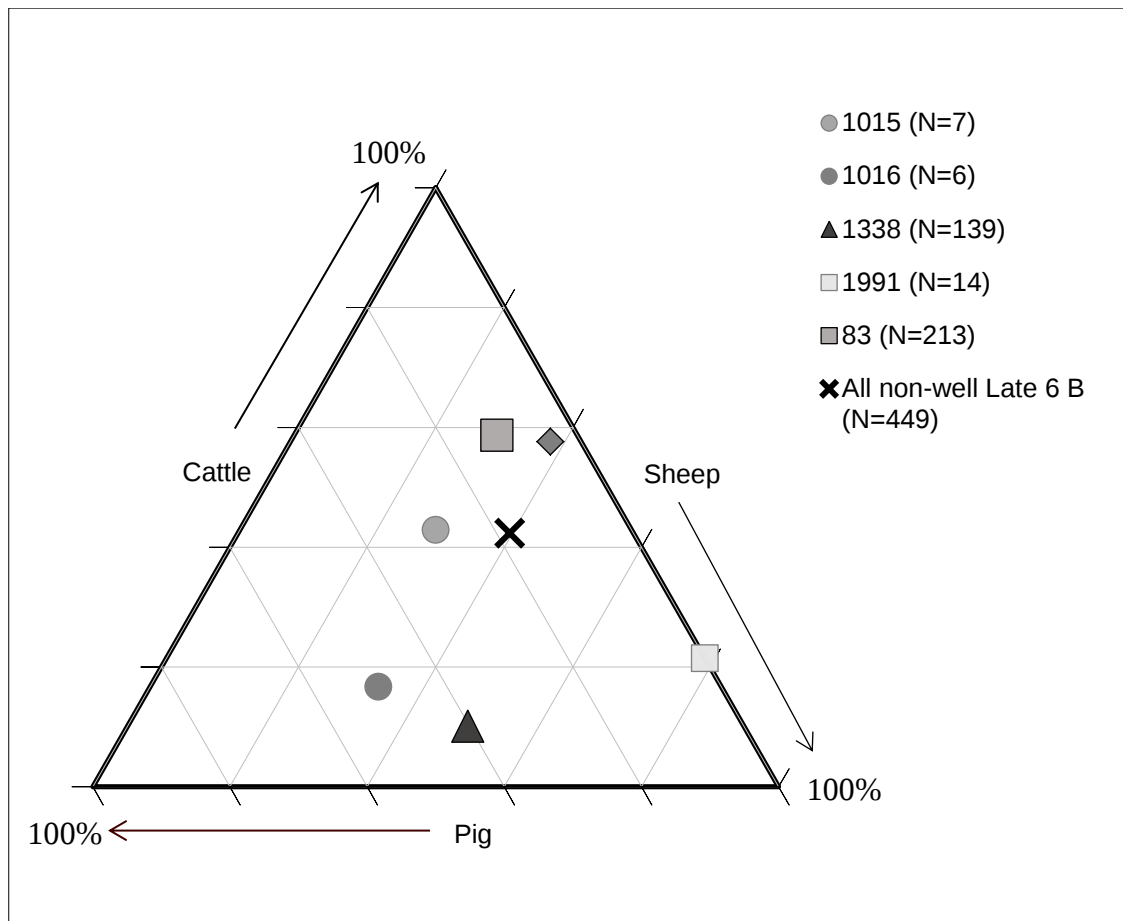


Figure 5-24: Triplot for major food domesticates in Late Phase non-well contexts (by NISP)

In terms of body part representation for the major food species, cattle show a unique pattern compared to the other two (Figure 5-25). For cattle, all major body parts are represented, including vertebrae and ribs and phalanges. Again, forelimbs were more prevalent than hindlimbs, and scapulae were the most common cattle element. Skulls and phalanges are relatively rare, suggesting that most of the remains may be discarded meat elements, although the large number of metapodials also suggest that boneworking may have been occurring. For sheep/goat, lower hindlimbs were more common, with some limited numbers of mandibles and upper forelimbs. Pigs are represented mainly by mandibles, although skulls and forelimbs are also common; the hindlimb is only represented by femora. Horn cores are present for cattle, but not for sheep, and could be linked to horn-working activities in the vicinity, or could simply be part of the deposit of primary butchery waste, along with the phalanges and lower limb bones.

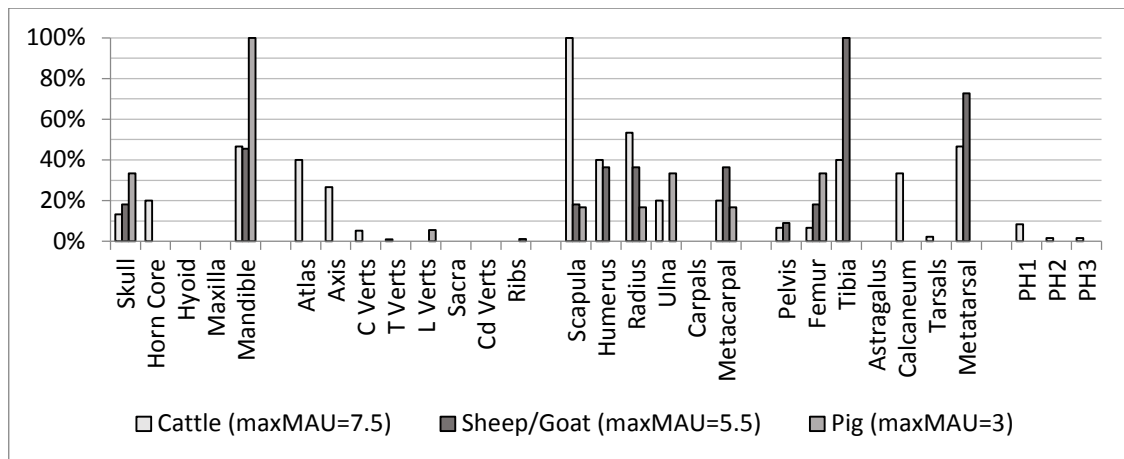


Figure 5-25: Body part represent by %MAU for Pit 83 in 3 major food taxa

Body part representation for horses shows that more complete animals are being found in the pits, with all body parts present except the lower hindlimb and foot elements. The pattern is similar for dogs, although they have fewer axial elements represented. The presence of mostly large long bones suggests that this material has been affected by taphonomic factors, and that it was moved after full decay of the original individuals. There do not appear to have been any primary dog or horse burials in these pits (Figure 5-26).

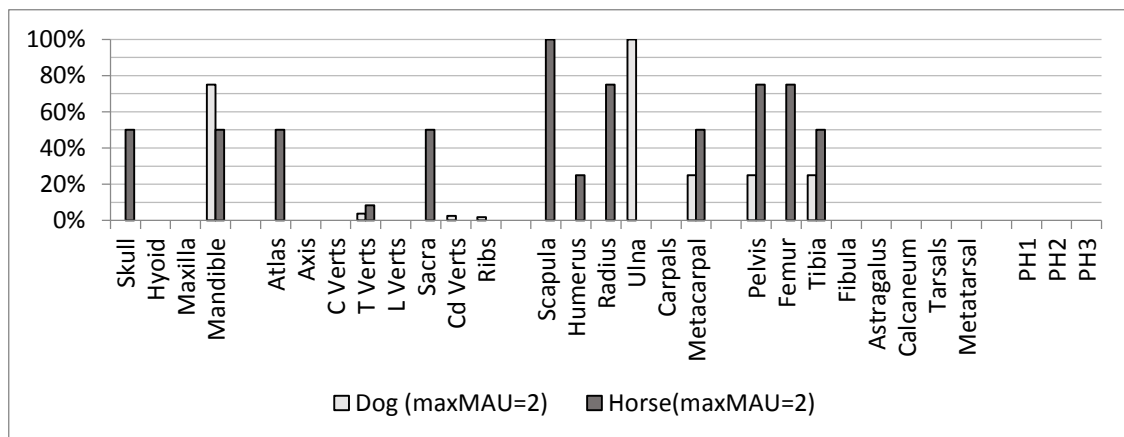


Figure 5-26: Body part represent by %MAU for Pit 83 in 2 major non-food taxa

In terms of butchery, the percentage of remains with cuts or chops was relatively low (Figure 5-27). The deer antler was the only element with evidence of sawing. Only about 27% of the cattle remains were butchered, with most marks being cuts. The prevalence of cuts over chops is also seen in sheep/goat and pig bones, although sample sizes were lower and the overall percentage of butchered remains was about half that as for cattle. Horse and dog bones did not show any butchery marks.

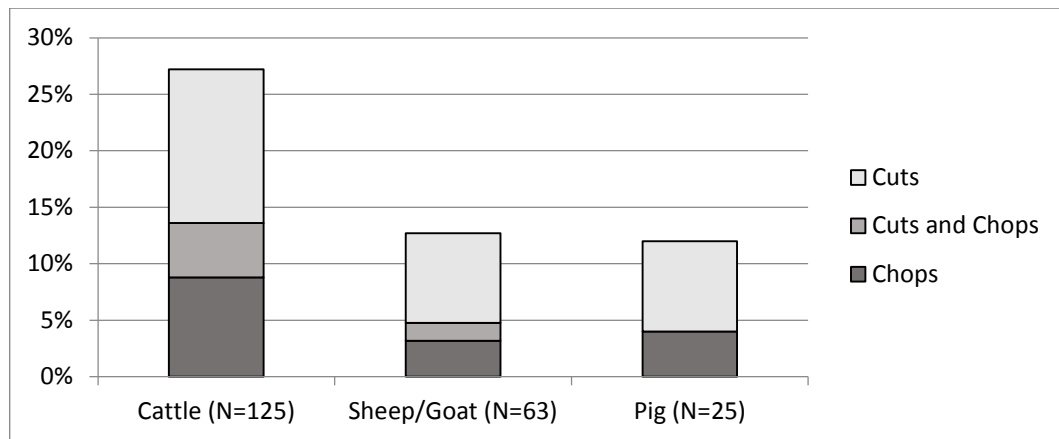


Figure 5-27: Butchery by type for Context 83

Pathology in the animals from context 83 also shows similar patterns to the pathologies present in the midden. One cattle ulna showed smooth lumpy growths extending over the side of the semilunar notch, consistent with those observed in context 300. Additionally, one of the ossified haematomas discussed previously belongs to a cattle metatarsal from this context. In terms of the Pathological Index for cattle feet, the five first and second phalanges with scores showed that the average was very slightly higher than the average for all of the Late Phase material (Table 5-17).

	N	Average PI values	Minimum PI values	Maximum PI values
Early Phase (mid-1st to early 2nd c AD)	15	0.2470	0.0000	0.6250
Middle Phase (early 2nd to late 3rd c AD)	21	0.1994	0.0000	0.5455
Late Phase (early 3rd to early 5th c AD)	37	0.1365	0.0000	0.3636
Pit 83 (mid 4 th to early 5 th c AD)	5	0.1697	0.0000	0.2727
Midden Context (mid 2nd to early 5th c)	34	0.2647	0.0000	0.7273

Table 5-17: Pathological Index values for Context 83

One of the twenty-five pig elements showed signs of a potential fracture. It was the only pig radius in the context, and was fully fused on the proximal end. No clear fracture line was visible, but a thick, built-up area of well-remodelled bone on the medial shaft just under the proximal epiphysis was observed, as well as thickening of the shaft and a bony lump on the anterior part of the bone.

Overall, pit F414 provides a picture of life towards the end of the site's life, although the bias against smaller elements and taxa must be taken into consideration. The need for great amounts of sand elsewhere in the site suggests that even at this late

period, construction was still occurring (Northamptonshire County Council n.d.: B8.6). However, the fairly conservative series of property divisions appears to have broken down in this part of the site, with activity apparently concentrating on the road to the south. Signs of trauma and disease were more common in cattle (1.6% elements affected) and pigs (4.0%) than in the rest of the Phase 6 Late B population, in which pathologies were relatively rare. Most of the material from these pits appears to be from meat-consumption waste, although some of the elements could have been collected for bone and horn-working. When combined with the presence of sawn antler, this suggests that craft-working is still occurring, hinting that these activities continue to hold importance in the site's economy.

5.4.2 Birds in Pit Feature F1497

Although birds made up a consistently small proportion of the animal remains from Ashton, there were several contexts that contained an anomalously high number of different bird species. Pit context F1497 in Area C is particularly notable for the number of bird remains contained in its several fills. The pit is believed to have been dug for gravel extraction, then filled with ash and domestic refuse (Northamptonshire County Council n.d.: C5.9).

In addition to animal bone, the pit also contained a considerable amount of pottery, including Samian. Some of the dishes were stamped, and most were Central Gaulish and date to approximately 160-190 AD (MacRobert n.d.: 29). One is highly decorated and has images of a bear, a panther, and a seated Apollo with a lyre. All show signs of considerable use, and one has a riveted base. These items were present all over Britain, and some of the stamps have also been noted at forts along Hadrian's Wall. Their presence in a pit with structured deposits including birds brings into question whether these objects may have also had increased significance for their owners, or whether they were simply more domestic refuse.

Animal bone was present in 12 of the pit's 17 fill contexts, most of which contained only a few fragments of bone (for data, see Table 5-18). Three of the topmost fills, however, contained a large number of bird remains. The other pit fills below the contexts containing geese show a fairly typical composition as contemporary non-well fills. Most remains come from domestic animals, with cattle dominant. It is probable that these represents bone that was mixed into the soil from previous deposition, given

the small sample sizes and its fragmented nature. It is notable that the single dog element included does come from one of the very small breeds introduced by the Romans. For the top fills, a further exploration of the anseriformes briefly discussed in the previous chapter (section 4.6.3) reveals useful information about how geese and similar animals were utilized at Ashton and their significance (elements shown in Figure 5-28).

Ceramic Phases	5-6	5-6	5-6	4-5?	5-6, 6
Fill Soil type	loam	ashy loam	loam	loam	loam, ash, sandy loam
	1498	1537	1538	1540	Fills 1541-1581
Cattle	1	0	1	2	14
Sheep/Goat	0	1	0	0	3
Pig	0	0	0	0	1
Horse	0	0	0	0	1
Dog	0	0	0	0	1
Goose	26	1	42	4	1
Large anseriforme	0	0	0	21	0
Accipitrid	0	0	1	0	0
Large bird	0	0	1	0	0
total	27	2	45	27	21

Table 5-18: Species representation by NISP for pit F1497

Unlike the semi-complete goose from well context 2128, these birds did not have all body parts present. They may not be complete individuals deposited, but rather bits of wing, lower leg, and head elements. These parts could be what remains after the meat-bearing parts of the bird were consumed. Elements that remain close to the torso, such as the humerus and femur, are almost entirely absent, with the exception of a distal humerus that shows extensive chop marks. These chops could have served to remove the extraneous wing elements with little meat value before roasting. Additionally, tibiotarsi present only include the distal ends, and none of these show any signs of scorching to indicate that they were still attached during roasting.

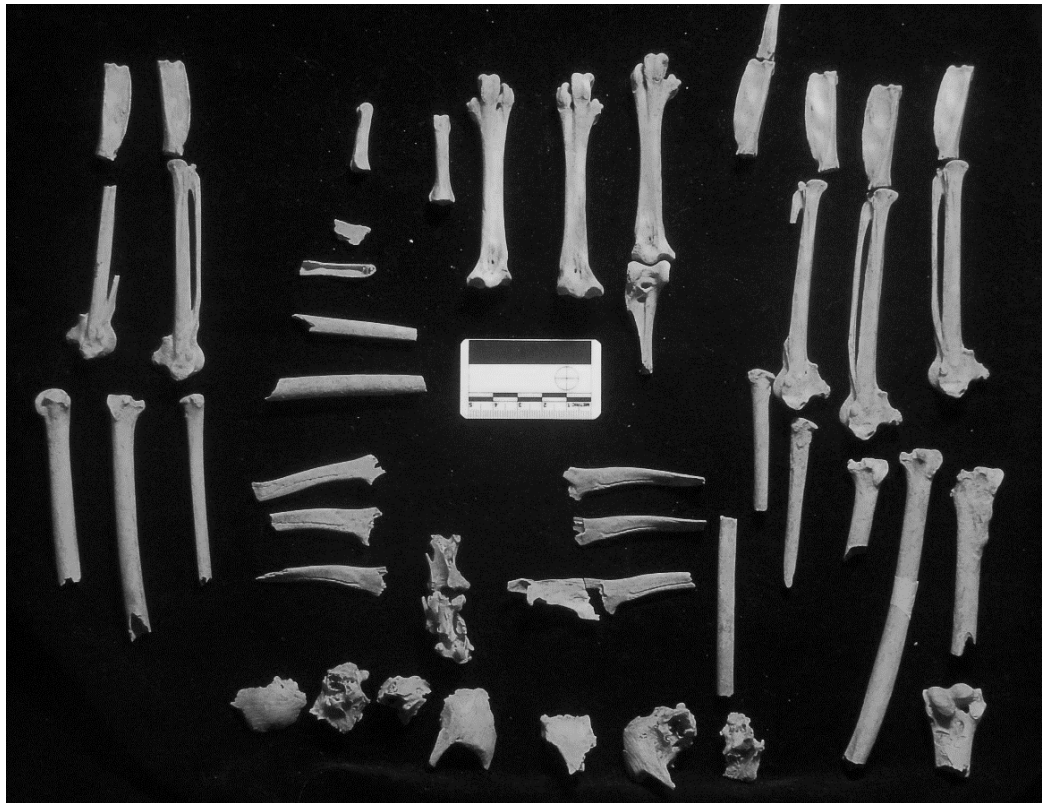


Figure 5-28: Anseriforme remains from context 1538

Although there is not a great deal of meat on the radius, ulna, and carpometacarpus, the attached feathers would have been a valuable resource. It is impossible to know whether these wings were deposited in the pit with their feathers or after the feathers had been removed. These would have very different ritual meanings, however. The deposition of fully feathered wings would represent the sacrifice of a valuable resource, and the feathered wings themselves may have had some symbolic meaning; bird flight was sometimes seen as a message from the gods, and the mass migration of birds would have been an important annual event if hunting was regularly practiced (Henig 1984: 19). It is also possible, however, that this could involve the deposition of elements that had been fully utilised for their primary and secondary products.

	1483 L	1483 R	1538 L	1538 R	1540 L	1540 R
Humerus	0	0	1	0	0	0
Radius	2	3	2	1	2	2
Ulna	3	2	2	2	2	2
Carpometacarpus	3	2	3	2	1	2
PH1 (wing)	1	2	4	2	1	1
Tibiotarsus	0	1	1	0	1	1
Tarsometatarsus	3	3	2	1	3	1

Table 5-19: Goose elements by MNE for pit F1497

The number of anseriformes involved in this pit represents the largest concentration of goose and related remains anywhere on the site. The geese vary in size, and not all were precisely identifiable to *Anser anser*; some elements were larger and more robust than those in the comparative collection. It is possible that the largest individuals may be small swans rather than large geese. *Carpometacarpi* provided the single element with the greatest number of comparable measurements, and an examination of the variations in greatest length (GL) versus proximal breadth (Bp) shows significant variation, as well as clustering that may indicate that some individuals were spread out across multiple contexts (see 1538 L, 1540 R on Figure 5-29). The smallest individuals cluster in context 1498, whereas the largest tend to be present in 1538.

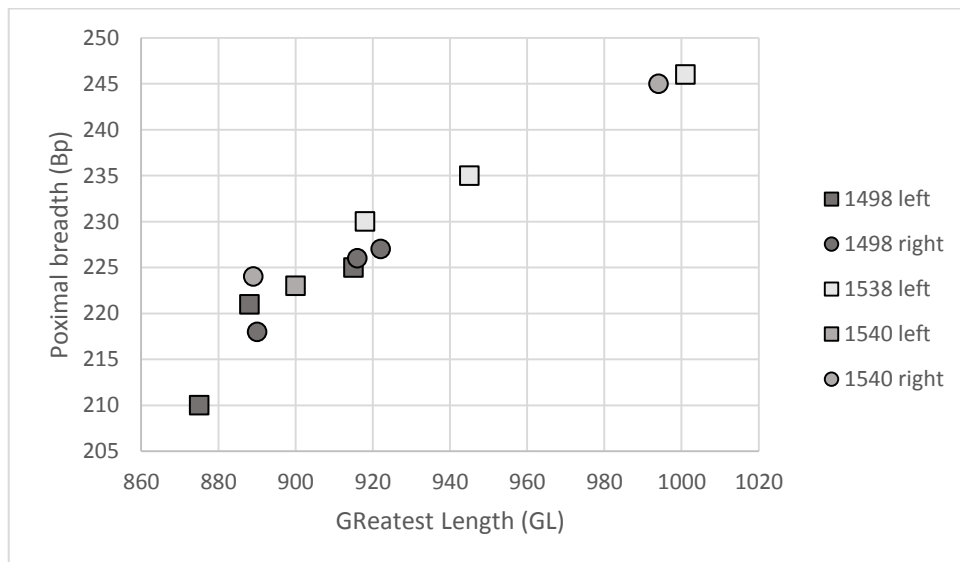


Figure 5-29: Log-scaled measurements for *carpometacarpi* in pit F1497 anserines

In addition to looking at possible variations in species and size, this context also features pathologies and irregular features that tell us about the health of the anseriformes deposited. One left radius from 1538 (Figure 5-31) shows signs of an irregular lump of new bone formation on the distal end where the element meets with the distal ulna (Figure 5-30). This lump coincides with a large lump of bone growth on the more pathological ulna discussed below (Figure 5-32, 5-33, and 5-34), and might be part of the same individual, with the same causes. Another radius from 1498 has thickening in the mid-shaft region. The swelling somewhat resembles the callus that forms after a fracture, but no clear fracture line could be located.



Figure 5-30: Left anseriforme radius from context 1538 with nodule of bone formation (L) and comparative collection specimen (R)

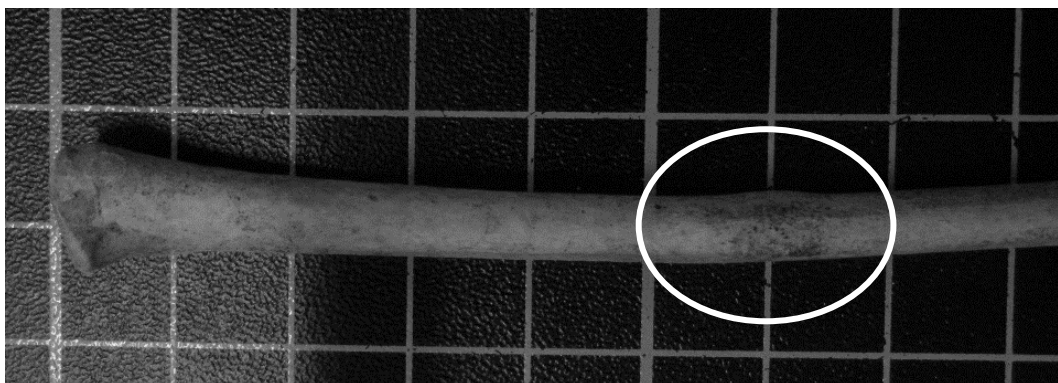


Figure 5-31: Right anseriforme radius from context 1498 with mid-shaft thickening of bone

A left ulna from a large goose shows signs of infection and extensive new bone formation, possibly caused by trauma to the distal radio-ulnar joint. When compared to other ulnae from the same context and from comparative modern specimens, the extent of the deformity is easily apparent (Figure 5-28, Figure 5-32, Figure 5-33). The new bone growth gives the distal shaft an irregular, lumpy appearance, although the texture of the bone is fairly smooth and consistent with that of the rest of the shaft. It occurs just above the distal articulation with the carpometacarpus. No corresponding pathologies were identified on any of the carpometacarpi.

Small foramina are present on the caudal side and on the cranial side of the distal end, likely acting as draining sinuses for the infection. Round lumps of bone are present on the surface where the ulna would articulate with the radius, mirroring those seen on an element from the same context. The new bone growth seems to have remained above the joint capsule. The element appears to have a straight shaft, with areas of swelling that enlarged the distal shaft cavity. No obvious necrosis was observed.



Figure 5-32: Lateral view of pathological anseriforme ulna from context 1538 (draining sinus indicated with white arrow) with comparative collection specimen

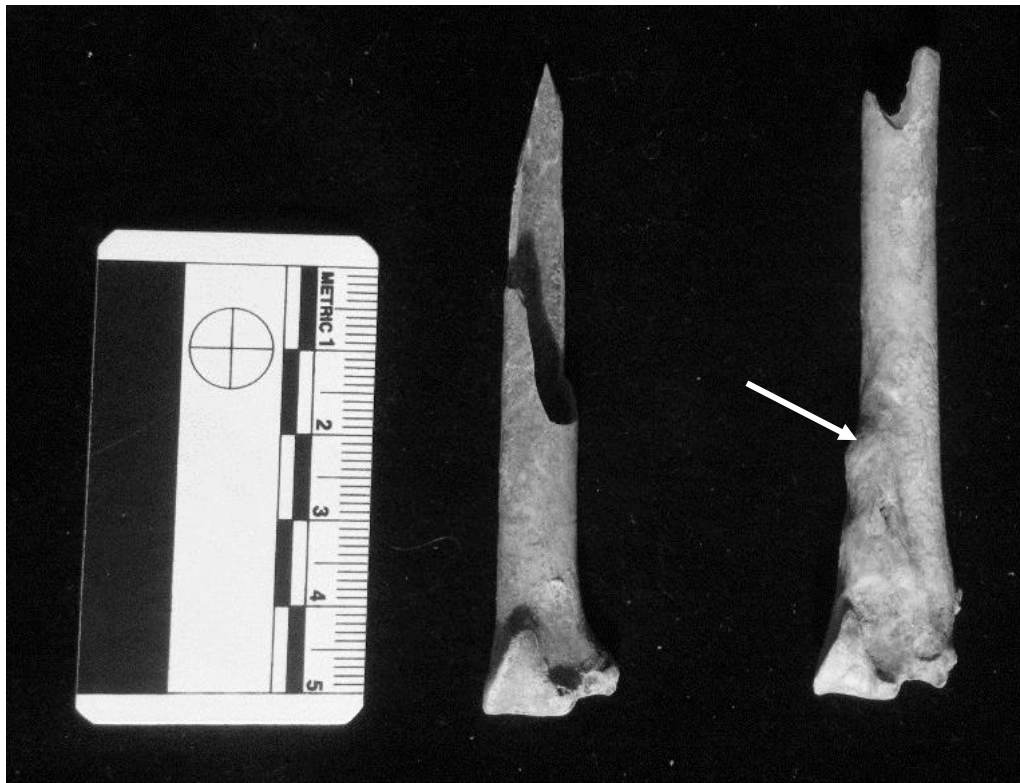


Figure 5-33: Caudal view of pathological left anseriforme ulna from context 1538 (draining sinus indicated with arrow), with specimen from comparative collection

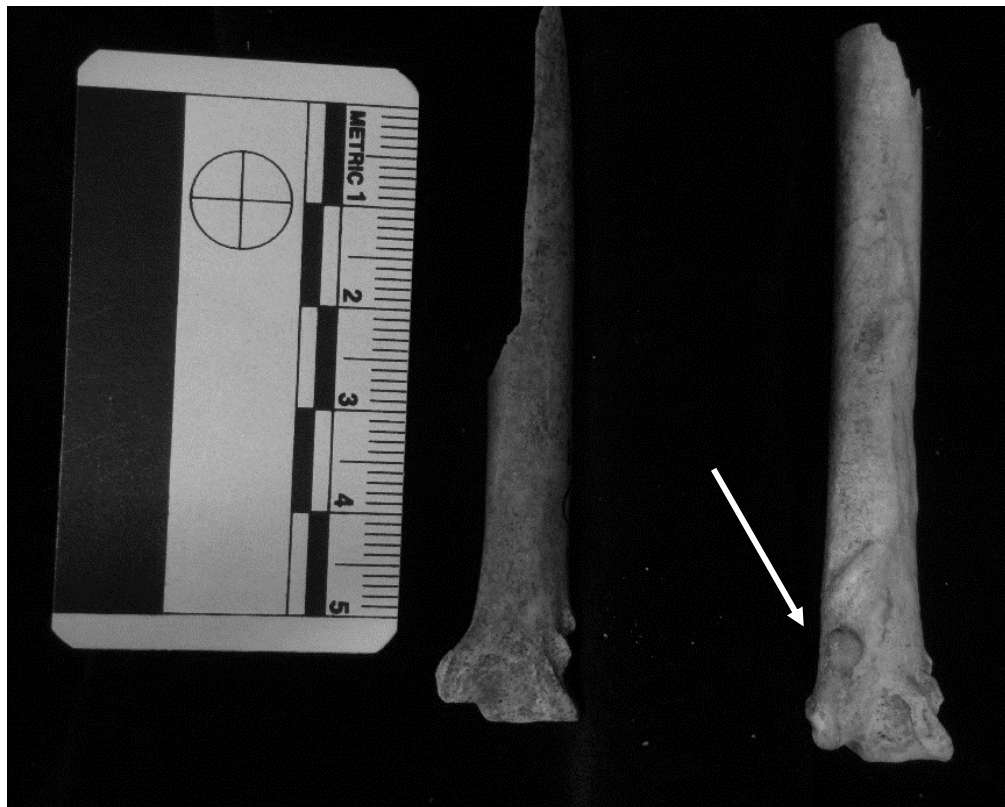


Figure 5-34: Round nodule of new bone formation (indicated by arrow) on pathological anseriforme ulna from 1538, with specimen from comparative collection

The lack of displacement and a distinctive callus is not indicative of fractures (Serjeantson 2009: 57-59). However, several features suggestive of osteomyelitis can be observed. The swelling of the shaft and development of new bone, known as involucrum, is observed, as well as the formation of small drainage channels (Serjeantson 2009: 59, Waldron 2008: 85). The presence of the three characteristic features of osteomyelitis suggests that this deformation was the result of bacterial infection due to the spread of bacteria in the animal's bloodstream or a penetrating injury (Waldron 2008: 84). Although it is not one of the most common sites affected by osteomyelitis (Mutalib et al. 1996 in Serjeantson 2009: 59), it is possible that trauma to the wing could be the source of the infection.

From this context, it is clear anseriformes of all sizes were being utilised at Ashton. The wings of these animals had great significance, and feathers were likely utilized for a variety of purposes. The presence of distal wing elements is highly suggestive of an emphasis on collecting feathers (Serjeantson 2009: 200). However, the nature of deposition suggests that this was not simply a straightforward discard of unwanted elements. Several discrete layers of ash were present in the pit, including one between fills 1538 and 1540. The layering of ash in between deposits of bird wings, possibly including elements from the same individual above and below argues against haphazard dumping of domestic waste. Additionally, rare species and breeds other than geese are also observed. The proximal femur of a rough-legged buzzard (*Buteo lagopus*) was one of the four non-anseriforme identified elements from 1538. Whether or not this was part of the same deposition practice involving the other birds is uncertain, as only a single partial element was present. However, the bones of other birds of prey have been observed in ritual contexts elsewhere on the site, and eagles and hawks are known to have had ritual significance to the Romano-British as well as being desirable for their feathers (Parker 1988: 209). As observed in many structured deposits, it is possible for animals to have both ritual and practical significance to the people who interacted with them, and the manner of their deposition is highly suggestive of both these modes of thought.

5.4.3 Pit F1365: Large-scale cattle butchery

This large rubbish pit presented a unique opportunity to examine cattle butchery during the 3rd century. It was likely first dug for sand and gravel extraction, but given the flat edges and bottom, it was soon filled with material and closed. The bottom three layers were simply sand, but the other layers contained a large quantity of domestic rubbish, including pottery and animal bone. Based on one of the *mortaria* found, the pit may have dated to the late 3rd or early 4th century or later (MacRobert n.d.: 31). It was located in Area C, where several late period buildings and pits continued in use until the end of the site's occupation.

The material from pit F1365 contained 12 nearly complete pots, many of which were Lower Nene Valley grey ware or colour-coated ware. This pit was created at the height of the Lower Nene Valley industrial complex, and thus the presence of a massive butchery waste dump suggests that the processing of animal carcasses may also have been occurring on a scale beyond the household level. The butchery processes involved are fairly consistent, and were likely carried out with a heavy cleaver, similar to those observed in urban contexts, such as Winchester (Maltby 2010) or Lincoln (Dobney et al, 1996).

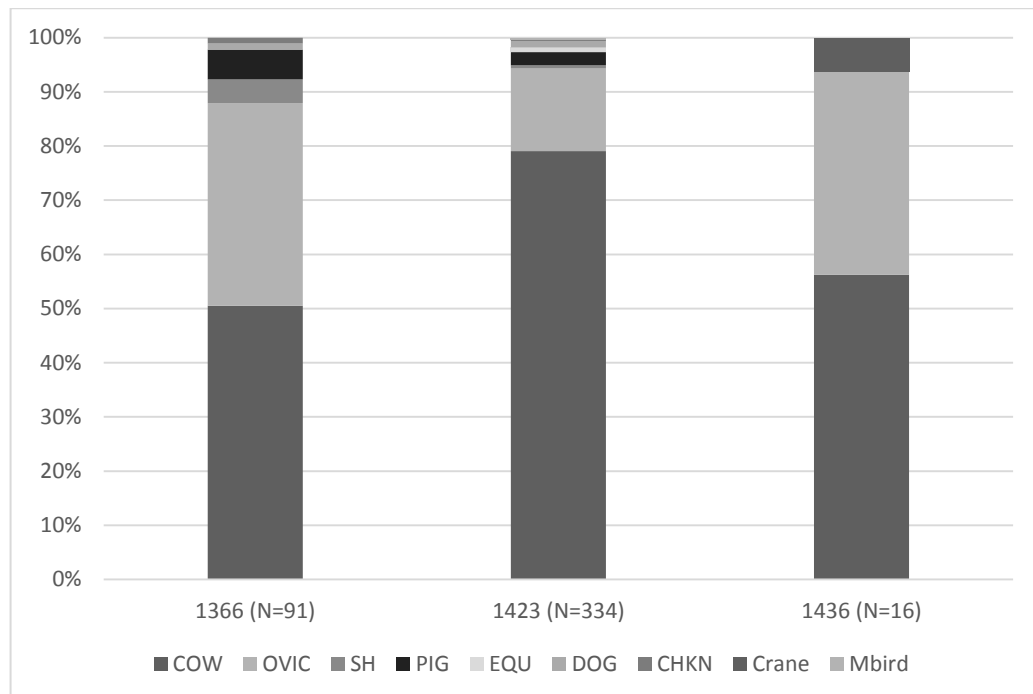


Figure 5-35: Species representation by NISP for pit F1365

When the three layers containing bone are compared, some differences appear (see Figure 5-35). Stratigraphically, context 1436 is in the middle of the pit, with sand deposits below and above. Context 1366 is the uppermost layer of the pit, with context

1424 directly beneath it. 1436 only contained a few bones. Most came from cattle and sheep, but there was one carpometacarpus from a crane present as well. Many elements had signs of butchery, and it is likely that this resulted from domestic waste in the area. Cattle still predominate in the material from top layer 1366, although sheep make up a sizeable proportion of the assemblage, and there is a greater diversity of species with both dog and domestic fowl present.

Context 1423 is markedly different, with approximately 79% of all identified bones coming from cattle. In addition, of the 398 unidentified bones, 365 were large mammal shaft fragments that were probably from cattle but could not be definitively assigned to species or element. Comparison of the cattle from 1423 with the sheep remains also shows a unique pattern (Figure 5-36). Head elements are present for sheep, in even greater proportions than in 1366, whereas they are nearly absent for cattle in 1423. Although sheep were being treated in a generalised way, the cattle were treated very differently. Further focus on this exceptional context provides a better idea of how cattle were butchered at this time.

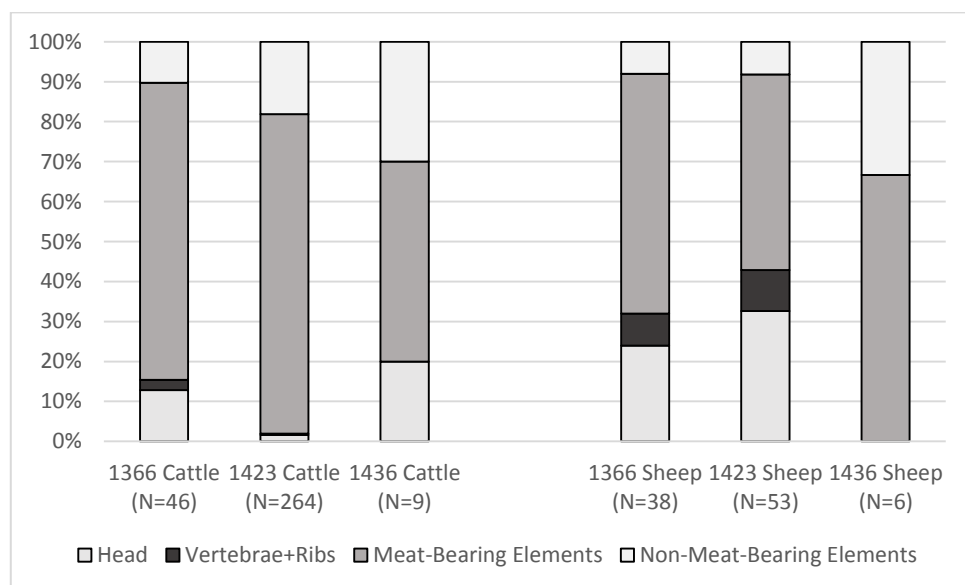


Figure 5-36: F1365 Element representation by %NISP for cattle and sheep/goat

All cattle remains from 1423 were highly fragmented, and almost all came from meat-bearing elements (Figure 5-37). The humerus, radius, ulna, femur, and tibia combined made up 91.7% of all identified cattle remains. No other bone made up more than 2% of the total. The relative absence of head and feet indicates that primary butchery waste was deposited elsewhere. However, several other meat-bearing bones such as the vertebrae, ribs, scapulae, and pelves were also under-represented. It is

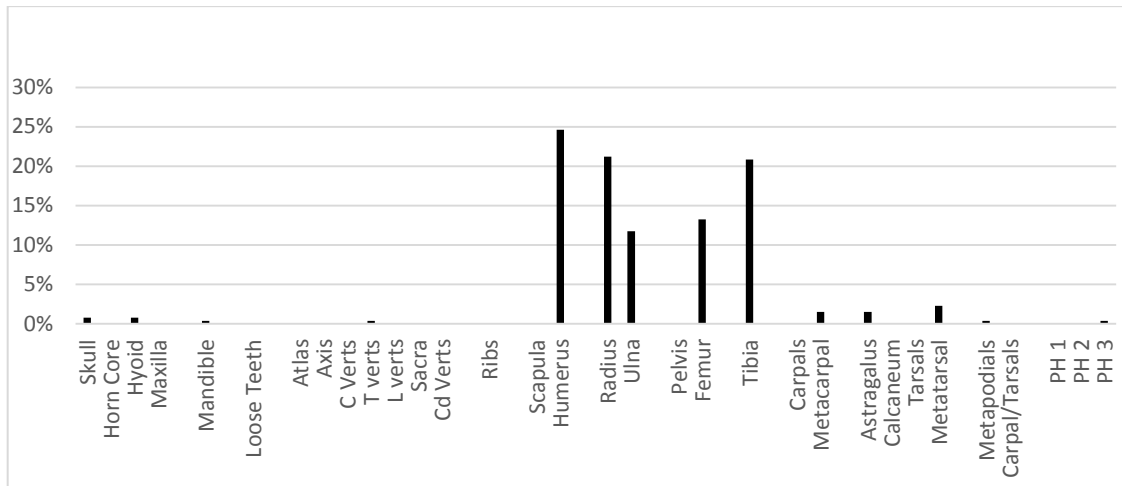


Figure 5-37: Element representation (%NISP) for cattle from context 1423 (N=264)

possible that these units could have been removed for consumption elsewhere, or for preservation.

The MNI and MAU values for this context were relatively high (Table 5-20). For the entire context, the minimum number of individuals is based on zone 7 (the shaft) of the right ulna, which indicates at least 11 animals. The number of rights and lefts was uneven across all elements, so minimum animal units is the most useful metric for counting these paired elements.

	NISP	MAU	MNI
Humerus	65	15	8
Radius	56	11	6
Ulna	31	15	11
Femur	34	4	2
Tibia	55	8	5

Table 5-20: Quantification of body part representation by various metrics for cattle in F1365

Fragmentation was very high, with a number of bones identifiable, but lacking 50% or more of any specific zone (Table 5-21). With the exception of the ulna, the average number of zones per bone never exceeded one. Other cattle bones from non-well contexts in the same period were similarly fragmented, although some elements had a higher average completeness. The high fragmentation coincided with intensive splitting of bones, a phenomenon observed in several urban sites (Maltby 2007).

Element	1423	Other non-well 5 Late A
Humerus	0.4	0.4
Radius	0.8	0.9
Ulna	1.1	1.6
Femur	0.3	1.0
Tibia	0.5	0.5

Table 5-21: Average number of zones per bone for CP6 contexts and Context 1423

It is interesting to note that the other contemporary material has a similar percentage of bones that have been chopped through the diaphysis, which is traditionally associated with the specialist processing of marrow (Maltby 2007: 70). However, chops through the epiphysis are far more prevalent, which suggests the possibility that initial dismemberment of the limbs into smaller segments was occurring before the bones were smashed for marrow extraction. The presence of scooped shave marks on the diaphysis also suggest meat removal. Chops to the diaphysis were also more common in the material from F1365. Epiphyses were not simply hit a few times with a cleaver to remove meat; the pattern here is one of rapid meat removal on a larger scale. Cuts were not entirely absent, but were fewer in number compared with contemporary material outside the pit. For details, see Figure 5-38 below.

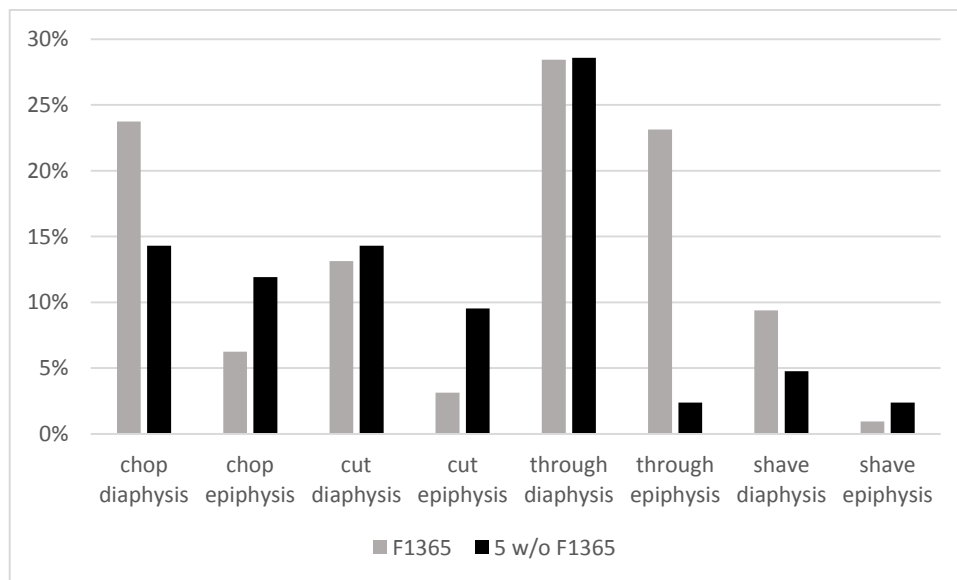


Figure 5-38: Butchery mark types for elements in F1365 and other contemporary non-well features

If marrow processing was the key objective of this butchery, one would expect to see more metapodia and mandibles in the assemblage (for examples of chopped bone, see Figure 5-40). From the number of butchery marks observed going through the epiphyses and the shaving along the diaphysis, it is clear that meat removal was equally important. The consistency of butchery suggests a single butchery style being employed. Additionally, the tight ceramic dating and the taphonomy of the pit's material suggests that this was from a discrete time and place. This material could possibly be from the waste of a specialist processor as described by Maltby, which would not be unknown for roadside settlements and small towns (2007: 71). These data suggest that Ashton was able to employ a specialised butcher, well-versed in urban Roman techniques. It is possible that this meat was then preserved via salting or smoking and sold on to larger urban and military centres, or that Ashton had enough specialists working in other industries to require specialised meat production.

In addition to the importance of examining butchery practices, context 1423 also allows an insight into the health repercussions for the animals involved in large-scale beef production and distribution. Approximately 31% of all Large Mammal shaft fragments unidentified to element show signs of new bone growth on the inside or outside of the cortical surface (Table 5-22). As noted in temporal considerations of cattle pathology, some elements in this context showed signs of significant endosteal new bone formation. One unidentified shaft fragment contained an extremely thick layer of new bone inside the curve of the shaft (Figure 5-39). It appears to be a localised occurrence, and is extremely porous compared to the cortical bone. The cause of this thickening is unknown, and is different in texture from the thinner layers of grey porous plaque present on other bones.

	Number of fragments
No new bone	254
New bone formation outside only	72
New bone formation inside only	21
New bone formation inside and outside	19
total fragments	366

Table 5-22: New bone formation in Large Mammal long bone shaft fragments from 1423

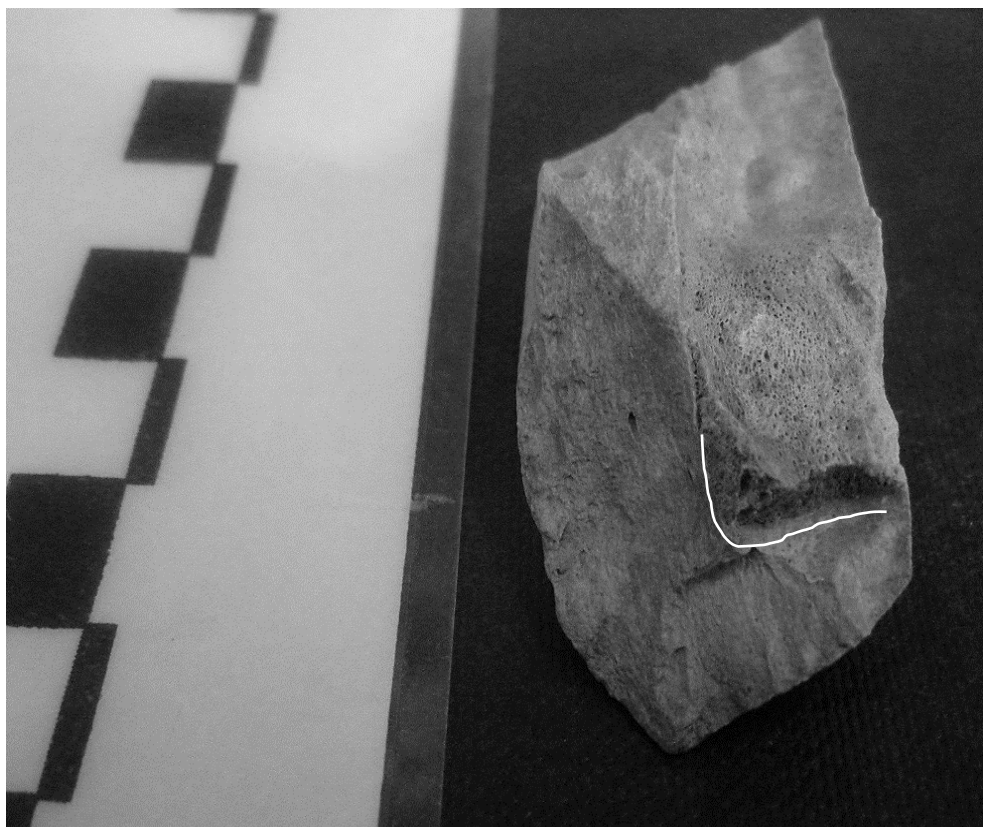


Figure 5-39: Endosteal new bone formation in long bone shaft fragment from 1423; outline of bone edge traced in white to highlight endosteal growth



Figure 5-40: Sample of fragmented long bone shafts from context 1423

5.5 Buildings and Structures

5.5.1 Enclosures

The enclosure systems from areas across the site vary in date of use, the size of area enclosed, the amount of change over the life of a specific layout, and the profiles and fills within. Area B (Table 5-24) and Area C (Table 5-25) tend to have the earliest enclosures, while Area A enclosures (Table 5-23) seem to have been laid out later; this fits with the interpretation that this southern part of the site was laid out first along the old droveway, with expansion to the northeast occurring later. There are some slightly different faunal patterns that can be observed between the different enclosures in the different areas.

Enclosure	AI	AII	AIII	AIV
Area	A	A	A	A
CP	3-6	n/a	2-6	3-6
Date (centuries AD)	late 1 st -late 3rd	n/a	later 1 st -late 3rd	late 1 st - late 3rd
Phases (Road)	I, II, IIa, III, III/IV	I	II, IIa, III, III/IV	II, IIa, III, III/IV
Enclosure phases	ab, c, d, e, f, g	a	b, c, d, e, f	b, c, d, e, f
Position (precursor)	W of road	E of road	E of road	E of road
Precursor	-	-	E II	E II
NISP	162	2	360	122
NSP	168	2	372	124
% Cattle/Sheep/Pig	89.5%	100%	81.7%	73.0%
Cattle/Sheep/Pig ratio	46 : 42 : 12	50 : 50 : 0	50 : 41 : 9	67 : 25 : 8
Horse?	Y	N	Y	Y
Dog?	Y	N	Y	Y
Wild Mammal?	N	N	N	N
Chicken?	Y	N	Y	Y
Other bird?	Y	N	Y	Y

Table 5-23: Area A enclosure summary

Enclosure	BI	BII	BIII	BV	BVI	BVII	BVIII
Area	B	B	B	B	B	B	B
CP	1-2 (5-6)	2-4	6	1-2 (5)	1-2	n/a	n/a
Date (centuries AD)	mid-late 1 st	later 1 st -mid-2 nd	early-late 3 rd	mid-late 1 st	mid-late 1 st	n/a	n/a
Phases (BCDH)	II, IIIa, IIIb	IIIa, IV, IV/V	IV/V, V	I, IIIa, IIIa-b	IIIb	IV/V	IV, IV/V
Enclosure Phases	b, c, d, e	ab	a	a, b	A, B	C, D, E	C, D, E
Position	W of drove	W of drove	E of drove	E of drove	E of drove	E of drove	E of drove
Precursor?	-	Enc I	-	-	Enc V	Enc VI	Enc VII
NISP	383	139	17	327	35	76	198
NSP	398	153	17	342	38	78	210
Cattle/Sheep/Pig ratio	41:44:15	53:37:10	76:24:0	53:36:11	39:56:6	65:32:3	55:36:10
Horse?	Y	Y	N	Y	Y	Y	Y
Dog?	Y	Y	N	Y	Y	Y	Y
Wild Mammal?	Y	N	N	N	N	N	N
Chicken?	N	Y	N	N	N	N	N
Other bird?	Y	N	N	N	N	N	N

Table 5-24: Area B enclosure summary

Enclosure	Enclosure CI	Enclosure CII	Enclosure CIII	Enclosure CIV
Area	C	C	C	C
CP	1-2	1-3	3-5	5-7
Date (centuries AD)	mid-late 1 st	mid 1 st -early 2 nd	late 1 st -late 2 nd	mid 2 nd -early 5 th
Phases	I, II, IIIa-b, III-IV	IIIa, IIIa-b	IV, IV-V	IIIb, V
Position/Precursor	n/a	CI	CII	n/a
NISP	311	572	142	240
NSP	939	1625	371	591
Cattle/Sheep/Pig ratio	32:53:15	38:51:12	48:47:5	75:22:3
Horse?	Y	Y	Y	Y
Dog?	N	Y	Y	Y
Wild Mammal?	Y	Y	Y	
Chicken?	N	Y	N	Y
Other bird?	N	Y	N	N

Table 5-25: Area C enclosure summary

Each enclosure in Area A occupied its own space, and did not supersede previous enclosures. The pattern remained fairly consistent, with frequent recuttings and some added complexity over time. The central feature of Area A is a path running perpendicular to the main driveway in Area B; it separates Enclosure I on the west side from Enclosures II, III, and IV on the east side. Enclosure I dominates the entire west side, while the east side is more subdivided, first with only Enclosure II but later splitting the space between Enclosures III and IV. The most important change occurs in the mid-2nd century when the first buildings are added to the enclosure west of the path. From this point on, remaining enclosures define yards for houses, or change from ditched boundaries to post-built fences.

For Enclosure AI, sample sizes for most enclosure phases were fairly small. However, where sample sizes were above 25, there seems to be a pattern of increasing cattle and decreasing sheep/goat (see Figure 5-41). The phase of enclosure that sees the construction of the first strip buildings, Enclosure AIg, has an unusual composition of ditch material. It contained only a dump of cattle horn cores, a sheep maxilla, and five leg elements from a single raven. Only a single horn core and one other bird element, a chicken in AI f, were present in the previous phases.

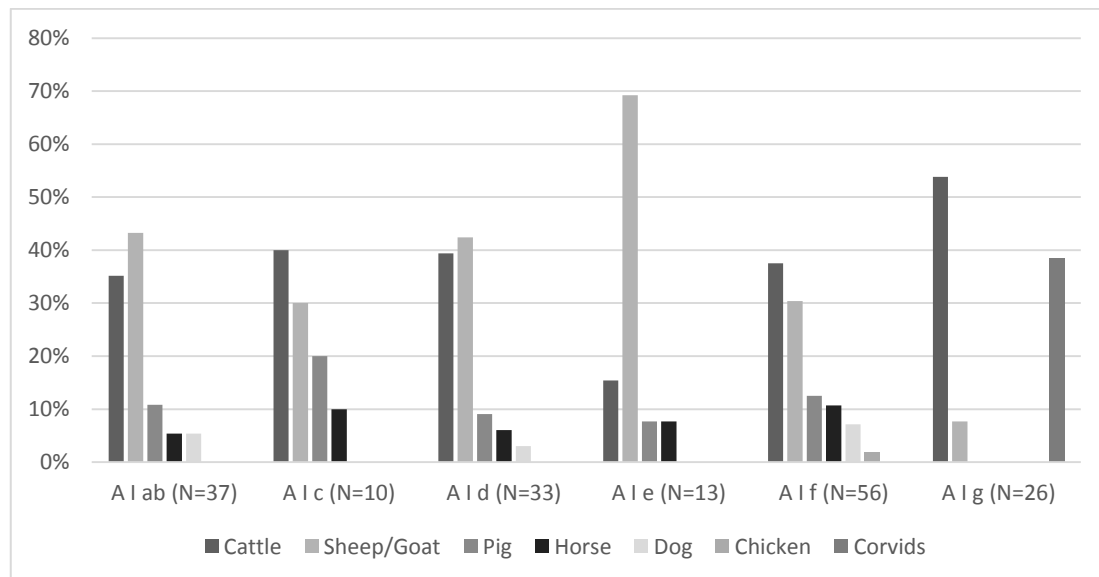


Figure 5-41: Species representation by %NISP for Enclosure AI phases

For the enclosures west of the track, sample size once again made comparisons difficult. Only two elements were present in Enclosure AII, one each from cattle and sheep/goat. No solid conclusions can be drawn from such a small sample.

Enclosures AIII and AIV succeeded Enclosure AII across the road from Enclosure AI. They date from the late 1st to early 2nd century AD, and last until the

construction of the strip buildings in the third century AD. The dividing line is somewhere around the eventual southwest corner of Building 2, with Enclosure III becoming the yards of Buildings 1 and 2 and Enclosure IV becoming the yard of Building 8. Although they start out as ditches, Enclosure AIII ends as a fenced enclosure; fences seem to have been more prevalent during the development of houses along the road.

Small sample sizes again hamper larger generalisations, but some patterns can be identified (Figure 5-42). Corvids only occur in the last phases, with a single crow femur in AIVf and a partial hind and forelimb from a rook and coracoid from a raven present in AIII f. Chickens also do not appear until the middle of the enclosure series. The high %NISP of horse remains in AIIIe comes from a fragmented horse skull and nearly complete maxillary dentition. Horses appear in nearly all phases of AIII and AIV, including juvenile individuals. Dogs were less common, with only a handful of non-articulated remains found across the enclosure series. Where sample sizes were larger than 100, the ratio of cattle to sheep/goat is fairly even. However, AIVe shows a definite bias towards cattle over sheep/goat, and the later phase AIII f also shows a slight increase in cattle over sheep/goat. Wild mammalian species are absent with the exception of a boar metacarpal in AIII d. It is likely that wild animals only made up a very small portion of the diet of Ashton's inhabitants by this time.

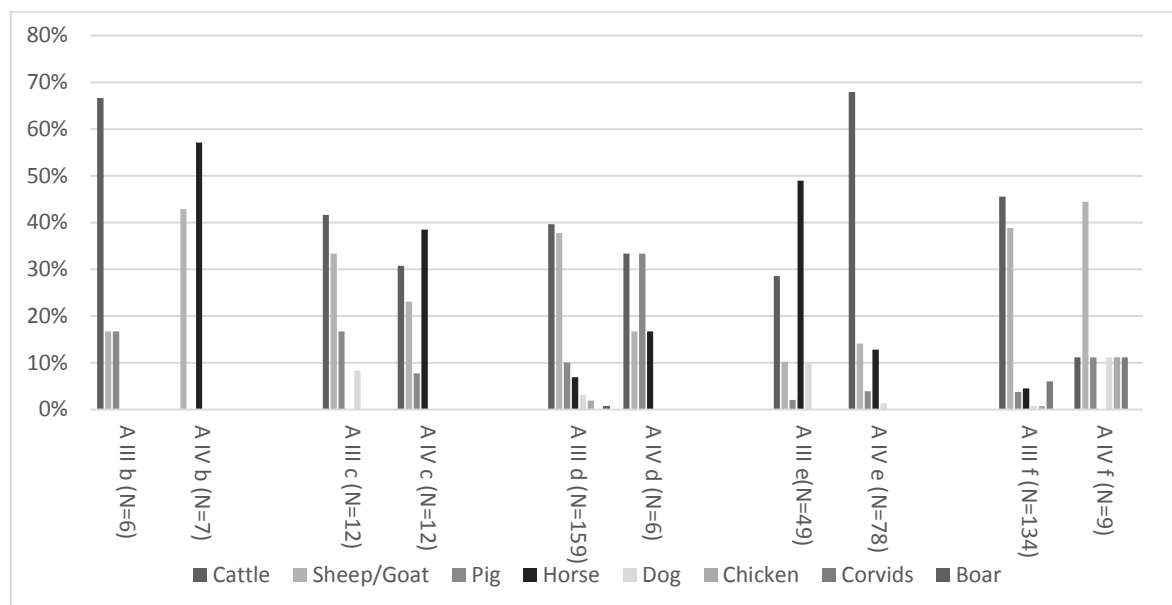


Figure 5-42: Species representation by %NISP for Enclosure AIII and AIV phases

Area B Enclosures

The enclosure series of Area B represents an earlier phase of settlement, although some of the later parts of the enclosure overlap temporally with the earliest parts of the Area A enclosures. Organisation surrounded a north-south driveway that was aligned nearly perpendicular to the track coming down from Area A, and it is likely that a crossroads would have been formed to the southeast in an unexcavated part of the site. The land partitions were only noted as deep enough to have deterred livestock in Enclosure BV and the external boundary of Enclosure BVIII. Some enclosures also seem to have been meant to delineate the boundaries of property around houses, such as Enclosure BI's association with SG102 and possibly SG101 as well. Currently, the only detailed maps available for Areas B and C are hand-drawn figures, which have been labelled and scaled to the best of the author's ability, with key features marked (Figures 5-45, 5-46, 5-47, 5-48).

The fauna from the Area B enclosures was fairly conservative (Figure 5-44). There are very few birds and wild species present in any of the enclosure systems. The only birds represented were wing and rib elements from geese in Enclosure BIe and a chicken humerus in BIIC. Wild animals were also extremely rare. Potential boar was identified in Enclosure BVb and IIC, and a red deer tibia in Enclosure BIe. Commensal species were also very rare, only represented by a single mouse rib in Enclosure BVa. This conservatism of species is in spite of several enclosure phases having over 100 identifiable specimens, and is less diverse than other smaller assemblages in Area A.

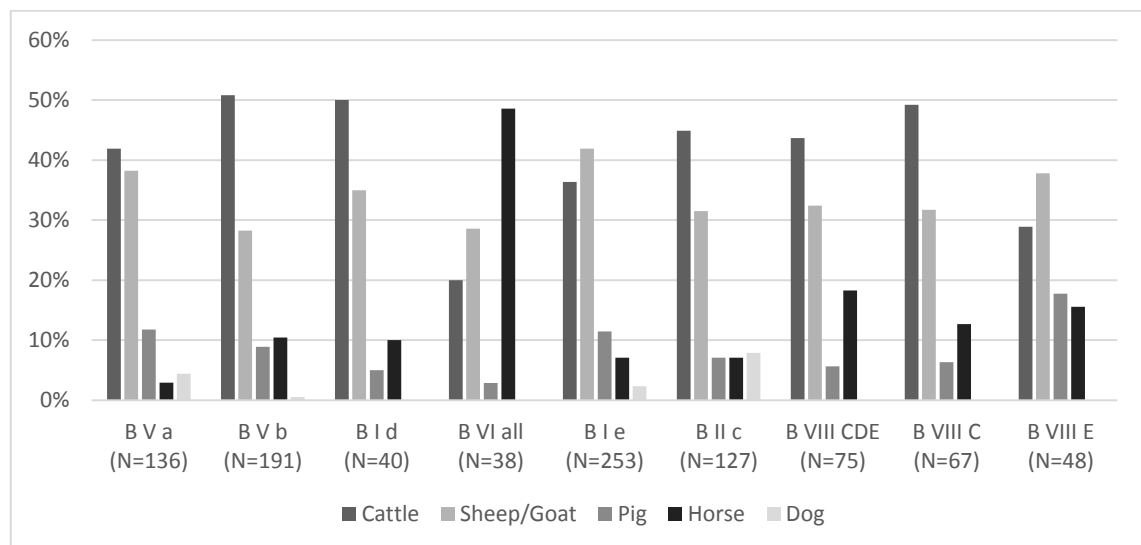


Figure 5-44: %NISP of domestic mammals for Area B Enclosures, arranged temporally, where $N > 30$

When arranged in a roughly chronological order, there are no clear patterns of representation for the main five domestic species over time. The earliest enclosures, BI and BV, are all from the earliest period of the site, the mid- to late 1st century AD, and show a surprising number of cattle compared to sheep when compared to overall site prevalence for that period. It is possible that these enclosures held more cattle, while sheep were kept in larger numbers in other locations during this earliest phase. Shifting usage of the enclosures may be observed as the balance shifts towards sheep by Enclosure BIe, then back towards cattle as the number of cattle at the site in general increases.

Pig tends to make up around 5-10% of total identified material for most enclosure phases. Horse and dog make up a small percentage of the remains, with dogs being particularly rare. Enclosure BVIII has higher percentages of horse, which include remains of juvenile individuals. It is possible that these enclosures could have been used for raising various stock, including horses.

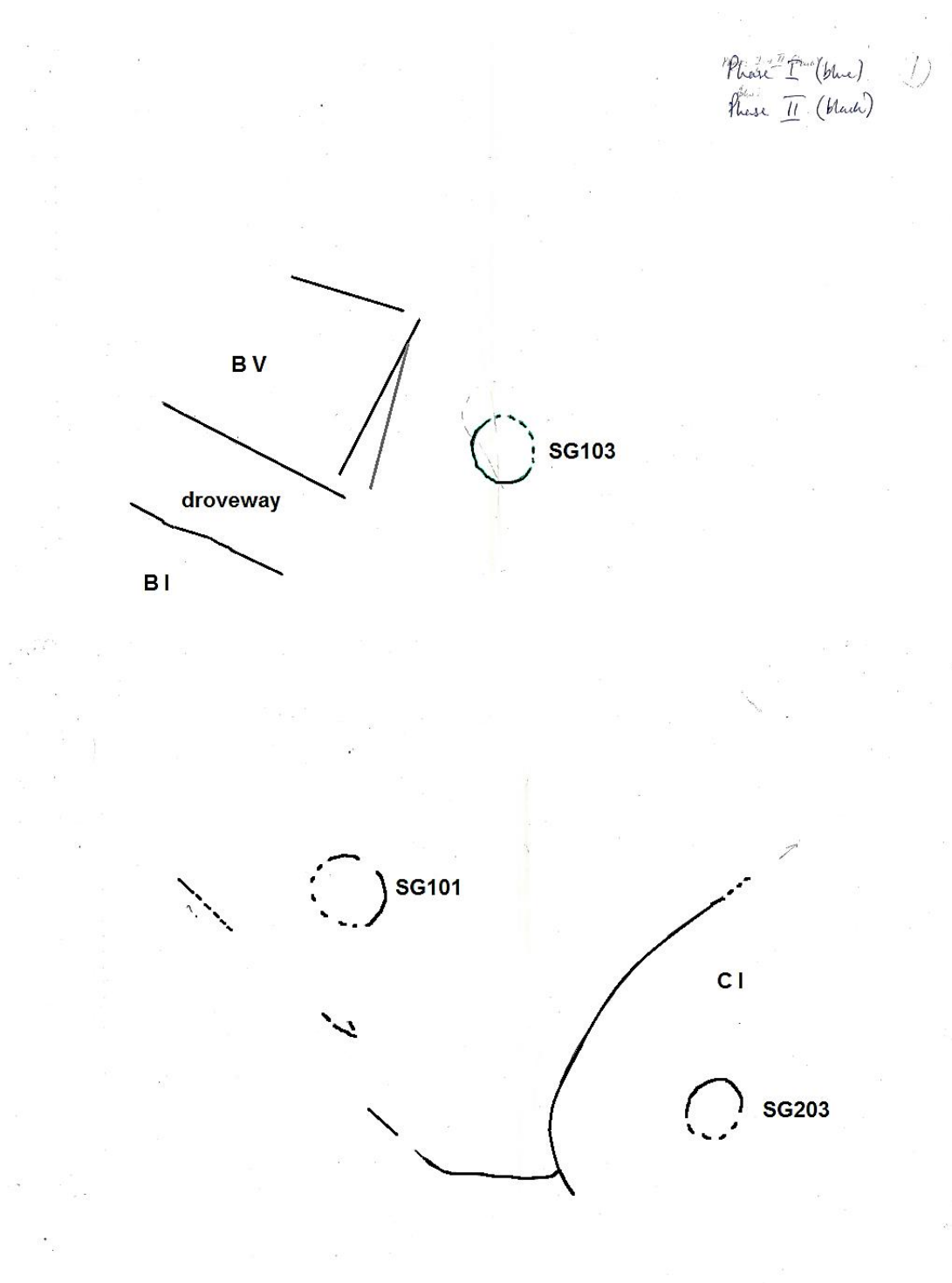


Figure 5-45: Area BCD map, Phase I in grey and Phase I in black (after map from Northamptonshire County Council, n.d.; no scale given)

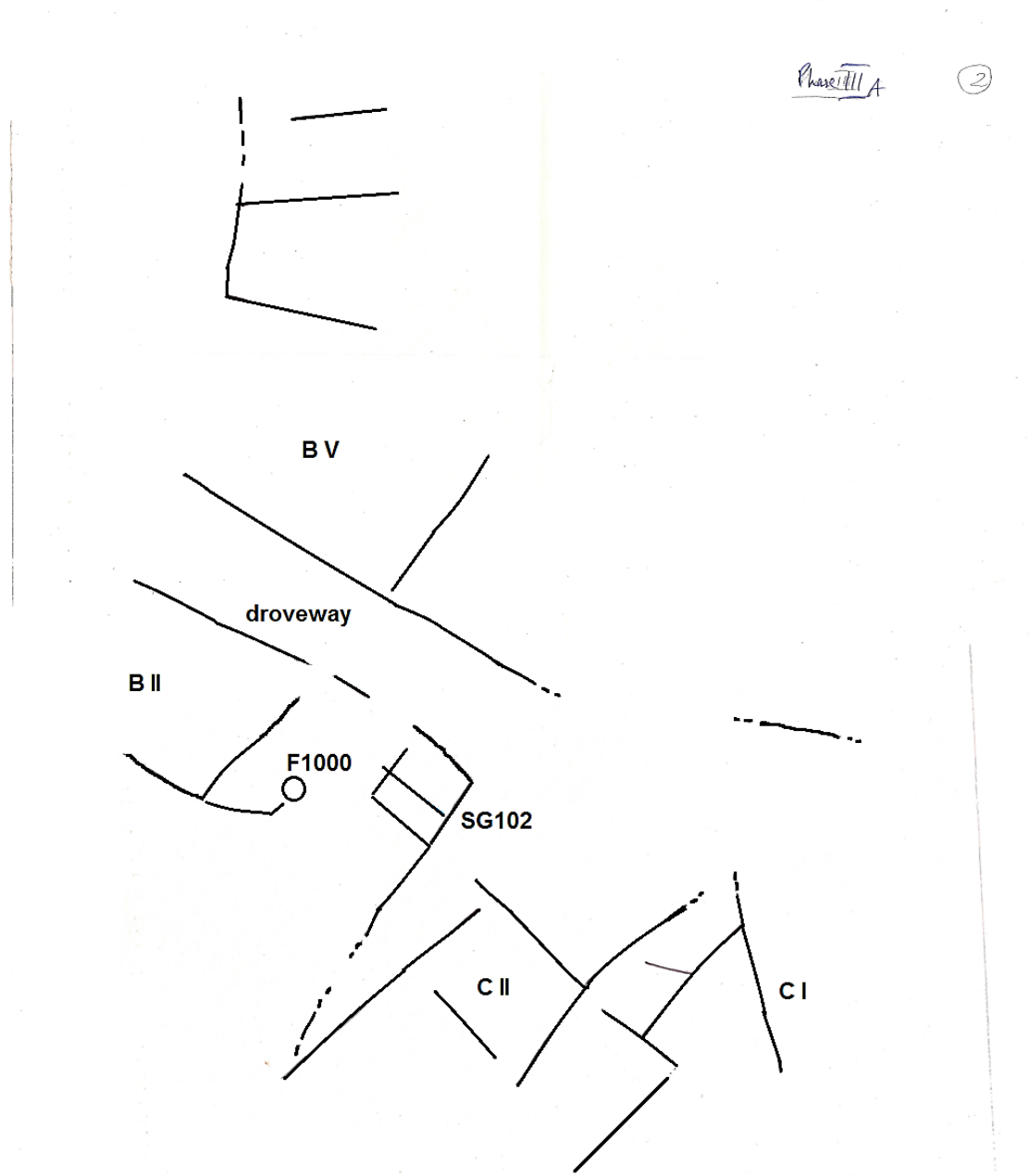


Figure 5-46: Area BCD map, Stratigraphic Phase IIIA (after map from Northamptonshire County Council, n.d.; no scale given)

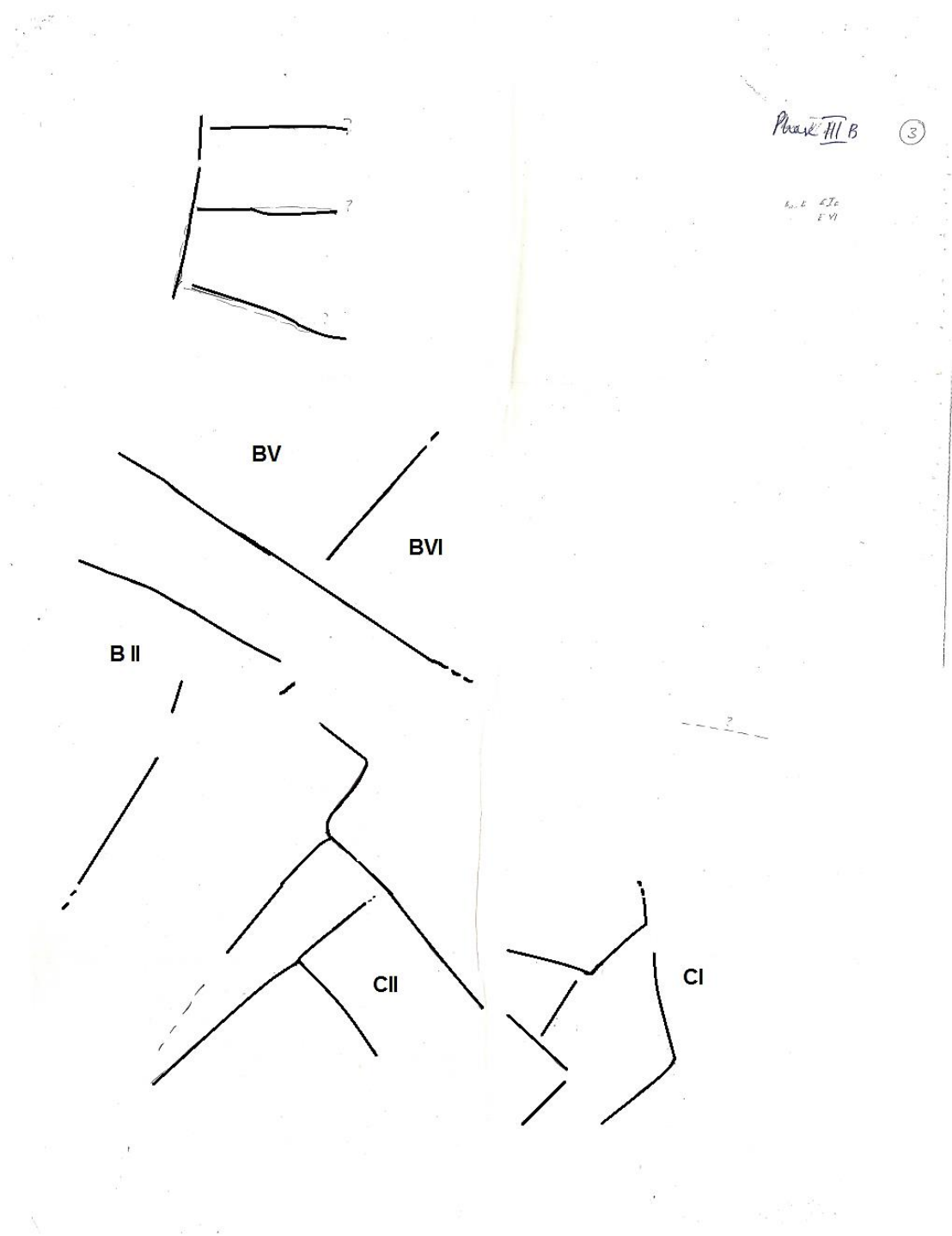


Figure 5-47: Area BCD map, Stratigraphic Phase IIIB (after map from Northamptonshire County Council, n.d.; no scale given)

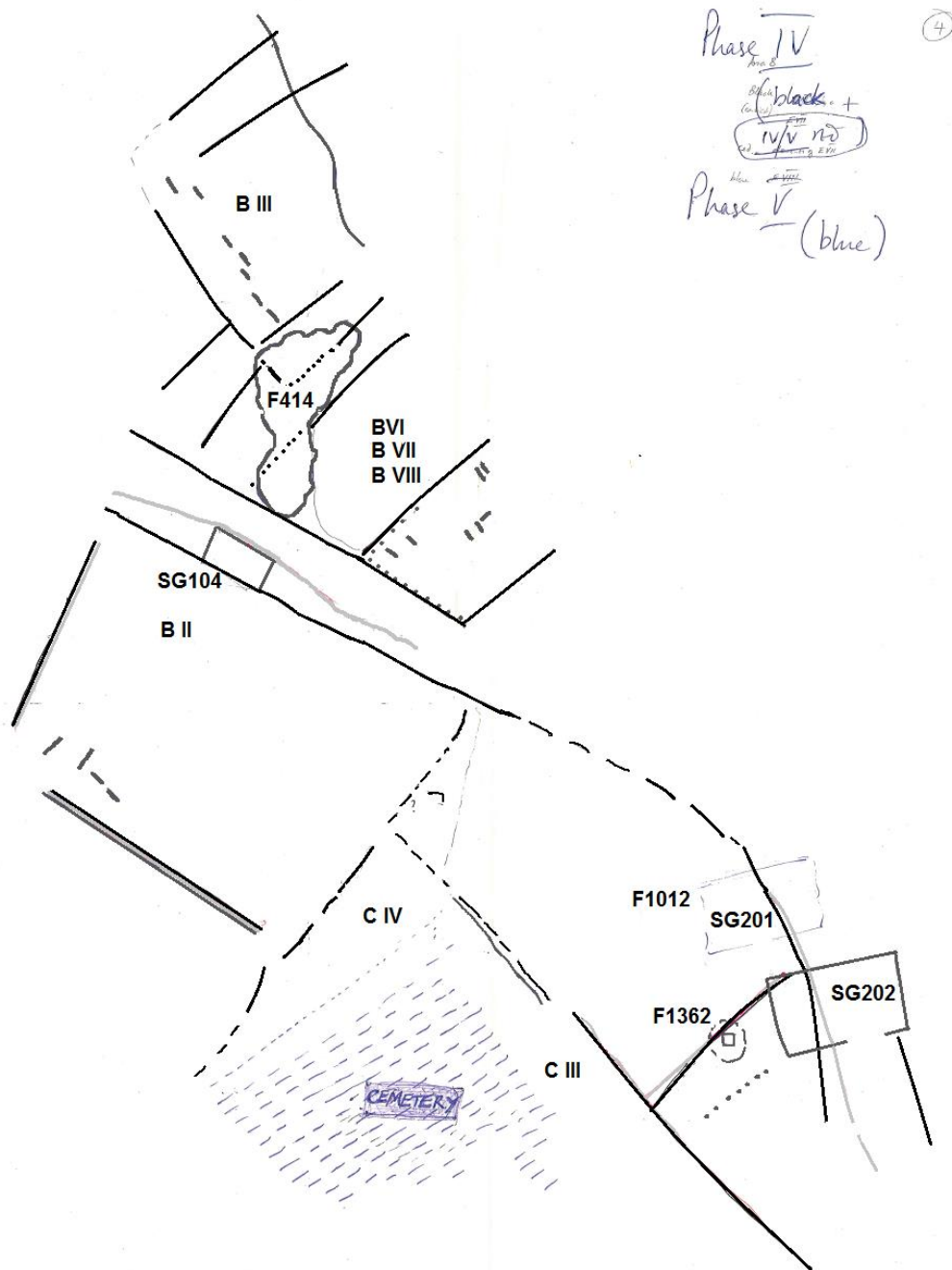


Figure 5-48: Area BCD map, Phase I in grey and Phase I in black (after map from Northamptonshire County Council, n.d.; no scale given)

Area C Enclosures

Area C and D also has a very early series of enclosures with some associated buildings. It is likely that Enclosure CI is contemporary with BI or earlier, while Enclosure CII is contemporary with later BI phases. Recutting of these ditches was less conservative than in Area B. Four main enclosures are defined in the southwest part of the town, most laid out to the west of the downward curving driveway that bisects Area B. Some of these are later covered in part by the cemetery that dates to the later period of occupation. During some phases, the enclosures were intensively subdivided, perhaps for use as stock pens (Northamptonshire County Council n.d.: 16).

Some enclosures were associated with buildings. The curvilinear nature of the earliest enclosure in Area C may have centred on a roundhouse, which sits back from the driveway inside early Enclosure CI. Later, rectangular building SG201 sits over the top of the previous Enclosure CIV, suggesting the repurposing of land in the last occupation phase. Land is progressively parcelled up into smaller units, then restored to larger sections, and in the final phase, much of the western parts of the former enclosure system is taken over by the cemetery. As these were usually located on the periphery, it could indicate a shift in primary activity further toward the road and away from the original focus of the driveway.

Structure	Encls I a	Encls I b	Encls I c	Encls II a	Encls II b	Encls III	Encls IV
Cattle	30.0%	17.6%	28.3%	31.4%	37.2%	39.4%	61.3%
Sheep/Goat	50.0%	64.7%	47.0%	49.4%	45.2%	38.0%	17.9%
Pig	10.0%	17.6%	13.6%	14.6%	8.0%	4.2%	2.1%
Horse	10.0%	0.0%	10.8%	2.5%	8.0%	13.4%	12.5%
Dog	0.0%	0.0%	0.0%	1.3%	0.0%	3.5%	3.8%
Chicken	0.0%	0.0%	0.0%	0.4%	0.9%	0.0%	1.7%
Cat	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%
Wild Mammal	0.0%	0.0%	0.4%	0.0%	0.3%	1.4%	0.4%
Corvids	0.0%	0.0%	0.0%	0.4%	0.0%	0.0%	0.0%
Rodents and Amphibians	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%
total NISP	10	17	279	239	325	142	240

Table 5-26: Species representation by %NISP for Area C enclosures

In general, we see an increase over time in the number of cattle compared to sheep and goat remains (Table 5-26; Figure 5-49). This increase is more gradual at first, but is starkly apparent by Enclosure CIV. Pigs also decline in frequency over time. This fits with the development of the early site as it gains a more formalised layout,

rectangular stone-founded buildings, and greater economic importance in the wider area. When the three main domesticates are compared amongst each other, this pattern is strengthened. By Enclosure CIV, cattle make up over 70% of the large ditch assemblages, indicating a move toward the production of both beef and cattle for traction. The percentage of the total NISP made up by the main three food species is also notable. For almost all enclosures, more than 80% of the total number of fragments came from the three main food species, reflecting the conservative nature of deposits in Area B enclosures. Enclosure CIIc is particularly conservative, with 99.6% of all elements belonging to cattle, sheep/goat, pig, or horse, in spite of having a larger sample size than the more taxonomically diverse enclosure CIII and CIV.

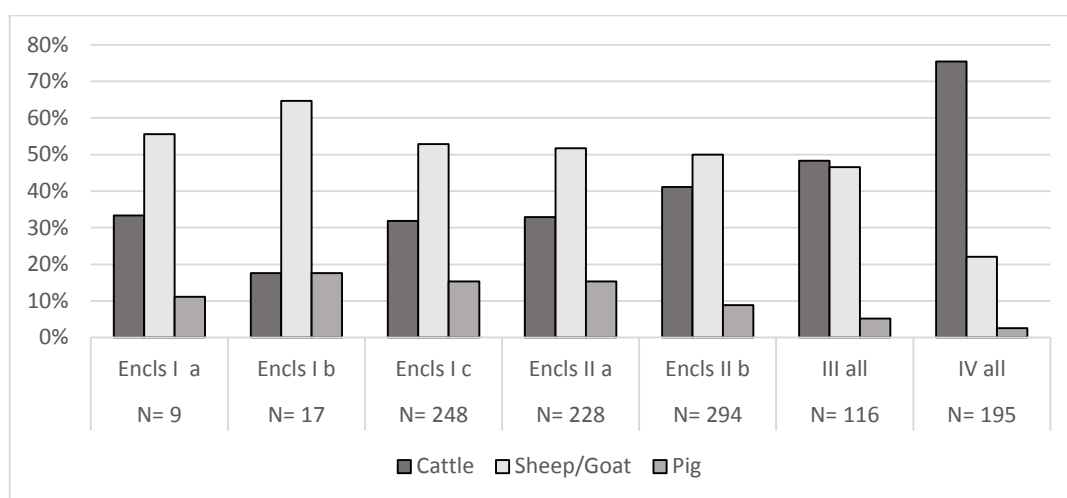


Figure 5-49: Comparison of main three domesticates for Area C enclosures (%NISP)

In terms of domestic mammals beyond the three key food species, horses and dogs were present in low numbers in several contexts, as well as a single instance of cat. In enclosures I, III, and IV, horse remains made up about 10% of the total NISP. They were slightly less common in Enclosure II. In enclosures I, II, and III, most horse remains were fully fused, with the occasional unfused vertebra or skull; Enclosure IV contained a higher number of unfused elements across several ditch contexts. Fragments of dog bone were present, with most of these being parts of the skull or mandible. Of the four mandibles from all enclosures, one shows signs of having a congenitally absent third molar and premolar; this is usually due to facial shortening in the creation of smaller breeds. In terms of age, most of these represent mature individuals, with the exception of those from Enclosure CIIa; the three elements there included a paired set of mandibles with the second molar just erupting and a fully unfused scapula. These are consistent with an individual between five and seven months of age (Silver 1969). The

presence of ubiquitous canine gnawing also confirms the presence of dogs in the vicinity of the enclosures. Domesticated cats were also potentially present in this area. A humerus from a kitten was found in a ditch in Enclosure CIV, with the proximal end fully unfused and the distal end just fusing. The presence of immature individuals does suggest that this animal may have been domesticated rather than the remains of a wildcat killed for skins or as a pest, although it could be a tamed individual rather than a fully domesticated companion animal.

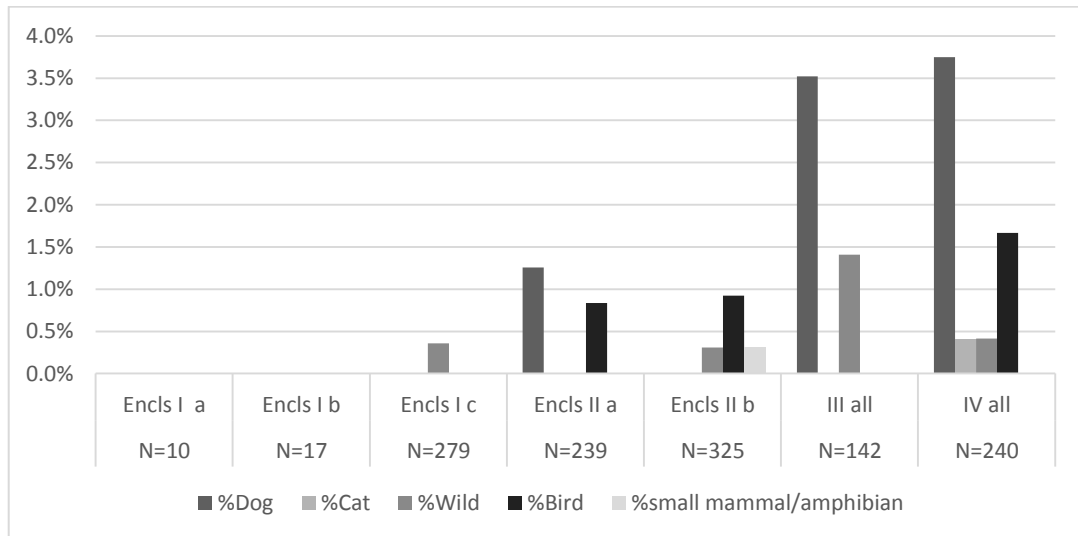


Figure 5-50: Less common species by %NISP in Area C enclosures

Birds and wild mammals are rare, but present (see Figure 5-50). The wild mammals noted include boar (Enclosure CIII), red deer (Enclosure CIIb), and roe deer (Enclosures CIc, CIV). All of these animals were represented by limb bones, which suggests definite hunting rather than collection of antlers for craft-working. In terms of birds, chickens were most common, as well as one instance of a raven carpometacarpus in Enclosure CII. Birds were more common in the later periods, and this is not entirely a factor of sample size. Chickens would have become more common throughout Roman Britain over time after their introduction in the late Iron Age.

5.5.2 Buildings in Area A

The strip buildings of Area A present a look at the later town phases, when Ashton was developing into a classic ribbon development with narrow frontages along the main street and enclosures behind. Many of the identified buildings contained one or more hearths with signs of iron-working, indicating that these may have been workshops as well as living spaces. For map, see Figure (5-51).

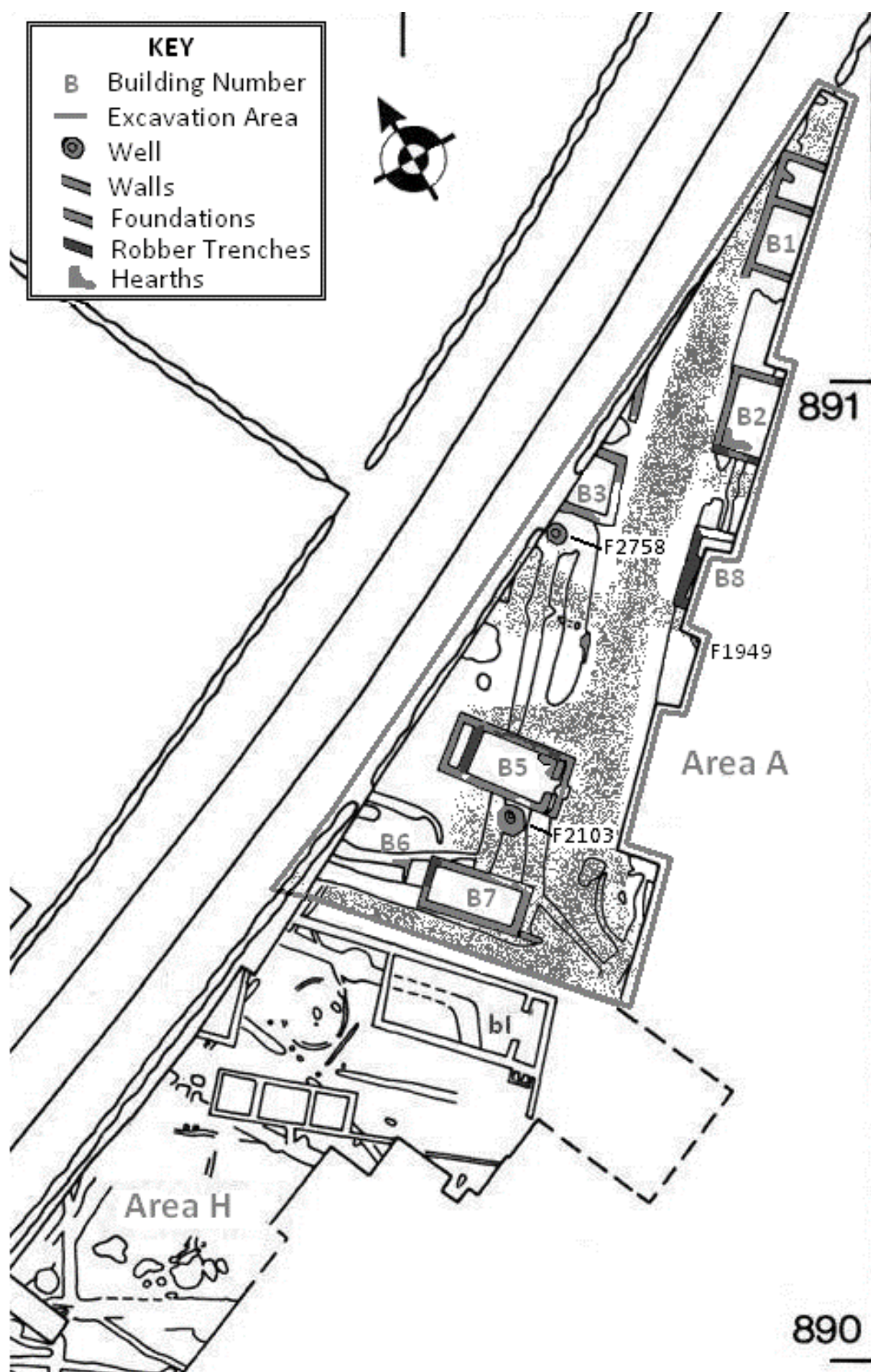


Figure 5-51: Map of Area A, (B represents Building Number (modified from map by Northamptonshire County Council, n.d., no scale given)

Eight main buildings have been identified and numbers 1-8, although Building 4 only exists as a small corner of masonry and its area is mostly covered by the later midden F300. Only buildings 5 and 7 have been excavated in their entirety, while the rest extend beyond the area of excavation, which narrows towards the north. Most have a single room, and nearly all experienced destruction and robbing towards the end of occupation.

The first strip buildings were constructed around the mid- to late 2nd century, and continued in use with several periods of refurbishment. Most were robbed for stone to build other structures well into the last phases of site in the late 4th to early 5th century. This area, along with the Area H excavation under the Middle Nene Archaeological Group, has the most evidence for iron-working and industrial activity, and activity here appears to be of a different character than that observed to the south in Areas B, C, and D.

Five of the seven excavated buildings in this area show signs of hearths, with all but one of these associated with metal-working. B8 likely contained hearths, but only the outer walls were within the excavated area. Of the buildings with a mostly-excavated floor plan, B1 and B5 have the most evidence for metal-working on a large scale, while B7 has comparatively little. An iron ladle and chisel blade were discovered in the floor levels of B and an extra room was constructed to house more hearths in later phases of its development (Northamptonshire County Council n.d. Area A Buildings: 11). Hearths were clearly structures of great importance; in Building 3, an infant was buried in the channel of a hearth (Northamptonshire County Council n.d. Area A Buildings: 21).

B1 and B5 were the first buildings to be constructed along the road, dating from somewhere in the early to late 2nd century; B7 also shows early dates for a foundation trench. B2 followed in the next phase of development, followed by the others along with an additional room added to B1. These buildings show some significant differences to the buildings in Areas B and C as well as differences to the enclosures in the same area.

Several buildings, notably B1 and B7, have pits in their floors with structured deposits, often including young lambs, neonatal pigs, birds, and fish. These pits, as discussed below, may represent foundation rituals, and contrast with the cattle-heavy representation seen in contemporary features.

	B1	B2	B3	B5	B6	B7	B8
CP	n/a	n/a	5-7a	6-7b	n/a	4-7b	7a
Road Phases	III, III-IV, IV	III-IV, IV	IV	III, III-IV, IV	IV	IV	IV
# hearths	6	1	0	3-5	1	1	0
Complete area excavated?	No	No	No	Yes	No	Yes	No
NISP	88	20	15	125	1	180	9
NSP	163	67	52	312	3	330	16
Structured deposits?	Yes	No	No	No	No	Yes	No
Cattle/Sheep/Pig ratio	62: 23: 15	29: 65: 6	54: 42: 4	39: 50: 11	0:100:0	15:49:36	50:50:0
Horse?	Yes	No	No	Yes	No	No	No
Dog?	No	No	No	Yes	No	Yes	No
Wild Mammal?	No	No	No	Yes?	No	No	No
Chicken?	No	Yes	No	Yes	No	Yes	No
Other bird?	No	Yes	No	Yes	No	Yes	No
Fish?	No	No	No	No	No	Yes	No

Table 5-27: Properties of buildings in Area A1

It is useful not only to contrast the buildings in Area A against those to the south, but amongst each other (Table 5-27). When all feature types for each building were combined, it can be seen that the basic species makeup varied widely for each. For most buildings, cattle, sheep/goat, and pigs were the most numerous species, especially if sample sizes were small. Buildings with large pit assemblages, however, such as B1 and B7 show an increase in rarer species.

The domestic species from the buildings vary widely amongst structures (Figures 5-52, 5-53). Much of this variation is due to the feature types present in each. Pig remains were highest in B7, where a special pit were present. The number of sheep/goat remains in B1 is similarly skewed by the presence of special pits. Other ratios were less extreme, and fit with the general patterns at Ashton. In most cases, where both foundation trenches and robber trenches were present, the robbing features showed higher numbers of sheep compared to the foundation features (see Figure 5-54). Small sample sizes prevent definitive conclusions, but this is suggestive of the overall

trend towards an increasing importance placed on sheep in the later Roman economy at Ashton.

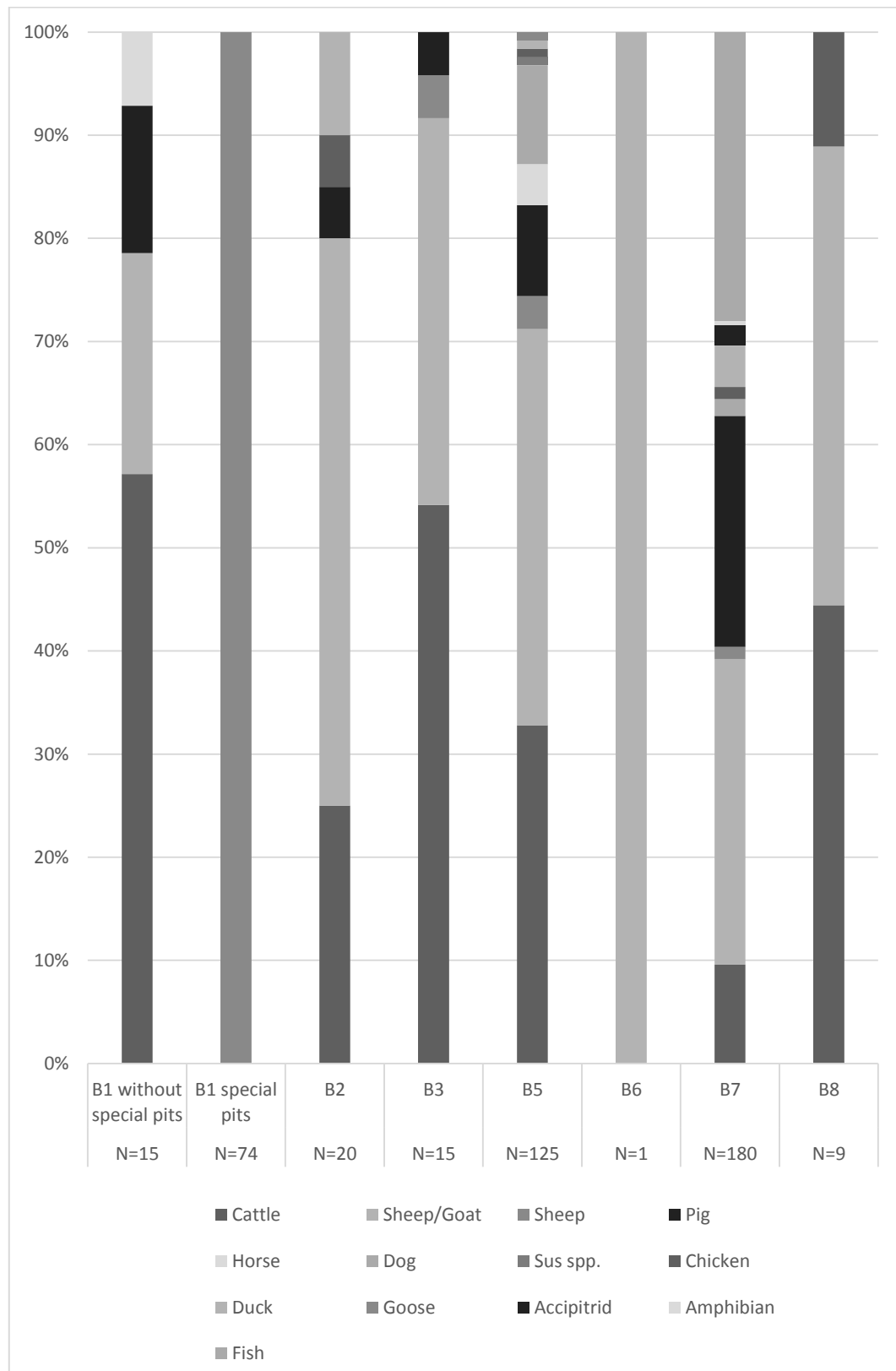


Figure 5-52: Species representation for buildings in Area A

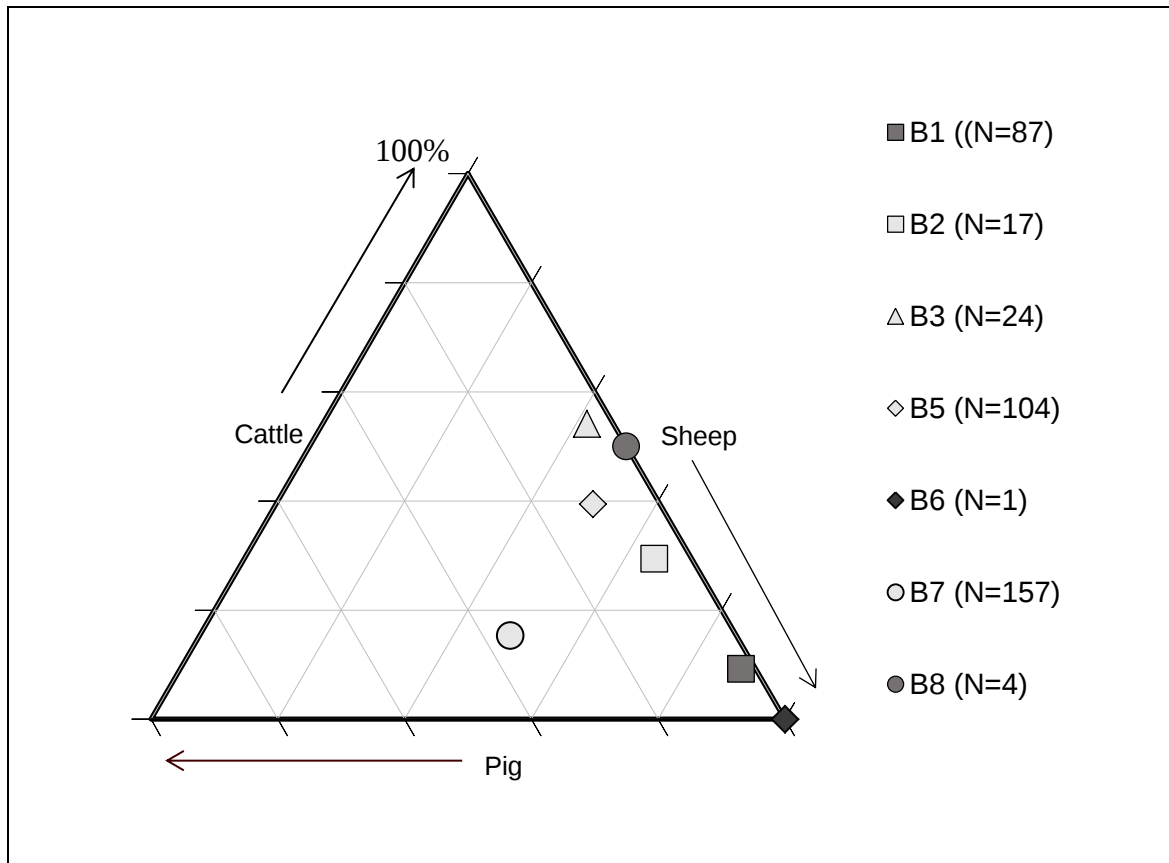


Figure 5-53: Triplot of three main domesticates for Area A buildings (arrows show direction of increasing prevalence)

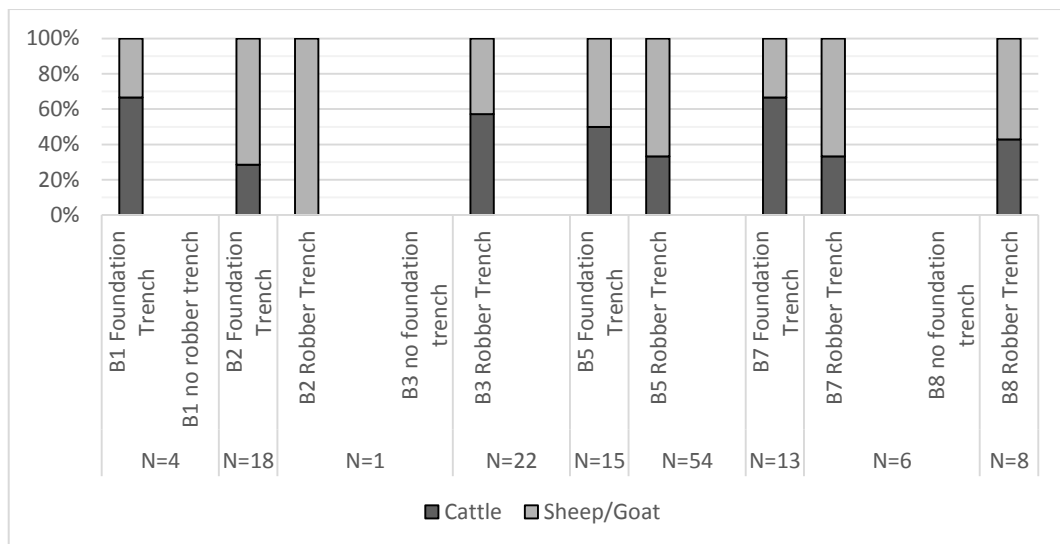


Figure 5-54: Ratio of cattle to sheep/goats in foundation trenches and robber trenches

The rarer domestic species were present in small numbers in a few of the house features. Horse elements were only identified in B1 and B5. B1 contained a single unfused vertebra, and B5 included loose teeth and an ulna and butchered radius. One would not expect the disposal of large animals within a house context outside of food waste, and thus the scarcity of horse elements is not unexpected. However, the presence

of butchered remains does hint at the processing of their carcasses. Dogs were also fairly uncommon, but their remains were found in B5 and B7. The dogs from B7 all come from pit context F1340, which may have been a structured deposition; teeth indicate that the skull remains in the pit were from an animal whose adult dentition was just beginning to form. One partial skeleton of a dog from a pit in B5 is notable for its small size; the greatest length of the fully-fused tibiae (77.3mm) was smaller than the Pomeranian-sized Hemel Hempstead individual noted by Harcourt as an example of small breed introductions (1974: 164). All bones were fused with the exception of an unfused frontal bone. The dog also showed signs of probable skinning, with cuts across the top of the humeral head and behind the orbits of the eye. Elements from the foundation trench and later robber trench included some bones from a larger dog as well as unfused tibiae pieces. The presence of worked elements from dogs and horses, both found in pit F493 in B5, supports the idea that workshops in this area were involved with processing skins and bone working in addition to iron-working.

The presence of chickens and other birds was noted in B2, B5, and B7 (summarised in Table 5-29). It is peculiar that they should be absent from Building 1, which had much of its floor area excavated, and had pits, structured deposits, and several floor layers. By both NISP and MNI, ducks were the most common birds found in the houses, having been present in all three houses with bird remains. Chicken remains were also present in small numbers across these three buildings. Geese and raptors only occurred in pit context F1340, which is discussed below as an example of a unique deposit.

Taxon	MNI	NISP	# contexts	Buildings
Accipitrid	1	5	1	B7
<i>Anas</i> spp.	2	13	3	B2, B5, B7
<i>Anser</i> spp.	1	1	1	B7
Chicken	1	5	4	B2, B5, B7

Table 5-28: Bird remains in Area A buildings

Area A building features largely lacked evidence for wild mammals and commensal species. No urban scavengers, such as foxes, stoats, or corvids were noted from the buildings. These animals were unlikely to have been found in buildings unless purposefully buried for special purposes, explaining their greater presence in open features beyond the buildings. Only a single possible wild animal was identified, a fragment of ulna that may have come from a wild boar. Although it was too fragmented for measurement, it was noticeably larger than even modern domestic pig ulnae.

Activity in Area A seems to have focused on the consumption and processing of domesticates; if wild animal bones, antlers, or pelts were being processed, there is no evidence of it in the building features.

Evidence for element representation and butchery does not suggest any specialised focus on primary butchery, consumption, or craft-working (Figures 5-55, 5-56). Small sample sizes hinder extensive interpretation, but where they are above 10, there is often a mix of head, foot, and meat-bearing limb elements. Sheep tended to have more of the lower limb elements such as the radius, ulna, and tibia, which would have made for smaller and more convenient joints of meat than their equivalent on cattle.

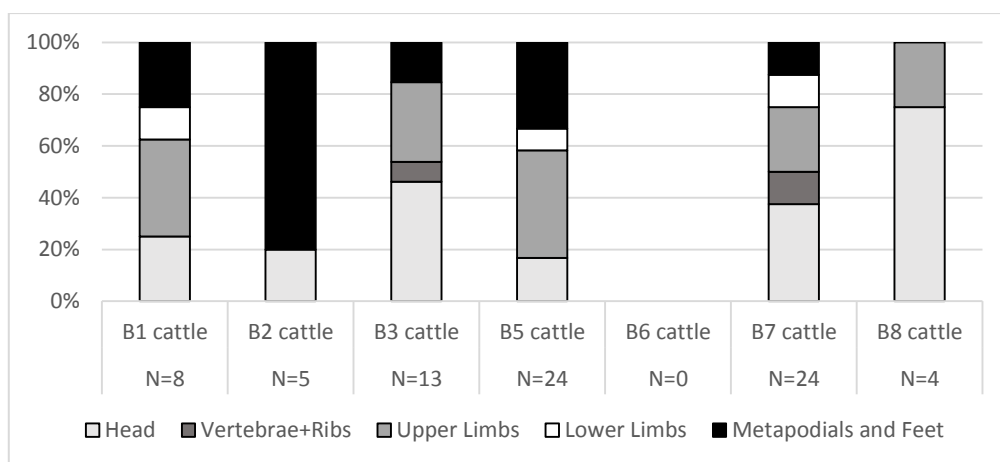


Figure 5-55: Element representation by NISP for cattle remains in Area A buildings

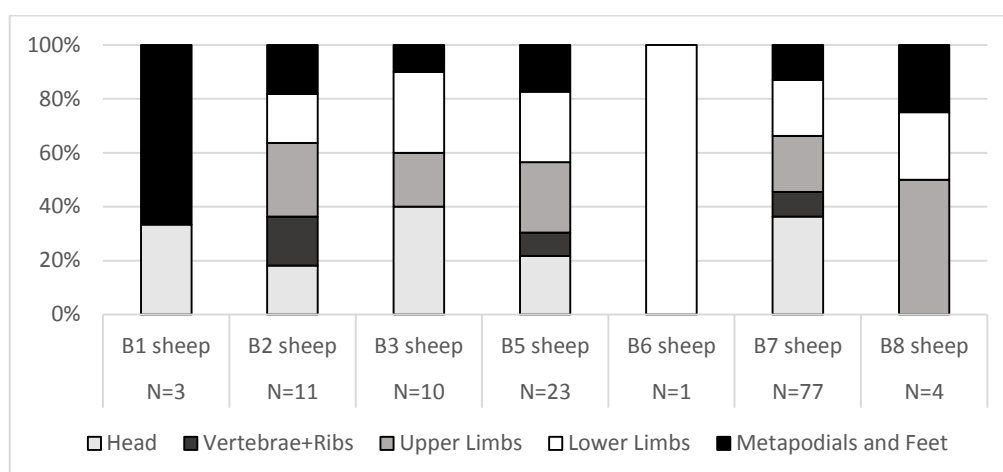


Figure 5-56: Element representation by NISP for sheep/goat remains in Area A buildings

The number of butchered remains (see Figure 5-57) was generally low, with the exception on B3 and B5, which showed butchery rates for the main three domesticates approaching 40% (the small group from B8 was discounted for its low sample size).

The higher butchery incidence was not due to anomalous features, but was present across all feature types. In all buildings, cuts were rarer than chops, fitting with the later Roman pattern of using heavy cleavers more commonly than delicate knife-work. The unique butchery patterns for the sheep in the special pits from B1 will be discussed further below, and represent the widespread use of cleavers as butchery tools, even for smaller species. Much of the material incorporated into the building features came from construction or robbing activities, and probably represents household waste that escaped being collected for the midden.

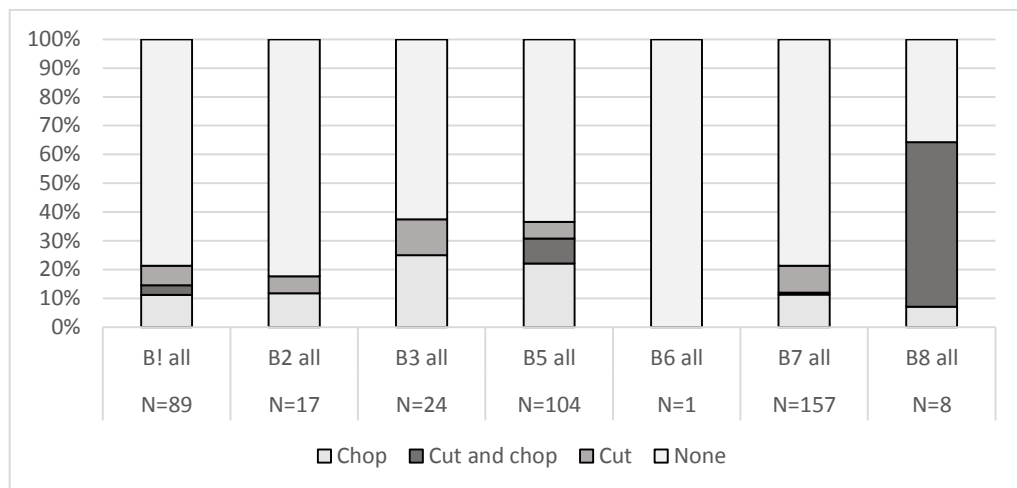


Figure 5-57: Butchery marks on main 3 domestic species in Area A buildings

Creating age profiles for the animals found in building contexts is also difficult due to small sample sizes. Across all buildings, only four cattle, ten sheep/goat, and six pig mandibles could be aged using tooth-wear. The post-pit in B1 contained a fully adult mandible, whereas the other mandibles from B5, B7, and B8 contained mandibles from subadults between 8 and 30 months of age (Halstead 1985; Hambleton 1999: 66). Sheep vary more widely. The sheep from pits in the floor of B1 will be further discussed below, and represent very young individuals. Similarly young sheep were found in a pit and hearth in B5. Animals ranging from six months to two years of age at slaughter were identified in B2, B3, and B7; B7 also contained a number of adult individuals three years of age and above. The oldest was somewhere between four and eight years old at slaughter. All of the pig mandibles available for ageing were found in pit F1340, discussed below, and come from animals ranging from very young (zero to two months old) to prime meat age (14-21 months old) at time of death. The ageing data suggests that animals in these contexts would have largely been exploited for meat while it was still tender, however the presence of older cattle and sheep is in keeping

with the older age profiles that show the increasing importance of secondary products in the later periods at Ashton. Where very young animals are found, they are usually parts of structured deposits, although there is also the possibility that raising animals in backyard enclosures could result in natural casualties which might have been buried and included in house features unintentionally.

Overall, the material from the Area A buildings agrees well with the temporal data for each species. Evidence of possible ritual deposits were present in several of the houses, and will be discussed further below. The importance of these workshops to the economy of later Roman Ashton would have been paramount, and thus the presence of such rituals being carried out in these buildings rather than the earlier ones to the south is intuitive.

Structured deposits: pits in B1

Dug into the first floor of B1 were two pits, one near the north wall and the other near the south wall. These two pits both contained the remains of juvenile lambs. Some of the bones from pit F1321 were still articulated when excavated (Northamptonshire County Council n.d.: 6). The semi-complete nature of the remains in addition to the presence of burning and distinctive butchery patterns suggests that something beyond typical consumption patterns was involved with these depositions.

The bones from Pit F1323 were mostly disarticulated and few were complete. However, elements from all parts of the body were present, including caudal vertebrae, elements of the head, torso, and all limbs. The skull itself was absent, as were all but a single toe bone, which may suggest their removal during the disarticulation process. The bones present are shown in Figure 5-58. Several elements were heavily butchered, especially the left forelimb which displayed many deep diagonal chop marks. Only the scapula showed any signs of cuts; otherwise, it seems that butchery was carried out with a heavy blade of some sort. In at least two cases, the epiphyses were sheared cleanly through. Most long bones were chopped through the centre of the shaft. None of the bones showed any signs of burning.



Figure 5-58: Butchery of juvenile sheep from F1323

The partially articulated bones from F1321 also show elements from all parts of the skeleton, although this context has significantly more axial and foot elements than the previous example (see Figure 5-58). In fact, when these contexts are examined, it is possible that both contexts represent bones from the same animal. The bones from F1321 consist largely of foot, vertebral, and head elements, although both scapulae and a tibia are also present. From the configuration of the parietal-occipital suture, it is likely that the animal here is a sheep rather than a goat.

In terms of butchery, the only chops were on the tibia, and were again inflicted by a heavy blade. The left atlas and calcaneum also show signs of cutting, likely as part of the skinning process. Like the scapula from F1323, the F1321 scapula also shows signs of horizontal cuts along the dorsal part of the medial surface of the blade. The right astragalus, right metacarpal, and two phalanges showed signs of burning or singeing. It is possible that the animal could have been roasted whole over a fire, then partitioned for consumption.

Epiphyseal fusion and dental eruption both show slaughter at a very young age. All long bone ends from both contexts were unfused, including the distal humerus, which fuses at 3-10 months and the distal scapula, which fuses at 6-8 months. However, the proximal metapodials show signs of being fully fused, which usually occurs by the time of birth. This suggests an animal in its first few months of life. The presence of a mandible in F1321 with an erupted dP4 that is just coming into wear and an erupting

M1 suggests an animal on the younger side of the 2-6 month estimate given by Payne (in Hambleton 1999: 64).

The assemblage appears to be a purposeful structured deposition of cooked animal remains. No other materials have been noted as being present in the pits with the exception of the lamb bones. The pits were not constructed prior to the building's construction, as F1321 cut through initial construction feature F1348. It is still possible that they could represent a foundation ritual for the building during its first phase of use. The sheep could have been roasted and consumed and then buried in the newly laid floor.

The deposition of lambs in building floors is not unknown in other parts of Roman Britain. Maltby noted several cases of lambs being buried beneath floors in Winchester, as well as in several other towns (2012: 152-158). He suggests that the practice was likely associated with dedications of new or refurbished buildings (2012: 159). Although he does not describe an examples found on rural sites, he does mention that the rural site of Owslebury do have juvenile sheep ABGS likely from skins, and that there are a few possible examples from villas and roadside settlements across Eastern England (Maltby 2012: 160-61). The presence of these individuals at Ashton suggests that this practice may be a wider-ranging part of Romano-British ritual practice.

Structured deposits: pit in B7

Pit feature F1340 was dug into the second floor of B7. It was oval-shaped and nearly half a meter deep, and lined with clay (Northamptonshire County Council n.d.: AreaA 52). A 20 cm deep groove was present along the circumference, and nails were discovered in the lining; excavators have speculated that this could either be for the base of a barrel feature in the room, or could have been a support for holding the lead tank found in the well in Area H (Northamptonshire County Council n.d.: Area A 52). The clay lining would have been useful for waterproofing, so it is also possible that it was used to store liquid for either iron working, tanning, or general storage (Northamptonshire County Council n.d.: Area A 52).

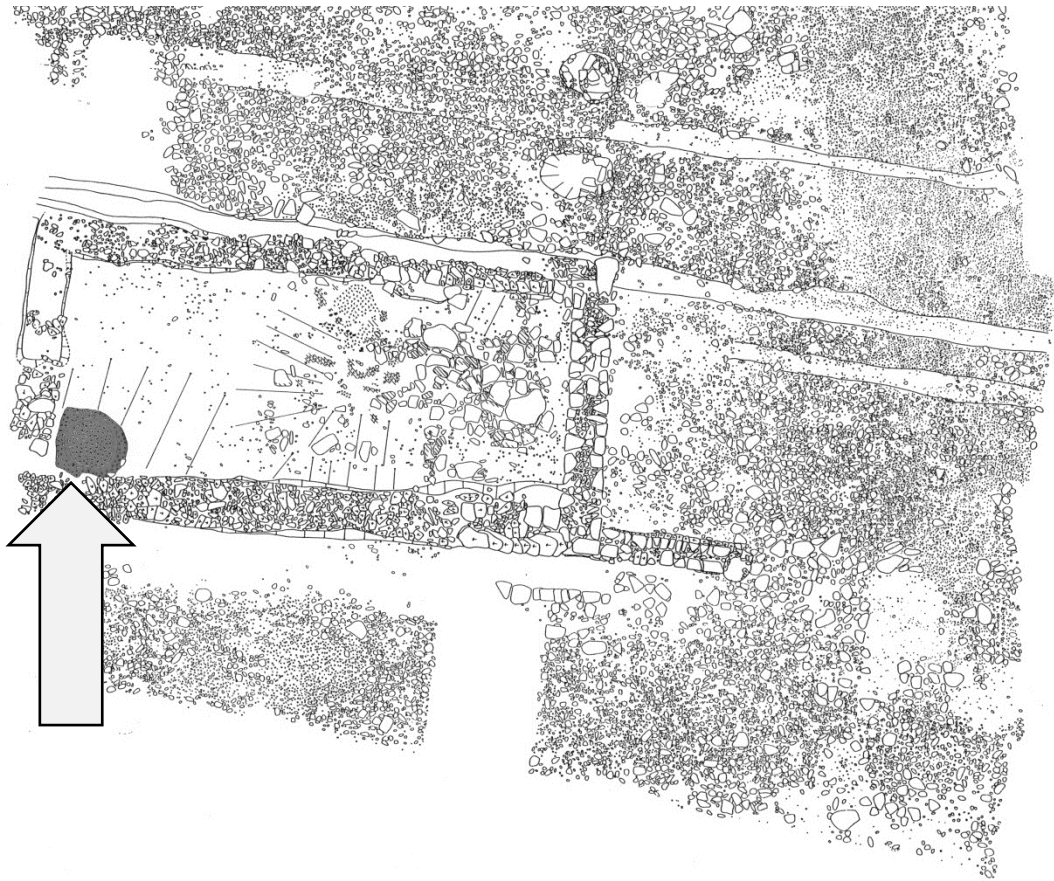


Figure 5-59: Building 7 feature map, with Pit F1340 highlighted (map from Northamptonshire County Council, n.d.; scale not available)

The fill of this pit, context 1338, contained several anomalous items. There was a scattered hoard of coins reported, which helped date the material found within, as well as ceramics; lead scraps and iron work were also found in the fill (Northamptonshire County Council n.d.: Area A 53). The animal bone was also unique, as it contained fish over 70 fragments of fish; only two other pieces of fish were found across the entire site. In addition to fish, foot elements from a large hawk or small eagle were found, as well as foetal or neonatal pigs and sheep, fragments of dog skull with developing adult dentition, and parts from a chicken. The high prevalence of birds and fish marks this as unusual, and when considered alongside the presence of coin hoard and other material found in the fill, it is clear that this is not simple the disposal of some household waste.

In terms of taphonomy, the pit appears to be relatively well-preserved and undisturbed. Only about 2.2% (NISP=6) of the identified remains show signs of carnivore gnawing. Approximately 80% of the material was of Good preservation (0-25% abrasion), and no bones were in Poor condition (greater than 50% abrasion). Whole bones made up nearly 25% of the assemblage, and the average number of zones per bone was 4.1, where zoning was applicable. Additionally, the recovery of the

remains of very small elements such as bird and fish bone shows that even very small, delicate elements were recovered. In general, the preservation for this pit was quite good, and it is possible that some of the elements deposited here could represent primary depositions.

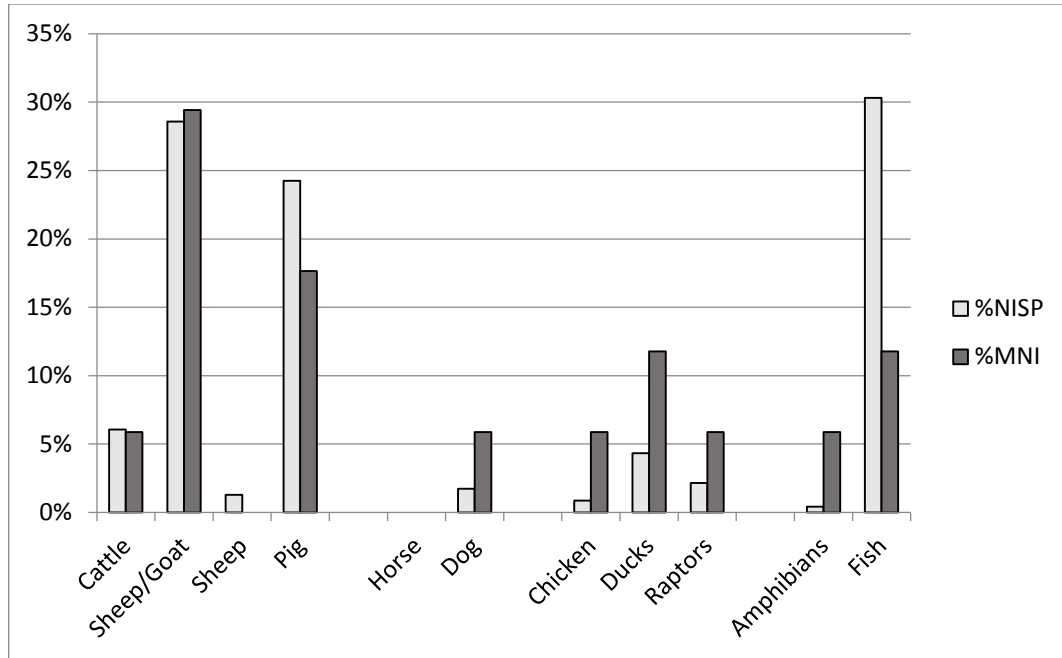


Figure 5-60: Species representation for pit fill 1338

Taxon	NSP	MNI
Cattle	14	1
Sheep/Goat	69	5
Pig	56	3
Dog	4	1
Very Small Mammals	2	n/a
Small Mammals	26	n/a
Medium Mammals	59	n/a
Large Mammals	21	n/a
Chicken	2	1
Anas spp.	10	2
Accipitridae spp.	5	1
Medium Birds	20	n/a
Amphibians	1	1
Fish	70	2
Unidentified	4	n/a
TOTAL	363	17

Table 5-29: NSP and MNI for pit fill 1338

Very few cattle bones were found in 1338; all were highly fragmented. Several showed signs of butchery, both cutting and chopping. The cattle remains include fragments of forelimb, two ribs, a pelvis fragment, a skull fragment, and a few loose teeth. It is possible that this could be consumption waste, although the presence of skull and teeth suggests possible either consumption of cuts of meat such as the cheek or small bits of primary butchery waste. By contrast, sheep/goat remains from all parts of the body are present, including skulls and foot bones. The most common remains for sheep are the distal tibiae, and three of these show signs of chop marks. The ageing data show individuals of several ages; mandibular wear data estimate one individual at 6-12 months of age, another at 3-4 years, and another at 6-8 years. The epiphyseal fusion observations show a similar pattern, with at least one neonatal element present as well as a majority of fully fused remains. Again, there does not appear to be any specific criteria for selection of individuals or elements.

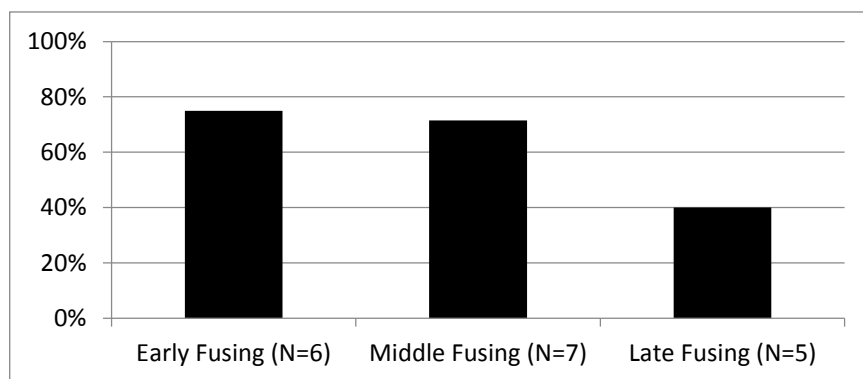


Table 5-30: Epiphyseal fusion data for sheep/goats in context 1338

Pigs make up 15.4% of the animal bones in the fill by NISP, and 17.6% by MNI. This number is slightly higher than the average for other 6 Late B non-well contexts (12.3%), and contains several foetal or neonatal remains. At least a tibia, fibula, and lumbar vertebra came from a neonate. Fusion data suggest that almost all were slaughtered before 24 months, with mandibular data refining that to show a few neonatal individuals, as well as some older individuals that were all slaughtered before they reached 2 years old. The presence of individuals fewer than 2 months of age suggests that not all the animals deposited here were allowed to attain prime meat age. Given the anomalous bird and fish remains, it is not impossible that these age groups could have been specially selected for deposition in the pit. Around 20% of the pig bones show signs of chopping, with one of those elements also showing cut marks.

ToothID	Side	Teeth Present	Age Estimate
1612	Left	dp2-M1, M2 in crypt	7-14 months
1613	Left	dP2-4, M2 in crypt	7-14 months
1615	Left	dP3-4, M1 visible	14-21 months
1614	Right	M3 erupting	2-7 months
1616	Right	dP3-4, M1 visible	0-2 months
1617	Right	dp2, dP3-4, M1 crypt	0-2 months

Table 5-31: Pig mandibular wear stage ageing in context 1338 (Halstead 1985 and Hambleton 1999: 65)

Taxon	Axial elements	Wing elements	Leg elements	Foot Elements	Total number	Butchery or Burning
<i>Accipitridae</i> spp.	n/a	n/a	R tarsometatarsus	4 distal phalanges (claws)	5	none
<i>Anas</i> spp. (likely <i>A. platyrhynchos</i>)	n/a	R coracoid	2 R femora (partial), 1 L femur (partial)	n/a	4	none
<i>Anas</i> spp. (likely <i>A. penelope</i>)	n/a	L ulna	n/a	n/a	1	none
<i>Anas</i> spp. (species unknown)	furculum, sternum fragment	distal phalanx of major digit, L humerus, R humerus (partial)	n/a	n/a	5	none
Chicken	2 mandible fragments	n/a	n/a	n/a	2	none
Medium Bird	Axis, 1 cervical vertebra (complete), 2 cervical vertebrae (partial), rib	L humerus (partial), 2 proximal phalanges of major digit	Fibula (partial, probably <i>Accipitridae</i> spp.)	5 phalanges (1 partial, 4 complete)	14	none

Table 5-32: Birds in pit context 1338

The bird remains in the pit contained some unique species in addition to the more common ones (Table 5-33). All birds were medium-sized, and distinguishing species for several elements was difficult, especially with partial or foot elements. Two fragments of chicken mandible were identified. Ducks were the most common bird identified to taxon. Although it is difficult to speciate ducks within the genus *Anas*, some elements were more consistent with mallard (*Anas platyrhynchos*) and one was more consistent with European wigeon (*Anas penelope*). The mallards may have been wild, domesticated, or tamed (Albarella 2005: 254). The most unique bird remains were

several foot elements either from a large hawk or small eagle. It is possible that some of the Medium Bird phalanges could belong to the raptor; the fibula is also consistent with those from other raptors. The presence of eagles and hawks in structured depositions has often been noted in Roman Britain; Parker mentions that birds have been found in pits under floors alongside young lambs, fish, and pots in a house in Silchester, as well as pits and wells containing raptor remains (1988: 208).

The Silchester pit, discovered in the 1902 excavations, was also found in a pit under the floor in the corner of a building identified as a house (Hope and Reid 1902: 19). The bones were contained within a pot buried in the floor; unlike this context, most of the bird remains were from juveniles and only one fish vertebra was identified (*ibid.*). However, the selective nature of the pit contents does hint at activity beyond simple subsistence. Although they are not noted as being complete individuals, it still appears that this is some sort of structured deposit.

The context is unlikely to represent a foundation ritual, as the pit was dug into the second floor, and dates to the last period of the site's occupation. However, it is contemporary with the last phase of occupation at the site which saw the growing Christian cemetery to the south and the deposition of the large lead tank in the well immediately south of the track between the buildings. The presence of fish, which was otherwise extremely rare at Ashton, may be linked with these beliefs. It is possible that this could be an example of syncretic beliefs: mixing Christian ideology with pagan ritual deposition practices.

5.5.3 Roundhouses and rectilinear buildings in Areas B and C

Unlike some of the roundhouses in Area H, none of these roundhouses were stone-lined. They were simple post-built structures, varying in diameter from 8-10 meters. SG101 and SG103 are both roundhouses constructed near enclosures on either side of the droveway in Area B (B3.10). Building SG203 is an early roundhouse in Area C, and only the half the outline is present. It was probably of similar wicker-and-hurdle construction to the two roundhouses in Area B. Each of these buildings was set back from the droveway, and separated by ditched enclosures. All date to the earliest identified occupation phase at Ashton, in the first stratigraphic phase, with ceramics dating to the mid- to late 1st century.

Later phases at Ashton show a transition to rectilinear houses. SG102 is likely the earliest of these, and still dates to the mid- to late 1st century. It possibly had a raised floor and horizontal sill-beam construction (B3.6). SG202 and its probably replacement SG201 in Area C probably date to the last few phases of the site, from the mid-2nd century and on. Similar to some buildings in Area A, which were likely built around the same time, these had at least limestone foundation, possibly with a timber superstructure on top. Buildings SG201 may have had timber features creating internal divisions. However, these buildings were set back off the street, unlike those to the north. The “Wamborough Type” building, SG104, was found along the former droveway in Area B, which shows that this boundary was no longer respected during the last phases of the site. It also had a raised floor, with evidence for a line of limestone pads for timbers on one side and postholes for the opposite wall (Northamptonshire County Council n.d.: 2). Unfortunately, no bone material was recovered from features related to this structure.

Sample sizes for most of the buildings in areas B and C were fairly small, with the exception of Building SG203. SG203 contained over 100 identifiable fragments, and matched the pattern of other early Ashton material in having far more sheep/goat than cattle. A small number of horse, chicken, and duck or goose was also present. No wild mammals were identified, and there were no dog remains (Figure 5-61). In contrast, the smaller assemblages from SG101 showed more cattle than sheep/goat and a higher prevalence of pig and horse. When you compare these to their respective enclosure features, it matches the pattern of the enclosures in area C having a higher proportion of sheep/goat compared to cattle than area B, even in contemporary structures. It is possible that cattle were raised closer to the river and droveway in Area B, while sheep were kept farther away in the more marginal enclosures.

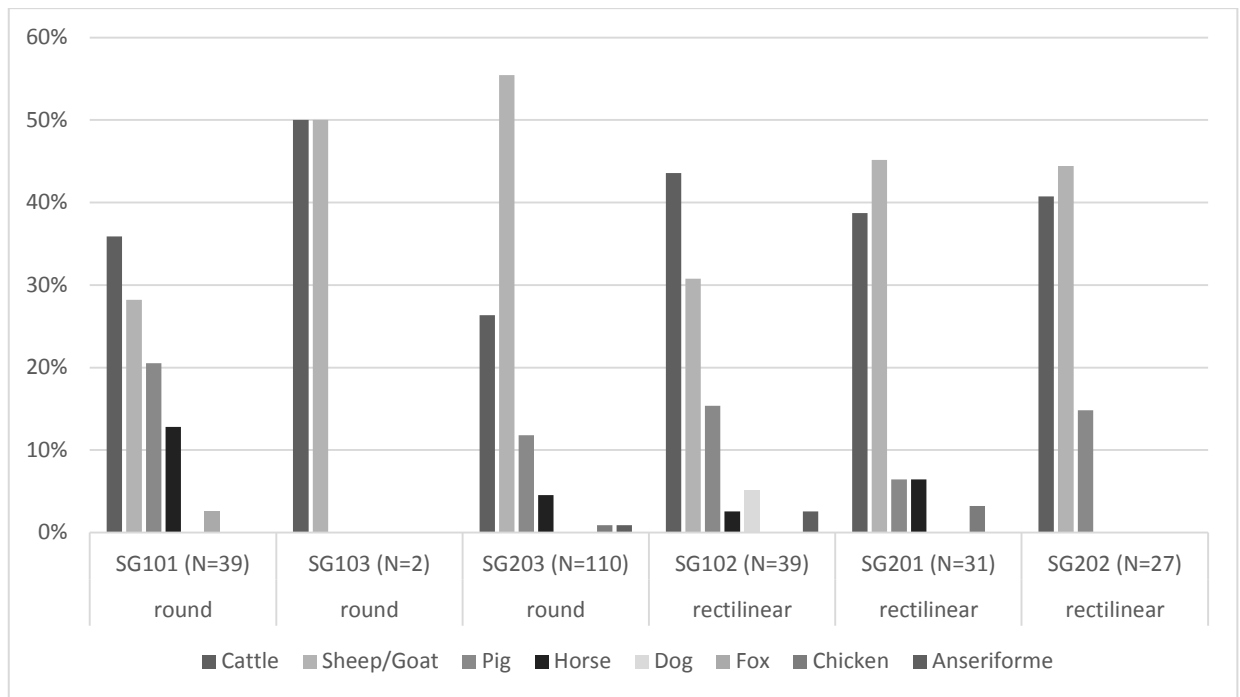


Figure 5-61: Species representation by NISP for Area B and C buildings

For the later rectilinear buildings, the building closer to the driveway in area B again showed a predominance of cattle over sheep/goat, although sample sizes in all cases were too small for any definitive conclusions. Dogs are present only in SG102, with both small fox-sized and larger greyhound-sized individuals present. Another interesting trend is the present of birds; a carpometacarpus of a small wild duck, probably of the genus *Aythya*, was identified in a post pit of SG102.

Overall, the buildings generally fit the temporal pattern of a return to sheep-dominant assemblages in later phases. Building SG202 and its successor SG201 date to the last identified stratigraphic phase for Area B and C, although they lack ceramic phases. The possible association of SG202 and SG102 with wells F1362 and F1012 respectively, both indicate a later occupation date. The well affiliation also raises the possibility that people using SG201 may have been involved in the processes that created the large number of sheep head and foot remains deposited in the nearby well. Perhaps this could have been a building away from the main thoroughfares and used to process skins. The entrance was noted as being larger than a door for a domestic house, and was large enough to fit a cart (Northamptonshire County Council n.d.: C3.6), supporting the idea that industrial activity may have taken place. The presence of ABGs in the well is also in keeping with their deposition at other parts of the site associated with heavy industrial activity, as seen to the north in Area H with the deposit of the lead tanks in the yard of an iron-working building.

Sample sizes are so small for most individual species that it is difficult to draw any conclusions about the element representation present (Figures 5-62, 5-63). However, some important observations can be made. Skull elements for cattle are more common than skull elements for sheep, both as a factor of their larger size and greater tendency to fragment. Horn cores are not common, and they may have been removed to elsewhere on the site for processing. Only one cattle horn core is identified, but it has been sawn from its base, which does suggest industrial removal, even at this early point. SG203, the largest group, has a split pattern of representation with both meat-bearing limb bones and head and foot elements present in relatively equal numbers. None of the patterns suggest solely consumption or primary butchery and industrial processing of marrow, horn, or other animal products, with the exception of SG201, which contains almost all head elements or foot elements, which is in keeping with the deposits in well F1012, especially context 2125. Pig elements are present in small numbers in most of the building features, and come from all parts of the body.

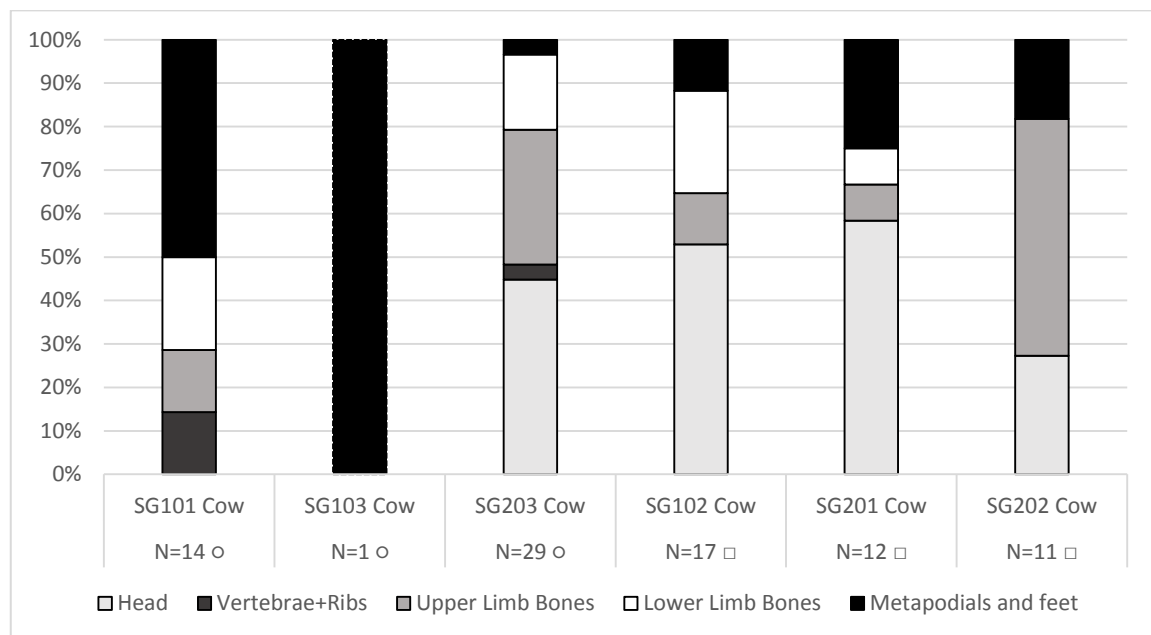


Figure 5-62: Element representation for cattle by %NISP in Area BC buildings

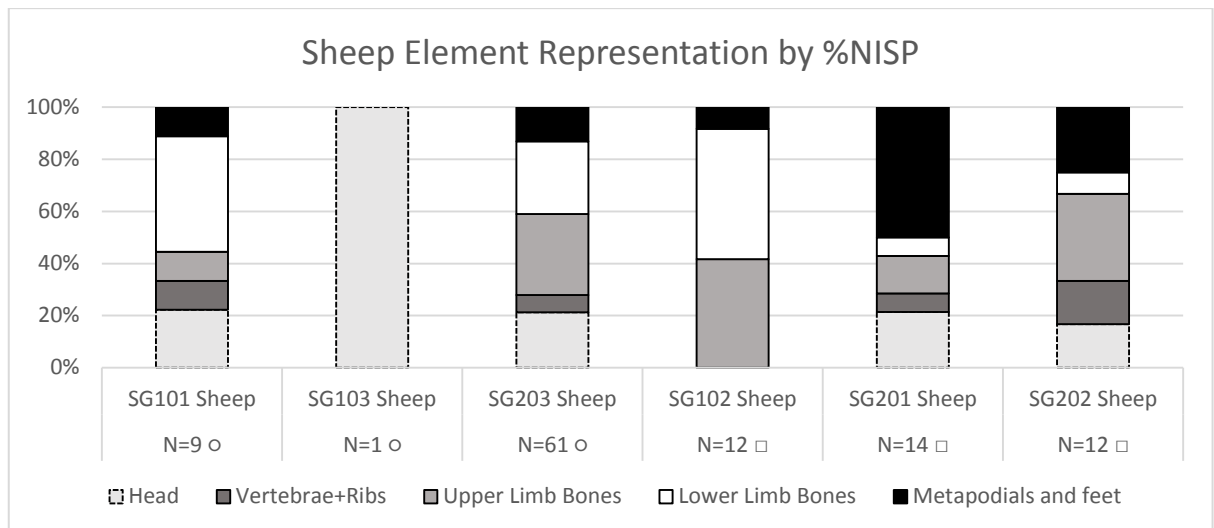


Figure 5-63: Element representation for sheep/goat by %NISP in Area BC buildings

Again, small sample sizes make ageing determination difficult for these buildings. However, it can be stated that most show the presence of immature individuals. In the roundhouses, SG101 has cattle less than 6-10 months of age and sheep and pigs at prime meat age. SG203 does not show much evidence for juvenile cattle, but it does have young sheep; 50% of the early fusing elements are not fused (Figure 5-64).

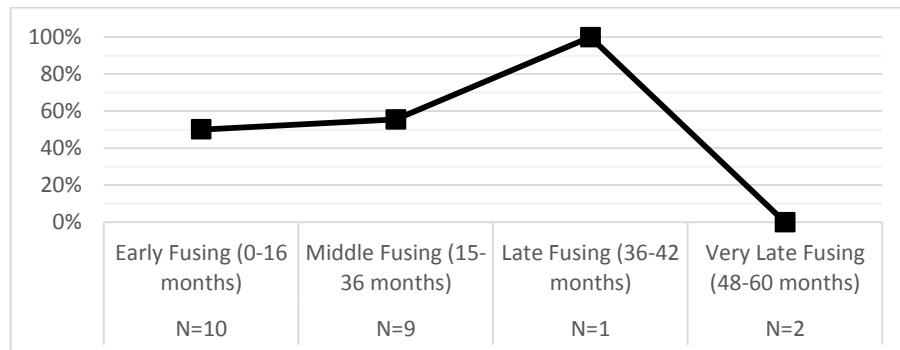


Figure 5-64: Epiphyseal fusion for sheep/goat elements in Building SG203 contexts

The later rectilinear buildings also show evidence for young animals, both in areas B and C, as well as older individuals. SG102 has elements from cattle in Stage H (Old Adult) (Hambleton 1999: 65, Halstead 1985). It also has an older pig with a fused distal radius, suggesting that the animal was older than 42 months; this could be from an animal kept for breeding before being slaughtered and consumed (Reitz and Wing 1999: 71). The sheep from SG102 show an opposite pattern, with the presence of at least one neonate. In the later buildings of Area C, SG202 has juvenile cattle less than 18 months, as well as neonatal pigs. Evidence for prime meat age sheep (12-24 months) and very young sheep (less than 6-16 months) is also found in the subsequent building SG201.

Juvenile horse teeth were also found in contexts from SG101. The association of these buildings with nearby enclosures, some of which were deep enough to corral herds of animals, in addition to the presence of neonates, affirms the importance of animal husbandry in the Ashton economy. At least in the earliest and latest phases of the site, local production of animal products was occurring.

Butchery is present in all buildings, for nearly all species. Cut marks are present in greater numbers in the earlier roundhouses, especially for cattle. Surprisingly, there are only chop marks identified for the 61 sheep/goat elements of SG203. The presence of sawing in SG203 is also interesting, as it hints at a need for specialised butchery techniques to facilitate horn-working, and is less common in the earlier contexts.

Overall, the early roundhouses show an expected pattern of mainly domestic refuse, with evidence for animal husbandry in the vicinity, as would be expected for a small nucleated settlement without much official organisation and integration with the wider Roman network. By the time the later rectilinear structures are being constructed in Area C, larger-scale agricultural activities are occurring across the site, as well as other industrial activities. Some differences in species representation can also be seen, although whether they are differences in beef and mutton consumption or differences in stock raised in different areas is difficult to tell. It does make it clear that there is no clear link between a more “Roman” structural pattern and a more “Roman” dietary pattern.

5.6 Conclusion on Spatial Distribution of Bone at Ashton

An examination of individual contexts with increased scrutiny as well as the general spatial distribution of animal bone across the different areas of the site illuminates a number of important aspects of life in Roman Ashton. Although different parts of the site were more important at different points in time, the animal bones present in specific features do not always reflect the general temporal trends. Deposit type and the context of placement and other material culture in the features provides a better understanding of each of these features.

The wells in various areas are unique, not only due to their nature as sieved assemblages capable of capturing larger quantities of small bone, but also as shafts used for ritual deposition. The presence of numerous ABGs shows that the inhabitants of Ashton utilised these features to carry out religious practices well into the time when the

Christian cemetery was in use. Whether this represents the coexistence of pagan sects with Christian neighbours or syncretic beliefs will be discussed further. Beyond their importance as sites for rituals, wells also give us a good look at rubbish deposits from various periods of occupation. The presence of juvenile sheep feet in one deposit in Area C suggests that the processing of lambskins was an important activity in this more agricultural area to the south.

Middens and general waste pits are also important features for understanding consumption. The midden in the gap between buildings in Area A (F300) and the series of pits rapidly filled with secondary waste deposits in Area B (F414) both show a prevalence of cattle with significant pathological indicators. Although this would be expected for midden F300, which spans the period of peak cattle husbandry at Ashton, it is more curious in the Area B pit context, which dates to the last phases of the site when sheep/goat had overtaken cattle as the most common species. The presence of large numbers of horncores and chopped or sawn antlers in both areas also highlights the continued importance of craftworking using animal products that continued throughout the last few centuries of Ashton's occupation.

The peak of cattle husbandry at Ashton is also exemplified by the large butchery deposit in Area C. The large number of long bones that show classic Romano-British butchery practices is evidence that Ashton was a settlement large enough to have attracted the services of a specialised butcher well-versed in urban techniques. Although many features of Ashton are consistent with a mostly rural way of life, the need to support specialist iron workers and other craftspeople clearly necessitated specialists in processing meat and other animal products during this later period.

Beyond the purely economic, the presence of ritual is visible beyond the wells at Ashton. Ritual pits such as F1497 in Area C provide a better chance to examine less common species such as geese and to think about the various uses of wild and domesticated birds in both a practical and mystical context.

Finally, the differences in how various parts of the site were used can be clearly seen from the enclosures and buildings in each area. Area A, which was mostly developed after the mid-2nd century and contains most of the stone-founded rectilinear strip buildings on the site shows a greater number of animal remains not belonging to the three main domestic species. Structured deposits in B1 and B7 are further evidence of the very important nature of this area, which involved the key iron-working industry that made Ashton grow from a small, largely agricultural settlement into a more

developed town. Greater numbers of cattle horn cores in this area show that industrial processes were very important in this portion of the site. However, no huge differences in species representation are obvious when temporal variation is taken into consideration. Areas B and C appear to have remained more agricultural throughout the period, and had a relatively conservative species representation that suggests a focus on raising cattle, sheep, and pigs. The animal bone in this area confirms the importance of stock enclosures, although the occasional presence of wild mammal remains shows that hunting was practiced at least occasionally throughout all periods of occupation.

6 Comparative Sites

Although the town of Ashton is not on one of the direct major roads through Roman Britain, it was connected into a wider network of sites in the Nene Valley and beyond. Smaller side roads, like the one on which Ashton is positioned, were smaller capillaries feeding into the key centres of distribution on which the Roman occupation of Britain depended. One of the key changes that occurred for sites such as Ashton after Roman contact would have been the introduction of goods, facilitated by easier travel along roads and rivers. As Ashton was built up around its road system, it is crucial to compare the settlement with others in its network.

The modern county of Northamptonshire has been the focus of a large quantity of high-quality fieldwork (Albarella and Pirnie 2008: 165; Foard et al. 2002; Taylor and Flitcroft 2004; Parry 2006). Most of the sites around Ashton consist of villas, farms, and slightly larger nucleated settlements (Parry 2006: 73). Unlike other areas of England, there are relatively few large towns in proximity. The largest nearby town in Roman times would have been *Durobrivae*, modern Water Newton. Unfortunately, this town has not seen many significant programs of excavation in recent years (Fincham 2004: 11). Fortunately, several other sites in the area have seen extensive excavation, and those assemblages better illustrate how animals were involved in the regional economy and how people interacted with them in the landscape.

In order to better understand the complex system of exchange operating in the hinterlands around Ashton, several different sites have been examined. The rural sites at Orton Hall Farm and Orton Longueville were just outside *Durobrivae*, about three miles to the east. They were not directly on the main roads; their main connection with the landscape lay in their position in the fertile valleys along the River Nene, further downriver than *Durobrivae*. Both show extensive evidence for agricultural production, and craft activity such as the iron production at Ashton is not in evidence. The comparison with largely agricultural sites is key to understanding the extent to which Ashton was a producer or consumer in its network. Examining more similar sites is also important; the village of Higham Ferrers is another excellent comparative site for Ashton, in that it has a similar development history and many of the same features, including strip buildings and centering on a road that connected it to *Durobrivae* and beyond. Examining the next step up in the site hierarchy of the region was achieved by looking at the larger small town of Towcester. Although not a *civitas* capital, Towcester

developed much as the larger towns did, with the development of townhouses, possible public buildings, and perhaps even an aqueduct in the central core and extensive suburbs outside the line of the eventual stone defenses (Burnham and Wachter 1990: 155). It is important to examine such well-developed “small-towns” as a means of placing settlements like Ashton within this widely-varying category of site. A clearly urban centre was also considered, and the site of Colchester was selected for both its connection with the wider fens landscape and as an example of the need to supply a large population with both local resources and foreign imports. The demands of military and urban supply create a very different pattern of animal usage than that for a smaller settlement, and the presence of both intramural and extramural assemblages allows for comparison of Ashton with two kinds of urban occupation.

Beyond direct comparisons, the material from Ashton will also be compared with a variety of sites throughout Central England, using data from Albarella and Pirnie’s *Review of Animal Bone Evidence from Central England*, available through the Archaeological Data Service (2008). When this is combined with the direct comparison sites, it becomes clear that Ashton lies somewhere in between a fully rural and a fully urban community, with aspects of each at different points in the site’s history.

6.1 Rural Non-Villa Sites: Orton Hall Farm and Orton Longueville

In order to better understand the animal husbandry and consumption practices at Ashton, it is important to have a local corollary for rural farming practices. Approximately 10 miles northwest of Ashton are the sites of Orton Hall Farm and Orton Longueville Monument 97. These two sites both represent rural farmsteads, although Orton Hall Farm is a larger and more complex site than Orton Longueville. Orton Hall Farm was occupied longer than Ashton, with the final phase lasting well into the early 6th century (Mackreth 1996). Orton Longueville had a more limited phase of activity with Roman period domestic occupation lasting from the mid-1st century AD until the mid-2nd century, after which field systems continued in use with no accompanying houses or yards.

Orton Hall Farm

The excavations at Orton Hall Farm produced a very large quantity of bone: approximately 12,153 fragments from the Roman and Saxon periods (King 1996: 216). The site developed enclosures systems in the mid-1st century, and by c. 175, two barns were being laid out in these enclosures (Mackreth 1996: 1). Site activity increased considerably throughout the third century, when a new barn and house were built and fitted with a drier, possibly for malting grain (14). Activity then peaked in the 4th century, when a building was converted to a millhouse and another large rectangular building was constructed, possibly the house workers, and then declined afterward when many buildings went out of use (20). There seems to be some continuity of site usage if not population, with Anglo-Saxons maintaining use of one of barns and building their own granary and hall before occupation ended in the early 6th century AD (20).

From the beginning, Orton Hall farm seems to focus on the husbandry of cattle (King 1996: 216). The presence of an associated bone group skews the representation of species for the Period 1 west enclosure system; 652 sheep elements were recovered (217). King estimates a minimum of fifteen fully mature and twelve immature animals were included, and assessment of horn cores suggested that all animals were female; six were at least partially articulated (217). No mention of butchery or burning has been made for these specimens, and the presence of all parts of the body and their articulated nature suggests either that they were roasted whole and all the butchery waste deposited into the feature with them, or that they were simply killed and deposited with all their soft tissues intact (217). Although King suggests the possibility of feasting or ritual purpose, the lack of evidence for dismemberment or consumption and the lack of other significant material from the deposit argues that this more likely represents natural or managed deaths of a portion of the herd (217).

Once the sheep ABG is removed from the data set, a fairly stable pattern emerges. In general, cattle remain at 60% or more of the main three food species. Sheep herds appear to decrease in relative importance after the farm is reorganized in the mid-2nd century, and pigs remain scarce throughout all periods. The author rightly points out that what remains at this site is not only what is being consumed, but what is absent due to being sold off to feed larger urban centres (King 1996: 221). This is best considered using ageing profiles and element representation.

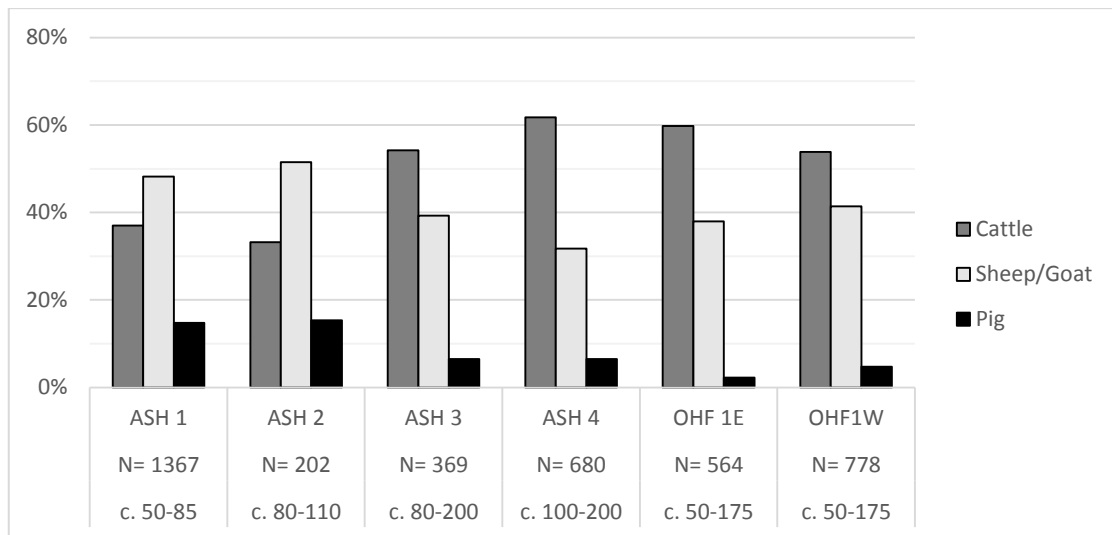


Figure 6-1: Representation of main food species for 1st-2nd century deposits at Orton Hall Farm (King 1996) and Ashton

While Ashton underwent rapid changes in its first two centuries of occupation, this is harder to tease out at Orton Hall Farm, as the data for all of Period 1 (mid-1st century- c. 175 AD) has been aggregated (see Figure 6-1). The data for this early period at the farm more closely resembles that at Ashton in the 2nd century. It is possible that most of the Orton Hall Farm data is from this later part of the century when the need for cattle for arable agriculture and beef to supply larger settlements became dominant, or it simply could represent specific site foci of production. Early Ashton appears to fit the stereotypical rural Romano-British site species makeup even better than the early period at Orton Hall Farm. It is possible also that Ashton could be retaining their sheep instead of sending them on for consumption elsewhere.

The third century material for Ashton and Orton Hall Farm appears to be very similar (Figure 6-2). The formalisation of the farmyard and rapid construction of buildings matches the profile of the small town in the peak of its activity. Where significant differences are seen is in the species proportions towards the end of each occupation. At Ashton, the species ratios change drastically, with an increase in sheep and pig and a decrease in cattle. However, Orton Hall Farm shows a continued focus on raising cattle, with maintenance of barns and enclosures even after Late Roman occupation ends and Anglo-Saxon activity begins. This may be due to differences in continuity. At Ashton, previous farming styles and participation in supply economies are disrupted towards the end of the fourth century, and cattle become far less important. Whatever the causes for the focus on cattle occur at Orton Hall Farm, it is clear that they are still operating well into the 5th and early 6th centuries.

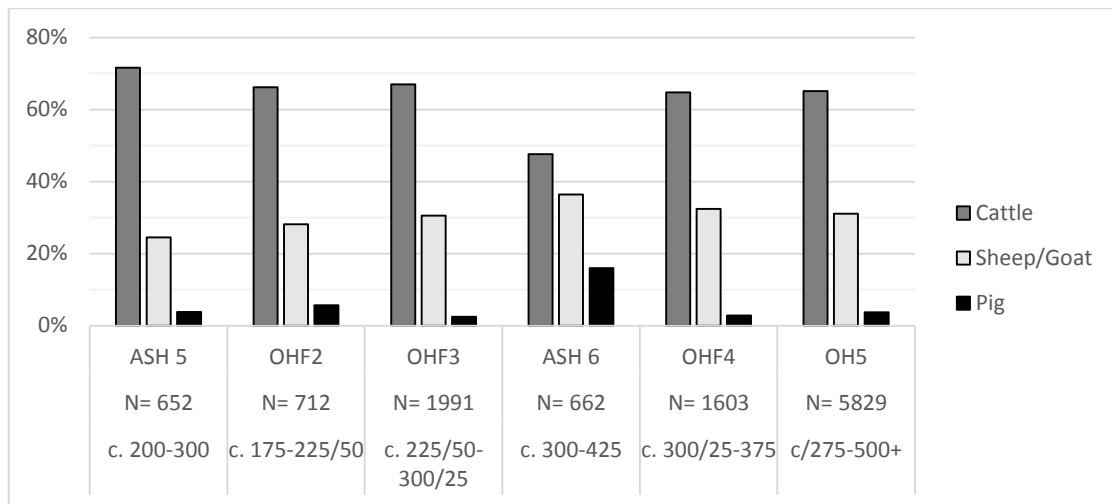


Figure 6-2: Representation of main food species for 3rd-6th century deposits at Orton Hall Farm (King 1996) and Ashton

Age at slaughter shows as little change for cattle from Orton Hall Farm as their prevalence over time. Approximately one-third were killed as immature animals (18-48 months), with the rest slaughtered as fully mature adults (48 months and older) (King 1996: 216). The slaughter peaks at Ashton, as evidenced by mandibular tooth wear, show a pattern of slightly younger ages at slaughter; in most periods, approximately half of all animals have been slaughtered by 30 months of age (the end of Halstead's Stage D). After this, it appears that they are kept into young adulthood, with gradual slaughter of older animals and fewer than 25% kept into senility (Stage I). These two patterns are difficult to compare due to the compression of age categories for Orton Hall Farm, but it does show that a younger age-at-slaughter was preferred by those raising cattle at Ashton.

For sheep, Orton Hall Farm has two temporal patterns. In periods 1, 3, and 5, one third of the flock is slaughtered before maturity with the rest kept until old age, while in periods 2 and 4 up to half the flock is slaughtered before reaching full adulthood (King 1996: 216-17). Why these changes occur at the turn of the 2nd century and at the beginning of the 3rd century is uncertain; if slaughter patterns remained the same and mature animals were being sold off to other settlements, this practice would create more equal balance of juveniles and adults at the farm (*ibid.*: 217). At Ashton, the number of mature animals had risen over the course of the 2nd century, although it declined again into the 3rd century. The changes at Ashton were more gradual, and could have suggested a husbandry strategy based on milk and wool, with the sale of mature animals as meat after providing a few clips of wool. The later phases maintained a

higher number of juveniles slaughtered than at Orton Hall Farm, suggesting milk may have been a more important commodity in the small town.

In terms of taphonomy, the two sites were relatively comparable. Approximately 50% of the material from Orton Hall Farm showed butchery marks, with many of the long bones being chopped through (King 1996: 217); this compares with the approximately 40-60% butchery rate for cattle bones, although sheep at Ashton showed far less with only around 20-40% butchered. Orton Hall Farm also had evidence of bone working as well as butchery marks indicative of removal of horn cores for craft-working. Gnawing by carnivores was also noted for the Orton Hall Farm, although not quantified. All body parts are present for cattle and sheep, indicating that if the export of animals for meat did occur, it was likely done on the hoof; this agrees with assemblages from primary butchery contexts in larger towns (King 1996: 216).

Horses, dogs, and cats all remain rare throughout. About 20% of horse elements were from young animals less than three and a half years of age, suggesting the possibility that horses were being raised on-site or acquired from nearby locations when they were still very young (King 1996: 217). Dog remains were fairly scattered, with the exception of a semi-complete skeleton of a small dog from Period 1 (*ibid.*:217). The dog was only about 270mm tall at the shoulder, and showed signs of a shortened jaw with overcrowded teeth osteo-arthritis in other elements (*ibid.*: 217).; This dog may have been one of the introduced breeds made popular by the Romans and thus a valued companion animal. In addition to dogs, cats were also present at the site in small numbers.

Besides the main three food species, Orton Hall Farm also showed evidence of scattered elements from wild animals including red deer antlers and hare bones. Several different types of birds were also noted, with domestic fowl being the most common, followed by ducks and then geese. Swans, corvids, and a buzzard were also found. One of the most distinctive bird deposits was a collection of ten tibiotarsi from a ditch, representing at least seven individuals of some species of redshank; the collection of only a single element suggests some form of curation of what was deposited. (*ibid.*: 218). No exotic bird species, such as pheasant or guinea fowl, were identified, although chicken was likely introduced during the Roman period and remained present in low numbers throughout.

Orton Longueville, Monument 97

Orton Longueville was a much simpler settlement. Occupation at the farm only appears to have occurred starting in the Late Pre-Roman Iron Age, around 25/50 AD and lasting until approximately 175 AD, after which time the field systems were maintained but domestic activity could not be seen (Mackreth 2001: 1, 6). A series of roundhouses were present, and appear to have been occupied one at a time, possibly suggesting a single family working the farm (34).

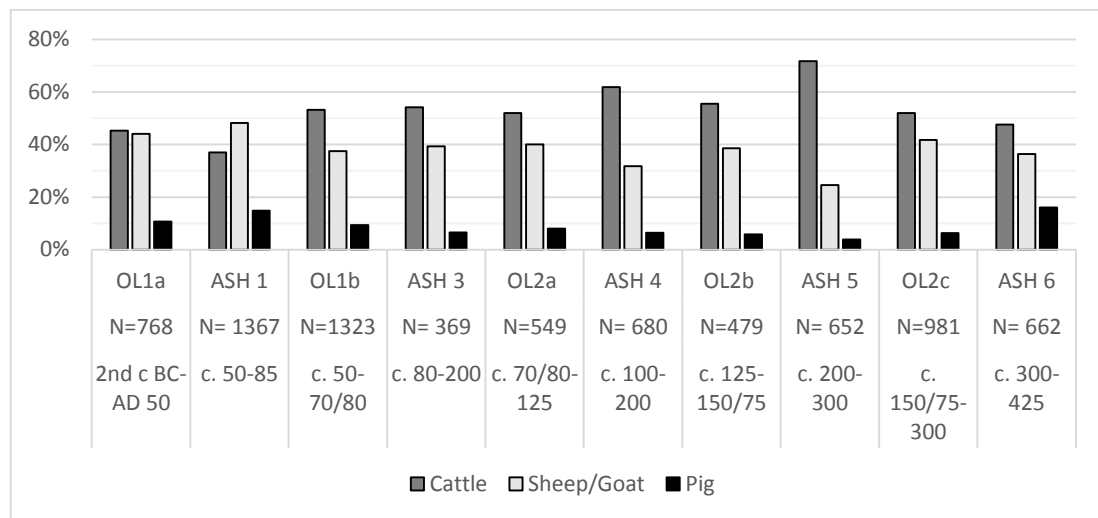


Figure 6-3: Species representation for main three domesticates by NISP at Orton Longueville and Ashton (data from Davis 2001)

Again, the species ratios from Orton Longueville are fairly similar to those at Ashton (see Figure 6-3). In the earliest Iron Age phase, sheep and cattle elements are present in nearly equal numbers, while at Ashton sheep show a slight predominance. After the beginning of the Roman period, cattle shifts to be the most common of the three main food domesticates, but the difference is not as marked as it is for later phases at Ashton. More importantly, Orton Longueville also shows the increase in sheep numbers at the end of the Roman period when the site declines. They do not, however, show a late increase in pig.

Age at slaughter for the Orton Longueville animals was fairly young, with the number of animal slaughtered before full maturity jumping from 27% to 60% between the late Iron Age period and the Roman period (Mackreth 2001: 34). This huge discrepancy could be due to requisitioning of older animals to feed nearby armies and towns, leaving the people in the towns to consume the younger animals. Mackreth notes that this change coincides with the military presence in the area (2001: 34). No such

drastic change occurs at Ashton, and they have a larger number of mature animals; however it is likely that cattle were more valuable there as a source of traction than as meat animals to be sold on. Sheep at Orton Longueville show a mixed strategy, with about half the animals slaughtered before full maturity (34). Although this pattern remains fairly stable, the presence of young lambs does decrease from 14% in the Iron Age to 5% by the end of the 3rd century; the shift towards older ages at slaughter may be due to the export of lambs, although it could also indicate that wool was an increasingly important product (34). Pigs were slaughtered young at both sites, although Orton Longueville shows an interesting decrease in age-at-slaughter for piglets around the end of the 1st century, perhaps reflecting a change in taste or necessities of economy (34).

In terms of non-food domesticates and other animals, numbers are extremely limited. The presence of a few deer bones at Orton Longueville in the late 1st century AD and one from early second shows that hunting had a minimal impact on the diet of the local people; collection of antler was not noted at the site either (Mackreth 2001: 35). Bone and antler-working does not seem to have been a key activity here, as it was at Orton Hall Farm, and to a greater extent, at Ashton. Hare was noted as present in small quantities and could have either been incidental or the remains of hunted individuals (35). The presence of single beaver bones in each of the last two phases of occupation at Orton Longueville are notable, as there are no water sources around the settlement where they could have lived, indicating that they were brought to the site, possibly for use as furs (35). In contrast to Ashton and Orton Hall Farm, birds at the smaller site were limited only to a few domestic fowl, which were present from the Iron Age context onward in small numbers (25).

Orton Longueville is a truly rural site, with an economy likely based on the raising of cattle, and to a lesser extent, sheep, for sale to military and urban centres in the vicinity, as well on the production of cereal crops. Spelt wheat was the main plant recovered from burnt samples, along with traces of other wheats and oats (Jones 2001: 82-3). The exploitation of plant crops does not appear to be as intensive here as at Orton Hall Farm, as the smaller site lacks any form of dedicated grain storage or processing areas. If these did exist, it is possible that they were simply farther away from the centre of occupation, but this also highlights what was most central to the lives of the people working the farm (Mackreth 2001: 36).

6.2 Village: Higham Ferrers

Like Ashton, some sites defy easy categorization. The site of Higham Ferrers, also on the River Nene, is considered by some to be a small town and by others to be a more rural farming settlement (Smith 2009: 323). The northern part of the settlement was excavated, including 18 buildings, a shrine complex, agricultural enclosures, and a few small cemeteries (Smith 2009: 313). Although some Iron Age settlement may have occurred up until the Roman army arrived in the area, the main area of occupation explored here began developing in the mid-2nd century AD (*ibid.*: 315). Reorganisation of the town came in the late 2nd century as changes were also happening at Ashton and across the region; at Higham Ferrers the development resulted in the paving of the main road, the construction of rectangular strip buildings, and the establishment of a monumental shrine (*ibid.*: 315). Continued occupation was evidenced from the 3rd to mid-4th centuries, although decline occurs earlier here than at Ashton and other nearby sites (*ibid.*: 322).

The settlement maintained an open pattern of settlement throughout, with buildings interspersed with garden and paddocks in enclosures, even after the formalization of plots along the roadway (Smith 2009: 324). Centralised processing of agricultural products appears to have occurred, and other than the colonettes and other decorations at the shrine, there was little evidence for high status occupation or consumption (*ibid.*: 324-5). Although some central organization was evidenced by the remodeling of plots and realignment of buildings as well as the scale of shrine construction, it appears that most of the inhabitants were engaged with some form of agricultural activity (*ibid.*: 317). Small workshops and signs of craftworking were present, as with a deposit of bone-working material at one of the houses, but there are no signs of large-scale metalworking or pottery production (318, 324).

The animal bone data consisted of over 16,157 fragments, and was analysed in three groups: the early, middle, and late Roman periods (for dating and numbers by taxon, see Table 6-1; Strid 2009). Taphonomy showed relatively little attrition from carnivore gnawing compared to the Ashton material, with under 3% of bones showing signs of gnawing (Strid 2009: 288). The pattern of representation for the main three domestic species (see Figure 6-4) is highly distinctive here compared to all other sites in the region; cattle make up less than 20% of this group throughout all periods at Higham Ferrers, in contrast to the shrine, where they make up nearly 90% of the three key species (Strid 2009: 289). Nearby sites have far more cattle, even those that are

classified as rural farms (*ibid.*: 289). This raises the possibility that the farmers here could be focusing on specialised sheep husbandry, with a few cattle and pigs as animals of ancillary importance (*ibid.*: 289). All body parts from the animals were present, indicating the presence of whole animals for both cattle and sheep (*ibid.*: 289).

Date	mid-late 2nd c	late 2nd-late 3rd c	late 3rd-mid 4th c	late 2nd-late 3rd c
NISP	(N=389)	(N=3253)	(N=2168)	(N=1721)
Site	HF3	HF4	HF5	Shrine
Cattle	49	248	368	77
Sheep/Goat	271	2473	1305	1355
Pig	33	293	304	133
Horse	13	38	71	6
Dog	20	63	49	39
Cat	1	1	1	0
Boar	0	9	1	2
Deer	0	4	3	4
Hare	0	4	1	2
Rabbit	0	4	0	1
Small Rodent	0	19	0	2
Chicken	2	29	43	12
Goose	0	1	3	0
Duck	0	7	7	4
Pigeon	0	2	1	2
Lapwing	0	1	0	0
Small Passeriforme	0	1	0	1
Corvid	0	21	1	16
Raven	0	2	4	1
Crow	0	5	0	3
Rook	0	5	1	5
Unidentified Bird				49
Frog/Toad	0	23	3	7
Eel	0	0	1	0
Carp	0	0	1	0
TOTAL	389	3253	2168	1721

Table 6-1: Number of identified animal remains by taxon for Higham Ferrers (data from Table 6.9, Strid 2009: 288)

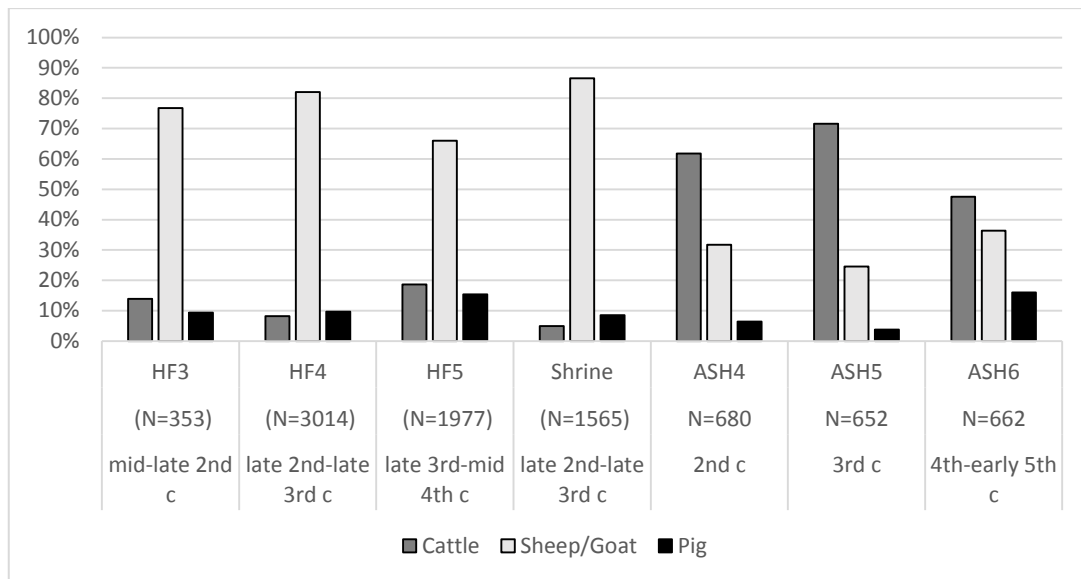


Figure 6-4: Species representation for main three domesticates (by %NISP) at Higham Ferrers [HF] and Ashton [ASH], with data from (Strid 2009)

Cattle were slaughtered at prime meat age throughout occupation at Higham Ferrers, with very few individuals surviving beyond 2.5 years of age until the late 3rd century (Strid 2009: 290). No evidence for organized butchery waste pits were mentioned, and the smaller numbers indicate a few isolated animals processed for meat. The sheep have two slaughter peaks, the largest for animals younger than a year old, and the second at two to four years of age (*ibid.*: 290). Additionally, sexing shows that most of the sheep killed were ewes; a female-heavy population with a cull of very young animals is suggestive of dairying (*ibid.*: 290, 299). *Mortaria* were noted as present, although no colanders or cheese presses were described in the pottery report (Timby 2009), although Cool notes that cheese presses remained rare in Roman Britain (2006: 96). Cheese would have been a valuable protein source that could be sold on to larger settlements, along with the larger, meatier male sheep (Strid 2009: 289). Throughout, pigs were slaughtered at a young age, with some focus on juveniles (*ibid.*: 290). More males than females were present in the death assemblage, indicating their preferential slaughter at a young age, while females were kept for breeding (*ibid.*: 291).

Although the shrine shares some characteristics with contemporary Middle Roman contexts, it also has some key discrepancies. The number of sheep remains is elevated at the expense of cattle and horses; this is in keeping with patterns of high sheep numbers at religious sites such as Uley and Elms Farm (Strid 2009: 294). The shrine seems to have been more a focus for ritual feasting and the food offerings than the deposition of partial or complete animals, and upper forelimbs of sheep were

particularly common (*ibid.*: 295). Although the shrine could not be clearly linked to a specific deity through animal remains or other methods, as at Uley, an increased percentage of bird remains can be seen in the shrine contexts (5.4%, compared with 2.3% for other Middle Roman contexts). The appropriate ritual offerings here also include young lambs and birds, a pattern also observed at Ashton in ritual pits across the site.

Other mammalian species on site were present in small numbers. Horses were mostly adult animals, and some have cuts and chops that may indicate butchery for meat (Strid 2009: 292). Dogs were present at the site and came in a range of sizes and ages; at least 1 neonate was present on-site (*ibid.*: 292). One semi-articulated dog was found in the floor of the shrine, possibly as part of one of the rare animal sacrifices there that did not involve consumption (*ibid.*: 297). Another partial individual shows signs of massive pathology due to age and infection; heavy tooth wear, mandibular infections, a healed fracture of the forearm, lipping around the joints, and osteoarthritic deformation of the tibia were all present across the skeleton (*ibid.*: 292). The care required for this individual would have been extensive, as evidenced by advanced age the animal reached. Domestic cats were present in very small numbers, and would have helped keep the visible rodent population under control (*ibid.*: 292).

In terms of wild mammals, roe deer, red deer, wild boar, and possibly hare were hunted. While red deer were represented largely by meat-bearing bones and roe deer by less meaty lower legs, both were likely exploited for food as well as antlers to supply the craftworkers (Strid 2009: 292). The only wild boar remains were found from the Middle Roman period, and most were subadults (*ibid.*: 293). Hares may have been intrusive, and rabbits almost certainly were, as most of their bones were from top subsoil layers (*ibid.*: 293).

Birds were present in limited numbers. The most common were domestic fowl, followed by ducks and then geese, as is common for Romano-British assemblages (Strid 2009: 293, Albarella 2005: 250-51). Although absent at Ashton, Higham Ferrers has a single bone from a wader (see Lapwing). Corvids were present, as at most Romano-British sites, although the limited number of raptors seen at Ashton were absent; this could be related to the reduced amount of scavenging in general observed at Higham Ferrers. The other key difference in the bird assemblages between the two sites was the presence of pigeons at Higham Ferrers; this was not uncommon, as dovecotes have been noted in literature if not in structural evidence from Roman Britain (Parker 1988: 203).

A few non-birds and non-mammals were identified. Fish were present as isolated elements. A single eel bone and a single carp spine were identified in the Late Roman material; the carp is likely intrusive (Nicholson 2009: 293). Frogs and toads were also noted, as would be expected at a site along a river valley.

Overall, the comparison between Ashton and Higham Ferrers highlights the importance of specialist production. Higham Ferrers appears to have focused more heavily on their sheep flocks and the products obtained from them, particularly dairy. This is contrasted with the iron-working focus that developed at the same time at Ashton. Both sites featured bone-working and antler-working in limited amounts. The presence of surrounding agricultural enclosures show that both sites were intricately tied into their agricultural landscapes for survival, although the inhabitants of Ashton were able to support a greater number of non-agricultural specialists. Although Higham Ferrers has evidence for a planned public shrine with greater architectural grandeur than any structure identified at Ashton, Ashton clearly maintains a more urban nature with its specialized cattle butchery deposits and higher output of specialist production.

6.3 Small Town: Towcester

Towcester is one of the larger small towns, and is thus a useful comparison both with larger centres such as Colchester as well as with smaller small towns like Ashton (Taylor et al. 2006: 7). Although it is not directly connected into the same line of roads that included Ashton, it provides an excellent example of how larger small towns would have functioned in terms of supply and production. Its position along Watling Street and the River Tove would have made it an important hub of communication, and some believe that the initial occupation grew up around a fort that has not yet been identified (Burnham and Wachter 1990: 152). The earliest buildings were in timber, with strip buildings constructed along the roads in the 2nd century, along with a possible mansio, bath house, townhouses, and other more varied structures (Burnham and Wachter 1990: 155). Fortifications were constructed beginning in the late 2nd century, with a late peak of building activity in the mid-4th century (*ibid.*: 156-7).

The two sites used here for comparison come from two of the largest excavations at Towcester. The Park Street site was excavated in 1976, and may contain the earliest domestic buildings on the site (Taylor et al. 2006: 16). It is located within the line of the eventual defenses on the junction of the two main roads: Watling Street and the road heading to Alchester in the south (Lambricks 1980: 35). It also includes such important

finds as the corner of a possible *temenos* wall for a temple that may have been transformed into a *mansio* in later periods (*ibid.*: 44). The Sponne School site was farther from the main centre of the town, although still within the defended area (Atkins and Chapman 2002: 2). Activity included pits with domestic waste, a 2nd century townhouse, and several soil horizons (*ibid.*: 24). Both sites were entirely hand-collected, and thus are only compared with the non-well material at Ashton.

Date	c. 50-100	c. 100-150	c. 150-200	c. 200-400	Saxon/ Norman	1st c	1st-2nd c	2nd c	3rd-4th c
Site	TWss1	TWss2	TWss3	TWss4	TWss5	TWps0	TWps4	TWps5	TWps6
Cattle	0	32	76	3	13	1	97	52	12
Sheep/ Goat	1	36	34	4	4	1	102	65	8
Pig	0	1	7	0	3	0	25	27	4
Horse	0	0	1	0	1	0	6	1	0
Dog	0	0	1	0	0	0	6	15	1
Cat	0	0	0	0	0	0	0	0	0
Deer	0	0	1	0	0	0	0	0	0
Hare	0	2	2	0	0	0	0	2	2
Chicken	1	5	2	2	0	0	12	20	5
Goose	0	1	0	0	0	0	1	1	0
Duck	0	0	2	0	0	0	1	1	2
Raven	0	0	0	0	0	0	3	1	0
Jay	0	0	0	0	0	0	0	5	0
Kestrel	0	0	0	0	0	0	0	1	0
Golden Plover	0	0	0	0	0	0	0	1	0
unID bird	0	0	0	0	0	0	0	4	0
TOTAL	2	77	126	9	21	2	253	196	34

Table 6-2: Animal bones at Towcester: Sponne School [TWss] Site (data from Kent 2002: 28) and Park Street [TWps] Site (data from Payne 1980: Table 9)

The number of animal bones at both sites was fairly small, although Park Street had some larger sample sizes for the middle periods (for data, see Table 6-2). Pigs were not as important as they were in larger towns such as Colchester. Towcester also shows the shift from more sheep to an increased number of cattle, when very small sample sizes are excluded. At Sponne School (for trends, see Figure 6-6), this occurs around the same time as the town house is constructed in Period 3 (Atkins and Chapman 2002: 24). This is also the period where the sole incidences of duck and fallow deer occur (Kent 2002: 28). As fallow deer were rare, high-status imports in the Roman period of Britain, this could indicate the wealth of the people occupying the townhouse (Sykes et al. 2011: 163). Ashton, although lacking in such prestigious animals, also sees a major shift toward beef over lamb and mutton at this time (Figure 6-8). This mirrors wider changes

across the region; beef would have become more available, and fewer sheep were being kept by local farmers. Even if the wealthy inhabitants of the townhome could have acquired status items for their table, like wild birds or rare deer, they would have to compete with other privileged consumers for the preferred cuts of meat.

It is interesting that no major shift occurs in the representation of sheep and cattle remains from the first century into the second at the Park Street site (Figure 6-7). The percentage of sheep remains higher than that of cattle even during the second century (Payne 1980: 112). We know that cattle would have been widely available in the area from the comparative sites seen elsewhere in this chapter, so the prevalence of sheep here represents selection by the local inhabitants. Payne notes that the element representation for sheep in this phase includes mostly mandibles, metapodia, and distal radii and tibiae; meat-bearing elements like the distal humerus and distal scapula which would have been expected to preserve well were missing (1980: 108). The interpretation for this material was as primary butchery deposits and collections of rubbish from the general area rather than pits of a specific household's consumption (*ibid.*: 112). If consumption in phase 4 at Park Street was associated with a temple precinct, that could explain the higher number of sheep remains; lambs would have been a ritually-important food and were often consumed at temple sites such as Uley (Cool 2006: 211). Similarly, if the building was interpreted as a *mansio*, one could imagine imperial officials consuming a diet that set them apart as a special status group from the people in the surrounding countryside as a way of maintaining their sense of importance (Payne 1980: 112). Practically, lambs would also represent smaller packages to be butchered than whole cattle, and thus primary butchery could be more easily carried out in the confined quarters of the urban centre.

Even in the following phase, sheep remained dominant, and a small increase in the amount of pig remains is also seen. During this time, the expansion of the corner building occurs, and a well-house is added; Lambrick notes that it seems to shift towards a more domestic usage (1980: 114). The author believes that the adaptations are consistent with the building's use as a *mansio*, and notes the presence of high-status tablewares and drinking flagons (*ibid.*: 114). A certain way of eating was being maintained here, and whether the building saw continuity of use or not, it certainly saw a continuity of status. The timber building that replaced it does see a return to the local pattern of higher cattle numbers, although sample size is too small to draw any definitive conclusions (Lambrick 1980: 49).

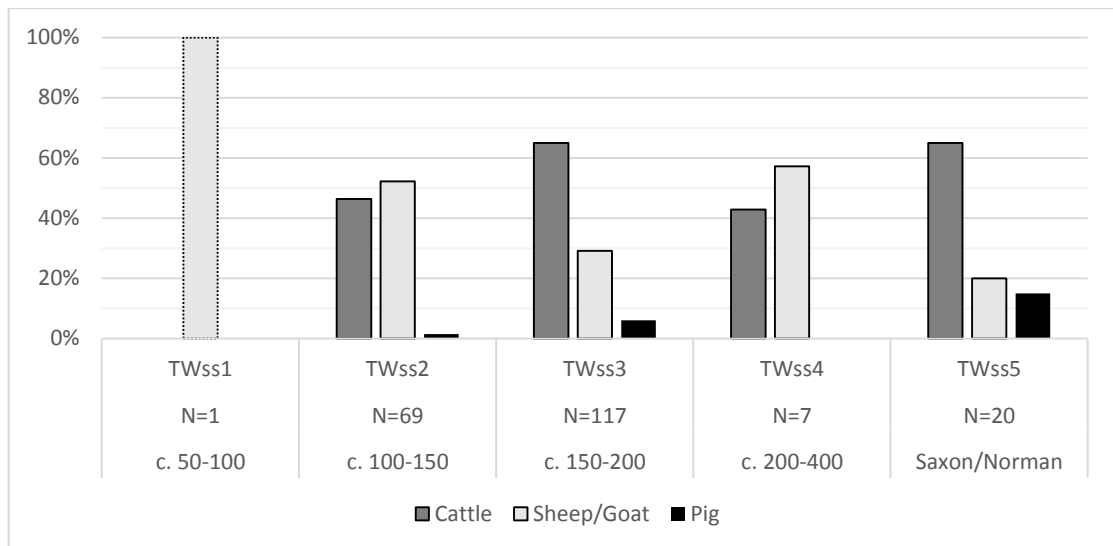


Figure 6-5: Species representation for main three domesticates (by %NISP) at Sponne School, Towcester (data from Kent 2002)

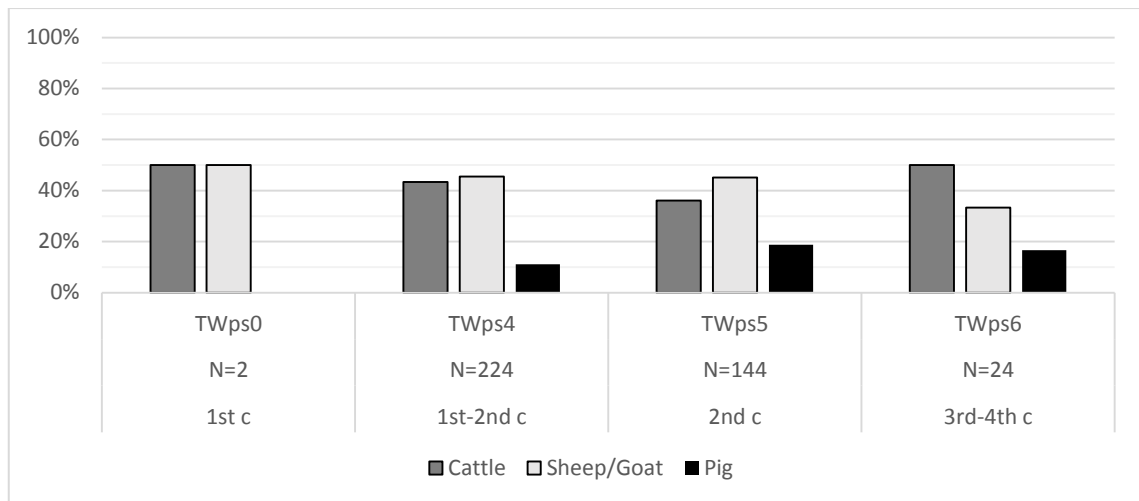


Figure 6-6: Species representation for main three domesticates (by %NISP) at Park Street, Towcester (data from Payne 1980)

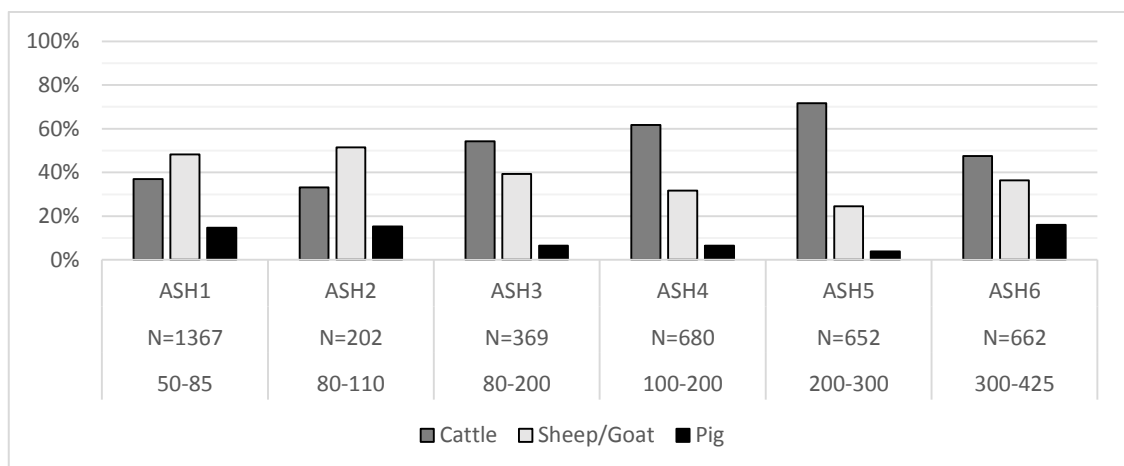


Figure 6-7: Species representation for main three domesticates (by %NISP) at Ashton

Element representation and age-at-slaughter further sets the Towcester deposits at Park Street and Sponne School apart from other contemporary sites (Figure 6-9). For sheep, the age at slaughter is very young, and few survive to later adulthood (Payne 1980: 109). When plotted against the material from non-well contexts at Ashton it is interesting to note that the material from Phase 4 is fairly consistent with the Middle Roman pattern of slaughter at Ashton, where at least half of all animals were slaughtered by one or two years of age, and few were kept into their older years (Figure 6-8). However, Ashton shows a greater number of sheep that survive Stage F (3-4 years of age), especially in the 2nd century; getting a few clips of wool may have been more important there than the production of tender meat. The husbandry strategy for the later material at Park Street was more akin to that at Ashton in the late 1st to early 2nd century, where most animals were killed before their first winter (Stage C) and almost none kept past full maturity. Park Street was able to acquire animals of prime meat age, and a growing taste for young lamb may be seen from the second century on; this may have resulted from changing preferences for the quality of meat or due to shifts in husbandry practices in the hinterlands that increasingly valued dairying and needed to sell off excess lambs.

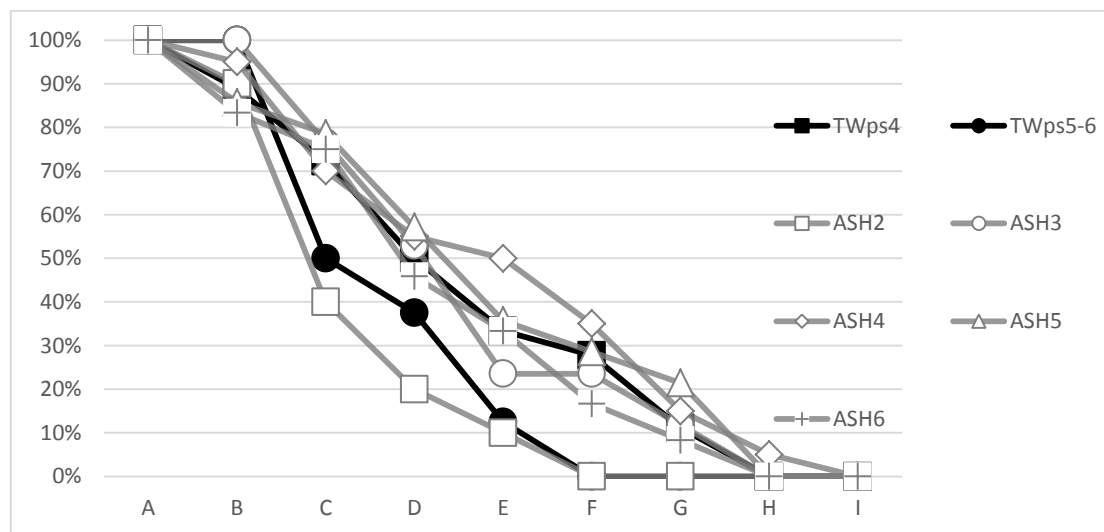


Figure 6-8: %Survival for sheep by mandibular wear stage (after Hambleton 1999, Payne 1973), data from Ashton and Park Street, Towcester (Payne 1980, Table 13)

For cattle, the pattern is more distinct from that at Ashton (Figure 6-10). Towcester shows a much lower prevalence of individuals under 3 years old (see Figure 6-9). Towns usually received older animals who were no longer fit for secondary uses like traction, and having large percentages of fully adult animals was not uncommon (Cool 2006: 85). Ashton shows the more varied “rural pattern, with culling at various

ages to maintain certain herd structure (*ibid.*: 86). Towcester certainly seems to fit into the more urban category, and with about half of animals surviving past young adulthood (Payne 1980: 111). After that, gradual attrition of adults continues as at Ashton. Although the taste for young lambs is prevalent in town, the residents did not seem to put the same importance on acquiring veal or prime age beef.

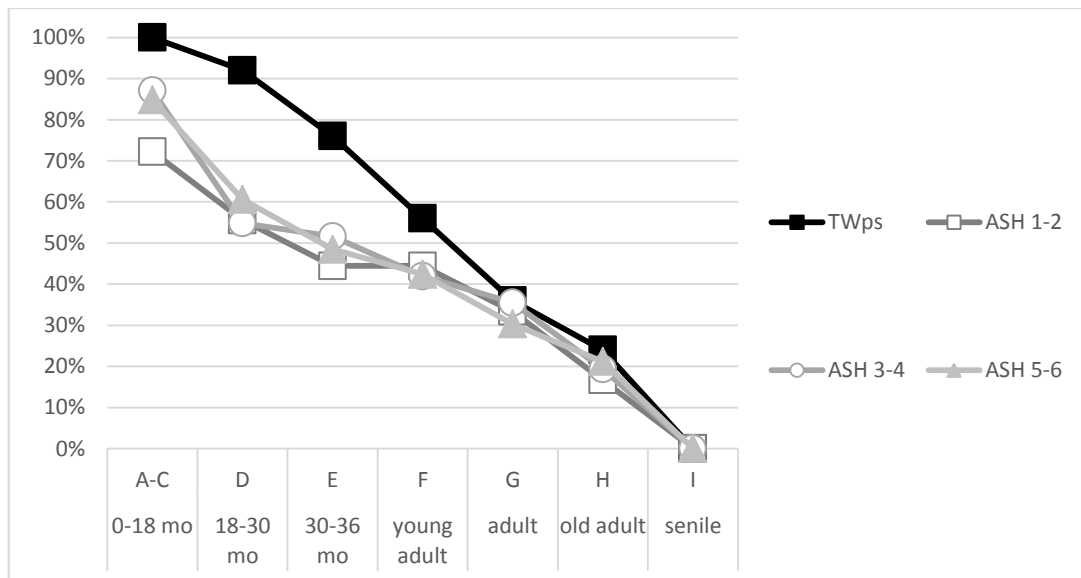


Figure 6-9: %Survival for cattle by mandibular wear stage (after Hambleton 1999, Payne 1973), data from Ashton and Park Street, Towcester (Payne 1980, Table 16)

Further confirmation of the status of the Park Street material from the first and second century phases is the presence of chicken and other birds in greater numbers than seen at many other sites in the town (Kent 2002: 28). Kent describes the extramural sites in Towcester as largely lacking bird remains, although whether that is a consequence of recovery on earlier excavations is not addressed (*ibid.*: 28). As chickens were an introduction in the Late Iron Age, it is not unexpected that their consumption would be more popular with elites and officials.

The unique nature of the deposits in Towcester show a different character of occupation than that seen at Ashton. Payne notes that only “one or two” elements show signs of carnivore gnawing, which indicates that food waste was not left exposed for long periods of time where scavenging dogs were present (1980: 108). Compared to the much higher rate of gnawing and general weathering from Ashton, the types of activity here were very different.

Towcester’s larger size and prominent position at the crossroads of several major routeways for the army and imperial administration would have given it a greater status than a small site like Ashton (Taylor et al. 2006: 7). Although both have evidence

for bone-working and other animal-product craft industries (Atkins and Chapman 2002: 27, Taylor et al 2006: 19), the town at Towcester developed more amenities for its residents. Fewer of the residents were likely to be directly involved with the production of their own food, and their ability to command high-status resources from those around them is reflected not only in the presence of status signifiers like tessellated floors, painted walls, and bath houses (Taylor et al. 2006: 16) but in the foods that they chose to consume.

6.4 *Colonia*: Colchester

When debating the nature of small towns, it is important to have an idea of how large urban areas functioned. The *colonia* at Colchester was certainly a distinctive urban centre. It began as an Iron Age centre that later developed into a military site post-conquest, and thereafter became a *colonia* for the settlement of veterans (Pitts and Perring 2006: 192). The town flourished early on, and had a stone wall by 75 AD (Luff 1993: 7). Over the its occupation history, it was razed in the Boudiccan revolts of 60/61 AD, rebuilt in the 2nd century, consolidated and enclosed further in the 3rd century, and eventually occupied by Anglo-Saxons after most of the Roman stone buildings were demolished or abandoned in the late 4th to early 5th century AD (*ibid.*: 7-8).

The data used here are drawn from Luff's monograph on the animal bone material from the Colchester excavations dating from 1971-1985. Although quantification methods were somewhat different than those used in Ashton, the differences these methods produced will be discussed further below. For ease of reference, NISP values were used wherever possible, and the lack of quantification by number of specimens for medium and small species was accounted for. The most useful metric is the comparison of the three major food animals, which were counted by specimen for all contexts from Colchester.

One of the benefits of using the detailed information from Colchester is the ability to look at a wide variety of specific temporal and spatial contexts. Seven different areas of the town were explored in Luff's animal bone report, including extramural suburbs with some industrial activity, intramural residential areas with evidence of high status occupation, and areas with Christian burials and a possible church. These sites are summarised below in Table 6-3. They span all phases of Roman occupation from the first century into the early fifth.

Site	Code	Location	Notes
Balkerne Lane	BKC	extramural, W	includes strip houses, temples, demolished c. 300-400 AD
Butt Road	BUTT	extramural, SW	pagan cemetery, later Christian church and cemetery
Middleborough	MID	extramural, NW	small suburb
Culver Street	CUL or 181	intramural, SW	military and civilian occupation, possible agricultural activity later
Gilberd School	GBS	intramural, NW	open land after Boudican destruction
Lion Walk	LWC	intramural, S	residential area
Long Wyre Street	COC	intramural, S	residential area

Table 6-3: Sites in Colchester (data taken from Luff 1993)

In terms of species representation, Colchester shows a very high incidence of pigs compared to other sites (Figure 6-11). This is especially true for earlier occupation phases and for intramural sites. The extramural areas are more characterised by a high incidence of cattle. Research into other rural sites in Essex suggests that cattle were predominant even in this early period (Luff 1993: 129). Additionally, the extramural site at Balkerne Lane had a large number of meat-bearing bones with butchery marks present; it is possible that beef was being slaughtered and processed on the outskirts of the city and then sold in town as boneless cuts (Luff 1993: 47, 143). Being smaller, pigs and sheep could have been treated differently and sold as bone-in joints more frequently. However, the differing status of the two areas is also important to consider. Culver Street (181) shows signs of probable tribune's houses and Gilberd School has evidence for soldiers' barracks (Luff 1993: 9). Meanwhile, occupation in Balkerne lane consisted of "flimsy" buildings of wooden construction and industrial workshops (Crummy 1984: 93). The large amount of meat provided by cattle and the productive nature of pig husbandry makes sense for a fledgling town that needed to feed a large influx of people, especially if they had a taste for beef and pork already from their homelands in Germany and Italy (Grant 2004: 373; King 2001: 220).

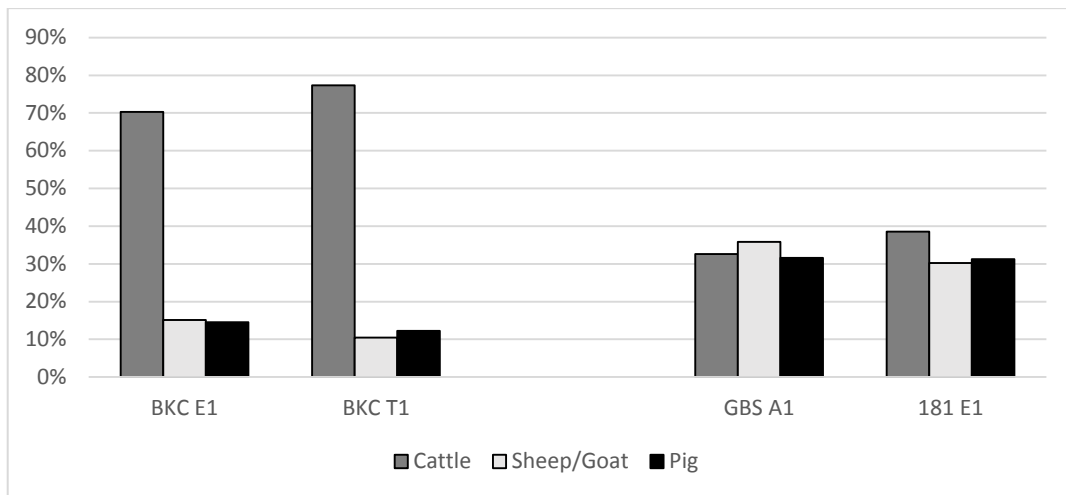


Figure 6-10: Ratio of main domestic species (by NISP) at Colchester, 44-60/61 AD (Luff 1993)

The next phase of occupation that occurs after the destruction of the town by Boudica is contemporary with the first phases at Ashton. They include many sites in the Balcerne Gate area, some of which were possibly associated with iron-working (Crummy 1984: 93), although Ashton does not show such an emphasis on the iron industry yet in the 1st century (see Figure 6-12). For early deposits, Ashton shows a more rural signature for sites in south-central England, with a majority of sheep/goat remains. This is starkly contrasted with the clear dependence on beef processing and distribution occurring in the extramural area at Balcerne Lane and the focus on pork products within the walls (see figure below).

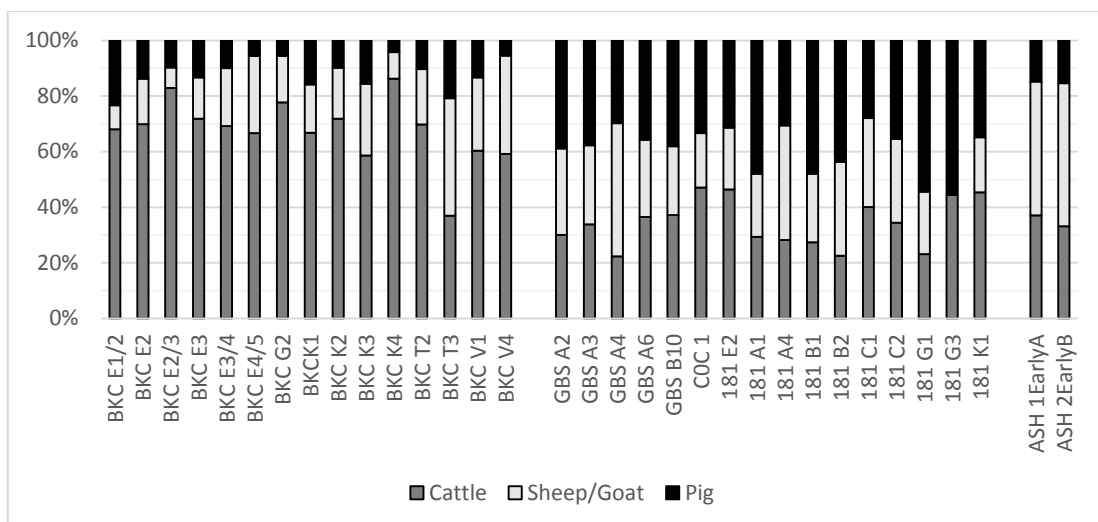


Figure 6-11: Ratio of main domestic species (by NISP) for Colchester and Ashton (non-wells), mid- to late 1st century AD

By the second century, both Ashton and Colchester were experiencing rapid changes (Figure 6-13). At Ashton, this period sees the rise of the iron industry and the

beginning of construction of the stone founded strip buildings, whereas Colchester involves the remodelling of houses with sturdier construction and the spread of luxuries such as mosaics and tessellated floors, heated rooms, and larger townhouses (Luff 1993: 7). Some buildings were also demolished to make way for the town wall, and certain areas were left open for a time, and may have evidence for horticulture inside the walls (*ibid.*: 9). By this period, Ashton shows a growing dependence on cattle over sheep, although they still have considerably more sheep than at Colchester. The levels of pig are very low, mirroring that at some of the Balcerne Lane sites. Although the Butt Road site is extramural as well, it involves agricultural plots and a pagan cemetery; this site has a large number of neonatal pigs that occur alongside a very large number of chicken bones, and may be the result of feasting (*ibid.*: 79).

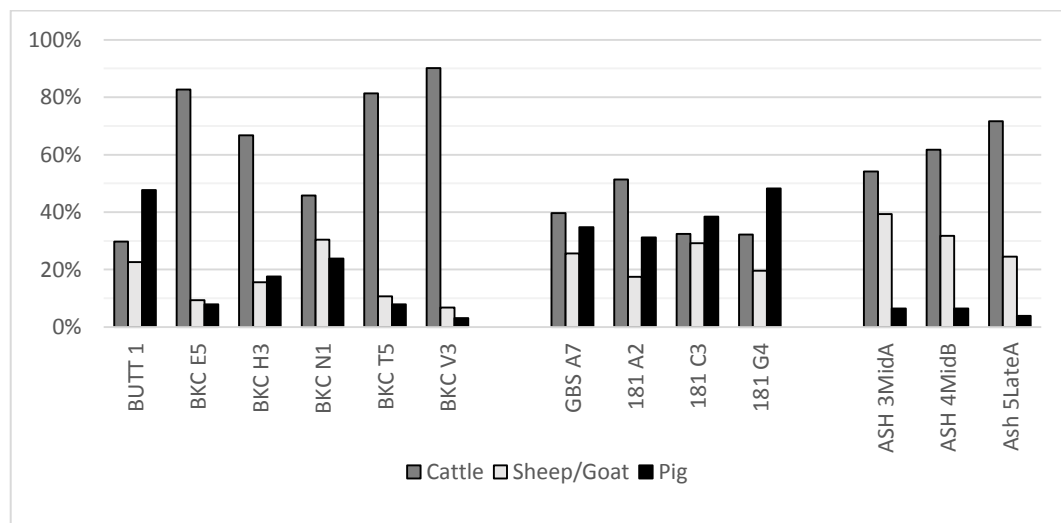


Figure 6-12: Ratio of main domestic species (by NISP) for Colchester and Ashton (non-wells), 2nd-3rd century AD

By the mid-3rd century at both Ashton and Colchester, major changes were occurring. Ashton saw a late burst in the market economy, as evidenced by coin loss (Condron 1995: 115-116). Additionally, Ashton saw a late phase of building and the deposition of material in several wells, as well as the appearance of a Christian cemetery. Colchester also saw significant change from the mid-3rd century on; they also developed an organised cemetery and church at Butt Road to the southwest outside the walled area (Crummy et al. 1993: 5). The largest change for the *colonia* was the destruction of extramural buildings, and the re-aggregation of settlement within town walls, perhaps in reaction to increased raids (Luff 1993: 7). Roman occupation continued into the early 5th century, as at Ashton, although Colchester shows signs of a

few isolated Anglo-Saxon huts and a few artefacts, suggesting that occupation continued on a limited basis in the 5th century and after (*ibid.*: 7-8).

At Colchester, pig numbers generally decline in this later period, especially in intramural sites; meanwhile the number of cattle bones increases (see Figure 6-14). The extramural Balcerne Lane sites show relatively little change from their previous pattern of cattle-dominant assemblages, although sheep are present in larger numbers in more locations. This coincides with a shift from a residential use of the area to its use for dumping unwanted material from the town and reinforcement of defences (Crummy 1984: 111-115). Ashton, however, sees its peak of cattle dominance in the assemblages over this period, coinciding with its maximum of economic activity, and more resembles the extramural assemblages of the 1st century, when that area was at the height of its importance. However, Ashton maintains higher sheep numbers, which is in keeping with both its regional context and the more rural nature of the site. Again, the Butt Road remains are anomalous, especially Butt Road 4, which again contains deposits possibly of a ritual nature.

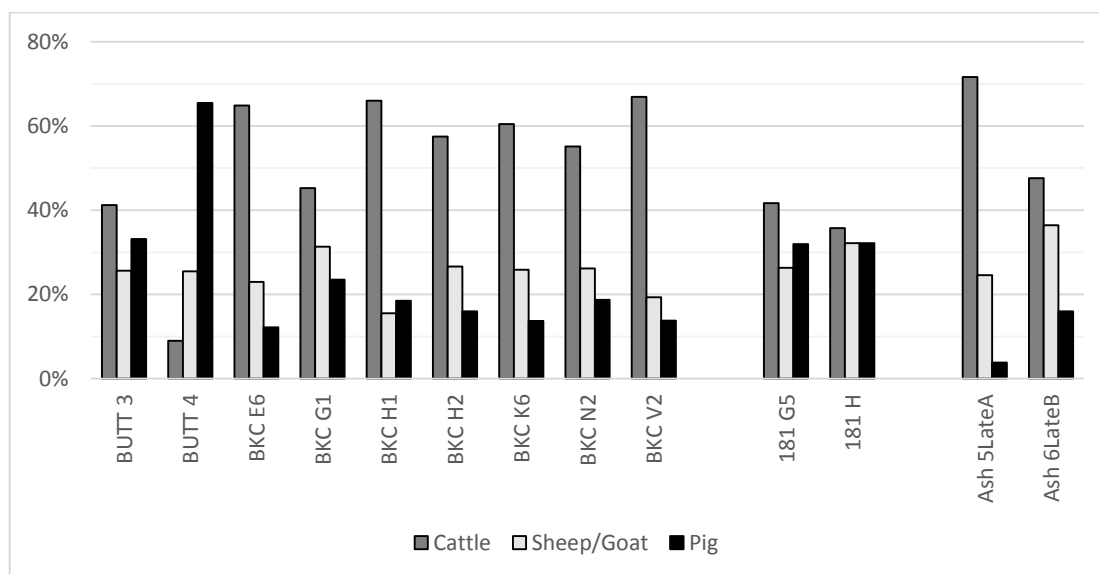


Figure 6-13: Ratio of main domestic species (by NISP) for Colchester and Ashton (non-wells), mid-3rd- 4th century AD

Age-at-slaughter helps inform on the key uses of animals at Ashton and Colchester, and whether animals were being kept into old age for their secondary products or whether they were kept until prime meat age and then slaughtered. For cattle, the first century material at Ashton contrasts that at Colchester, with far fewer older individuals present in the small town and a slaughter peak at around 8-18 months of age. It is not until the 2nd century that Ashton takes on a pattern more like that at the

extramural settlements of Colchester, with slaughter peaks in 18-30 month old and senile animals (Luff 1993: 55). Like Colchester, Ashton does show a shifting focus on the slaughter of very young animals, which is seen both intramurally and extramurally in the *colonia* (*ibid.*: 63). Changes in age at slaughter for sheep are more apparent, however, they are complicated by potential social differentiation. Younger animals tend to be present at the early intramural sites at Colchester, such as Lion Walk, where 65% of all animals have already been slaughtered by one year of age (*ibid.*: 68). This is a very different pattern from the early extramural sites at Balkerne Lane, which have slaughter peaks mostly around three to six years of age and a smaller peak at one to two years of age. Over time, all Colchester sites show an increasing trend toward the slaughter of younger lambs (*ibid.*: 81). Ashton shows a similar pattern towards increasing slaughter of very young lambs, and Luff speculates that this may be due to the growing importance of ewe's milk and wool in the Roman economy (1993: 81). For both Colchester and Ashton, pigs are slaughtered when they have reached prime meat age, with a few older individuals kept for breeding and neonates and very young animals present in structured deposits (*ibid.*: 81). There was a slight increase in the presence of immature pigs over time at Colchester, especially at Balkerne Lane; it is possible that this represents a shift in the use of the area to process carcasses for the intramural area and keeping less favourable animals to being used for dumping material from intramural consumption.

Wild mammals are very rare at Colchester, as at Ashton. The exception is the site of Gilbert School, which contains a large number of roe deer remains, mostly postcranial bones rather than antlers, as is the case for red deer (Luff 1993: 98). These animals are probably the remains of young deer hunted for meat in the 1st century during the town's military phase. Red deer were less common than roe deer, and were utilised more for their antlers, although the presence of skulls with antlers sawn off shows that animals were likely eaten in addition to their use in antler-working. Some number of red deer remains were found at Gilbert School, with more at Culver Street where sawn antler pedicles and partially complete objects suggest the localised production of antler artefacts (*ibid.*: 99). Ashton shows an opposite pattern of deer exploitation, with far more red deer postcranial elements than those for roe deer; this could be due to differing habitats and increase woodland cover in the surrounding area. However, like Colchester, antler was a key resource and most of the elements from red deer are antler fragments or portions of skulls with antlers removed for craft-working.

Another key difference between Ashton and Colchester was the representation of bird species. Only domestic fowl, domestic or greylag geese (*Anser spp.*), an domestic or mallard ducks (*Anas spp.*) were quantified in Luff's report, and it is difficult to know exactly which contexts and sites at each individual location that they were present in, so comparison of bird quantities with numbers of domestic mammals is limited. However, Luff notes that exceptionally large numbers of domestic fowl were found at Gilbert School sites dating from 44-60/1 and 60/1-275 AD, Butt Road 4E from the 4th-5th centuries, and Culver Street from 150-400+ AD (1993: 83). Another relatively large assemblage was noted for the Roman material of Lion Walk. All of these are intramural sites, with the exception of Butt Road, where the domestic fowl were found in association with possible church deposits. The birds selected for consumption here were also statistically larger than other birds across the site, and the presence of both hindlimbs and forelimbs in fairly equal numbers suggests the presence of whole animals consumed and deposited on-site (*ibid.*: 86-87, 97). Gilbert School and Culver Street, in contrast, have more leg than wing elements; this might be due to lower levels of preservation that bias the collection of smaller, more delicate elements like the scapulae and carpometacarpus (*ibid.*: 85). Chicken was clearly more available in Colchester than at Ashton, where chicken as a percentage of NISP remains very low throughout all periods. As chicken was introduced in the Late Iron Age and gained popularity throughout the Roman period, it is not unexpected that a well-connected urban centre like Colchester should have a great deal of chickens; the birds would also be easy to raise in the confines of the town. Another interesting contrast in the domestic fowl at Colchester and Ashton is the significant number of very large, male individuals at Colchester. Of the sixteen sexable tarsometatarsi for Ashton, only two came from male individuals. Colchester's population of birds may have contained certain birds bred for cockfighting, although the presence of some individuals with spurs removed suggest some males were simply bred to produce more meat (Luff 1993: 90-7).

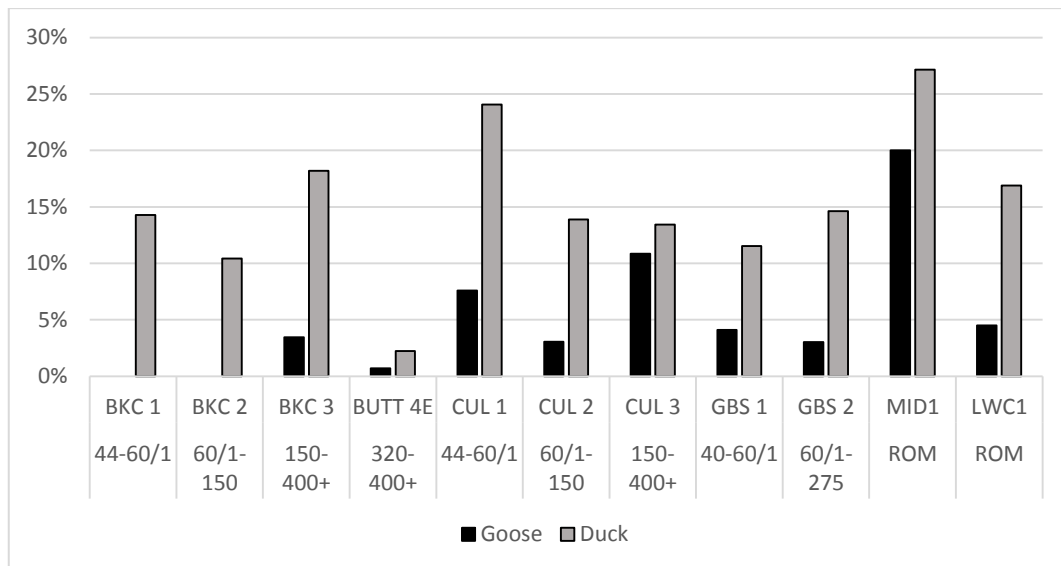


Figure 6-14: Geese and Ducks as a %NISP of bird remains in Colchester (data from Luff 1993)

Beyond domestic fowl, ducks and geese were the other key species (see Figure 6-15). Unlike Ashton, ducks were more common than geese at Colchester. Compared to chickens, they were never present in very large numbers. No clear temporal trends are present, and no large groups of partial or complete individuals were noted. In addition to ducks and geese, a list of birds were noted as present but not quantified. A number of wild ducks and other waterfowl were noted, as well as waders, small Passeriformes, corvids, doves, and accipitrids (Luff 1993: 98, table 6.4).

The urban site of Colchester provides a very useful comparison for the material at Ashton. The clear differences in wealthy intramural areas and more industrial extramural areas shows what was considered high-status by segments of the population that were able to wield power in the Roman state. The preferential consumption of younger animals, chickens, and roe deer at sites like Gilbert School represent a privileged segment of society (Luff 1993: 142). However, extramural urban sites cannot be directly compared with the small town at Ashton either. Balcerne Gate would have directly served the needs of the inner town, not just maintained its own consumption habits. The presence of large-scale processing of meat-bearing cattle bones outside the gates is logical, as processing very large animals would be a smelly, messy process (Luff 1993: 143). At Ashton, cattle butchery pit F1365 was similarly located back in Area C, away from the main thoroughfares and strip buildings. The presence of these external processing sites in both cases shows that the short-distance transport of pre-prepared meats was a key facet of supplying those not involved in agricultural pursuits.

Bird Species	Colchester	Ashton
Teal	X	
Wigeon	X	X
Tufted duck	X	
Swan	X	
Crane	X	X
Partridge	X	
Pheasant	X	
Snipe	X	
Woodcock	X	
Bar-tailed godwit	X	
Black-tailed godwit	X	
Curlew	X	
Whimbrel	X	
Dunlin	X	
Golden plover	X	
Golden/grey plover	X	
Greysrike	X	
Corncrake	X	
Lapwing	X	
Mistlethrush	X	
Redwing	X	
Carrion crow	X	X
Jackdaw	X	
Raven	X	X
Stock/rock dove	X	
Buzzard	X	?
Sparrowhawk	X	

Table 6-4: Colchester and Ashton wild bird representation (data for Colchester taken from Table 5.4, Luff 1993: 98)

6.5 Ashton's place in Central England

Ashton not only lies in-between important tribal domains in England (Upex 2001; 24), but in-between site categories as defined by various authors (see Chapter 2). The collection of data from Albarella and Pirnie (2008) for counties in Central England provides an excellent way to compare material from the broader region in a way that allows distinction between site types and temporal periods. Available to query on the Archaeological Data Service, this database was used to build a portfolio of sites occupied across the Late Iron Age and into the Early Saxon period for comparison with the data from Ashton. The sites, selected from the counties of Northamptonshire, Cambridgeshire, and Essex, are briefly summarized by type and chronology in Table 6-5.

Site	County	Site Type	Dates
Longthorpe ('67-73)	Cambridgeshire	military	ER
Longthorpe ('70-74)	Cambridgeshire	military	ER
Norman Cross	Cambridgeshire	small town	LR
Vinegar Hill	Cambridgeshire	small town	LR
Godmanchester	Cambridgeshire	small town	MR
Stonea ('80-5)	Cambridgeshire	small town	MR-AS
Tort Hill ('97) East	Cambridgeshire	small town	MR-LR
Tort Hill ('97) West	Cambridgeshire	small town	MR-LR
Stonea ('75)	Cambridgeshire	small town	R
Orton Longueville	Cambridgeshire	rural	ER-MR
Barnack	Cambridgeshire	rural	M-LR
Orton Hall Farm	Cambridgeshire	rural	MLR-VLR
Lynch Farm	Cambridgeshire	rural	R
Grandford	Cambridgeshire	village	ER-MR
Maxey ('79-81)	Cambridgeshire	village	R
Colchester	Essex	urban	ER-VLR
Sheepen	Essex	industrial	ER
Braintree	Essex	urban	R
Elms Farm	Essex	urban	VE-VLR
Great Holts Farm	Essex	villa	LR
Paston	Northamptonshire	rural	MR-LR
Wakerley	Northamptonshire	rural	R
Brigstock	Northamptonshire	ritual	LR
Park St. Towcester	Northamptonshire	urban	ER
Redlands Farm	Northamptonshire	villa	R

Table 6-5: Sites used from Albarella and Pirnie (2008) database [ER= Early Roman, 1st-2nd c; MR=Middle Roman, 2nd-3rd c; LR=Late Roman, 3rd-4th c; VLR= Very Late Roman, 4th-5th c, MLR= Mid-to-Late Roman]

Plotting Ashton's place in comparison with other sites is a difficult endeavour for several reasons. First, many different factors affect the species composition on a site. Even within site categories, two rural sites might have very different profiles if they focus on different types of husbandry. However, when these are related to wider patterns from Roman Britain, some of these discrepancies can be accounted for. Second, the differential methods of recovery and quantification can pose barriers to comparability. Here, only hand-collected sites were selected for comparison, as this was the most common collection method. Also, only sites with a NISP available were included. In order to get an idea of the wider region, sites from beyond Northamptonshire were included, as many sites in Cambridgeshire were actually closer to Ashton than those in its own modern country. Material from Essex also provides a good comparison for the network around *Durobrivae*, with its large cattle (Johnstone

and Albarella 2002) and its connection with the fens. Third, site summaries are often presented for settlements as a whole, without spatial and temporal distinction in general overviews (Cool 2006; Grant 2004). The division of assemblages into a comparable set of time periods is extremely useful for looking at change over time, and Albarella and Pirnie's periods are used in each graph, with the data from Ashton matched to these as closely as possible (120).

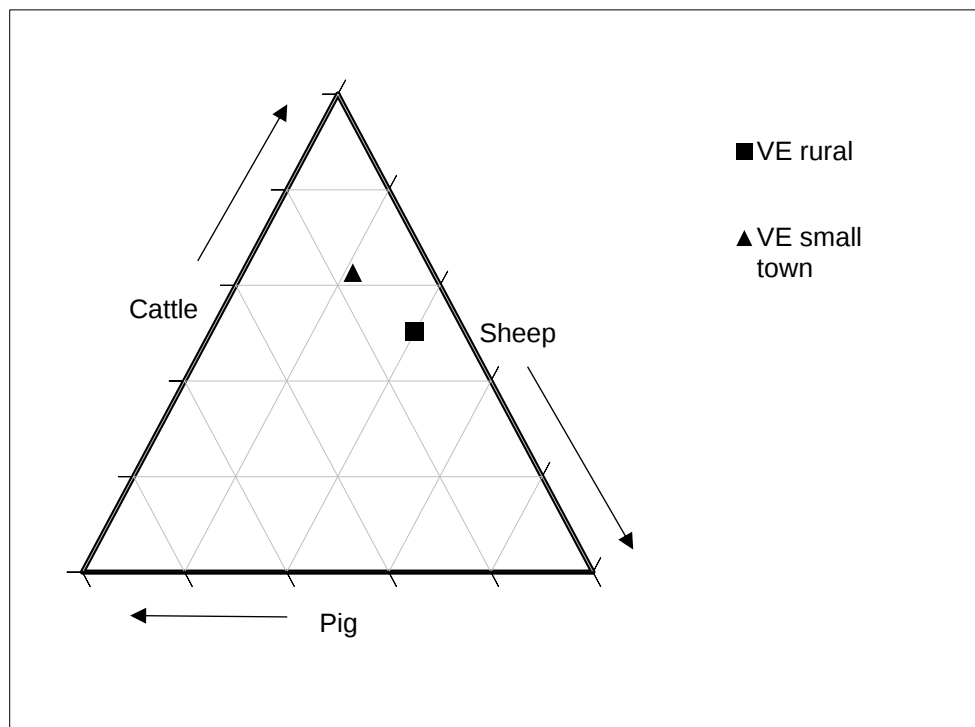


Figure 6-15: Data for main three domesticates, Very Early (Albarella and Pirnie 2008); arrows indicate movement toward 100% prevalence

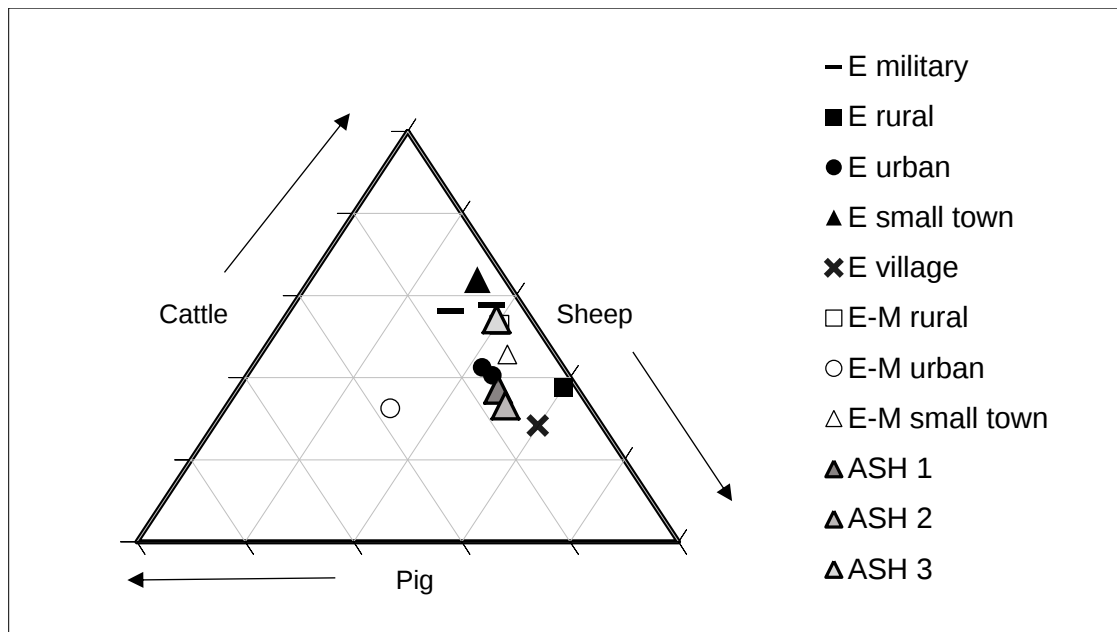


Figure 6-16: Data for main three domesticates, Early and Early-Middle (Albarella and Pirnie 2008) ; arrows indicate movement toward 100% prevalence

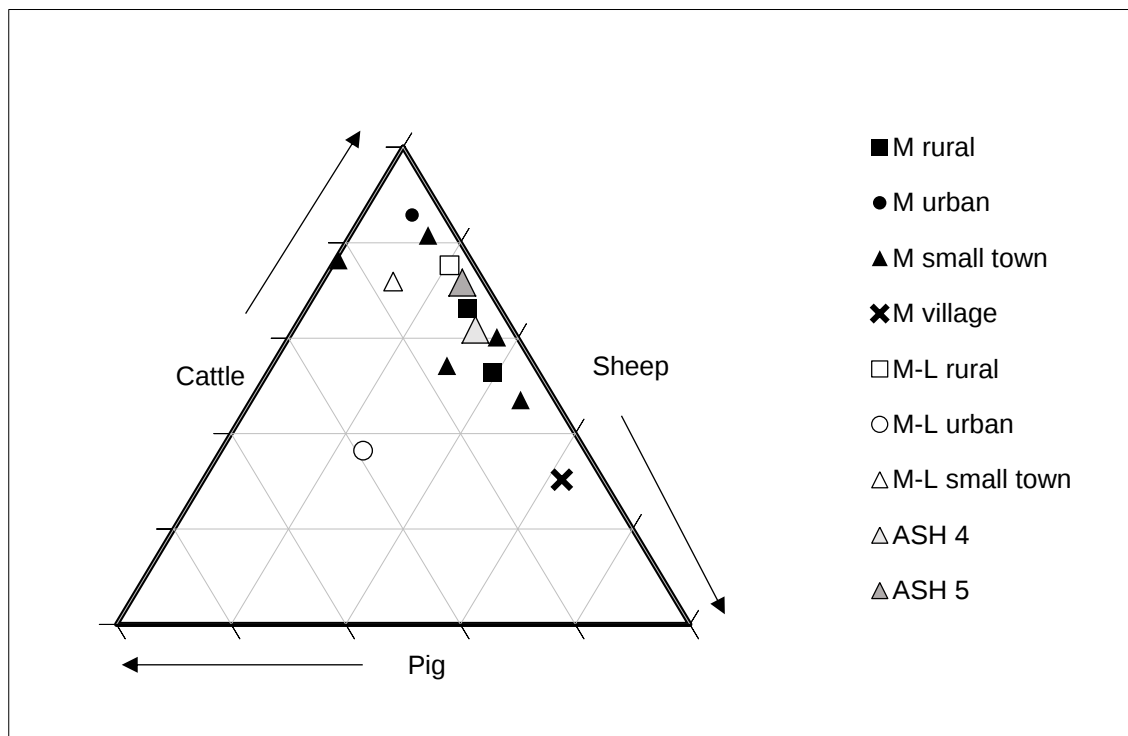


Figure 6-17: Data for main three domesticates, Middle and Mid-to-Late (Albarella and Pirnie 2008) ; arrows indicate movement toward 100% prevalence

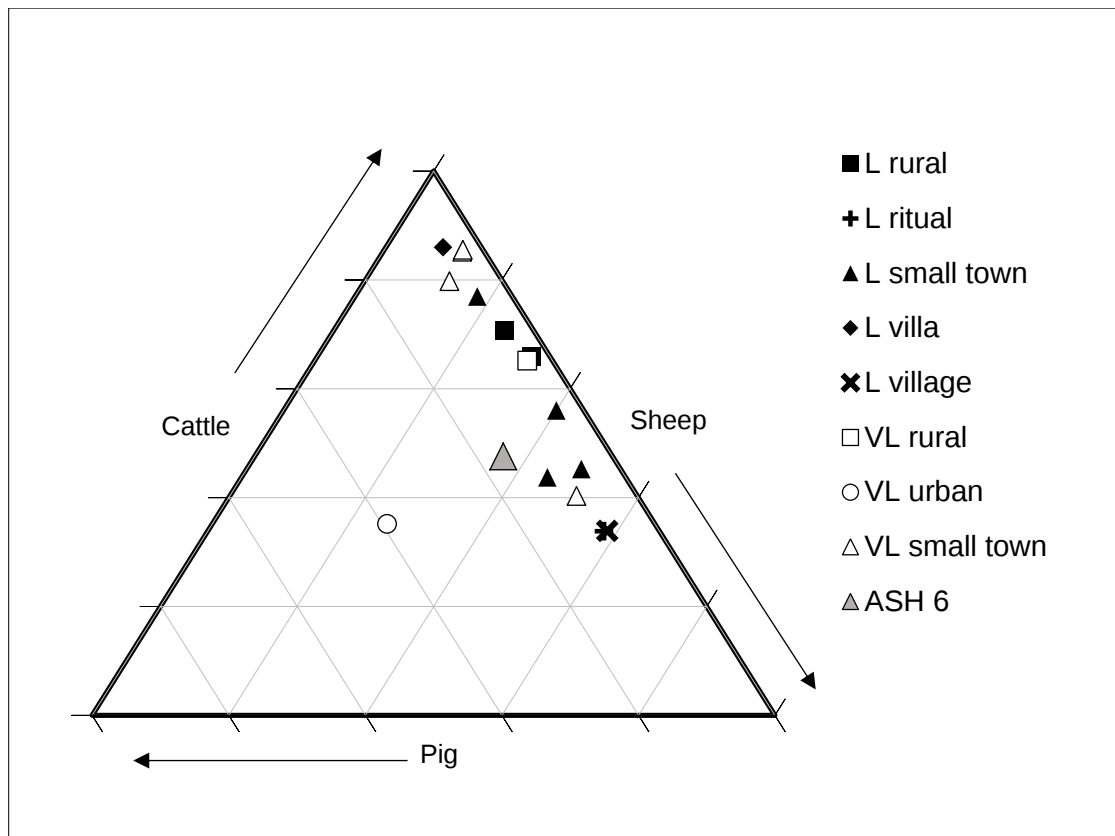


Figure 6-18: Data for main three domesticates, Late and Very Late (Albarella and Pirnie 2008) ; arrows indicate movement toward 100% prevalence

When the relative numbers of cattle, sheep/goat, and pigs were calculated, some patterns can be seen in the data. Pig numbers remain fairly low for all sites, with the exception of Colchester, as discussed in Section 6.4. At Ashton, the earliest pattern is one of greater numbers of pig remains than are found on contemporary rural sites; the data for Periods 1 and 2 cluster with the urban datapoints. As reorganisation in the second century begins, however, Ashton moves towards an increasing dependence on cattle, bringing it into line with the proportions of food domesticates at the early military site of Longthorpe (Figure 6-16). In the Middle Roman period of the second to third centuries, the number of cattle at Ashton further increase, reflecting a trend of increasing variety in cattle numbers (Figure 6-17). The range of variation for small towns is quite large, and larger towns can be distinguished by their higher numbers of pigs and cattle. Ashton plots nearer the rural sites for this period. In the Late Roman period, the third and fourth centuries, two groups of small town deposits appear. One cluster with very few sheep and higher cattle numbers appears, as well as one with a greater number of sheep. The late material from Ashton is more similar to the latter, and the presence of more Very Late period sites in this group supports the idea of another

key change in pastoral economy towards the end of the Roman period. It is also interesting to note that in the Late Roman period, the rural sites and villas have higher cattle numbers, whereas small towns and villages have more sheep.

Ashton does not clearly plot with groups in either the rural or urban category. With the exception of the early period, it appears to fit within the range of variation for other small towns in the area relatively well. It is possible that an organised system of supply and demand operated in these towns; they would have been useful as foci for exchange for those in nearby rural sites, even if the lack of wealth in the smaller settlements indicates that they did not have the access, or perhaps even the desire, for Roman luxury goods seen in the *civitas* capitals and villas. The position of Ashton within the scope of rural variation, however, especially in the Early and Middle Roman periods, shows that it was never fully divorced from agricultural production.

7 Discussion

7.1 Introduction

The data from Ashton paint a picture of a town with complex and unique patterns of animal husbandry and animal-human interactions. The patterns of cattle and sheep/goat remains in particular show a rise from a lifestyle that would have been familiar to those who lived before the Roman Conquest to a new, more globally connected town that was motivated to change the way they interacted with their familiar animals and to accept new animal breeds and species. These changes created some unique depositions across the site, even though distinct areas of status and activity could not be definitively identified. These patterns are further illuminated by the landscape and cultural context of the town, revealing a dynamic site history that fills key gaps in our knowledge about how small towns functioned in the region.

7.2 Animal Economies in a Small Town

The addition of Britain as a Roman province had a profound effect on the people of Ashton. The institution of taxation would have been a major shift from the previous Iron Age system of tribal allegiances; taxes rose to a maximum in the fourth century and then declined in severity as the empire became less efficient at collecting them (Mattingly 2006: 94, 519). As mentioned previously, roads were necessary to the collection of taxes, as they created an organized network of central places for aggregation of goods and currency. Although taxes were probably collected in kind during some periods, the widespread presence of money was also a Roman innovation that would have transformed how animals were traded and treated (*ibid.*: 519).

Ashton was linked into this wider world by the road that ran from Irchester to Durobrivae, which was itself linked into the extensive Fens area (Fincham 2004: 43). This hub was itself linked with the military and administrative bodies of the province, both by road and by the eastern North Sea Coast; the fortress of Longthorpe would have served as a military overseer for the area, while the significant structures at Stonea Grange may indicate some sort of administrative centre (*ibid.*: 171-2, 183). The Nene Valley pottery industry, as well as its prolific iron industry, made this area a key supplier for the province (Fincham 2004: 102, Burnham and Wachter 1990: 89-90).

The iron production was the resource that made Ashton grow rapidly and produced the most attractive commodity for those interested in wider trade networks. As one of the key iron-producing centres of Roman Britain, described by Schrufer-Kolb, the Nene Valley region that includes Ashton would have been a supplier of iron objects needed to build, defend, and work the province (2004: 1, 37). Given the presence of several hearths in the northern area of the town and the amount of ironworking slag, Ashton has proven to be one of the main centres for the production of iron objects. It is possible that animal products could have travelled alongside this main export as a supplementary cargo.

The supply of towns, *colonia*, and military bases would have required a great deal of plant and animal food. The raising of animals for market would have represented a key economic opportunity. It is likely that most animals were driven on the hoof, as there are no major imbalances in the representation of waste elements (head and feet) with meat-bearing elements (upper limb bones) overall at Ashton. However, meat could have been deboned and preserved at some step along the way. Salt was a key commodity in the preservation of meat and its presence in the Fens when combined with the excellent grazing land in the Nene Valley made this region an ideal production centre for this important resource (Cool 2006; Fincham 2004).

Animals would have provided more than meat. The key food resource mentioned in most Roman records was grain (Cummings 2009: 73). Extensive production of wheat and other grains would require the use of draught cattle, and if grain production became more important than meat production, this might account for the prevalence of older cattle at larger sites (Albarella 2007; Grant 1989; Cool 2006). If keeping older cattle for secondary products is a sign of this favoring of cereal over animal agriculture, and can be combined with the Pathological Index data for possibly draught pathologies, it would appear that animals were being used most heavily in the first and second century, and then at the peak of the town's activity in the mid- to late third century. The decrease in Pathological Index values in these later periods may be due to the larger size of the animals, which might have allowed them to better distribute the loads imposed on them.

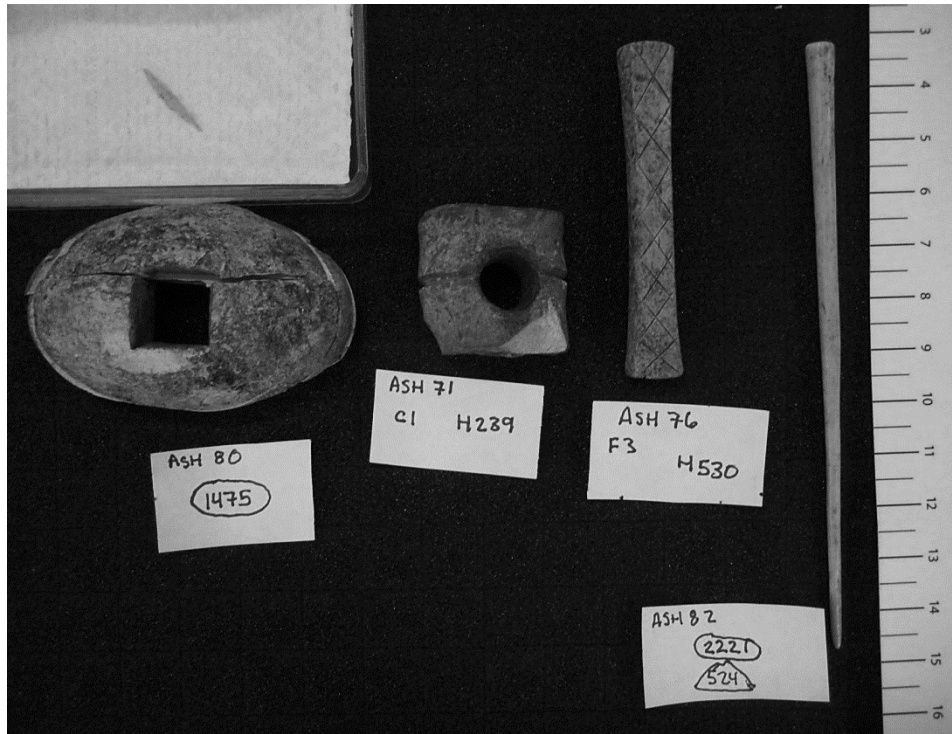


Figure 7-1: Worked bone from Ashton

Other key resources from animals would have included bone, horn, and antler for craftworking. 41 worked bone pieces were discovered during the late excavations and 54 from the amateur excavations; these pieces included gaming counters, knife handles, pins, and various other objects (Northamptonshire County Council n.d.). Such industries were common on rural sites, from farmsteads to villas to suburbs of small towns (Taylor 2007: 47, Burnham and Wachter 1990: 47). Ashton obviously had a thriving bone-working industry, given the number of partially worked items, bone slivers from large mammal long bone shafts, and features such as F1365 that collected bone material suitable for shaping into objects (for examples, see above Figure 7-1).

The production of textiles, including wool and leather, is also suggested by the material from Ashton. The increasing proportion of sheep kept into old age in the later periods hints at a possible increase in the importance of wool, although the collection of this resource would not interrupt the slaughter of the animal at a relatively tender age. Additionally, the well deposits from context 2125 in Well F1012 are highly suggestive of the large-scale processing of lamb skins for leather.

Eggs and feathers from birds would also have been gained in addition to meat. The contribution of dairy products may also have been significant; the slaughter of

some very young lambs and cattle in the later phases may indicate a byproduct of exploiting this resource.

The key question is that if Ashton was such a productive site in terms of iron work as well as animal products, why do we not see signs of material wealth? Ashton had relatively few of the usual signs of Roman prestige goods, such as samian, amphorae, or other imports. In contrast, the Roman villa at Cotterstock 2.5 km away displays wealth on a grand scale, with its large mosaic, bath suites, and wall plaster (Upex 2001: 89). Upex suggests the possibility of a link between the villa and the small town (*ibid.*:89). It is possible that the wealthy owners of the villa were able to commandeer the wealth of the small town next to it; it is possible that those living at Ashton were tenants of a sort to the villa owners, not fully profiting from their trades.

7.3 Transitions

Ashton does not provide clear evidence of Late Pre-Roman Iron Age settlement prior to the conquest. However, the relatively rural pattern of early animal husbandry on the site does suggest that it was not a full participator in the imperial economy from the town's foundation. The presence of a coin of Tasciovanus may be a sign of tribal affiliation, but it could equally likely be a relic kept by someone in the town and deposited long after the tribal entities ceded power to the Romans.

It is the transition from the Late Roman into the late Sub-Roman period that provides the most fruitful material for consideration. Although often considered a time of crisis and catastrophe, it is perhaps more useful to think of the changes in Late Roman Britain as being driven by mechanisms promoting change (Reece 1981: 27). A shift in the organisation of the provinces had already occurred by the 4th century, dividing them into smaller units and reorganizing tax collection (Mattingly 2006: 227). The decline can also not be considered in purely terms of the scale of urban building, as elites still had money to spend on homes and public spectacles; they simply chose to express their wealth in different ways (Webster 1981: 344-5; Millett 1981: 526). Participation in Roman urban lifestyles decreased in importance, even as personal wealth seems to have increased, given the grandeur of villas like Cotterstock.

The changes were not the direct result of Anglo-Saxon incursions; these were not recorded in historical chronicles until at least the mid-fifth century (Jones and Casey: 1988: 367). There is little evidence for Anglo-Saxon occupation at Ashton, although

the wider region does have early Anglo-Saxon sites. Furthermore, Holmes has observed that late Roman populations had a very different diet than their Anglo-Saxon successors (Hull and O'Connell in Holmes 2014: 123). The changes that are seen are more likely to be due to the shifts in structures of power and economy than the result of a change in population.

7.4 The Character of a Small Town: Identity and Practice

The lives of the people of Ashton were not only affected by being enmeshed in the network of Roman trade and economy, but by the accompanying involvement in the animals that came along with it. The transition from an early Roman site that mainly focused on agricultural production to a late Roman town where ironwork and other crafts were a booming industry to a more subsistence-based settlement shows the adaptable nature of people and their settlements in Roman Britain.

When considering animals and humans in their landscape, the town of Ashton has several important lessons to impart. Considerations of how animals affect livelihood are key for understanding how largely rural economies functioned. Additionally, the parts animals played in ritual as well as economy would have had profound effects on belief systems. Furthermore, a consideration of how changing animal landscapes would have been experienced by people can further our understanding of how the people of Ashton conceived of the world around them, and their part in it.

When one's livelihood is tied up in the land around them and their resources, investment in that livelihood is key. The important of larger breeds of cattle at Ashton may represent just such an investment by the town's inhabitants. Introducing larger animals would have been an impressive sight for people used to smaller stock, and might have been a sign of relative status in an otherwise fairly homogenous population. When considering status for people further from the urban centres of Roman Britain, it is important to remember that relative status may be more important than a strict adherence to a single "Roman" pattern of display.

Hints of ritual activity are seen all over Ashton. The presence of variable burial rituals in the Late Roman phases makes it clear that pagans and Christians were living alongside one another in the fourth century town. The presence of a complete lead tank and the fragment of another found in the well in the Hadman area is one of the most significant finds (Guy 1981; Watts 1991; Petts 2003). The presence of a ritual deposit of

fish remains in a pit in Building 7 may be associated with Christian practice; fish remains were otherwise rare across the site and in Romano-British assemblages as a whole (Locker 2007: 141). The linking of certain types of animals with certain beliefs is crucial for understanding how people could conceive of both commercially important animals like sheep as good offerings as well as animals only used for special purposes, which is perhaps the case with fish.

The link with goods from the wider Roman Empire, although limited by availability and distribution, gave the people at Ashton some chance to choose things that enriched their lives. The adoption of very small breeds of dog, such as that from well context 2066, may hint at the need for small dogs to act as rat catchers, but could equally be seen as participation in the trend of owning tiny lapdogs (Harcourt 1974). Eating chickens and their eggs in increasing numbers would have let the inhabitants of the town both have a form of protein security by raising meat animals in their yards, but also represents changing attitudes towards the consumption of birds after the Iron Age. The presence of other birds like cranes, ducks, and geese, sometimes with butchery marks, confirms this trend.

For most periods, agricultural production appears to have been a key activity at Ashton. Although there was enough of a surplus to supply specialist workers in the fourth century, the extensive field systems beyond the town and evidence for animal breeding makes it clear that the people were still intimately involved with their stock. Throughout all the changes, animals remained a constant presence in the everyday lives of the people.

8 Conclusions

The material from Ashton illustrates the key importance of analysing data from site types that do not fit easily in the standard categories of urban or rural. Understanding this nebulous category of site is a key goal for many syntheses on Romano-British archaeology. It is hoped that the data presented herein will contribute towards a better knowledge of how separate small towns functioned on their own within their settlement hierarchy, and better illustrate the similarities and differences within the categories created by each analysis of the topic.

One of the most illuminating results to come out of the study of this material was in the final century before occupation ended. Although much scholarship has focused on the shifting trends in animal bone composition from the Iron Age into the Roman period, there are fewer examinations of how animal economies and human-animal interactions changed when the Roman period ended. Few sites have continuous occupation from the Roman period into the Anglo-Saxon period. Ashton is no exception; no artefacts indicating occupation beyond the early 5th century were discovered and there is no sign of later structures. However, understanding the economic and social processes happening just before the site's abandonment are also very important for examining how Roman influence faded from the Nene Valley and left the opportunity for Anglo-Saxon power structures to dominate.

The shift from a cattle-focused husbandry strategy driven by the need to produce large amounts of cereals to a more sheep-focused pattern illustrates the declining need for producing large amounts of plant and animal products for urban and military markets. The increase in taxation can be seen to precipitate the cattle increase, and it is likely that the decrease in the ability of the later imperial administration to collect taxes precipitates the decrease in cattle numbers. That the population also seems to be prioritising meat yield in the mid-fourth to early fifth century also suggests that the need for secondary products was decreasing; perhaps with fewer animals being sent on to other sites, they were able to keep more of the prime meat-aged animals, creating more balanced age profiles.

This study also highlights the rich ritual life of the inhabitants of Ashton. Over the course of occupation, it shifts from a purely pagan settlement to a place where significant Christian practices are taking place. Whether these practices are purely Christian in terms of what would be recognisable for people from Rome is unknown;

the presence of the crumpled lead tank in the well in the Hadman excavation area and its accompanying deposit of animal bone shows that syncretic beliefs were still taking place. Uncommon animal species are often taken as examples of ritual and structured deposition, and the fish from the pit in Building 7 are no exception. Their presence in a house pit with other bone and material culture associated with ritual deposits does suggest that they were placed in the house as part of some kind of observance. That the fish is associated with Christianity and is otherwise uncommon at Ashton and other Romano-British sites can be combined with its deposition in a pit that matches the dimensions of the lead tank may be coincidental, but it is a reminder to consider the associations animals might have had with daily and spiritual life for the people that interacted with them. The ritual nature of common animals of great economic importance cannot be overlooked either, as the juvenile sheep present under the floors of the buildings illustrate. Rare animals are sacred and special for their rarity and the special features that associate them with the realm of the divine; common animals are sacred for the great importance they have in the lives of the people who interact with them.

With such a large body of data, it is impossible to exhaustively complete all the desired strings of research in a single work. It is hoped that in the future, this material will serve as the basis for a wider examination of the site of Ashton, incorporating the structural remains, ceramics, small finds, other environmental evidence, and all other data from the settlement. All data were recorded in a Microsoft Access database, in hopes that further information can be extracted from the primary analysis.

It is also hoped that the provision of data from this site will be useful in integrating Ashton into syntheses on husbandry in Roman Britain. The recent rise in big data projects, as evidenced by the expanding number of projects available on the Archaeological Data Service, shows the need for more sites to contribute towards a better understanding of animal variation over space and time. Large datasets with explicit methodologies are especially useful for these, as they are more easily comparable than less specific analyses with vague descriptions of how results were compiled.

An exciting new direction for research on the animals at Ashton would be an examination of the material from the Hadman area wells. Ceramic phases were available for most of the contexts, and thus more detailed stratigraphic data could allow for exploration of the patterns of deposition. Primary analysis by Alessandra Cosso has

suggested several interesting trends, including the presence of large amounts of neonatal and foetal sheep, pigs, and dogs. University of Leicester undergraduate students also assisted in the identification of a semi-complete juvenile red deer in one of the wells, which is a unique discovery within the site. The presence of such unique deposits in a series of wells containing the Christian-associated lead tank would be an important contribution to the understanding of pagan and Christian ritual practice at the end of the site's occupation.

Of all the things accomplished by the present work, the primary objective was to illustrate the presence of animals in the everyday lives of the people at Ashton. The people living in this small Romano-British settlement did not leave behind inscriptions that provide us with their names, and their home was not mentioned on any of the itineraries or records for the province. Their lifestyles were not flashy enough to attract the attention of antiquarians, but they were nevertheless a key piece in the mosaic of connections that supported the production of grander objects and structures. Animals were indirect participants in massive economies of supply. They supported those who were creating the large quantities of iron work that helped the town grow. The fortunes of the settlement's people and animals varied in tandem. Whether wild or domesticated, strange or familiar, the animals that left behind their bones at Ashton would have been an important part of the lives of these everyday people, forming a key part of the patterns of life in Roman Britain.

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Appendix I: Landmark Zones for Element Recording

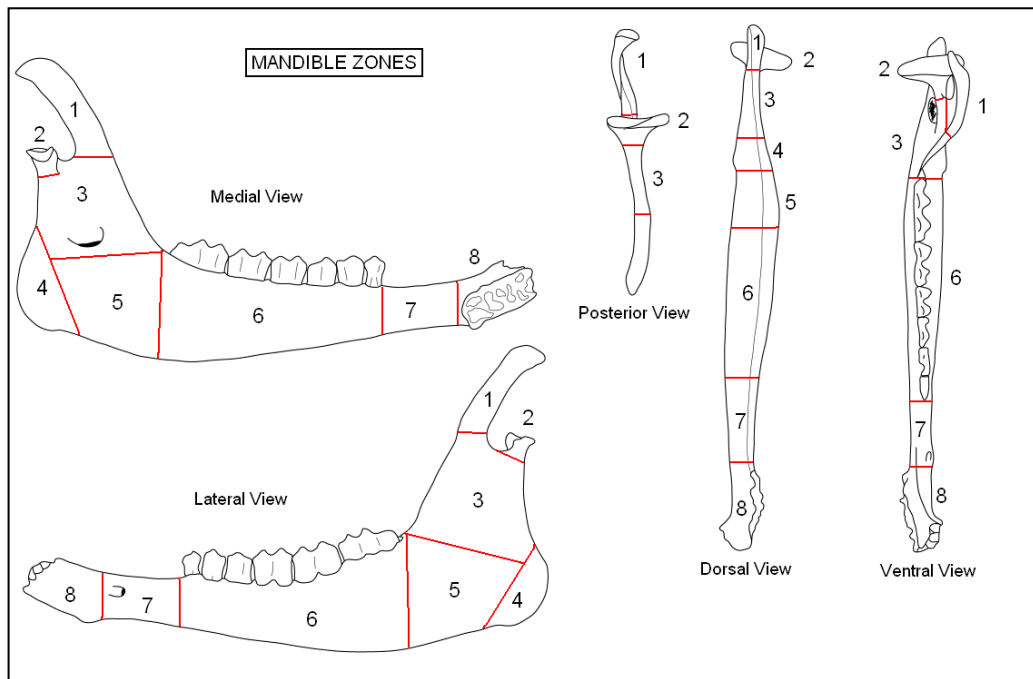


Figure I-1: Mandible landmark zones

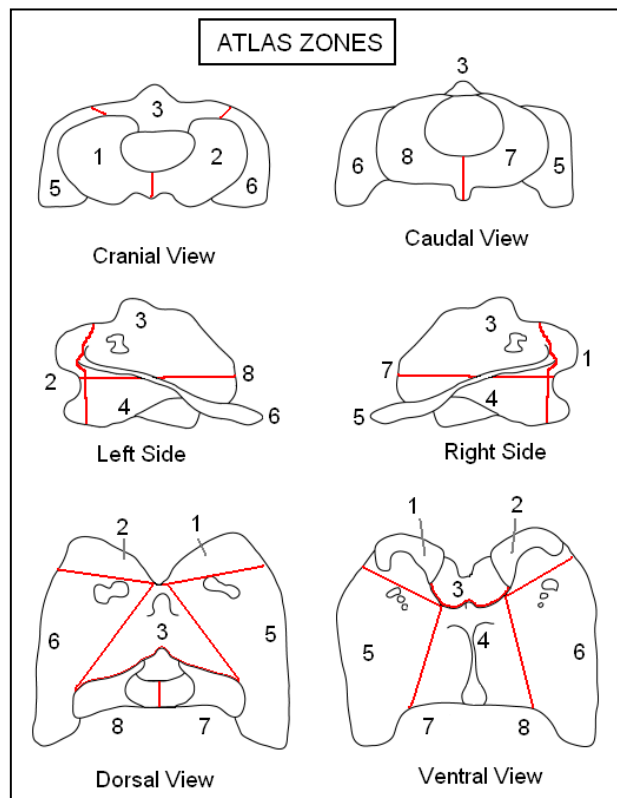


Figure I-2: Atlas landmark zones

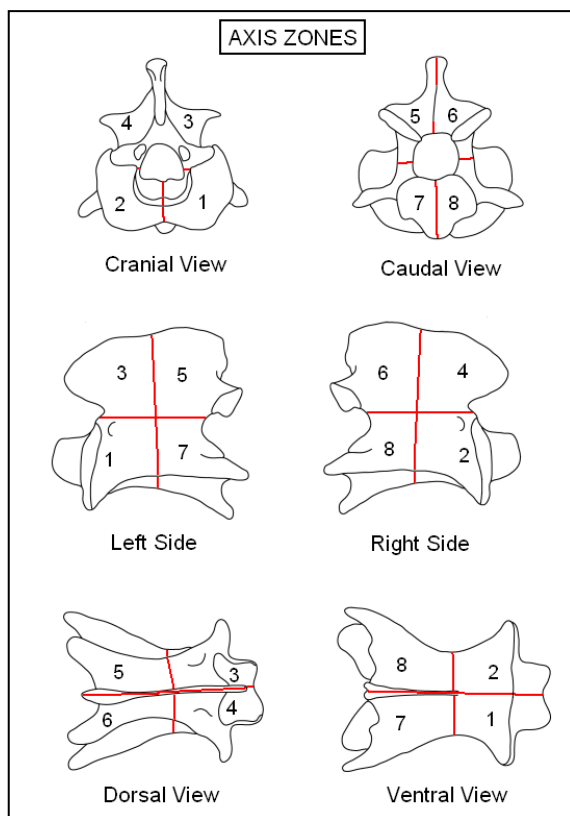


Figure I-3: Axis landmark zones

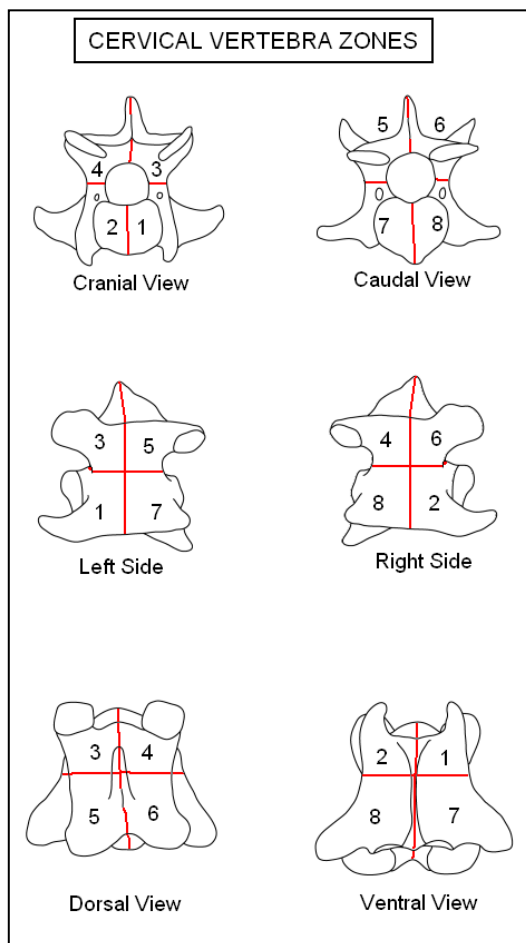


Figure I-4: Cervical vertebra landmark zones

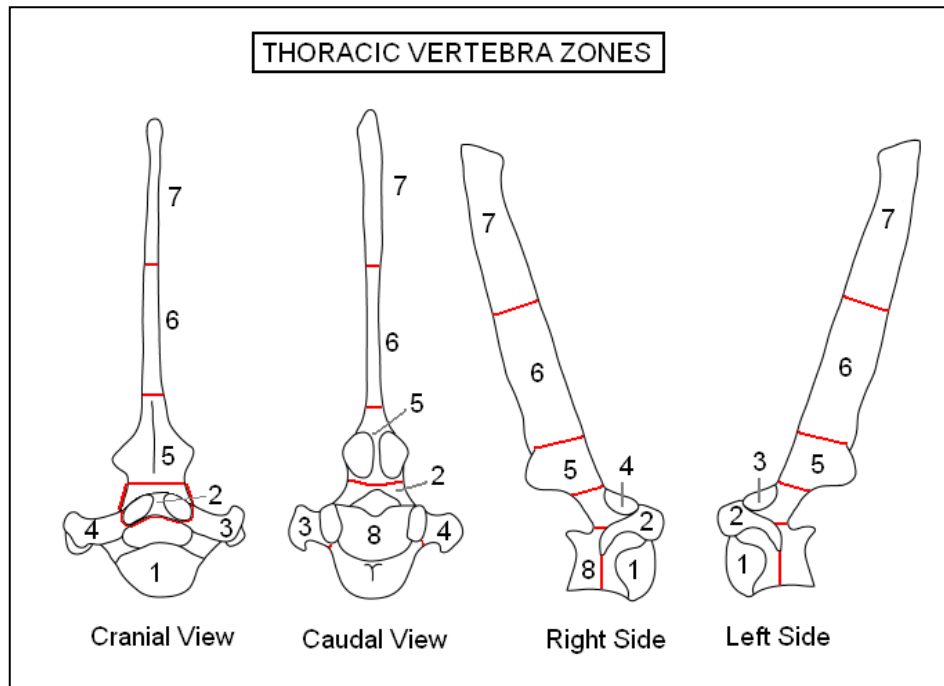


Figure I-5: Thoracic Vertebra landmark zones

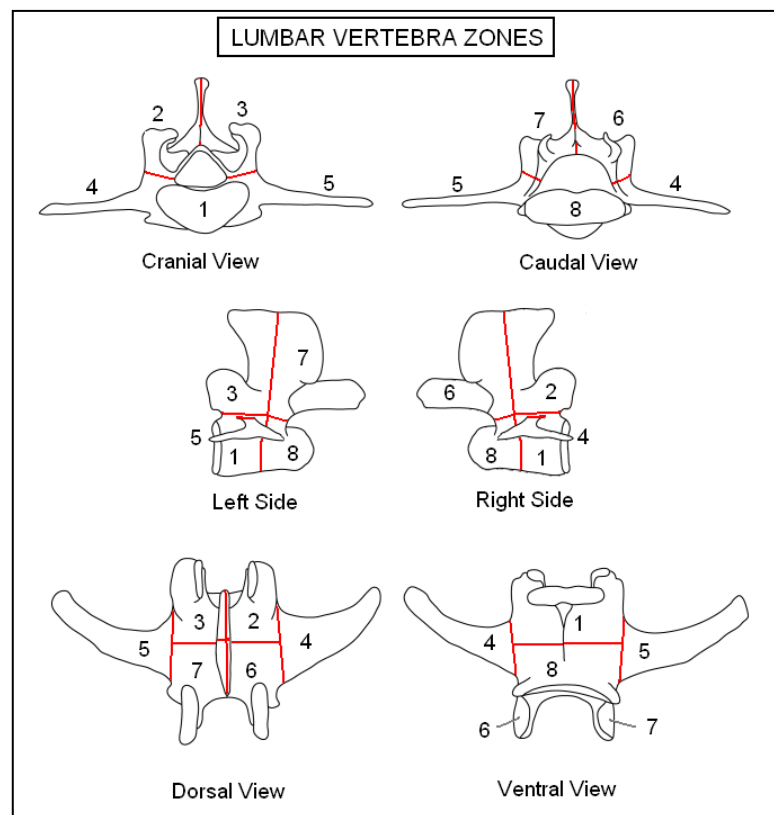


Figure I-6: Lumbar vertebra landmark zones

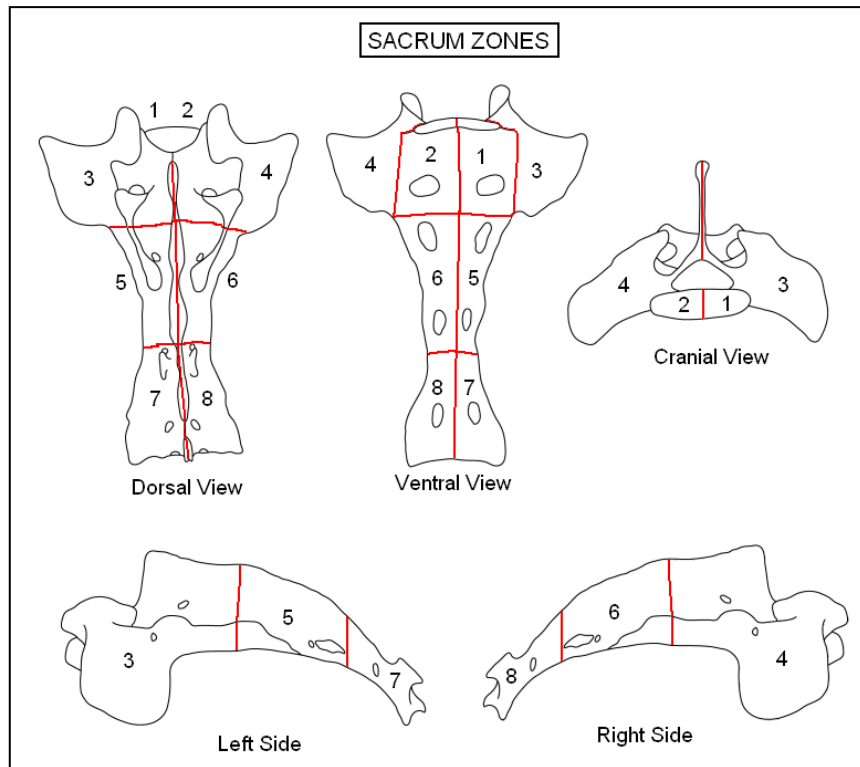


Figure I-7: Sacrum landmark zones

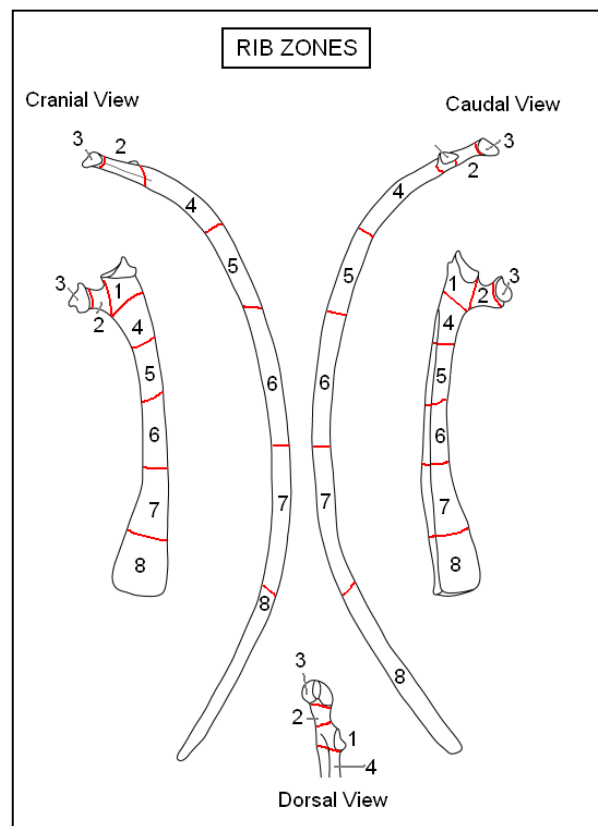


Figure I-8: Rib landmark zones

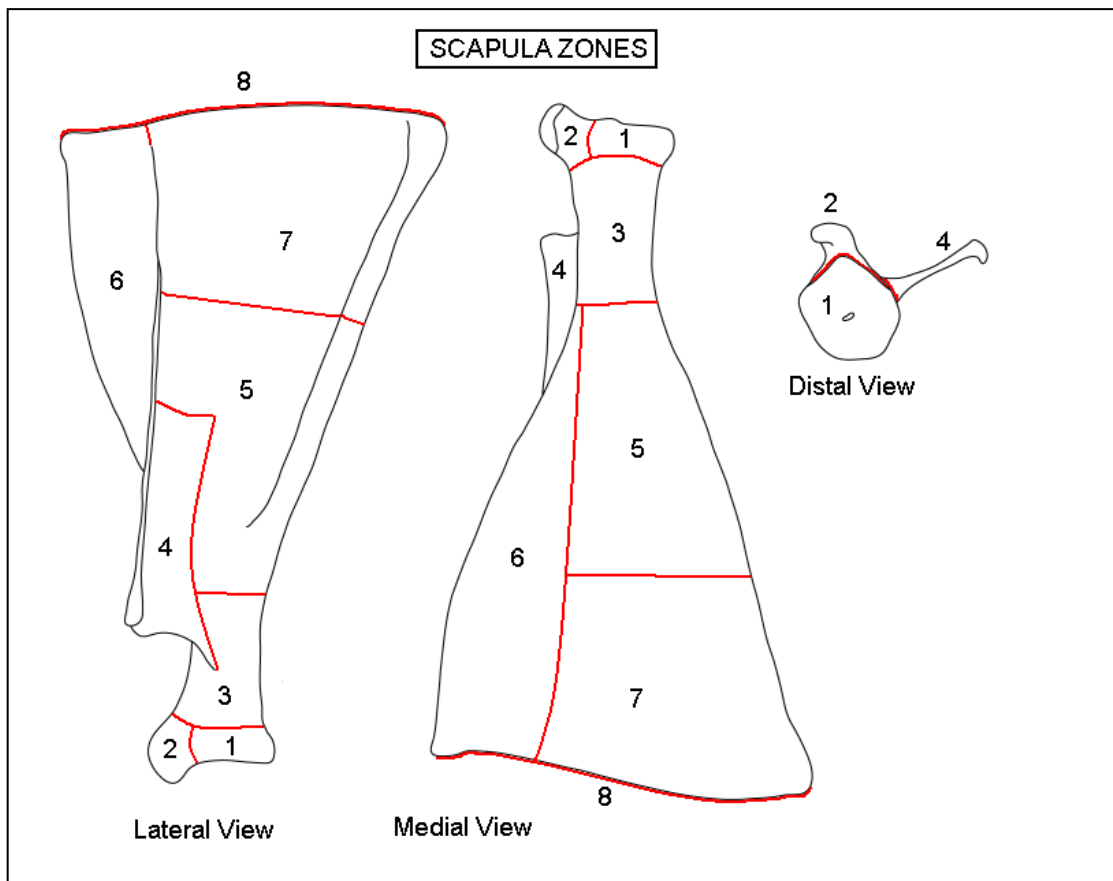


Figure I-9: Scapula landmark zones

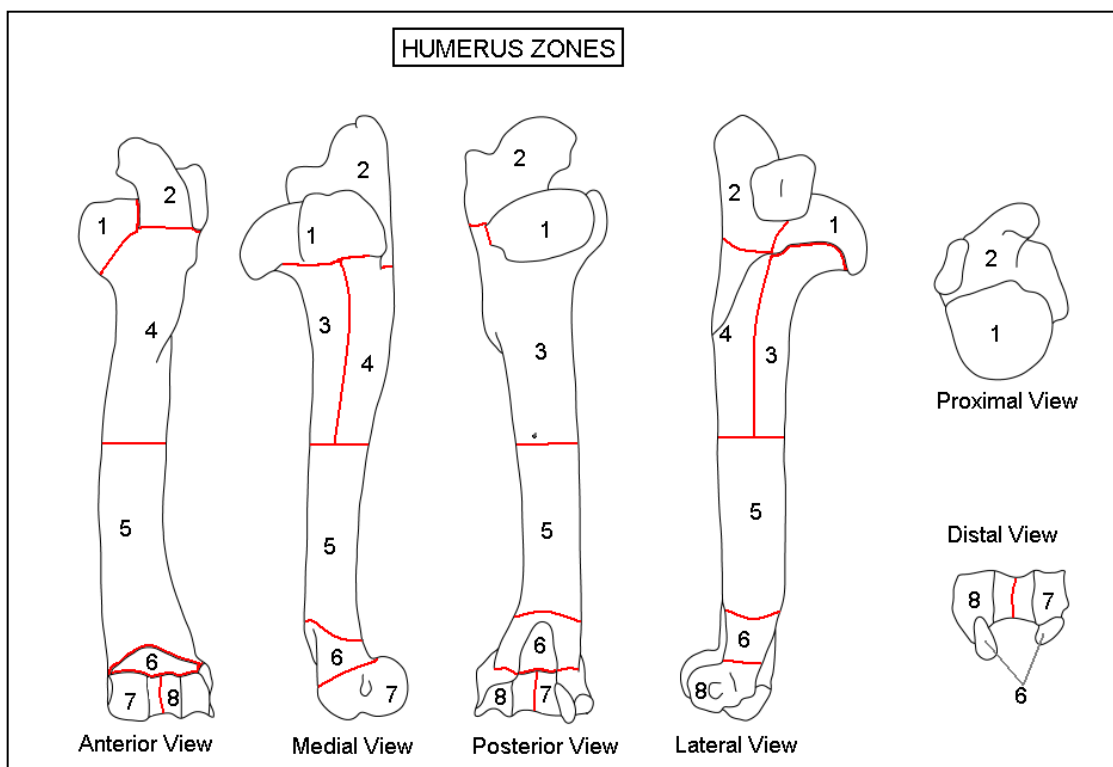


Figure I-10: Humerus landmark zones

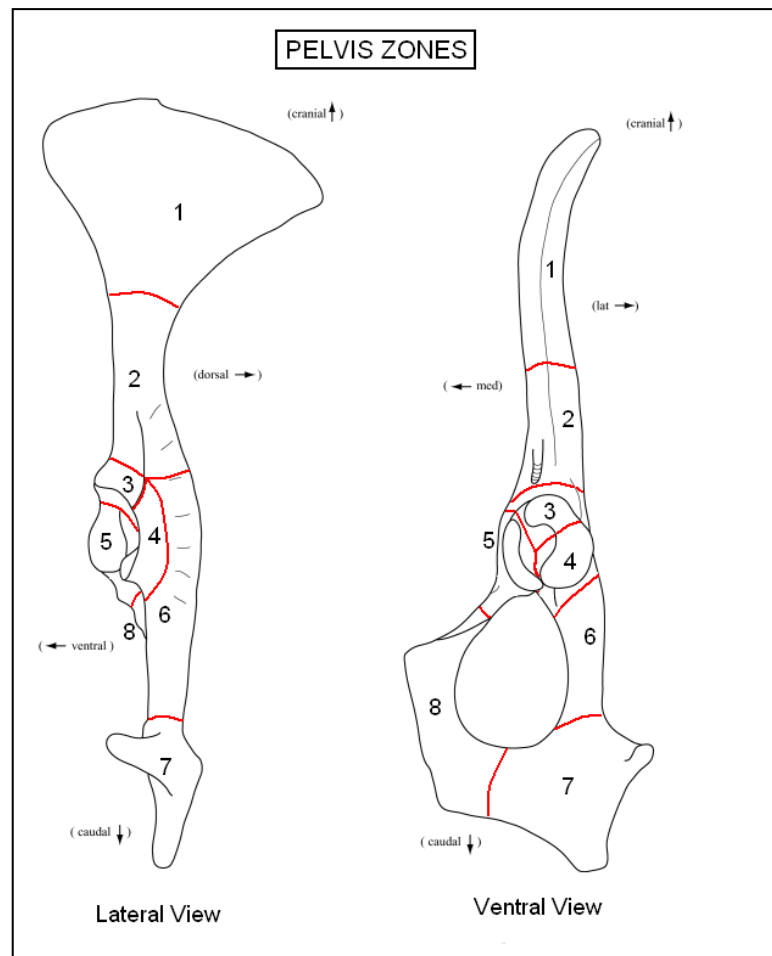


Figure I-13: Pelvis landmark zones

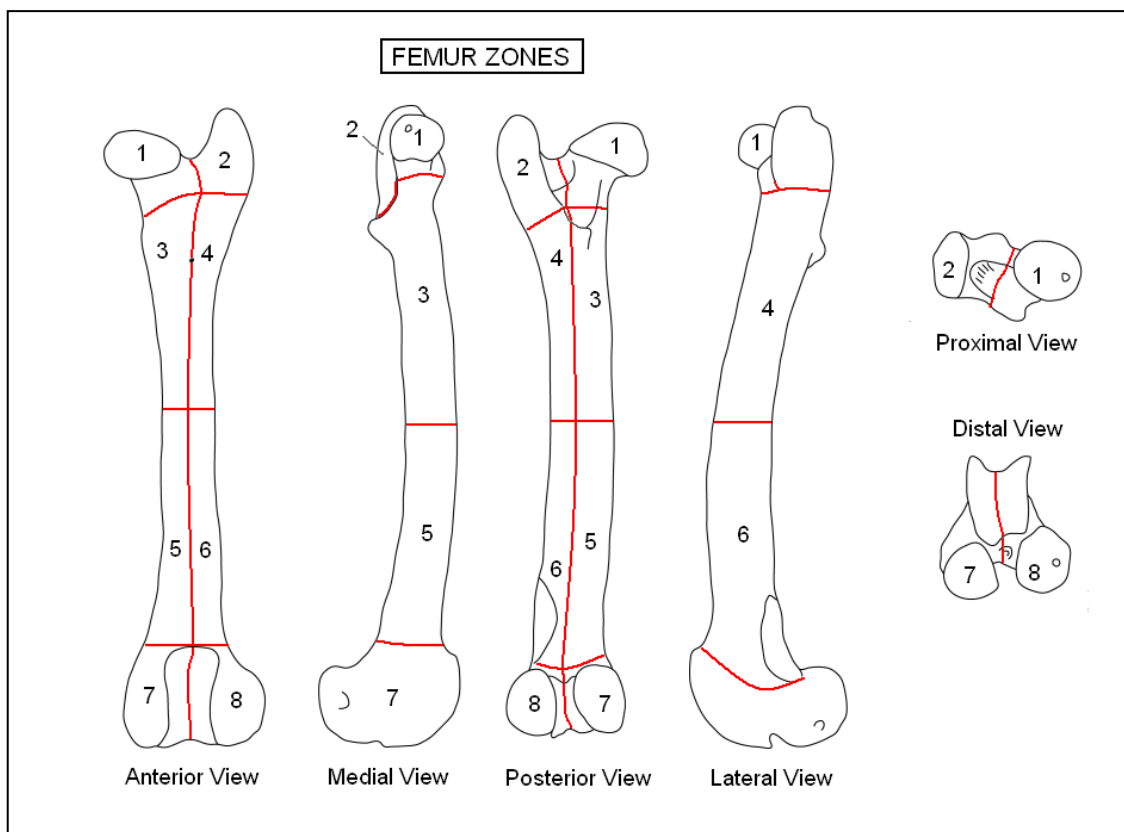


Figure I-14: Femur landmark zones

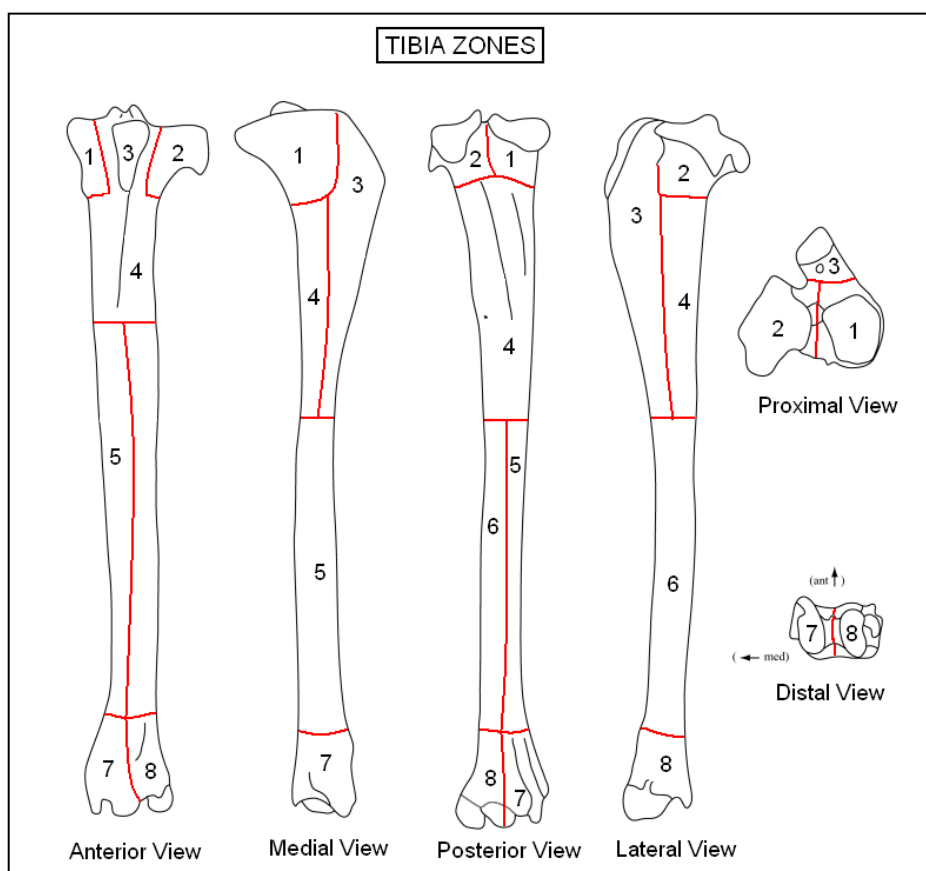


Figure I-15: Tibia landmark zones

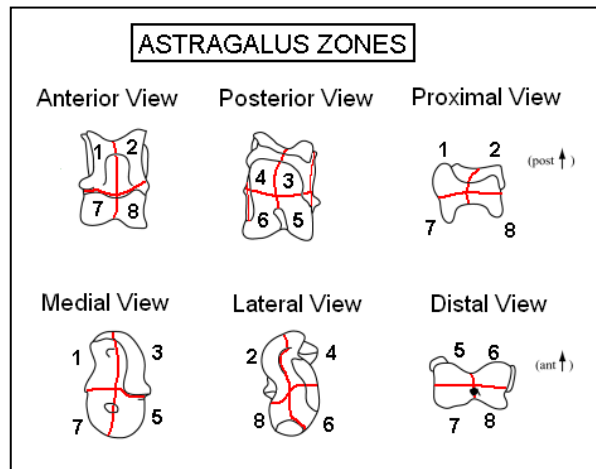


Figure I-16: Astragalus landmark zones

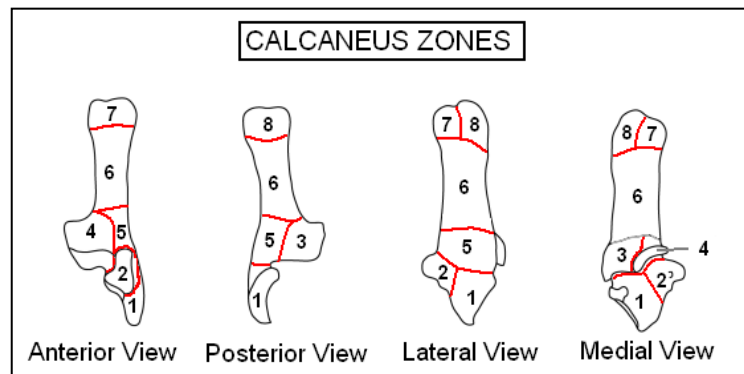


Figure I-17: Calcaneus landmark zones

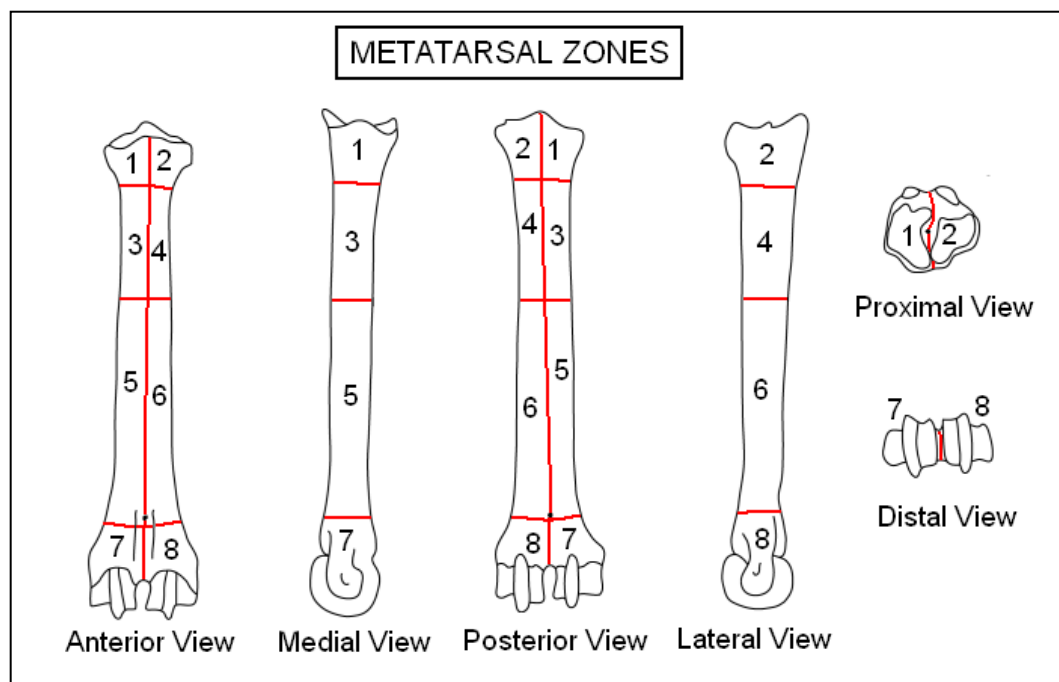


Figure I-18: Metatarsal landmark zones

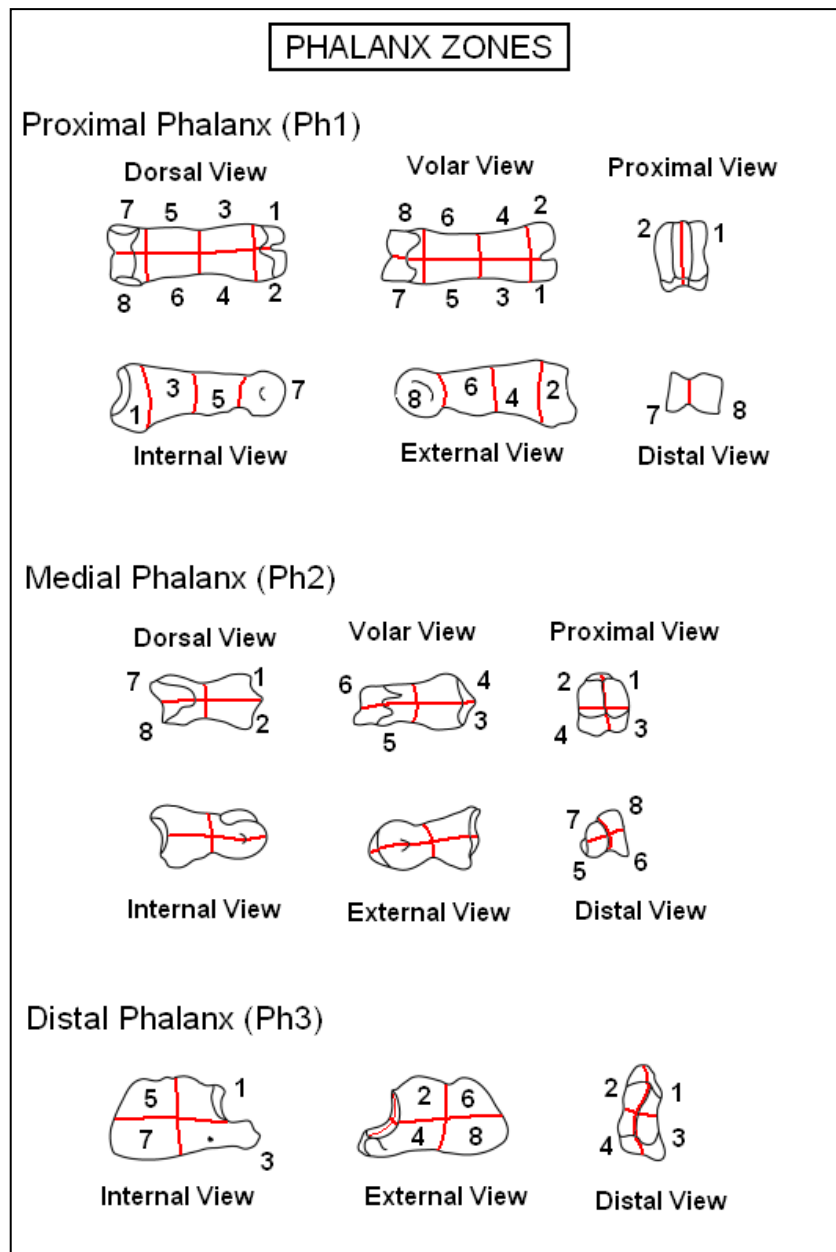


Figure I-19: Phalanx landmark zones

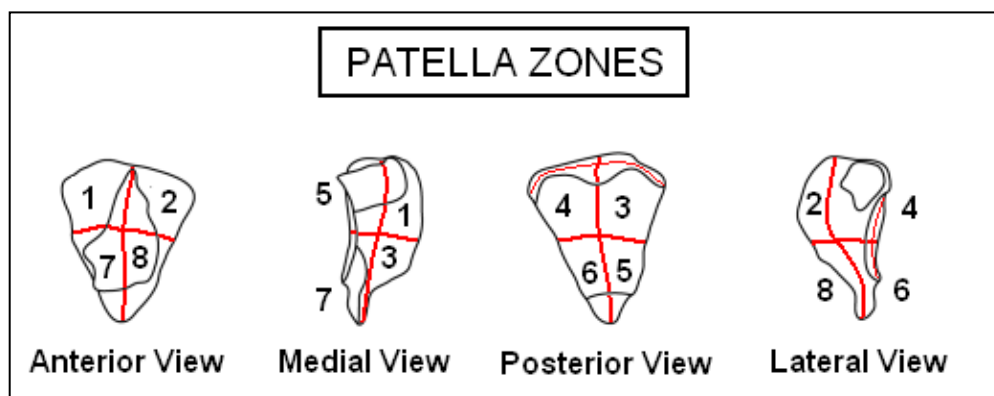


Figure I-20: Patella landmark zones

Appendix II: Measurement Methodologies

Figures included in this appendix all represent left elements. Most are taken from von den Driesch (1976), where some elements were portrayed as right elements; these have been reflected horizontally to transform them into left elements.

Table II-1: Bird and Mammal Long Bone Measurements, after von den Driesch (1976) for mammals and Cohen and Serjeantson (1996) for birds

Humerus	GLC/GL†	SD	Bp	Bd	Dp	Dd	HTC‡	
Radius	GL	SD	Bp	Bd	Dp	Dd		
Metacarpal	GL	SD	Bp	Bd	Dp	Dd		
Femur	GL/Lm†	SD	Bp	DC	Dp	Dd		
Tibia/ Tibiotarsus†	GL/La†	SD	Bp	Bd	Dp	Dd		
Metatarsal	GL	SD	Bp	Bd	Dp	Dd		
Phalanx 1	GLpe	SD						
Phalanx 2	GLpe	SD						
Carpometacarpus*	GL	SD	Bp	Bd	Dp	Dd		
Tarsometatarsus*	GL	SD	Bp	Bd	Dp	Dd		

† Measurements given for mammals/birds

‡ HTC only taken for pigs (Payne and Bull 1988)

* Measurement only for birds

Table II-2: Measurements of irregular bones

Horncore/Antlers	GL	Min. Diameter	Max. Diameter
Pelvis	H1**		
Astragalus†	GLI/GH/GL	Bd/-/-	DI/-/-
Calcaneum	GL		

** Measurement taken from Greenfield (2008). All others are from von den Driesch

† Measurements for the astragalus differ based on taxon, and are listed in order for Artiodactyls/Equids/Carnivores

Table II-3: Measurements of Distal Metapodials, following Davis (1992)

Cattle	a	b		3	
Caprines	a	b	1	3	4
Cervids				3	

Equids

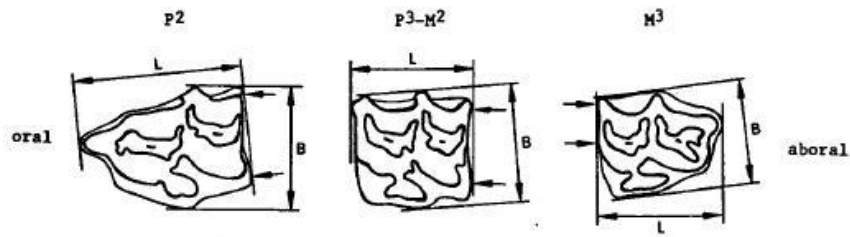


Figure 6b: Length (L) and breadth (B) at the biting surface of Equus maxillary teeth.

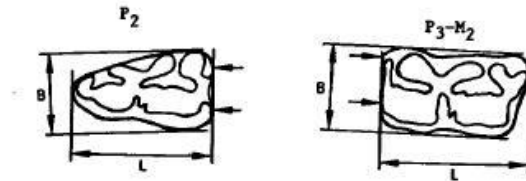
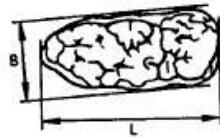


Figure 19b: Equus mandibular teeth, length (L) and breadth (B) at the biting surface

Suids

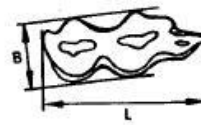
Figure 22a: Sus M₃



Length (L) and breadth (B) near the base of the crown. (see M 10)

Bovids and Cervids

Figure 21b: Bos M₃



Length (L) and breadth (B) at the biting surface. (see M 10)

Canids

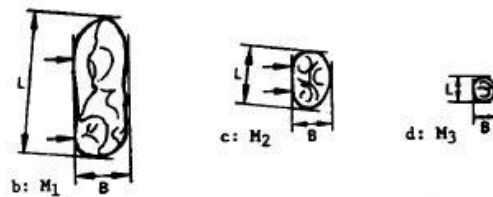


Figure 23b-d: Canis mandibular teeth, length (L) and breadth (B), M 13, 15, 16.

Figure II-1: Teeth measurements (von den Driesch 1976)

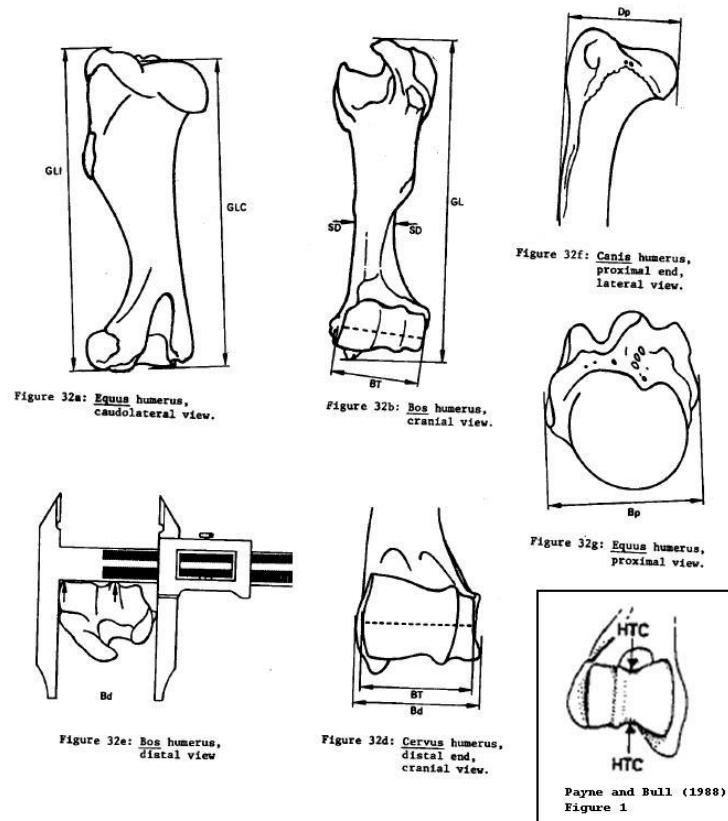


Figure II-2: Humerus measurements (von den Driesch 1976: 76; Payne and Bull 1988: 42)

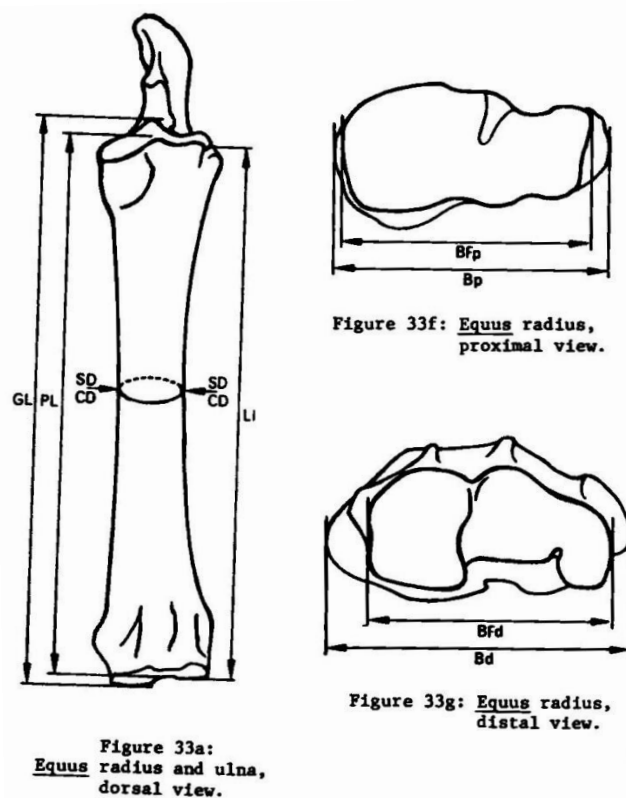


Figure II-3: Radius measurements (von den Driesch 1976: 80-1)

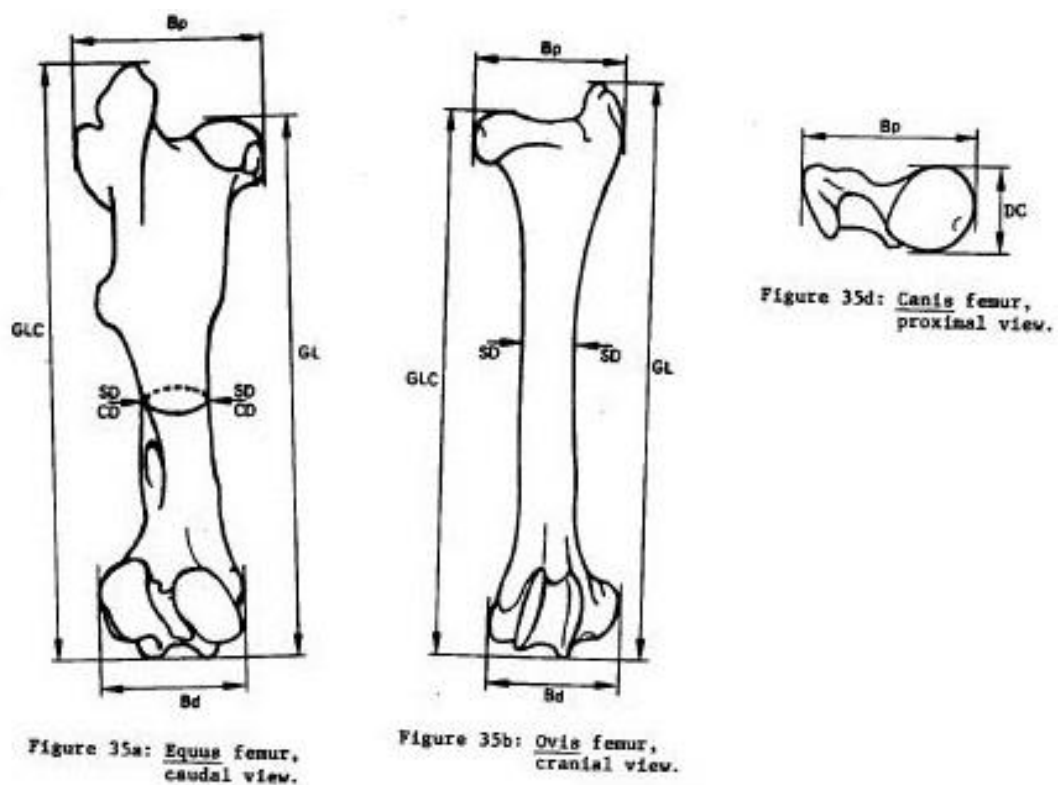


Figure II-4: Femur measurements (von den Driesch 1976: 84)

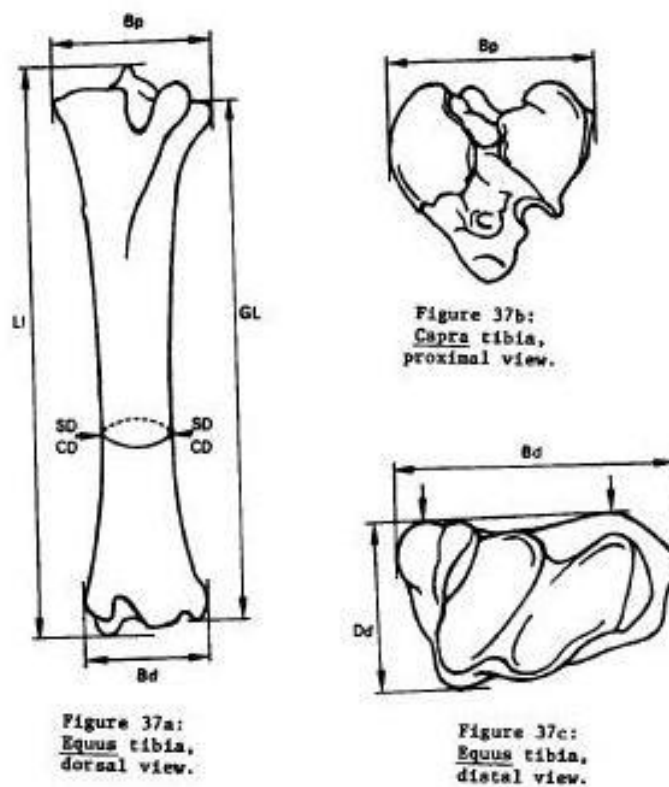


Figure II-5: Tibia measurements (von den Driesch 1976: 86)

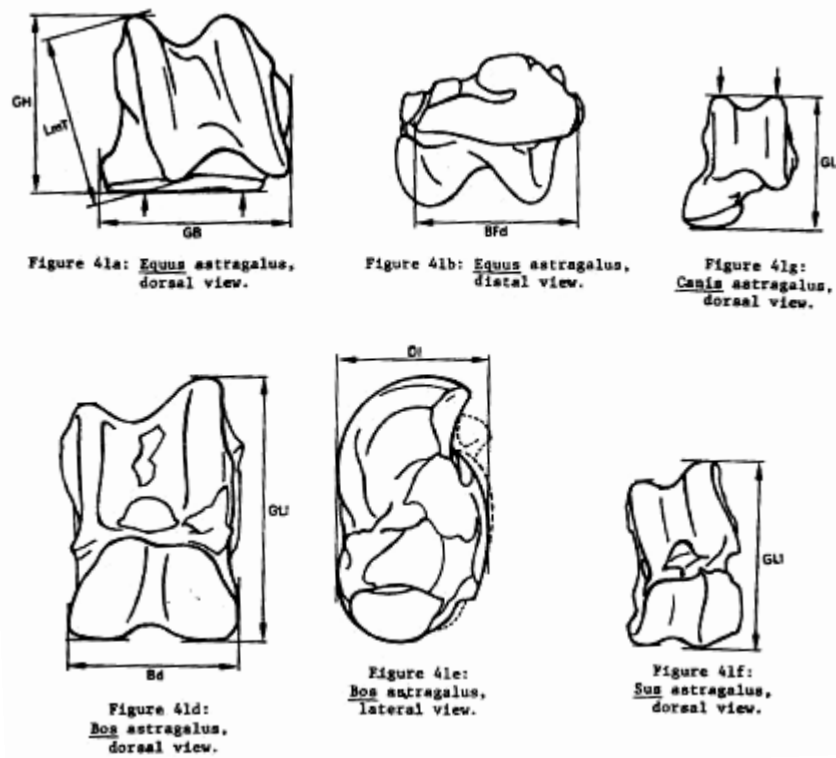


Figure II-6: Astragalus measurements (von den Driesch 1976: 87)

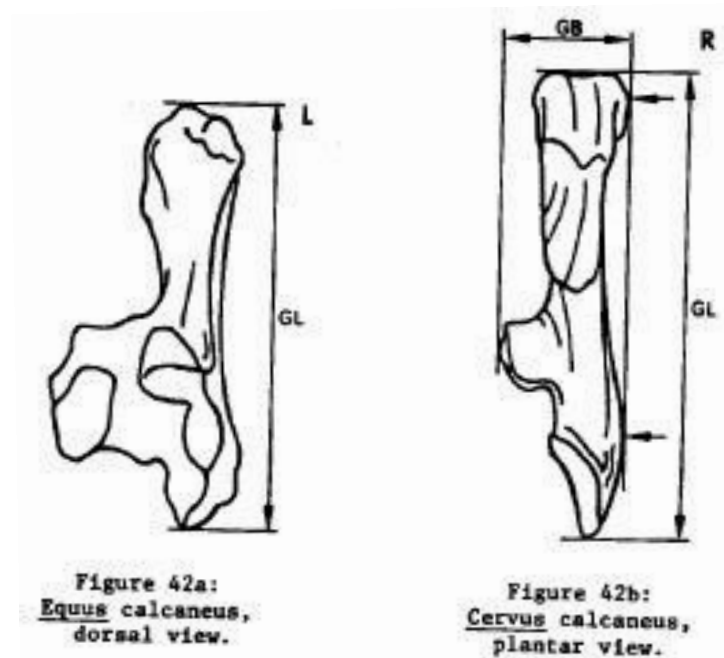


Figure II-7: Calcaneus measurements (von den Driesch 1976: 90)

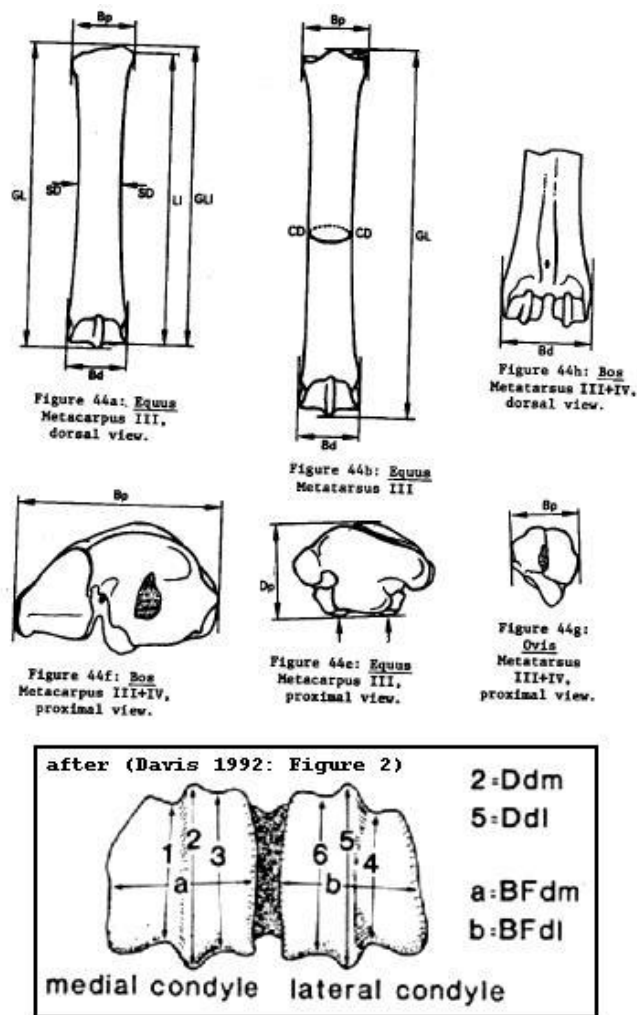


Figure II-8: Bovidae and Perissodactyl metapodial measurements (von den Driesch 1976: 92; Davis 1992: Figure 2)

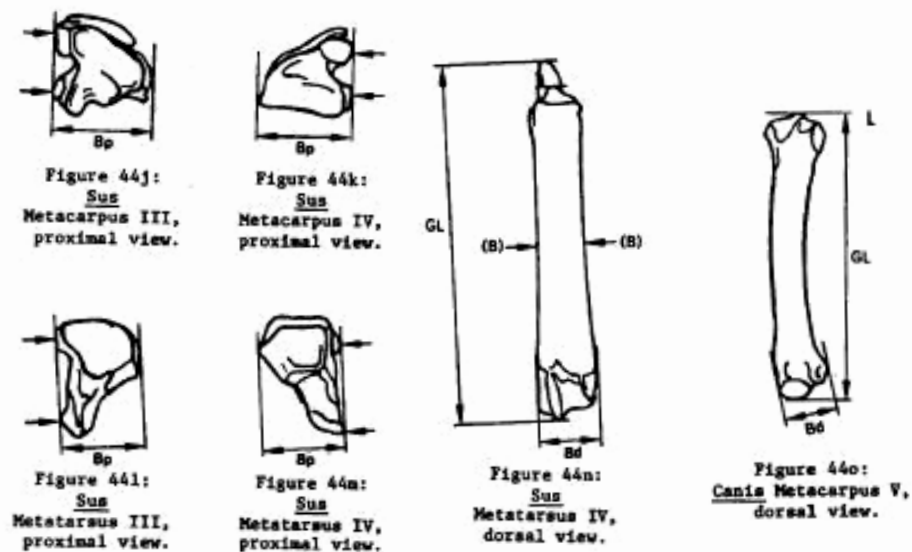


Figure II-9: Canid and Suid metapodial measurements (von den Driesch 1976: 94)

Appendix III: Raw Data

III.1 NISP TABLES

Table III-1: NISP by Taxon for all contexts

Taxon	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Mammals								
Cattle	506	71	203	439	498	638	397	27
Sheep/Goat	603	107	140	227	166	731	260	11
Sheep	54	9	5	8	10	28	10	0
Goat	3	0	0	0	0	1	0	0
Unidentified Bovidae	0	0	1	0	1	0	0	0
Pig	202	32	25	85	30	122	28	2
Pig/Boar	0	0	0	4	0	6	0	0
Wild Boar?	0	0	0	0	0	0	2	0
Horse/Donkey /Mule	70	12	14	58	27	52	22	7
Horse	31	1	8	19	6	15	1	0
Donkey	0	0	0	0	0	0	0	0
Dog	10	0	8	20	9	114	5	1
Dog/fox	2	0	0	1	0	49	1	0
Red Fox	1	0	0	0	0	29	1	0
Cat	0	0	0	0	0	5	0	1
Mustelid	0	0	0	0	0	0	1	0
Red Deer	1	0	0	1	0	5	0	0
Roe Deer								
Rabbit	0	0	0	0	1	0	0	0
Water vole	1	0	0	0	0	0	0	0
Field Vole	0	0	0	0	1	10	0	0
Small microtus	1	0	0	0	0	2	0	0
Small rodent	0	0	0	0	0	1	0	0
Unidentified small mammal	0	0	0	0	0	1	0	0
Unidentified medium mammal	39	9	5	15	15	40	11	3
Unidentified large mammal	29	8	5	22	18	47	16	3

Taxon	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Birds								
Chicken	2	2	4	10	5	54	7	1
Chicken/pheasant	0	1	0	0	0	0	0	28
Chicken/guinea fowl	0	0	0	3	0	0	1	0
Geese (Anserinae)	1	0	0	82	5	97	1	8
Large Anseriforme	0	0	0	21	0	1	0	0
Duck/Goose	0	0	1	0	0	1	0	0
Duck (Anas spp.)	0	0	0	0	1	13	4	0
Grus spp.	0	0	0	0	1	0	0	0
Corvid	0	0	0	0	0	0	2	1
Raven (C. corax)	1	0	0	6	2	0	2	0
Crow (C. corone)	0	0	0	0	0	7	0	0
Rook	0	0	0	8	0	0	0	0
Crow/Rook	0	0	9	0	0	0	0	0
Accipitriforme	0	0	0	1	0	5	0	0
Barn Owl	0	0	0	0	0	0	2	0
Unidentified Small Bird	0	0	0	0	0	2	0	0
Unidentified Medium Bird	0	0	1	1	1	42	0	6
Unidentified Large Bird	0	0	0	1	0	1	0	0
Bird	0	0	0	0	0	2	0	0
Amphibians								
Frog/Toad	3	0	0	0	25	97	0	0
Fish								
Gadid	0	0	0	0	0	1	0	0
Pike	0	0	0	0	1	0	0	0
Unidentified	1	0	0	0	0	2	0	1
TOTAL NISP	1561	252	429	1032	823	2221	774	100

Table III-2: NISP by taxon for non-well contexts

Taxon	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Mammals								
Cattle	506	67	200	420	467	315	397	26
Sheep/Goat	602	96	140	209	151	226	260	9
Sheep	54	8	5	7	9	15	10	0
Goat	3	0	0	0	0	0	0	0
Unidentified Bovidae	0	0	0	0	1	0	0	0
Pig	202	31	24	44	25	106	28	2
Pig/Boar	0	0	0	4	0	5	0	0
Wild Boar?	0	0	0	0	0	0	2	0
Horse/Donkey/Mule	70	12	14	57	17	41	22	7
Horse	31	1	8	18	1	5	1	0
Donkey	0	0	0	0	0	0	0	0
Dog	10	0	8	19	9	33	5	1
Dog/fox	2	0	0	1	0	17	1	0
Red Fox	1	0	0	0	0	0	0	0
Cat	0	0	0	0	0	3	0	1
Mustelid	0	0	0	0	0	0	1	0
Red Deer	1	0	0	1	0	4	0	0
Roe Deer	1	0	0	0	0	0	0	0
Rabbit	0	0	0	0	0	0	0	0
Water vole	1	0	0	0	0	0	0	0
Field Vole	0	0	0	0	0	0	0	0
Small microtus	1	0	0	0	0	0	0	0
Small Rodent	0	0	0	0	0	0	0	0
Unidentified small mammal	0	0	0	0	0	0	0	0
Unidentified medium mammal	39	9	4	12	12	12	11	3
Unidentified large mammal	29	8	5	21	18	32	15	3

Taxon	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Birds								
Chicken	2	2	4	9	3	4	7	1
Chicken/pheasant	0	1	0	0	0	0	0	0
Chicken/guinea fowl	0	0	0	3	0	0	1	0
Geese (Anserinae)	1	0	0	73	4	0	1	0
Large Anseriforme	0	0	0	21	0	0	0	0
Duck/Goose	0	0	1	0	0	0	0	0
Duck (Anas spp.)	0	0	0	0	0	10	4	0
Grus spp.	0	0	0	0	1	0	0	0
Corvid	0	0	0	0	0	0	2	0
Raven (C. corax)	1	0	0	6	2	0	2	0
Crow (C. corone)	0	0	0	0	0	7	0	0
Rook	0	0	0	7	0	0	0	0
Crow/Rook	0	0	9	0	0	0	0	0
Accipitriforme	0	0	0	1	0	5	0	0
Barn Owl	0	0	0	0	0	0	2	0
Unidentified Small Bird	0	0	0	0	0	0	0	0
Unidentified Medium Bird	0	0	1	1	1	18	0	0
Unidentified Large Bird	0	0	0	1	0	1	0	0
Bird	0	0	0	0	0	0	0	0
Amphibians								
Amphibian	3	0	0	0	0	1	0	0
Fish								
Gadid	0	0	0	0	0	0	0	0
Pike	0	0	0	0	1	0	0	0
Unidentified	1	0	0	0	0	0	0	0
TOTAL NISP	1561	235	423	935	722	860	772	53

Table III-3: NISP by taxon for well contexts

Full Name	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Mammals								
Cattle	0	4	3	19	31	323	0	1
Sheep/Goat	0	11	0	18	15	505	0	2
Sheep	0	1	0	1	1	13	0	0
Goat	0	0	0	0	0	1	0	0
Unidentified Bovidae	0	0	1	0	0	0	0	0
Pig	0	1	1	41	5	16	0	0
Pig/Boar	0	0	0	0	0	1	0	0
Wild Boar?	0	0	0	0	0	0	0	0
Horse/Donkey/ Mule	0	0	0	1	10	11	0	0
Horse	0	0	0	1	5	10	0	0
Donkey	0	0	0	0	0	0	0	0
Dog	0	0	0	1	0	81	0	0
Dog/fox	0	0	0	0	0	32	0	0
Red Fox	0	0	0	0	0	29	1	0
Cat	0	0	0	0	0	2	0	0
Mustelid	0	0	0	0	0	0	0	0
Red Deer	0	0	0	0	0	1	0	0
Fallow Deer	0	0	0	0	0	0	0	0
Roe Deer	0	0	0	0	0	0	0	0
Rabbit	0	0	0	0	1	0	0	0
Water vole	0	0	0	0	0	0	0	0
Field Vole	0	0	0	0	1	10	0	0
Small microtus	0	0	0	0	0	2	0	0
Small rodent	0	0	0	0	0	1	0	0
Unidentified small mammal	0	0	0	0	0	1	0	0
Unidentified medium mammal	0	0	1	3	3	28	0	0
Unidentified large mammal	0	0	0	1	0	15	1	0

Taxon	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Bird								
Chicken	0	0	0	1	2	50	0	0
Chicken/pheasant	0	0	0	0	0	0	0	28
Chicken/guinea fowl	0	0	0	0	0	0	0	0
Geese (Anserinae)	0	0	0	9	1	97	0	8
Large Anseriforme	0	0	0	0	0	1	0	0
Duck/Goose	0	0	0	0	0	1	0	0
Duck (Anas spp.)	0	0	0	0	1	3	0	0
Grus spp.	0	0	0	0	0	0	0	0
Corvid	0	0	0	0	0	0	0	1
Raven (C. corax)	0	0	0	0	0	0	0	0
Crow (C. corone)	0	0	0	0	0	0	0	0
Rook	0	0	0	1	0	0	0	0
Crow/Rook	0	0	0	0	0	0	0	0
Accipitriforme	0	0	0	0	0	0	0	0
Barn Owl	0	0	0	0	0	0	0	0
Unidentified Small Bird	0	0	0	0	0	2	0	0
Unidentified Medium Bird	0	0	0	0	0	24	0	6
Unidentified Large Bird	0	0	0	0	0	0	0	0
Bird	0	0	0	0	0	2	0	0
Amphibian								
Amphibian	0	0	0	0	25	29	0	0
Frog/Toad	0	0	0	0	0	67	0	0
Fish								
Cod	0	0	0	0	0	0	0	0
Gadid	0	0	0	0	0	1	0	0
Pike	0	0	0	0	0	0	0	0
TOTAL NISP	0	17	6	97	101	1361	2	47

III.2 Element Representation for Cattle

Table III-4: Element Representation by NISP for cattle from all contexts

	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Skull	49	6	26	48	23	148	26	3
Horn Core	6	0	12	48	12	25	22	0
Hyoid	0	1	2	3	3	2	2	0
Maxilla	14	3	2	12	3	14	2	0
Mandible	73	12	25	52	30	61	41	4
Loose Teeth, Mandibular	19	2	9	19	7	22	19	0
Loose Teeth, Maxillary	23	8	12	18	12	29	9	0
Loose Teeth, Indeterminate	3	1	0	4	0	0	0	0
Atlas	1	1	1	0	1	5	5	0
Axis	4	0	1	1	0	5	1	0
Vertebrae, Cervical	5	0	12	7	4	8	17	0
Vertebrae, Thoracic	20	2	2	11	8	8	13	3
Vertebrae, Lumbar	18	0	2	14	4	4	17	0
Vertebrae, Caudal	0	0	0	0	0	1	0	0
Vertebrae, unID	0	0	0	4	1	0	0	0
Ribs	4	0	5	3	0	10	8	1
Sacrum	3	0	0	4	1	1	0	0
Scapula	35	2	21	33	23	35	37	4
Humerus	37	1	15	23	75	45	20	2
Radius	30	3	9	14	71	27	12	2
Ulna	14	3	2	10	42	10	12	0
Pelvis	29	8	6	19	11	18	26	2
Femur	14	0	3	10	43	24	9	2
Tibia	19	2	7	15	64	22	7	1
Carpals	3	0	0	0	3	1	5	0
Metacarpal	17	5	4	13	16	19	15	0
Astragalus	9	1	1	6	7	7	3	0
Calcaneum	10	1	4	10	4	14	9	1
Tarsals	1	0	0	1	1	4	3	0
Metatarsal	26	3	12	18	17	30	15	2
Carpals/Tarsals	0	0	0	0	2	0	0	0
Metapodial	2	0	0	3	1	7	3	0
Phalanx, 1st	15	4	8	11	5	20	24	0
Phalanx, 2nd	1	1	0	4	2	7	11	0
Phalanx, 3rd	2	1	0	1	2	5	4	0
TOTAL	506	71	203	439	498	638	397	27

Table III-5: Element Representation by NISP for cattle from well contexts

	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Skull	0	0	0	1	2	87	0	0
Horn Core	0	0	0	2	2	16	0	0
Hyoid	0	0	0	0	0	1	0	0
Maxilla	0	0	0	1	1	12	0	0
Mandible	0	0	0	3	2	29	0	0
Loose Teeth, Mandibular	0	0	0	2	1	12	0	0
Loose Teeth, Maxillary	0	0	0	1	1	18	0	0
Loose Teeth, Indeterminate	0	0	0	0	0	0	0	0
Atlas	0	0	0	0	0	1	0	0
Axis	0	0	0	0	0	1	0	0
Vertebrae, Cervical	0	0	0	0	2	3	0	0
Vertebrae, Thoracic	0	0	0	2	3	5	0	0
Vertebrae, Lumbar	0	0	0	0	0	1	0	0
Vertebrae, Caudal	0	0	0	0	0	1	0	0
Vertebrae, unID	0	0	0	0	0	0	0	0
Ribs	0	0	1	0	0	7	0	1
Sacrum	0	0	0	0	0	1	0	0
Scapula	0	0	0	0	5	12	0	0
Humerus	0	1	0	0	3	24	0	0
Radius	0	0	0	0	2	6	0	0
Ulna	0	0	0	1	0	2	0	0
Pelvis	0	3	0	0	2	3	0	0
Femur	0	0	0	0	0	8	0	0
Tibia	0	0	0	1	1	13	0	0
Carpals	0	0	0	0	1	1	0	0
Metacarpal	0	0	1	2	1	7	0	0
Astragalus	0	0	0	0	0	4	0	0
Calcaneum	0	0	0	0	0	6	0	0
Tarsals	0	0	0	0	0	2	0	0
Metatarsal	0	0	1	0	0	15	0	0
Carpals/Tarsals	0	0	0	0	0	0	0	0
Metapodial	0	0	0	2	0	5	0	0
Phalanx, 1st	0	0	0	1	1	10	0	0
Phalanx, 2nd	0	0	0	0	1	6	0	0
Phalanx, 3rd	0	0	0	0	0	4	0	0
TOTAL	0	4	3	19	31	323	0	1

Table III-6: Element Representation by NISP for cattle from non-well contexts

	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Skull	49	6	26	47	21	61	26	3
Horn Core	6	0	12	46	10	9	22	0
Hyoid	0	1	2	3	3	1	2	0
Maxilla	14	3	2	11	2	2	2	0
Mandible	73	12	25	49	28	32	41	4
Loose Teeth, Mandibular	19	2	9	17	6	10	19	0
Loose Teeth, Maxillary	23	8	12	17	11	11	9	0
Loose Teeth, Indeterminate	3	1	0	4	0	0	0	0
Atlas	1	1	1	0	1	4	5	0
Axis	4	0	1	1	0	4	1	0
Vertebrae, Cervical	5	0	12	7	2	5	17	0
Vertebrae, Thoracic	20	2	2	9	5	3	13	3
Vertebrae, Lumbar	18	0	2	14	4	3	17	0
Vertebrae, Caudal	0	0	0	0	0	0	0	0
Vertebrae, unID	0	0	0	4	1	0	0	0
Ribs	4	0	4	3	0	3	8	0
Sacrum	3	0	0	4	1	0	0	0
Scapula	35	2	21	33	18	23	37	4
Humerus	37	0	15	23	72	21	20	2
Radius	30	3	9	14	69	21	12	2
Ulna	14	3	2	9	42	8	12	0
Pelvis	29	5	6	19	9	15	26	2
Femur	14	0	3	10	43	16	9	2
Tibia	19	2	7	14	63	9	7	1
Carpals	3	0	0	0	2	0	5	0
Metacarpal	17	5	3	11	15	12	15	0
Astragalus	9	1	1	6	7	3	3	0
Calcaneum	10	1	4	10	4	8	9	1
Tarsals	1	0	0	1	1	2	3	0
Metatarsal	26	3	11	18	17	15	15	2
Carpals/Tarsals	0	0	0	0	2	0	0	0
Metapodial	2	0	0	1	1	2	3	0
Phalanx, 1st	15	4	8	10	4	10	24	0
Phalanx, 2nd	1	1	0	4	1	1	11	0
Phalanx, 3rd	2	1	0	1	2	1	4	0
TOTAL	506	67	200	420	467	315	397	26

III. 3 Element Representation for Sheep/Goat

Table III-7: Element representation by NISP for sheep/goat from all contexts

	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Skull	14	3	4	11	4	53	12	0
Horn Core	4	0	0	2	0	6	0	0
Hyoid	1	0	0	0	4	4	1	0
Maxilla	5	1	1	5	4	10	10	0
Mandible	112	17	27	39	24	67	47	1
Loose Teeth, Mandibular	34	9	0	10	9	58	26	0
Loose Teeth, Maxillary	23	3	2	12	9	35	8	0
Loose Teeth, Indeterminate	0	0	3	0	2	1	0	0
Atlas	1	0	0	0	0	2	0	0
Axis	0	0	0	0	1	1	1	0
Vertebrae, Cervical	1	0	1	0	3	1	2	0
Vertebrae, Thoracic	5	0	1	1	2	4	0	0
Vertebrae, Lumbar	0	1	0	0	2	1	1	0
Vertebrae, Caudal	0	0	0	0	0	0	0	0
Vertebrae, unID	0	0	0	0	0	0	0	0
Ribs	10	2	6	9	5	16	12	0
Sacrum	0	0	0	0	0	1	0	0
Scapula	25	2	4	4	5	16	3	0
Humerus	39	6	9	22	13	27	17	0
Radius	93	10	20	16	12	25	20	1
Ulna	16	4	4	3	2	7	10	0
Pelvis	20	2	2	6	8	11	14	0
Femur	25	6	8	4	13	15	10	1
Tibia	140	25	23	42	15	57	20	3
Carpals	0	0	0	0	0	9	0	0
Metacarpal	35	10	16	15	16	38	28	2
Astragalus	0	0	0	2	0	3	0	0
Calcaneum	2	1	2	0	0	6	1	0
Tarsals	0	0	0	0	0	11	0	0
Metatarsal	46	13	10	30	20	59	26	3
Carpals/Tarsals	0	0	0	0	0	0	0	0
Metapodial	1	0	0	0	0	64	0	0
Phalanx, 1st	4	1	1	1	2	87	1	0
Phalanx, 2nd	2	0	1	0	1	43	0	0
Phalanx, 3rd	1	0	0	1	0	22	0	0
TOTAL	659	116	145	235	176	760	270	11

Table III-8: Element representation by NISP for sheep/goat from well contexts

	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Skull	0	1	0	1	0	39	0	0
Horn Core	0	0	0	0	0	6	0	0
Hyoid	0	0	0	0	0	2	0	0
Maxilla	0	1	0	1	1	6	0	0
Mandible	0	2	0	2	2	41	0	0
Loose Teeth, Mandibular	0	0	0	1	2	37	0	0
Loose Teeth, Maxillary	0	0	0	0	0	25	0	0
Loose Teeth, Indeterminate	0	0	0	0	2	1	0	0
Atlas	0	0	0	0	0	2	0	0
Axis	0	0	0	0	0	1	0	0
Vertebrae, Cervical	0	0	0	0	0	1	0	0
Vertebrae, Thoracic	0	0	0	0	0	3	0	0
Vertebrae, Lumbar	0	0	0	0	1	0	0	0
Vertebrae, Caudal	0	0	0	0	0	0	0	0
Vertebrae, unID	0	0	0	0	0	0	0	0
Ribs	0	1	0	0	2	7	0	0
Sacrum	0	0	0	0	0	0	0	0
Scapula	0	0	0	0	0	5	0	0
Humerus	0	1	0	1	1	15	0	0
Radius	0	1	0	2	0	9	0	0
Ulna	0	0	0	0	0	4	0	0
Pelvis	0	0	0	1	1	1	0	0
Femur	0	0	0	1	1	6	0	0
Tibia	0	4	0	4	0	16	0	0
Carpals	0	0	0	0	0	9	0	0
Metacarpal	0	0	0	1	1	24	0	2
Astragalus	0	0	0	0	0	1	0	0
Calcaneum	0	0	0	0	0	1	0	0
Tarsals	0	0	0	0	0	11	0	0
Metatarsal	0	1	0	3	2	33	0	0
Carpals/Tarsals	0	0	0	0	0	0	0	0
Metapodial	0	0	0	0	0	63	0	0
Phalanx, 1st	0	0	0	0	0	86	0	0
Phalanx, 2nd	0	0	0	0	0	43	0	0
Phalanx, 3rd	0	0	0	1	0	21	0	0
TOTAL	0	12	0	19	16	519	0	2

Table III-9 : Element representation by NISP for sheep/goat from non-well contexts

	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Skull	14	2	4	10	4	14	12	0
Horn Core	4	0	0	2	0	0	0	0
Hyoid	1	0	0	0	4	2	1	0
Maxilla	5	0	1	4	3	4	10	0
Mandible	112	15	27	37	22	26	47	1
Loose Teeth, Mandibular	34	9	0	9	7	21	26	0
Loose Teeth, Maxillary	23	3	2	12	9	10	8	0
Loose Teeth, Indeterminate	0	0	3	0	0	0	0	0
Atlas	1	0	0	0	0	0	0	0
Axis	0	0	0	0	1	0	1	0
Vertebrae, Cervical	1	0	1	0	3	0	2	0
Vertebrae, Thoracic	5	0	1	1	2	1	0	0
Vertebrae, Lumbar	0	1	0	0	1	1	1	0
Vertebrae, Caudal	0	0	0	0	0	0	0	0
Vertebrae, unID	0	0	0	0	0	0	0	0
Ribs	10	1	6	9	3	9	12	0
Sacrum	0	0	0	0	0	1	0	0
Scapula	25	2	4	4	5	11	3	0
Humerus	39	5	9	21	12	12	17	0
Radius	93	9	20	14	12	16	20	1
Ulna	16	4	4	3	2	3	10	0
Pelvis	20	2	2	5	7	10	14	0
Femur	25	6	8	3	12	9	10	1
Tibia	140	21	23	38	15	41	20	3
Carpals	0	0	0	0	0	0	0	0
Metacarpal	35	10	16	14	15	14	28	0
Astragalus	0	0	0	2	0	2	0	0
Calcaneum	2	1	2	0	0	5	1	0
Tarsals	0	0	0	0	0	0	0	0
Metatarsal	46	12	10	27	18	26	26	3
Carpals/Tarsals	0	0	0	0	0	0	0	0
Metapodial	1	0	0	0	0	1	0	0
Phalanx, 1st	4	1	1	1	2	1	1	0
Phalanx, 2nd	2	0	1	0	1	0	0	0
Phalanx, 3rd	1	0	0	0	0	1	0	0
TOTAL	659	104	145	216	160	241	270	9

III.4 Element Representation for Pig

Table III-10: Element representation by NISP for pigs from all contexts

	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Skull	18	3	0	4	2	8	2	0
Hyoid	0	0	0	0	0	0	0	0
Mandible	44	3	2	10	1	24	4	0
Maxilla	18	0	1	11	1	3	4	0
Loose Teeth, Mandibles	1	0	2	6	4	16	3	0
Loose Teeth, Maxillae	17	0	0	0	1	3	0	0
Loose Teeth, Indeterminate	5	0	0	0	0	1	0	0
Atlas	1	0	0	1	0	1	0	0
Axis	0	0	0	0	0	0	0	0
Vert.,Cervical	1	0	0	2	0	1	0	0
Vert.,Thoracic	0	0	1	6	3	5	0	0
Vert., Lumbar	2	0	0	0	0	13	0	0
Vert., Caudal	0	0	0	0	0	0	0	0
Vert., unID	0	0	0	0	0	0	0	0
Ribs	10	1	4	11	1	8	3	0
Sacrum	0	0	0	1	0	0	0	0
Scapula	15	6	2	2	5	4	1	0
Humerus	15	2	0	4	2	3	3	0
Radius	8	1	2	1	0	4	0	0
Ulna	8	3	1	2	0	5	2	0
Pelvis	7	3	0	2	1	1	0	0
Femur	7	0	2	3	0	9	3	1
Tibia	15	3	3	8	4	4	1	1
Fibula	3	1	1	1	1	2	1	0
Carpals	0	0	0	0	0	0	0	0
Metacarpal	4	0	0	4	1	2	0	0
Metacarpal (lat)	1	1	0	0	0	0	0	0
Astragalus	0	0	1	3	0	0	0	0
Calcaneum	0	1	0	1	1	1	0	0
Tarsals	0	0	0	0	0	0	0	0
Metatarsal	1	1	1	2	1	1	0	0
Metatarsal (lat)	0	1	1	0	1	1	0	0
Carpals/Tarsals	0	0	0	0	0	0	0	0
Metapodial	0	0	0	0	0	0	0	0
Metapodial, lateral	0	0	1	0	0	0	0	0
Phalanx, 1st	1	1	0	0	0	1	1	0
Phalanx, 2nd	0	1	0	0	0	0	0	0
Phalanx, 3rd	0	1	0	0	0	1	0	0
TOTAL	202	33	25	85	30	122	28	2

Table III-11: Element representation by NISP for pigs from well contexts

	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Skull	0	0	0	2	0	0	0	0
Hyoid	0	0	0	0	0	0	0	0
Mandible	0	0	0	1	1	4	0	0
Maxilla	0	0	0	6	1	0	0	0
Loose Teeth, Mandibles	0	0	0	0	0	2	0	0
Loose Teeth, Maxillae	0	0	0	0	0	1	0	0
Loose Teeth, Indeterminate	0	0	0	0	0	1	0	0
Atlas	0	0	0	1	0	0	0	0
Axis	0	0	0	0	0	0	0	0
Vert.,Cervical	0	0	0	2	0	0	0	0
Vert.,Thoracic	0	0	0	4	0	0	0	0
Vert., Lumbar	0	0	0	0	0	3	0	0
Vert., Caudal	0	0	0	0	0	0	0	0
Vert., unID	0	0	0	0	0	0	0	0
Ribs	0	0	0	9	1	0	0	0
Sacrum	0	0	0	1	0	0	0	0
Scapula	0	0	0	1	1	0	0	0
Humerus	0	0	0	1	0	0	0	0
Radius	0	0	0	1	0	0	0	0
Ulna	0	0	0	1	0	2	0	0
Pelvis	0	0	0	0	1	0	0	0
Femur	0	0	0	1	0	1	0	0
Tibia	0	0	0	2	0	1	0	0
Fibula	0	1	0	0	0	0	0	0
Carpals	0	0	0	0	0	0	0	0
Metacarpal	0	0	0	3	0	0	0	0
Metacarpal (lat)	0	0	0	0	0	0	0	0
Astragalus	0	0	0	2	0	0	0	0
Calcaneum	0	0	0	1	0	0	0	0
Tarsals	0	0	0	0	0	0	0	0
Metatarsal	0	0	1	2	0	1	0	0
Metatarsal (lat)	0	0	0	0	0	0	0	0
Carpals/Tarsals	0	0	0	0	0	0	0	0
Metapodial	0	0	0	0	0	0	0	0
Metapodial, lateral	0	0	0	0	0	0	0	0
Phalanx, 1st	0	0	0	0	0	0	0	0
Phalanx, 2nd	0	0	0	0	0	0	0	0
Phalanx, 3rd	0	0	0	0	0	0	0	0
TOTAL	0	1	1	41	5	16	0	0

Table III-12: Element representation by NISP for pigs from non-well contexts

non wells	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Skull	18	3	0	2	2	8	2	0
Hyoid	0	0	0	0	0	0	0	0
Mandible	44	3	2	9	0	20	4	0
Maxilla	18	0	1	5	0	3	4	0
Loose Teeth, Mandibles	1	0	2	6	4	14	3	0
Loose Teeth, Maxillae	17	0	0	0	1	2	0	0
Loose Teeth, Indeterminate	5	0	0	0	0	0	0	0
Atlas	1	0	0	0	0	1	0	0
Axis	0	0	0	0	0	0	0	0
Vert.,Cervical	1	0	0	0	0	1	0	0
Vert.,Thoracic	0	0	1	2	3	5	0	0
Vert., Lumbar	2	0	0	0	0	10	0	0
Vert., Caudal	0	0	0	0	0	0	0	0
Vert., unID	0	0	0	0	0	0	0	0
Ribs	10	1	4	2	0	8	3	0
Sacrum	0	0	0	0	0	0	0	0
Scapula	15	6	2	1	4	4	1	0
Humerus	15	2	0	3	2	3	3	0
Radius	8	1	2	0	0	4	0	0
Ulna	8	3	1	1	0	3	2	0
Pelvis	7	3	0	2	0	1	0	0
Femur	7	0	2	2	0	8	3	1
Tibia	15	3	3	6	4	3	1	1
Fibula	3	0	1	1	1	2	1	0
Carpals	0	0	0	0	0	0	0	0
Metacarpal	4	0	0	1	1	2	0	0
Metacarpal (lat)	1	1	0	0	0	0	0	0
Astragalus	0	0	1	1	0	0	0	0
Calcaneum	0	1	0	0	1	1	0	0
Tarsals	0	0	0	0	0	0	0	0
Metatarsal	1	1	0	0	1	0	0	0
Metatarsal (lat)	0	1	1	0	1	1	0	0
Carpals/Tarsals	0	0	0	0	0	0	0	0
Metapodial	0	0	0	0	0	0	0	0
Metapodial, lateral	0	0	1	0	0	0	0	0
Phalanx, 1st	1	1	0	0	0	1	1	0
Phalanx, 2nd	0	1	0	0	0	0	0	0
Phalanx, 3rd	0	1	0	0	0	1	0	0
TOTAL	202	32	24	44	25	106	28	2

III.5 Element Representation for Horse

Table III-13: Element representation for horses from all contexts

	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Skull	7	0	0	7	9	2	1	0
Hyoid	0	0	0	0	0	0	0	0
Maxilla	4	0	0	1	1	1	0	0
Mandible	4	2	4	3	0	4	0	0
Loose Teeth	27	5	10	18	5	12	1	0
Atlas	2	1	0	0	0	1	0	0
Axis	2	0	0	0	0	1	1	0
Vert.,Cervical	3	0	0	4	3	2	0	2
Vert.,Thoracic	1	0	0	1	0	3	6	0
Vert., Lumbar	0	0	0	0	0	0	0	0
Sacra	1	0	0	0	0	2	0	0
Vert., Caudal	0	0	0	0	0	0	0	0
Ribs	2	0	0	0	0	0	2	0
Scapula	2	0	1	3	2	6	1	0
Humerus	7	1	3	4	2	3	1	1
Radius	12	0	0	2	0	6	1	0
Ulna	4	0	0	0	1	0	0	0
Carpals	0	0	0	0	0	0	0	0
Metacarpal	3	1	0	1	1	3	2	1
Lateral MC	0	0	0	1	0	0	0	0
Pelvis	2	1	1	6	1	8	0	1
Femur	3	1	3	9	2	8	0	1
Tibia	4	0	0	4	3	3	2	0
Astragalus	2	0	0	1	0	0	1	0
Calcaneum	1	0	0	3	0	0	1	0
Tarsals	0	0	0	0	0	0	4	0
Metatarsal	1	0	0	5	1	0	3	0
Lateral MT	0	0	0	1	1	0	2	0
Metapodial	0	0	0	2	0	1	0	0
Lateral MP	0	0	0	0	0	0	0	0
Sesamoid	0	0	0	0	0	0	1	0
PH 1	5	1	0	1	1	0	2	1
PH 2	2	0	0	0	0	0	1	0
PH 3	0	0	0	0	0	1	1	0
TOTAL	101	13	22	77	33	67	34	7

Table III-14: Element representation by NISP for horses from well contexts

	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Skull	0	0	0	0	9	0	0	0
Hyoid	0	0	0	0	0	0	0	0
Maxilla	0	0	0	0	1	1	0	0
Mandible	0	0	0	0	0	2	0	0
Loose Teeth	0	0	0	1	4	8	0	0
Atlas	0	0	0	0	0	0	0	0
Axis	0	0	0	0	0	0	0	0
Vert.,Cervical	0	0	0	0	0	2	0	0
Vert.,Thoracic	0	0	0	0	0	0	0	0
Vert., Lumbar	0	0	0	0	0	0	0	0
Sacra	0	0	0	0	0	1	0	0
Vert., Caudal	0	0	0	0	0	0	0	0
Ribs	0	0	0	0	0	0	0	0
Scapula	0	0	0	0	1	1	0	0
Humerus	0	0	0	0	0	0	0	0
Radius	0	0	0	0	0	2	0	0
Ulna	0	0	0	0	0	0	0	0
Carpals	0	0	0	0	0	0	0	0
Metacarpal	0	0	0	0	0	0	0	0
Lateral MC	0	0	0	0	0	0	0	0
Pelvis	0	0	0	0	0	3	0	0
Femur	0	0	0	0	0	1	0	0
Tibia	0	0	0	0	0	0	0	0
Astragalus	0	0	0	0	0	0	0	0
Calcaneum	0	0	0	0	0	0	0	0
Tarsals	0	0	0	0	0	0	0	0
Metatarsal	0	0	0	0	0	0	0	0
Lateral MT	0	0	0	0	0	0	0	0
Metapodial	0	0	0	0	0	0	0	0
Lateral MP	0	0	0	0	0	0	0	0
Sesamoid	0	0	0	0	0	0	0	0
PH 1	0	0	0	1	0	0	0	0
PH 2	0	0	0	0	0	0	0	0
PH 3	0	0	0	0	0	0	0	0
TOTAL	0	0	0	2	15	21	0	0

Table III-15: Element representation by NISP for horses from non-well contexts

	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Skull	7	0	0	7	0	2	1	0
Hyoid	0	0	0	0	0	0	0	0
Maxilla	4	0	0	1	0	0	0	0
Mandible	4	2	4	3	0	2	0	0
Loose Teeth	27	5	10	17	1	4	1	0
Atlas	2	1	0	0	0	1	0	0
Axis	2	0	0	0	0	1	1	0
Vert.,Cervical	3	0	0	4	3	0	0	2
Vert.,Thoracic	1	0	0	1	0	3	6	0
Vert., Lumbar	0	0	0	0	0	0	0	0
Sacra	1	0	0	0	0	1	0	0
Vert., Caudal	0	0	0	0	0	0	0	0
Ribs	2	0	0	0	0	0	2	0
Scapula	2	0	1	3	1	5	1	0
Humerus	7	1	3	4	2	3	1	1
Radius	12	0	0	2	0	4	1	0
Ulna	4	0	0	0	1	0	0	0
Carpals	0	0	0	0	0	0	0	0
Metacarpal	3	1	0	1	1	3	2	1
Lateral MC	0	0	0	1	0	0	0	0
Pelvis	2	1	1	6	1	5	0	1
Femur	3	1	3	9	2	7	0	1
Tibia	4	0	0	4	3	3	2	0
Astragalus	2	0	0	1	0	0	1	0
Calcaneum	1	0	0	3	0	0	1	0
Tarsals	0	0	0	0	0	0	4	0
Metatarsal	1	0	0	5	1	0	3	0
Lateral MT	0	0	0	1	1	0	2	0
Metapodial	0	0	0	2	0	1	0	0
Lateral MP	0	0	0	0	0	0	0	0
Sesamoid	0	0	0	0	0	0	1	0
PH 1	5	1	0	0	1	0	2	1
PH 2	2	0	0	0	0	0	1	0
PH 3	0	0	0	0	0	1	1	0
TOTAL	101	13	22	75	18	46	34	7

III.6 Element Representation for Dog

Table III-16: Element representation by NISP for dogs from all contexts

	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Skull	1	0	4	0	2	3	0	0
Hyoid	0	0	0	0	0	0	0	0
Mandible	6	0	0	3	1	11	0	0
Maxilla	0	0	2	1	0	5	0	0
Loose Teeth, Mandibles	0	0	0	0	0	1	0	0
Loose Teeth, Maxillae	0	0	0	0	0	3	0	0
Loose Teeth, Indeterminate	0	0	0	0	2	1	0	0
Atlas	0	0	0	0	0	1	0	0
Axis	0	0	0	0	0	0	0	0
Vert., Cervical	0	0	0	1	0	3	0	0
Ver., Thoracic	0	0	0	0	0	9	0	0
Vert., Lumbar	0	0	0	0	0	12	1	0
Vert., Caudal	0	0	0	0	0	3	0	0
Vert., unID	0	0	0	0	0	0	0	0
Sternal elements	0	0	0	0	0	5	0	0
Ribs	0	0	0	1	0	23	2	0
Sacrum	0	0	0	0	0	3	0	0
Baculum	0	0	0	0	1	0	0	0
Scapula	2	0	1	1	1	5	1	0
Humerus	2	0	0	3	0	6	1	0
Radius	0	0	0	2	0	5	0	0
Ulna	0	0	0	2	1	13	1	0
Pelvis	0	0	0	0	0	8	0	0
Femur	1	0	0	0	0	7	0	0
Tibia	0	0	0	4	0	7	0	0
Fibula	0	0	0	0	0	2	0	0
Carpals	0	0	0	0	0	0	0	0
Metacarpal	0	0	1	3	1	9	0	0
Astragalus	0	0	0	0	0	0	0	0
Calcaneum	0	0	0	0	0	0	0	0
Tarsals	0	0	0	0	0	0	0	0
Metatarsal	0	0	0	0	0	3	0	1
Metapodial	0	0	0	0	0	3	0	0
Phalanx, 1st	0	0	0	0	0	12	0	0
Phalanx, 2nd	0	0	0	0	0	0	0	0
Phalanx, 3rd	0	0	0	0	0	0	0	0
TOTAL	12	0	8	21	9	163	6	1

Table III-17: Element representation by NISP for dogs from well contexts

	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Skull	0	0	0	0	0	2	0	0
Hyoid	0	0	0	0	0	0	0	0
Mandible	0	0	0	0	0	7	0	0
Maxilla	0	0	0	0	0	5	0	0
Loose Teeth, Mandibles	0	0	0	0	0	1	0	0
Loose Teeth, Maxillae	0	0	0	0	0	1	0	0
Loose Teeth, Indeterminate	0	0	0	0	0	0	0	0
Atlas	0	0	0	0	0	1	0	0
Axis	0	0	0	0	0	0	0	0
Vertebrae, Cervical	0	0	0	0	0	3	0	0
Vert., Thoracic	0	0	0	0	0	8	0	0
Vert., Lumbar	0	0	0	0	0	10	0	0
Vert., Caudal	0	0	0	0	0	2	0	0
Vert., unID	0	0	0	0	0	0	0	0
Sternal elements	0	0	0	0	0	5	0	0
Ribs	0	0	0	0	0	21	0	0
Sacrum	0	0	0	0	0	3	0	0
Baculum	0	0	0	0	0	0	0	0
Scapula	0	0	0	0	0	5	0	0
Humerus	0	0	0	0	0	4	0	0
Radius	0	0	0	0	0	3	0	0
Ulna	0	0	0	0	0	5	0	0
Pelvis	0	0	0	0	0	6	0	0
Femur	0	0	0	0	0	5	0	0
Tibia	0	0	0	1	0	4	0	0
Fibula	0	0	0	0	0	0	0	0
Carpals	0	0	0	0	0	0	0	0
Metacarpal	0	0	0	0	0	0	0	0
Astragalus	0	0	0	0	0	0	0	0
Calcaneum	0	0	0	0	0	0	0	0
Tarsals	0	0	0	0	0	0	0	0
Metatarsal	0	0	0	0	0	2	0	0
Metapodial	0	0	0	0	0	1	0	0
Phalanx, 1st	0	0	0	0	0	10	0	0
Phalanx, 2nd	0	0	0	0	0	0	0	0
Phalanx, 3rd	0	0	0	0	0	0	0	0
TOTAL	0	0	0	1	0	114	0	0

Table III-18: Element representation by NISP for dogs from non-well contexts

	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
Skull	1	0	4	0	2	1	0	0
Hyoid	0	0	0	0	0	0	0	0
Mandible	6	0	0	3	0	4	0	0
Maxilla	0	0	2	1	0	0	0	0
Loose Teeth, Mandibles	0	0	0	0	0	0	0	0
Loose Teeth, Maxillae	0	0	0	0	0	2	0	0
Loose Teeth, Indeterminate	0	0	0	0	2	1	0	0
Atlas	0	0	0	0	0	0	0	0
Axis	0	0	0	0	0	0	0	0
Vert., Cervical	0	0	0	1	0	0	0	0
Vert., Thoracic	0	0	0	0	0	1	0	0
Vert., Lumbar	0	0	0	0	0	2	0	0
Vert., Caudal	0	0	0	0	0	1	0	0
Vertebrae, unID	0	0	0	0	0	0	0	0
Sternal elements	0	0	0	0	0	5	0	0
Ribs	0	0	0	1	0	2	0	0
Sacrum	0	0	0	0	0	0	0	0
Baculum	0	0	0	0	1	0	0	0
Scapula	2	0	1	1	1	0	0	0
Humerus	2	0	0	3	0	2	0	0
Radius	0	0	0	2	0	2	0	0
Ulna	0	0	0	2	1	8	0	0
Pelvis	0	0	0	0	0	2	0	0
Femur	1	0	0	0	0	2	0	0
Tibia	0	0	0	3	0	3	0	0
Fibula	0	0	0	0	0	2	0	0
Carpals	0	0	0	0	0	0	0	0
Metacarpal	0	0	1	3	1	9	0	0
Astragalus	0	0	0	0	0	0	0	0
Calcaneum	0	0	0	0	0	0	0	0
Tarsals	0	0	0	0	0	0	0	0
Metatarsal	0	0	0	0	0	1	0	0
Metapodial	0	0	0	0	0	2	0	0
Phalanx, 1st	0	0	0	0	0	2	0	0
Phalanx, 2nd	0	0	0	0	0	0	0	0
Phalanx, 3rd	0	0	0	0	0	0	0	0
TOTAL	12	0	8	20	0	49	0	0

III.7 Mandible Wear Stages for Main 3 Domesticates

Wear Stage (age in months)	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B
A (0-1m)	0	0	0	0	0	1
B (2-8m)	0	0	0	0	0	0
C (8-18m)	6	0	1	4	3	0
D (18-30m)	6	2	2	8	0	2
E (30-36m)	2	0	1	1	1	0
F (young adult)	0	0	2	1	1	0
G (adult)	3	0	1	1	1	2
H (old adult)	4	1	0	0	1	1
I (senile)	3	1	6	3	1	3
TOTAL	24	4	13	18	8	9

Table III-19: Number of individuals in each Mandibular Wear Stage (after Hambleton 1999) for CATTLE in all contexts

Wear Stage (age in months)	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 mid to Late	8 Late AB
A (0-1m)	0	0	0	0	0	0	0	0
B (2-8m)	2	1	0	1	2	4	1	0
C (8-18m)	16	5	4	5	1	2	1	0
D (18-30m)	15	2	4	3	3	7	3	2
E (30-36m)	4	1	5	1	3	3	3	0
F (young adult)	2	1	0	3	1	4	1	0
G (adult)	4	0	2	4	1	2	1	0
H (old adult)	2	0	1	1	3	2	2	0
I (senile)	2	0	0	1	0	0	1	0
TOTAL	45	10	16	18	14	24	12	2

Table III-20: Number of individuals in each Mandibular Wear Stage (after Hambleton 1999) for SHEEP/GOAT in all contexts

Wear Stage (age in months)	1 Early A	2 Early B	3 Middle A	4 Middle B	5 Late A	6 Late B	7 Mid to Late	8 Late AB
A (0-2 m)	0	0	0	1	0	5	0	0
B (2-7m)	0	0	0	3	0	1	0	0
C (7-14m)	6	0	1	0	0	2	0	0
D (14-21m)	7	0	0	0	1	5	3	0
E (21-27m)	3	0	0	0	0	0	1	0
F (27-36m)	0	0	0	0	0	0	0	0
G (adult)	0	0	0	0	0	0	0	0
H (old adult)	0	0	0	0	0	0	0	0
I (senile)	0	0	0	0	0	0	0	0
TOTAL	16	0	1	4	1	13	4	0

Table III-21 Number of individuals in each Mandibular Wear Stage (after Hambleton 1999) for PIGS in all contexts

III.8 Measurements: Cattle

Table III-22: Measurements for Cattle Bones from Phase 1 Early A (given in mm)

Specific Phase	Element	GL	Bd	BFd	Dd	Bp	Dp	SD
1 Early A	Humerus		67.0					
1 Early A	Humerus		70.2					
1 Early A	Humerus		89.2					
1 Early A	Metacarpal	189.0	61.2			58.2		32.7
1 Early A	Metacarpal					46.9		
1 Early A	Metacarpal					50.9		
1 Early A	Metatarsal	216.0	56.7			48.3		27.7
1 Early A	Metatarsal	221.0	54.4			47.5		27.5
1 Early A	Metatarsal					43.2		23.3
1 Early A	Metatarsal					45.9		25.8
1 Early A	Metatarsal		40.2		36.6	0.0		22.3
1 Early A	Metatarsal		46.5			0.0		28.0
1 Early A	Radius					79.5		
1 Early A	Radius					60.4		
1 Early A	Radius					72.5	36.2	
1 Early A	Radius					75.5		
1 Early A	Radius					80.0		
1 Early A	Radius					81.6		
1 Early A	Radius		62.0	56.8		0.0		
1 Early A	Radius		62.1		43.0	0.0		
1 Early A	Radius		64.1			0.0		
1 Early A	Radius		66.3		47.8	0.0		
1 Early A	Radius		71.3	65.8		0.0		
1 Early A	Radius		73.5	61.8		0.0		
1 Early A	Tibia		56.6		40.8	0.0		
1 Early A	Tibia		56.7			0.0		
1 Early A	Tibia		56.8			0.0		
1 Early A	Tibia		57.0			0.0		
1 Early A	Tibia		57.5			0.0		
1 Early A	Tibia		62.9			0.0		

Table III-23: Measurements for Cattle Bones from Phase 2 Early B (given in mm)

Specific Phase	Element	GL	Bd	BFd	Dd	Bp	Dp	SD
2 Early B	Metacarpal		50.1			0		
2 Early B	Metatarsal					38.3		
2 Early B	Metatarsal					41		
2 Early B	Radius					71		
2 Early B	Radius					76.9		

Table III-24: Measurements for Cattle Bones from Phase 3 Middle A (given in mm)

Specific Phase	Element	GL	Bd	BFd	Dd	Bp	Dp	SD
3 Middle A	Metacarpal					57.3		32.2
3 Middle A	Tibia		61.3			0		

Table III-25: Measurements for Cattle Bones from Phase 4 Middle B (given in mm)

Specific Phase	Element	GL	Bd	BFd	Dd	Bp	Dp	SD
4 Middle B	Femur		116			0		
4 Middle B	Humerus		81.7			0		
4 Middle B	Metacarpal	195.6	63.2			62.2		
4 Middle B	Metacarpal					49.1		
4 Middle B	Metacarpal					63.3		35.6
4 Middle B	Metacarpal					68.5		
4 Middle B	Metacarpal					60.7	35.9	34.3
4 Middle B	Metacarpal					65.7		
4 Middle B	Metatarsal	209	53.3			44.6		23.3
4 Middle B	Metatarsal					48.5		
4 Middle B	Metatarsal					45.1		25.7
4 Middle B	Metatarsal					47.8		27.1
4 Middle B	Metatarsal					47.1		
4 Middle B	Radius	295	77.1	72.1		84.3		40.8
4 Middle B	Radius					79.2		
4 Middle B	Radius		76.1	65				
4 Middle B	Radius					85.8		
4 Middle B	Radius		72.8	66.2		0		

Specific Phase (contd)	Element (contd)	GL (contd)	Bd (contd)	BFd (contd)	Dd (contd)	Bp (contd)	Dp (contd)	SD (contd)
4 Middle B	Tibia		55.2			0		33.9
4 Middle B	Tibia		58.5			0		
4 Middle B	Tibia					90.7		
4 Middle B	Tibia		35.9			0		33.6

Table III-26: Measurements for Cattle Bones from Phase 5 Late A (given in mm)

Specific Phase	Element	GL	Bd	BFd	Dd	Bp	Dp	SD
5 Late A	Metacarpal					53.6		32.3
5 Late A	Metacarpal					58.7		30.4
5 Late A	Metacarpal		53.4			0		
5 Late A	Metacarpal		66.6			0		
5 Late A	Metatarsal	214	52.9			44.9		24.1
5 Late A	Metatarsal					43.9		22.7
5 Late A	Metatarsal					46		26.1

Table III-27: Measurements for Cattle Bones from Phase 6 Late B (given in mm)

Specific Phase	Element	GL	Bd	BFd	Dd	Bp	Dp	SD
6 Late B	Femur		82			0		
6 Late B	Femur		99			0		37.2
6 Late B	Femur		55.8		42.9	0		
6 Late B	Humerus		79.1			0		
6 Late B	Humerus		80.9			0		34.6
6 Late B	Humerus		81.4			0		
6 Late B	Humerus		86			0		
6 Late B	Humerus		95		90.6	0		
6 Late B	Metacarpal	177	48.3		26.8	50.8	30	
6 Late B	Metacarpal	181	51.7			48.9	28.7	28.1
6 Late B	Metacarpal	184	63.8			62.1		36
6 Late B	Metacarpal	189	57.9		32.3	55.2	34	28.4
6 Late B	Metacarpal					54.3		27.7
6 Late B	Metacarpal					49.3	30	26.6
6 Late B	Metatarsal	203	45.2		25.7	40.6	38.3	21.7

Specific Phase (contd)	Element (contd)	GL (contd)	Bd (contd)	BFd (contd)	Dd (contd)	Bp (contd)	Dp (contd)	SD (contd)
6 Late B	Metatarsal	203	45.1		26.4	41.2		21.4
6 Late B	Metatarsal	218	57.1		33.1	46.2		26.3
6 Late B	Metatarsal					42.2		23.9
6 Late B	Metatarsal					47.8	45.7	
6 Late B	Metatarsal					49.8	41.8	
6 Late B	Metatarsal					52.7		29.4
6 Late B	Metatarsal		57.8		33.4			
6 Late B	Radius					74.6		36.3
6 Late B	Radius					91.1	45.5	
6 Late B	Tibia		54.1					
6 Late B	Tibia		64.5		48.5			
6 Late B	Tibia		66.4		49			
6 Late B	Tibia		71.8					

Table III-28: Measurements for Cattle Bones from Phase 7 Mid to Late (given in mm)

Specific Phase	Element	GL	Bd	BFd	Dd	Bp	Dp	SD
7 Mid to Late	Metacarpal					53.2		
7 Mid to Late	Metacarpal					61.3		
7 Mid to Late	Metacarpal					56.5	35	
7 Mid to Late	Metacarpal					57.6	36.5	
7 Mid to Late	Metatarsal					45.7		23.6
7 Mid to Late	Radius		73.2	66.4				

Table III-29: Measurements for Cattle Bones from Phase 8 Late AB (given in mm)

Specific Phase	Element	GL	Bd	BFd	Dd	Bp	Dp	SD
8 Late A-B	Metatarsal					45.6		
8 Late A-B	Metatarsal					47.8		
8 Late A-B	Radius		74.3	68.5				

III. 9 Measurements: Sheep/Goat

Table III-30: Measurements for Sheep/Goat Bones from Phase 1 Early A (given in mm)

Specific Phase	Element	GL	GLpe	Bd	BFd	Dd	Bp	Dp	BT	SD
1 Early A	Humerus			24.7					22.9	11.0
1 Early A	Humerus			26.8						12.4
1 Early A	Humerus			25.9					23.9	
1 Early A	Humerus			26.1					25.1	
1 Early A	Humerus			25.3						
1 Early A	Humerus			26.9						
1 Early A	Metacarpal			20.6						11.0
1 Early A	Metacarpal						18.4			10.7
1 Early A	Metacarpal			21.9			19.6			12.3
1 Early A	Metacarpal	82.6								
1 Early A	Metatarsal	138.6		23.5		15.5	20.1	19.6		11.8
1 Early A	Metatarsal						15.9			8.6
1 Early A	Metatarsal						15.7			9.2
1 Early A	Metatarsal						18.1			9.5
1 Early A	Metatarsal						16.8			10.0
1 Early A	Metatarsal						18.3			10.5
1 Early A	Metatarsal						18.3			11.0
1 Early A	Metatarsal						19.5			11.0
1 Early A	Metatarsal						20.0	21.6		
1 Early A	Phalanx 1		34.0							10.0
1 Early A	Phalanx 1		34.0							10.0
1 Early A	Phalanx 1		30.2							8.9
1 Early A	Phalanx 1		33.8							9.7
1 Early A	Phalanx 2		20.5							
1 Early A	Phalanx 2		20.6							
1 Early A	Radius	131.0		22.9	20.3					12.4
1 Early A	Radius						25.7			14.0
1 Early A	Radius						26.2			14.4
1 Early A	Radius						28.0			14.4
1 Early A	Radius						27.3			15.2
1 Early A	Radius						27.2			15.5
1 Early A	Radius									16.0
1 Early A	Radius						29.6	14.0		
1 Early A	Radius						26.0			
1 Early A	Radius			22.9						

Specific Phase (contd)	Element	GL	GLpe	Bd	BFd	Dd	Bp	Dp	BT	SD
1 Early A	Radius			24.7						
1 Early A	Tibia			20.8						11.7
1 Early A	Tibia			22.2						11.9
1 Early A	Tibia			22.2						12.0
1 Early A	Tibia			22.2						12.2
1 Early A	Tibia			21.9						12.3
1 Early A	Tibia			24.3		18.0				13.0
1 Early A	Tibia			22.9						13.0
1 Early A	Tibia			23.5						13.0
1 Early A	Tibia			23.5		17.5				
1 Early A	Tibia			22.8		18.8				
1 Early A	Tibia			20.2						
1 Early A	Tibia			23.5						
1 Early A	Tibia			24.3						

Table III-31: Measurements for Sheep/Goat Bones from Phase 2 Early B (given in mm)

Specific Phase	Element	GL	GLpe	Bd	BFd	Dd	Bp	Dp	BT	SD
2 Early B	Calcaneum	47.1								
2 Early B	Metacarpal						17.2			11.5
2 Early B	Metatarsal						17.1			10.2
2 Early B	Phalanx 1		33.4							

Table III-32: Measurements for Sheep/Goat Bones from Phase 3 Middle A (given in mm)

Specific Phase	Element	GL	GLpe	Bd	BFd	BFd	Bp	Dp	Dp	SD
3 Middle A	Calcaneum	48.2								
3 Middle A	Humerus			21.6						
3 Middle A	Metatarsal						18.0	18.3	11.1	
3 Middle A	Phalanx 1		39.2							10.6
3 Middle A	Phalanx 2		41.7							
3 Middle A	Radius	11.1								
3 Middle A	Tibia			24.9						

Table III-33: Measurements for Sheep/Goat Bones from Phase 4 Middle B (given in mm)

Specific Phase	Element	GL	GLpe	Bd	BFd	Dd	Bp	Dp	BT	SD
4 Middle B	Astragalus		24.5	15.9						
4 Middle B	Astragalus		25.2	17.0						
4 Middle B	Humerus			32.0					30.1	
4 Middle B	Humerus			28.5						
4 Middle B	Metacarpal						20.1			11.4
4 Middle B	Metacarpal						21.0			12.2
4 Middle B	Metacarpal						21.2			
4 Middle B	Metatarsal	139.3		23.0			19.0			
4 Middle B	Metatarsal						17.1			10.6
4 Middle B	Metatarsal						18.2			11.2
4 Middle B	Metatarsal						17.8			11.7
4 Middle B	Metatarsal						18.1	17.9		
4 Middle B	Metatarsal			29.3						
4 Middle B	Phalanx 1		37.7							9.4
4 Middle B	Radius									13.6
4 Middle B	Radius	140.5		26.0	23.0		28.2		25.1	14.0
4 Middle B	Radius						27.2			14.4
4 Middle B	Radius						25.7			
4 Middle B	Tibia			22.9						11.7
4 Middle B	Tibia						25.5			
4 Middle B	Tibia			22.7						
4 Middle B	Tibia			23.5						
4 Middle B	Tibia			24.2						
4 Middle B	Tibia			25.5						
4 Middle B	Tibia			25.6						
4 Middle B	Tibia			29.0						

Table III-34: Measurements for Sheep/Goat Bones from Phase 5 Late A (given in mm)

Specific Phase	Element	GL	GLpe	Bd	BFd	Dd	Bp	Dp	BT	SD
5 Late A	Humerus			25.0						12.7
5 Late A	Humerus			31.2						
5 Late A	Metacarpal			26.6		16.4	24.3	17.7		14.2
5 Late A	Metacarpal									
5 Late A	Metacarpal			28.5						16.4
5 Late A	Metatarsal	116.0		20.5			17.3			9.5
5 Late A	Metatarsal									11.7
5 Late A	Metatarsal						19.1			11.1

Specific Phase (contd)	Element	GL	GLpe	Bd	BFd	Dd	Bp	Dp	BT	SD
5 Late A	Metatarsal						22.1			
5 Late A	Phalanx 1		38.3							10.1
5 Late A	Radius						33.7			
5 Late A	Radius			25.7						

Table III-35: Measurements for Sheep/Goat Bones from Phase 6 Late B (given in mm)

Specific Phase	Element	GL	GLpe	Bd	BFd	Dd	Bp	Dp	BT	SD
6 Late B	Astragalus		26.3	16.3			15.1			
6 Late B	Astragalus		29.3	18.9			16.1			
6 Late B	Astragalus		28.2	18.1						
6 Late B	Calcaneum	58.7								
6 Late B	Calcaneum	61.2								
6 Late B	Femur	47.9	43.7	12.0		10.1	14.6	8.1		5.6
6 Late B	Femur	35.2								
6 Late B	Femur	50.8								
6 Late B	Humerus									12.0
6 Late B	Humerus			24.1					21.7	12.7
6 Late B	Humerus			26.3					25.2	
6 Late B	Humerus			26.2		22.2			25.8	
6 Late B	Humerus			15.0	7.4					
6 Late B	Humerus			26.6						
6 Late B	Metacarpal						16.5	11.2		
6 Late B	Metacarpal						18.9	12.8		
6 Late B	Metacarpal						20.8	13.3		
6 Late B	Metacarpal						20.0	14.1		
6 Late B	Metacarpal						20.1	14.1		
6 Late B	Metacarpal		22.6							
6 Late B	Metacarpal	79.6								
6 Late B	Metacarpal						22.3			
6 Late B	Metatarsal	133.9		24.9			20.8			11.9
6 Late B	Metatarsal						20.4			11.5
6 Late B	Metatarsal						17.0	16.6		
6 Late B	Metatarsal						17.5	17.2		
6 Late B	Metatarsal						17.8	17.7		
6 Late B	Metatarsal						18.6	18.2		
6 Late B	Metatarsal	69.5								

Specific Phase (contd)	Element	GL	GLpe	Bd	BFd	Dd	Bp	Dp	BT	SD
6 Late B	Metatarsal	77.1								
6 Late B	Metatarsal						19.3			
6 Late B	Phalanx 1		35.5							11.9
6 Late B	Phalanx 2		20.0							7.8
6 Late B	Phalanx 2		20.2							8.0
6 Late B	Phalanx 2		20.0							8.1
6 Late B	Phalanx 2		20.1							8.2
6 Late B	Phalanx 2		19.8							8.7
6 Late B	Phalanx 2		21.2							8.8
6 Late B	Radius	39.2		10.0		6.8	8.6	5.2		4.8
6 Late B	Radius						26.6			13.3
6 Late B	Radius			29.0						
6 Late B	Radius	39.4								
6 Late B	Tibia			23.5						12.6
6 Late B	Tibia			25.2			41.4			13.2
6 Late B	Tibia			25.7						14.3
6 Late B	Tibia			26.9						14.3
6 Late B	Tibia			27.9						16.2
6 Late B	Tibia						11.2	6.1		
6 Late B	Tibia			23.2						
6 Late B	Tibia			23.6						
6 Late B	Tibia			25.8						
6 Late B	Tibia			26.1						
6 Late B	Tibia			26.3						
6 Late B	Tibia			27.9						
6 Late B	Tibia	43.5								
6 Late B	Tibia	45.3								
6 Late B	Ulna	47.5								
6 Late B	Ulna	47.7								

Table III-36: Measurements for Sheep/Goat Bones from Phase 7 Mid to Late (given in mm)

Specific Phase	Element	GL	GLpe	Bd	BFd	Dd	Bp	Dp	BT	SD
7 Mid to Late	Femur			39.6						
7 Mid to Late	Humerus			30.5					28.1	
7 Mid to Late	Metacarpal	129.5		25.6			21.9	16.0		14.7
7 Mid to Late	Metacarpal						22.5			14.0
7 Mid to Late	Metacarpal						27.6			18.1
7 Mid to Late	Metatarsal	109.0					22.9	22.8		13.7
7 Mid to Late	Metatarsal									13.6
7 Mid to Late	Phalanx 1		40.1							9.8
7 Mid to Late	Radius						25.5	12.8		
7 Mid to Late	Radius						30.5			
7 Mid to Late	Tibia			27.1		21.2				

Table III-37: Measurements for Sheep/Goat Bones from Phase 8 Late AB (given in mm)

Specific Phase	Element	GL	GLpe	Bd	BFd	Dd	Bp	Dp	BT	SD
8 Late A-B	Metacarpal	130.1		24.2			25.3			13.1
8 Late A-B	Tibia			27.3						

Table III-38: Measurements of the distal metapodia for distinguishing sheep and goat (given in mm)

Specific Phase	Element	a	b	1	3	4
1 Early A	Metacarpal	9.7	8.8	8.5	11.3	8.6
1 Early A	Metatarsal	10.0	9.4	10.0	12.7	9.2
4 Middle B	Metatarsal	19.3	19.6	19.3	12.2	18.5
5 Late A	Metatarsal	9.0	7.5	8.9	11.5	8.2
5 Late A	Metatarsal	10.5	10.1	9.9	13.4	9.3
5 Late A	Metacarpal	11.6	11.7	11.4	14.9	10.4
5 Late A	Metacarpal	12.5	11.5	10.3	13.5	9.9
5 Late A	Metacarpal	12.6	12.6	12.4	15.5	12.1
6 Late B	Metatarsal	10.5	10.2	9.7	12.5	9.1
7 Mid to Late	Metacarpal	11.1	10.8	10.4	13.0	10.1
7 Mid to Late	Metatarsal	12.0	1.1	11.0	14.3	10.6
7 Mid to Late	Metatarsal	-	16.2	-	-	9.9
8 Late A-B	Metacarpal	10.1	10.3	10.7	13.6	10.0

III. 10 Measurements: Pigs

Table III-39: Measurements for pigs from all phases (given in mm)

Specific Phase	Element	GL	Bd	Dd	Bp	Dp	BT	HTC	SD
1 Early A	Humerus							16.5	
1 Early A	Radius				26.9				
1 Early A	Radius				27.9	19.7			
1 Early A	Tibia		26.9	25.0					
1 Early A	Tibia		28.5						
1 Early A	Tibia		28.6						19.0
2 Early B	Humerus		40.5				32.0	17.6	
2 Early B	Radius				32.3				
4 Middle B	Humerus		40.2				31.7	15.3	
4 Middle B	Metacarpal				14.5				11.6
4 Middle B	Tibia		30.4	25.1					