BUTCHERY AND INTRA-SITE SPATIAL ANALYSIS OF ANIMAL BONE: A CASE STUDY FROM DANEBURY HILLFORT, HAMPSHIRE, ENGLAND.

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by

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ABSTRACT

Butchery And Intra-Site Spatial Analysis Of Animal Bone: A Case Study From Danebury Hillfort, Hampshire, England.

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This thesis explores the questions of status divisions, specialised activity and task areas, meat consumption, ritual and structured deposition, and addresses a main theme: what was the status of hillforts in the Iron Age?

The basis of the study was to analyse the potential of butchery and intra-site spatial patterning of animal bone to aid interpretation of specialisation and status distinctions on archaeological sites. The Iron Age hillfort at Danebury was chosen as a case study for this project. Danebury has a large sample size, continuous area of excavation and full butchery and location records. Butchery analysis defined which bones were found in which butchery 'units', and their positions could then be plotted using a Geographic Information System. Some individual deposits were also examined for temporal differences in bone elements and associations through manual investigation of several individual pits.

Results suggested that despite the apparently specialised nature of butchery techniques, activities could not be directly inferred from deposits, and that some time or distance had elapsed between butchery, consumption and deposition. However, the most likely scenario to explain the complex deposition pattern was that meat eating was small-scale and periodic. Since the distance between butchery, consumption and deposition was substantial, deposition may in fact have been the activity that tells us most about the community. Thus there was no evidence for different 'functional areas'.

Nearby sites excavated during the Danebury Environs project were also investigated, and evidence from butchery techniques and deposition patterns used to compare their status to that of Danebury. Recommendations for further work are made, including application of the methodologies presented on sites that show clear evidence of divisions (e.g. Manching), to enable the development and extent of specialist industries in the Iron Age to be ascertained.

Keywords: Danebury; Butchery; Intra-site; Spatial analysis; Geographic Information Systems; Consumption; Ritual; Deposition.

CONTENTS

3 Iron Age Butchery at Danebury 62-166

4 Spatial patterning: two dimensional 167-206

5 Spatial patterning: three-dimensional 207-252

6 Discussion: meat consumption and disposal of animal bone at Danebury hillfort 253-288

FIGURES

Page Number

Chapter 1

Chapter 2

Chapter 3

Chapter 4

Chapter 5

Appendix 3

TABLES

Page Number

Chapter 2

Chapter 3

Chapter 5

Appendix 3

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1 INTRODUCTION

1.1 RESEARCH QUESTIONS

The role of hillforts in the Iron Age has been much debated, especially with regard to the type and continuity of occupation and status of the inhabitants. Authors have argued for and against a high status for the hillfort, citing occupation evidence, artefactual presence and absence, rampart construction and geographical location. Opinion has differed regarding the nature and extent of the differences between hillforts and undefended settlements, the location of hillforts on the boundary or centre of territories, and the seasonality of occupation. In addition, both ritual and secular interpretations have also been advanced to account for the deposits at hillfort locations (for example Cunliffe 1992; Hill 1995a; Grant 1984c; Wilson 1992). This thesis aims to address these questions by furthering our understanding of the structuring of society within the ramparts of hillforts.

Using the hillfort at Danebury in Hampshire as a case study, butchery techniques and spatial patterning of bones will be investigated, to assist in developing an understanding of the activities undertaken at the site. Butchery analysis will be used to determine the intensity of exploitation of the carcass and the divisions that animal bones were split into. The positions of these 'butchery units' can then be investigated spatially; the zoning of particular elements in certain areas would indicate segregation of activity or deposition, and therefore some degree of specialisation or status based differentiation. More detailed analysis of associations of bone elements in individual deposits will help to define which activities led to particular deposits, and whether they had any specific status based on ritual or social distinctions.

Therefore, analysis will focus on the nature and scale of meat consumption and its status, the specialisation of tasks and segregation of activities, the manner of deposition of animal bone, and the changes in occupation and use over time. Some direct inter-site comparisons can be made with other Iron Age sites in the vicinity of Danebury, where the relevant data is available for study (section 1.3.1.3), and with sites that have already been subject to similar types of spatial investigation such as Wendens Ambo and Winklebury (Halstead *et al.* 1978; Fisher 1985).

Specifically, research questions will include:

a) Was butchery a specialised craft?

b) What parts were carcasses divided into, and how widely were they distributed?

c) Do some deposits reflect consumption activities? If so, can the scale of meat consumption be established?

d) Can the distribution of animal bone elements in pits and layers help us to detect zoning of activities in the hillfort?

e) Are there any identifiable differences in bone deposits that could indicate 'ritual' and 'secular' activity?

f) Are there any identifiable high and low status animal bone deposits?

g) Are there any distinctions between animal bone assemblages from pits and ditches?

h) How was consumption and deposition activity at Danebury different to that at Iron Age non-hillfort sites in Wessex?

1.1.1 Why Danebury?

The area excavated at Danebury is unusually large, and the continuous strip of excavated interior (section 2.1) provides an ideal opportunity to try to identify different use areas, as have been suggested for contemporary Manching (Collis 1976) and Maiden Castle (Sharples 1991). Thousands of pits were half sectioned and then fully excavated, providing entire, discrete deposits with well stratified fills that can be analysed as individual entities. Layers that had built up in quarries and against the ramparts were also excavated, so deposits in different feature types can also be compared.

The records of faunal remains at Danebury are full, computerised and detailed. They are also numerous, with over 240,000 identified bone fragments recorded. Much of the material recorded in this database had not been fully utilised. For example the butchery records have not previously been looked at in detail, despite the comprehensive manner of recording. The extremely large dataset is unique for Iron Age sites, many of which have only been sampled, and many outside southern Britain producing little in the way of surviving bones. The bones at Danebury are also extremely well preserved, and because of this, the butchery marks are very clearly defined. For butchery analysis, a large sample size is especially important, since the process of butchering may result in a very small percentage of cuts impacting on the bone (section 1.3.5). In terms of comparative data, the Danebury Environs project (Cunliffe 2000) provides several sites in the vicinity, excavated, recorded and written up in a similar manner.

1.1.2 Why butchery?

'butchers, like artists, leave something akin to a signature in the marks of their handiwork' (Kemp 1994:145).

There is considerable potential to help resolve some of the questions raised about the nature of Iron Age society using evidence from butchery techniques alone. The types of marks found on the bones can help us to interpret social aspects of butchery and meat eating: chopping through bones to produce meat parts on the bone suggests rapid processes, with little regard for the physiology of the animal. Large chunks of meat can be taken as evidence of large scale, communal consumption. Cuts to the articular parts of bones suggest a careful technique and detailed knowledge of the skeleton and musculature. Analysis of changing butchery patterns over time can assess the extent of outside influences (such as Roman techniques), tool type and intensity of use.

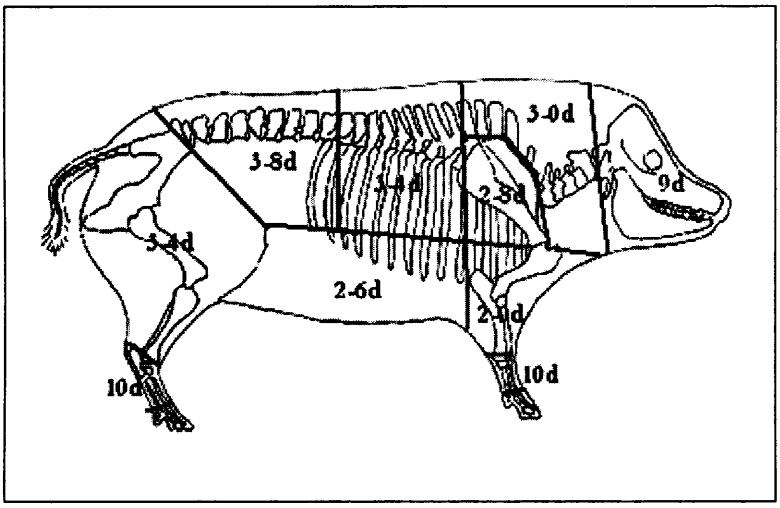


Figure 1.1: Monetary value of different pig carcass parts. After: Gerrard 1964: 200.

Even today, butchery processes are regionally divergent and the resulting cuts of meat are imbued with status. For example, the meat on the lower limbs is cheaper and less desirable than that on the rump or loin (figure 1.1). In this study the main purpose of investigating butchery, however, is to enable the particular units of butchery to be identified, and their locations within the hillfort displayed. Each butchery unit consists of a group of bones (perhaps the phalanges and tarsals for the feet), a single bone or a part of a bone (in modern butchery, the front of the pelvis provides meat for a specific cut, for instance). Obviously it is impossible to say whether all bones were butchered in the same manner, or at all, but the standardisation of marks implies a consistent method was followed (Grant 1987).

1.1.3 Why spatial patterning?

Once individual butchery units have been defined, they can then be spatially located by deposit or area. If these units, which are separated at the time of carcass dismemberment, are not found in the same pit or layer, they have obviously been further dispersed (see below). If butchery units are found together, this implies more immediate deposition, or that the units remained together during cooking and meal preparation.

Many authors have suggested functional or taphonomic differences between areas (Wilson 1986; 1994), or activity-based segregation of areas (Halstead *et al.* 1978; Meadows 1997). Cunliffe states that no patterning of small finds was present at Danebury (Cunliffe 1995: 42), although he identified different use areas on the basis of structures. However, many analyses can be carried out with animal bone other than simply frequency and location. Species and body part are also important; the skull and the femur or the horse and the sheep may represent very different activities or values, and may have been consumed by different people or groups.

Communities with social hierarchies, such as are envisaged by Cunliffe for Danebury (Cunliffe 1995), may produce deposits or areas that contain predominantly 'rich' or 'poor' remains. This type of segregation occurs when rich and poor groups live in different areas and deposit remains separately. Meat bones of a high perceived value (which may not be the same as those defined as such today) will then be located mainly in richer areas. Trotters and heads, commonly perceived as low status cuts in modern England, may have a different distribution to vertebrae and pelvic bones. This kind of separation has been suggested for Roman and medieval sites (Stokes 1996; Loveluck 1998), but is unlikely to be recognised during excavation by non-specialists.

A centralised society is likely to have butchery and consumption activities taking place in different areas. An example is Roman Exeter (Maltby 1979), where butchery waste in high densities was deposited in certain defined areas. Cunliffe suggests that occupation and storage at Danebury were mainly found in different areas, and bone evidence may reflect this, although the analysis of distribution of other finds has not shown a clear relationship to the structural evidence. A less specialised society might produce different types of bone deposits, so one might expect a range of bone elements spread across the site.

A wide distribution of bone elements across the site is, then, as interesting a scenario as evidence for segregation of body parts. A society that selects and deposits its food in no particular pattern may in fact be highly developed, with complex means of waste collection and disposal. A high degree of control over butchery and/or depositing bones may be exercised in this case. Alternatively, the society may have been egalitarian, making no distinction between what are commonly regarded as meat cuts of high and low values. Other forms of evidence such as settlement type, housing and artefactual evidence can then be brought in to shed further light upon these phenomena.

An important consideration when looking at spatial patterns is temporal differences in bone distributions. The analyses outlined above are only suitable when pits can be regarded as a single entity, an idea that has been challenged by Hill (1995b) and Grant (2002). Investigation of separate deposits within pits needs to be performed, allowing different faunal contents between individual deposits to be defined. Specific events, such as feasting, might produce a distinctive signature in the bone record - large quantities of bone from many animals.

In addition, some pits contain 'special deposits' (section 1.3.4), possibly indicating that a completely different deposition strategy was in place for pits, compared to that for the layers which built up around the ramparts and in hollows, and as occupation layers in buildings. If pits and layers show variation in depositional practice, then one topic that needs addressing is whether they also contain the remains of different types of consumption activity. It is also important to identify whether different consumption and depositional practices were taking place in the pits that did not contain 'special deposits'.

The large area of Danebury that was excavated, and the huge number of bones recovered, provides the perfect opportunity to look for spatial patterning. However, the large sample size makes manual investigation very difficult. Geographic Information Systems provide an ideal medium by which to investigate this kind of patterning. The faunal data can be linked to the spatial locations of pits and layers easily, and particular bones or combinations displayed very quickly. This is especially useful when repetitive analyses are undertaken, for example where the locations of bones of different species and from different phases need to be explored.

1.1.4 Models for identifying consumption activities and social structures

Some models for identifying different activities and social groups using butchery evidence and animal bone distributions are outlined below. In some cases they overlap, and the same bone distribution could be used to argue for more than one scenario. Where it is impossible that the scenarios could have co-existed, it is necessary to include other types and sources of information other than faunal remains, and from different sites, to clarify interpretations (see chapter 6).

1.1.4.1 Feasting or 'household' scale consumption

Ethnographic and historical sources cite that meat eating in large quantities is often regarded as desirable, but is in fact relatively uncommon (Fiddes, 1991: 11-23). However, communal eating and feasting could be represented by the presence of bones that carry large quantities of meat, or by dense deposits of many bones from individual animals. A dense deposit could be recognised from the archive data, if a large number of bones was recovered from a relatively small volume of soil. The meat from a modern young pig (similar in size to a mature Iron Age pig) could feed at least 60 people (R. Boulton, pers. comm.), and if this number of people was eating at once, the bone remains of an entire pig may be found together in one deposit.

Carcasses are unlikely to remain articulated even when the whole animal is roasted on the bone (as might take place prior to feasting), as the ligaments break down during cooking and the bones disarticulate. However, articulated parts or whole animals may have been filleted, even if they do not show any butchery marks, and would have produced a similar quantity of food to an animal cooked whole on the bone. In both types of butchery, the full resources available would not have been utilised, as when the butchery method left parts of the animal still articulated, it is likely that small scraps of meat and the marrow would have been deposited with the bones. This type of cooking, while not feasting, certainly does not utilise the carcass to its fullest potential.

Smaller scale 'family' or 'household' eating could be inferred from small parts of larger animals, such as a small consecutive series of vertebrae from a pig, or by larger parts of small animals, for example a whole sheep limb. A range of species and bone elements, perhaps in distinct butchery units (as identified during butchery analysis), might be indicative of general household debris (see below for status distinctions). Another characteristic of smaller communities is the preservation of meat, when the quantity of meat available from one animal exceeds the amount that the group can eat before the meat begins to rot. In early modern Britain, one pig per family per year was slaughtered, and the preserved meat lasted until the next pig was killed in the next year (Malcolmson & Mastoris 1998).

A similar practice was observed until recently in the village of Fageca, Spain (Joan Segui pers. comm.). Most bones were deposited at once after disarticulation and filleting, but some (the scapula and the femur for example) were retained in the preserved meat to aid preservation. These bones, therefore, would be deposited at a later date, and possibly in a different place to the majority of the bones. Such a system, based on frugal use of meat, would probably also involve boiling up bone to use the scraps of meat and possibly extracting marrow. This would further disseminate the bone and fragment it.

1.1.4.2 Hierarchical or egalitarian society

If the people using the hillfort were of different social classes, they might be expected to consume the meat of different species, ages or from particular parts of animals. Therefore a predominance of younger animals, which have not yet reached their optimum meat weight, might indicate higher status if the young meat was seen as possessing social prestige. Alternatively, older animals may have been more valued as their meat is stronger in flavour. Older animals will also have been kept for longer, consuming more resources, and could therefore have higher status. Thus an area or deposit that contained the bones of certain ages, or maybe of rarer species, could indicate particular status for this part of the hillfort or for the particular group that created the deposit. Pigs have sometimes been regarded as indicative of high status due to their lack of secondary products (see Grant 1988), but were also bred by poorer families since they are very easy to feed, eating scraps and waste products.

Specific meat cuts may have held different values. The head and trotters have traditionally been regarded as low status in modern Britain, and indeed these 'waste' parts are seldom eaten now. Obviously we cannot say for certain what value meat parts may have held in the Iron Age, but a cluster of specific bone elements or butchery units in one area could indicate particular status. Theoretically, bones carrying high (femur), medium (vertebrae) or low (skull) proportions of meat might be differently distributed. Large quantities of 'meaty' bones, or a high density of bones might indicate large-scale meat consumption, something that may only have been available to the more powerful members of society.

If all inhabitants of the hillfort were of the same social ranking, there might be no segregation of certain parts of meat, which would result in a homogenous pattern across the site, with no differentiation in species proportions, bone elements, types of butchery, or ages of animals.

1.1.4.3 Specialised or unspecialised activity

A specialised society might be inferred from the consistency of techniques (such as butchery), which suggests work tasks had been taken up by selected individuals or groups.

If such specialisations existed, waste might be of a distinctive nature. Meat bones from different stages of butchery could include 'waste' bones such as the head and feet, filleted meat-bearing bones, etc. Consumption refuse might consist of bone from smaller species or parts of bone from larger species that had been cooked with the meat, for instance distal tibiae, vertebrae or ribs. Craft waste from hide working might comprise the metapodials and maybe skull, while glue production would result in fragmented bones. Horn working would produce concentrations of horncores and skulls with horncores removed, while bone working would perhaps result in scapulae with holes cut during button making or worked metapodials, etc. These might be found in separate areas, pits or deposits, if deposition was also segregated. A lack of specialisation might be implied from haphazard butchery techniques.

1.1.4.4 'Structured' or random deposition

Ritualised activity has been suggested to explain at least a part of some pit fills. Cunliffe (1992) and Grant (1984a) regard 'special deposits' - articulated animals or parts of animals, skulls, unusual combinations - as propitiatory offerings, while Hill (1995a) suggests that all material in pits was 'structured'. Hill proposes that the number of bones recovered from Iron Age sites do not represent the total numbers of animals bred. Therefore bones that did survive must have been specially treated. However, the amount of meat consumed in the Iron Age could have been very small, so the deposits within the hillfort may provide an accurate reflection of the number of animals eaten. It is also possible that all the bones in pits may have held some sort of significance, for instance if they had all been derived from special occasion meals. The butchery on the bones certainly implies that meat was consumed, though it may have had a ritual basis, perhaps in feasting or sacrifice.

No special deposits were noted in the layers, which might represent a different and possibly more 'secular' activity. If the contents of the pits *excepting special deposits* contain material of a similar nature to layers, could it be said that there are lenses of ritual activity but that the rest of the deposit is 'secular'? Or might the whole site be ritual in nature? Indeed, strict distinctions between ritual and secular activity may not have had any validity in the Iron Age (section 1.3.4). Hill's hypothesis requires the bones to have been somehow selected for inclusion into pits, and so certain combinations or elements might be found together. Immediate deposition into available pits after consumption, with no ritual basis to the action, would mingle the bone elements, reducing any evidence of 'structuring'.

Certain areas of the site have been afforded different status by Cunliffe (1991: 25) and one of the key questions addressed in this thesis is whether the pits around the central 'shrine' structure contain bone assemblages that are noticeably different to pits in the 'storage' or 'occupation' areas? Whole heads, or exclusively unbutchered bone, for example, would add weight to a non-functional interpretation and specific associations of species and bone elements in certain areas - a horse and dog were buried together in one pit (Grant 1984c: 222) - might also suggest unusual deposition activity.

Other ritual acts such as sacrifice could be recognised by the deposition of whole animals or articulated parts of animals with no butchery evidence, which *may* have been deposited fully fleshed. It is difficult to say with certainty whether bones had been deposited with meat still covering the bone, as filleting marks will not necessarily be made on each bone that is filleted. Identification of sacrificial activity is further complicated by ethnographic evidence that some acts of sacrifice are accompanied by feasting (Klenk 1995). The resulting bones may bear butchery marks and be disarticulated, making them very difficult to distinguish archaeologically from the remains of 'ordinary' consumption.

One final possibility that is worth noting in the context of supposedly ritual activity is the deliberate curation of rubbish for later deposition (Pollard 1992). It could be inferred archaeologically by the incidence and location of gnawing and weathering, and small parts of disassociated bone.

1.1.5 Conclusions

This study will follow several major strands of enquiry. Firstly, the question of whether the occupants of the hillfort were socially stratified or not, and if such status differences are visible archaeologically through bone deposits. Secondly, to identify the scale of meat eating at Danebury, compared to other sites. Were the inhabitants eating communally or in small groups? Thirdly, it is important to consider the possible ritual nature of some deposition – are particular deposits (excluding those previously categorised by Grant (1984a) as 'special deposits') conspicuously different to the majority? The final broad aspect to address is the potential for identifying spatially segregated areas of activity that could indicate specialisation of crafts.

The methodology of the research has been designed to address the key issues outlined here through analysis and interpretation of the butchery marks by species phase and feature type, and by spatial investigation of the butchery 'units' in two and three dimensions. Thus it should be possible to describe and interpret the distribution of particular bone elements across the hillfort, the scale of bone deposition and the integrity of bone elements in individual deposits. The analysis can also be used to investigate sites other than Danebury, in order to provide comparative results.

1.2 THESIS STRUCTURE

The thesis begins with a review of the relevant literature to date, and its impact upon this study (section 1.3). The appropriateness of methodologies for investigating butchery and spatial patterning is assessed, the results outlined, and the main theoretical issues are described, and interpretations given.

Chapter 2 broadly outlines my methodology: the selection of data, choosing a sample area of the site, phasing and the nature of the available data. Detailed methodologies for each analysis (butchery, spatial distribution) are provided at the start of each of the three data analysis chapters (chapters 3-5).

Chapter 3 describes and interprets the butchery marks at Danebury by species, phase and feature type, in order to ascertain which bones made up butchery 'units' in each case. Butchery patterns at Suddern Farm and Nettlebank Copse, two sites excavated during the

Danebury Environs programme, and Balksbury hillfort, a nearby settlement, are also analysed in the same way, using butchery records made by Julie Hamilton and Mark Maltby.

Spatial analysis begins in chapter 4 with two-dimensional investigation of the butchery unit distribution across the selected sample area of the site. Investigation was again divided into species, phase and feature type. In chapter 5 the spatial analysis was expanded to look at individual deposits in pits and layers. This introduced a three-dimensional aspect to the investigation, which enabled temporal differences in deposits to be considered at the same time as spatial ones. Also, 'occupation' deposits in circular structures are compared to stratified layers in pit.

The data chapters are followed by a discussion chapter, chapter 6, which brings results of the analyses together in order to explore possible interpretations and incorporate evidence from other sites and different specialisms. The concluding chapter (chapter 7) sums up my interpretation of the results, with an analysis of how the aims of this project have been met, and an appraisal of the methodologies used. As expected, the thesis has prompted more questions than it has addressed, and profitable lines of further enquiry have been outlined at the end of chapter 7.

Appendices detailing the coding method for recording butchery marks and the coded entries themselves are provided (appendices 1 and 2). Appendix 3 describes a butchery experiment undertaken to investigate and consolidate the interpretations of butchery marks drawn in the archive. Appendices 4 and 5 provide a glossary of terms for reference and a diagram of the positions of bone elements in the skeleton.

Where practical, illustrations have been included in the manuscript, but the inclusion of all figures in text would render some sections of chapters 3, 4 and 5 very difficult to follow. For this reason, the majority of the figures are located at the end of each relevant chapter, and are referenced by chapter and figure number (the first figure in chapter 5, for example, is figure 5.1). The list of figures (pages vii-viii) indicates which illustrations are embedded in the text. Where figures have been adapted or sourced from other authors, the relevant publication is referenced in the figure caption. Illustrations and photographs were drawn or taken by the author unless otherwise stated, although the butchery diagrams and carcass divisions in chapter 3, and bone element representations in chapter 5, were turned into digital images from my drawings and then manipulated into more presentable forms by Cain Hegarty.

1.3 REVIEW OF THE LITERATURE

1.3.1 Hillforts And The Iron Age

1.3.1.1 Danebury and its interpretation

Danebury is probably the best-known and most extensively excavated Iron Age hillfort in Britain. Its first interpretation as a centre of control was proposed by Barry Cunliffe, who co-ordinated excavation of almost 60% of the site over more than 20 years. His suggestion that 'large communal hilltop enclosures were probably built to serve as bases for the autumn and winter management of stock' (Cunliffe 1991: 356) was based on high proportions of immature individuals evidenced from the faunal analysis. The hillfort was one of only a few to be redefended in the 4th century BC, and this, he says, gave it a 'position of dominance'; a defensive 'focal point for the community' (Cunliffe 1991: 356). The redefence was seen as a response to changes initiated by pressure on land, which increased as the bronze economy collapsed. Further periods of stress were proposed at the end of the third century (Cunliffe 1984a: 31), from increasing quantities of slingshots, sheep, the incidence of periodontal disease in sheep and propitiatory human burials. The numerous pits found within the hillfort were interpreted as underground storage for grain (Cunliffe 1992). This was taken to be evidence for stockpiling of resources, with the hillfort as a central redistribution point controlled by tribal leaders. The theory was developed using information on seed provenance, which showed the grain to have originated from many locations (Jones 1995). However the hillfort did not attract large quantities of goods from long distance (Cunliffe 1984a: 32), suggesting that any influence it held was regional.

Cunliffe's interpretation has been challenged and modified since its initial publication. For example, the viability of underground grain storage was investigated. An experiment undertaken at Butser experimental farm showed that grain could be stored successfully for many years without spoiling, if it were properly sealed (Reynolds 1974; Hill *et al.* 1983), and Fitzpatrick states that grain stored underground has twice the germination rate of that above ground (Fitzpatrick 1997: 80). Why, then, were the four post structures (interpreted as granaries) so common? Cunliffe suggested food stored in these was intended for more immediate consumption, with that stored underground reserved for sowing in the coming year.

Cunliffe's explanation for the underground burial of grain has an economic basis, though he ties it in with symbolic practice. The lack of evidence for warfare suggests that grain was not beneath ground to avoid spoiling in conflict, but he suggests that the grain in pits was kept as a back up in the case of crops failing or as a safe store between harvest and germination. The special deposits (see part 1.3.4) were thought to have been placed at appropriate times after the safe removal of the grain to give thanks or request bountiful crop growth (Cunliffe 1992). It should be possible to test whether all deposits in pits, or just some, have a different, or special nature which could be indicative of this kind of propitiatory 'offering'.

Stopford (1987: 70) disputed the interpretation of Danebury as the residence of the top elements of a socially stratified society. She maintained that the structures within the enclosure did not provide evidence of stratification: there was nothing to suggest the presence of a 'single high status house' such as would be inhabited by a chief or tribal leader. The 'granaries' *were* found in two size categories, though the larger were not necessarily of more complex construction, so could not be regarded as high or low status. It could be argued that Stopford's conclusions are based on rather Eurocentric, 20th century distinctions of power and prestige, where larger, most robust structures are considered the most important. Stopford does go on to say that the central locations and lasting nature of a central rectangular structure suggest that it was of greater importance than the housing. Despite being interpreted as a 'shrine', there is nothing to indicate what it was used for.

Stopford also convincingly reasoned that the artefactual evidence suggests a site with only a few specialisations, similar to most undefended settlements in southern Britain in the Iron Age (with the exception of Meare and Gussage all Saints). She suggests that sites with easy access and more finds, such as Glastonbury, are likely to have acted as 'neutral' exchange centres (1987: 73). Lock (1989) argued against her interpretation, but only by refuting her suggestion that Danebury was not primarily for residence on the grounds of posthole evidence for housing. Sharples claimed that Maiden Castle in Dorset had a similar material culture and mixed economy to surrounding Iron Age sites, and that the only difference was the construction of ramparts, allowed by a large population sustained by acquisition of agricultural land (Sharples 1991: 259). Of course, Maiden Castle may have operated differently to Danebury.

The homogenous nature of material culture is explained by Sharples as a 'deliberate suppression of status distinctions' (Sharples 1991: 260). In his opinion, the elite who organised the construction and maintenance of the defences were trying to manipulate public opinion, to portray the defences as a benefit for all, not a means by which power structures could be maintained. The motivation therefore was not personal gain, in the form of foodstuffs, goods or habitat (all distinctions between pottery types vanished in the early-middle Iron Age), but presumably more to do with the ability to command an expanse of land or the services of people, possibly related to warfare. This would make any analysis of status difference on the basis of artefactual evidence redundant, but if there did appear to be differences in social status between some deposits, it suggests that his claim is invalid.

The use of hillforts as primarily defensive centres was argued against by Bowden and McOmish, using examples in Dorset which were overlooked by higher ground and situated indivisibly with earlier prehistoric monuments (Bowden and McOmish, 1989). They suggested that other interpretations such as ceremonial centres needed to be considered.

Hill also suggests that hillforts were not primarily defensive, but served as a gathering place for the people of the dispersed farmsteads. Citing the similarity of deposits at Danebury and Winklebury, he regards the special deposits as defining the settlements. The differences between deposits at the hillforts may have resulted from different farm-holders 'owning' the land (Hill 1995b). He suggests that the storage of grain acted as a symbol of unity, conjoining the diverse origins of the grain. Hill also suggests that hillforts are less densely occupied than farmsteads (Hill 1995b). This is however based on the assumption that un- or partially filled pits were left open long enough to trap small mammals and so would have had to have been avoided by the population, from the rather slight evidence of rodent bones in some pits. The proposed difference is not substantiated for a number of reasons: pits are also found on non-hillfort sites such as Winnall Down; only a few pits may have been open at any one time; and they could in any case have been loosely covered.

Fitzpatrick (1997) also suggests the hillforts acted as focal areas, but to facilitate breeding of stock in a landscape of dispersed communities with small flocks. However the similarity between sheep mortality profiles from Danebury, Balksbury and undefended settlements such as Old Down Farm and Winnall Down suggests that these have a common economy, rather than that each performed a specialised role (Hill 1996a: 98).

Sharples, in his discussion of Maiden Castle, suggests that hillforts were defended because they straddled the area between pastoral and arable land. These settlements, he suggests, were defended since control over the land allowed the development of a large community, which was consequently required to defend the land (Sharples 1991: 259). The large capacity of hillforts for grain storage would thus have been needed to feed workers (with both workers and grain brought in from 'client settlements'), during periodic (yearly) episodes of rampart construction and maintenance (Sharples 1991: 260). He explains the absence of a hierarchy in material culture between sites by proposing that control and ownership of resources, not individual status, were the focus of competition. Therefore attacks on individuals would achieve little, while violent assault on the community as a whole could lead to dominance over advantageous land.

Harding (1980: 11) counters the interpretation of hillforts as central places, citing the peripheral role hillforts played in border areas in historic Ireland, as ecclesiastical, specialised or royal domains. It is difficult to accept this as evidence as the period and location are completely different, and coincidence of form does not imply parity of function. Harding also suggested that hillforts controlled trade routes, since multivallate examples in Dorset are found on the coast in suitable positions. Hill refuted the Theissen polygon theory, used by Cunliffe to explain the areas of control he visualised for hillforts, since not all hillforts can be shown to be in use at one time. Instead he suggests a more inclusive analysis, in conjunction with other settlement types (Hill 1996a: 101).

The limited artefactual evidence for Danebury operating as a centre of exchange or industry, or an elite residence, shows that the hillfort 'could well be something peripheral to the main functioning of the local society rather than its centre' (Collis 1985: 349). Haselgrove concurs with this opinion, stating that until comparable sites have been dug there is nothing for Danebury to be the centre *of* (Haselgrove 1986: 367). This has been addressed by the Danebury Environs project (Cunliffe 2000), although Cunliffe's interpretation does not alter, instead conforming to and reinforcing the original representation of Danebury as a central place (discussed below in section 1.3.1.3). The investigation of bone to be undertaken here will add a new dimension. The nature of butchery, consumption and deposition at different settlements can be contrasted, indicating variety of butchery technique, extent of specialisation, possible evidence for higher status, etc. The potential for large animal bone assemblages to aid our understanding can also be elucidated.

1.3.1.2 Differences between regions in the Iron Age

Extremely divergent Iron Age material culture, funerary practice and settlement have been recognised, especially between the north and south of Britain (Hill & Cumberpatch 1995), and more recently books such as *Northern Exposure* (Bevan 1999) have explored the Iron

Age in the north in its own right, rather than as an inferior branch of Southern Britain. Even within Southern Britain there are differences between Iron Age settlements: Maiden Castle has a lower density of pits, and a higher density of structures than Danebury. Hill (1996a) interprets this regional diversity as a product of the different belief systems maintained by the people in each area, each using hillforts as a communal focus. Other analyses reinforce the differences between wider regions in the Iron Age. In the Welsh Marches for example, the largest hillforts lie in the lowland zones, with smaller ones, interpreted as household sized establishments, on the upland areas (Jackson 1999: 207). This is opposed to the pattern in the southern areas, where the larger hillforts lie on the higher land. In the South West the pattern is different again; in Devon hillforts are not situated on the top of a hill, but are just offset, implying their function was dissimilar in this region (Collis 1997: 88).

Jackson (1999: 218) suggests that the location of undefended settlements on good quality farmland would have 'allowed attention to focus on the wider community... and permit mobilisation of the resources necessary to construct the LHF's [large hillforts] which dominate zone 1 [poor land]'. Those from Wessex, however, show an even spread across zones of poor to good land, and another process may have been at work here. In addition, their status as special places is suggested, and the siting of one, Berth, Shropshire, in a marshy area, is linked to the suggested importance of watery deposits in the Iron Age (Jackson 1999: 213).

1.3.1.3 The Danebury Environs project

A selection of site types was chosen for investigation in a 'like manner' to Danebury (Cunliffe 2000: 14) to enable accurate comparison of the settlements in the area, and the way these would have related to the hillfort. The animal bones from the Environs project were identified and recorded by Julie Hamilton, but the methods used were 'intended to be compatible with, and as similar as possible to, those used by Grant (1984a, 1991a) for Danebury' (Hamilton 2000a: 59). The proximity of the sites to Danebury and the similarity of excavation techniques make the Environs sites the most appropriate comparisons for this analysis.

Although the main focus of this thesis is the intra-site investigation of butchery for spatial analysis, the inclusion of a comparative section is extremely important. A study of only the hillfort would give a narrower view. Many of the questions outlined in part 1.1 would be very difficult to address from the investigation of one site alone. Detailed scrutiny of butchery evidence from other settlements might identify major differences in eating and deposition, which could be representative of different sizes of community groups, social or ritual practice, or consumption activity.

The two sites chosen for detailed butchery analysis were selected from three suggested by Julie Hamilton, as having the largest faunal assemblages, and therefore a relatively large number of butchery marks. Suddern Farm, Middle Wallop (4km west of Danebury) had a long lifespan so animal bone and butchery marks from the early Iron Age to the Roman period were available for study. Cunliffe called Suddern Farm an 'enditched enclosure' and suggested it was of high status due to the presence of more elaborate pottery, copied from Gallo-Belgic forms. Its re-use after the demise of Danebury was also considered proof of transference of power (Cunliffe 2000: 192).

Nettlebank Copse, Wherwell (2km north-east of Danebury) provided a contrast in settlement type, length of use and continuity of occupation. This site was originally a small settlement, which was occupied in the early Iron Age then abandoned. It was reused in the mid-first century BC after ditches were cut, becoming what is generally classified as a banjo enclosure (Cunliffe 2000: 176). It was then supposedly reoccupied and used as a stock management centre (Cunliffe 2000: 188).

Cunliffe used pottery evidence to suggest a period of abandonment for both sites. St. Catherine's Hill-Worthy Down pottery types were missing from Nettlebank Copse and Suddern Farm, but prolific at Danebury. Cunliffe dismissed the idea that their absence was due to the lower status of Nettlebank Copse and Suddern Farm, since this pottery type was present at other small scale settlements in the area. He also suggests that they could not have been overlooked during excavation as Nettlebank Copse was totally excavated. (Cunliffe 2000: 181).

The evidence from animal bone and charred grain assemblages was incorporated into his interpretation. In the early period (800-300BC) it was suggested that, at Danebury, grain arrived already processed, while at the other sites there was evidence of both winnowing and threshing: the processed products from these sites could have been taken to Danebury. The ages at death of animals from the Environs sites were diverse, suggesting year round use (Cunliffe 2000: 172). This correlates with the evidence from the grain assemblages, which also showed no evidence for seasonal occupation. In this early period, the percentage of cattle compared to other species was higher at Suddern Farm, which Cunliffe says indicates a higher status than Nettlebank Copse. Both consisted of predominantly mature animals, implying that at both sites animals were kept mainly for their secondary products.

In the middle period (300-100BC) Danebury was refortified, but the other settlements appear to have been abandoned. Cunliffe suggests that the hillfort, or its immediate environment, were then occupied by a dislocated population, who processed the crops in the fields before delivering them to the hillfort. The presence in the fort of many neonatal sheep and cattle is taken as confirmation that the flocks and herds were in the vicinity at lambing time (Cunliffe 2000: 182). This hillfort-centric view is not substantiated by the demonstrated presence of any complementary activities in the surrounding area, although it would of course be very hard to find archaeological evidence of such activities. Danebury was certainly surrounded by field systems, which were thought to have gone out of use with the abandonment of the hillfort (Palmer 1984: 131). It is worth mentioning that neonatal animals are not necessarily evidence of lambing, as such animals could have been specifically selected from outlying settlements.

In the late period (100BC-50AD) Danebury was burned and the gate never rebuilt. There is little evidence for its use after the millennium (Cunliffe 2000: 188). However, at this time Suddern Farm's ditches were recut and Nettlebank Copse was reoccupied. Cunliffe proposed a transfer of authority from the hillfort to defended settlement sites such as Suddern Farm. Nettlebank Copse was thought to be a centre for seasonal gathering, with livestock culled in festivals. Animal seasonality profiles suggested sheep were killed in the autumn/ winter. The relatively high percentages of pig at 23% MNI (minimum number of individuals) (Hamilton 2000b: 178; 2000c: 104) was given as a possible indication of feasting (Cunliffe 2000: 188).

Pottery and faunal evidence indicates variations in status (Cunliffe 2000: 189). Nettlebank Copse contained only 10% of imported Poole Harbour fabrics, as opposed to 30-40% at Suddern Farm. Cunliffe uses the (slightly) higher percentages of cattle at Suddern Farm (24% MNI at Suddern Farm and 17% MNI at Nettlebank Copse (Hamilton 2000b: 178)), and the presence of imported pottery to imply the higher status of this site (Cunliffe 2000: 189). The cattle at Suddern Farm were killed at an optimum age for meat production, rather than kept to supply traction or milk, a possible indication of lower intensity of exploitation and therefore higher status at this site.

I will explore the validity of Cunliffe's interpretation by examining butchery marks on the animal bone. He believed that these settlements were initially subordinate to Danebury, and possibly paid tax in provisions, then became seasonal foci or substitutes for the location of authority. The butchery techniques may reveal the degree of use of the sites, and any change over time. Evidence of festivals can be provided from larger parts of animals, while taxes could be paid in preserved meat products, which could result in a different butchery technique. Knowledge of butchery techniques may confirm some of the events suggested by Cunliffe. A change in butchery technique in the late Iron Age, for example, could be linked to the disturbance that he attributes to the tripartite influences of possible Belgic settlement, Classical influences from cross-channel trade and the campaigns of Julius Caesar (Cunliffe 2000: 189).

Conclusions

The function of hillforts, therefore, has been much debated. Cunliffe and Hill, who suggest that hillforts are a centre of tribal control or a community gathering place, respectively, provide two main differences of opinion. Much of the archaeological evidence could be used to support either statement, with grain from many different areas at the hillfort, large defences requiring many people and much time, and regional diversity. However the animal husbandry evidence and types of deposit and artefact do not differ substantially between hillfort and non-hillfort sites, suggesting that their status was similar. Some differences in pottery types and species proportions are described for Suddern Farm and Nettlebank Copse; meat consumption patterns for these two sites will be used to investigate possible status differences.

There is the potential to use animal bones to better understand hillforts in two main areas:

a), through analysis of butchery, to recognise differences between hillforts and open settlements, that might be indicative of a higher status, such as size of meat deposits and intensity of carcass use;

b), at a more detailed level, to attempt to recognise, in the spatial distribution of different cuts of meat, clues to indicate areas within the hillfort which could be indicative of different sectors of society or more advanced craft specialisation.

1.3.2 Animal Husbandry In The Iron Age

Using Grant's (1984a) analysis of the faunal remains from Danebury as a starting point, this section aims to discuss the current views of animal husbandry in the Iron Age, and how this is relevant to the ways people have interpreted deposits of animal bone. The species proportions, herd age structure, parts of the carcass present and evidence for disease will be considered. The butchery will be discussed separately, in section 1.3.5.

At Danebury the mixed farming economy indicated by the presence of the three main domesticates, together with horse, dog, cat, bird and wild animals, suggests a fairly wide exploitation of animals, focused though on domestic species. Butchery marks on cattle, sheep, pigs, horse and dog (including filleting marks for the removal of flesh, not just skin or sinews) suggest exploitation of all these species for food. The use of a range of species has advantages over monoculture in terms of farmland rotation and use of diverse habitats, as well as the production of secondary products such as milk, hides, traction and manure. Cultural preference must also be considered, although this is difficult to pinpoint.

The change in species proportions over the span of occupation appears small. This lack of change is considered 'remarkable' by Grant (1984a), as one might expect alteration of husbandry practices over time necessary to adjust to the environment. However, Grant attributes slight changes in proportions to some changing husbandry practices in respect of secondary product exploitation, and density of occupation over time. Pigs seem to become relatively less common over time, which was suggested to result from a lack of inclination, as the population increased, to keep animals which could compete with humans for food. Sheep show a higher incidence of periodontal disease over time, taken as evidence for greater pressure on grazing land. Fewer whole animal deposits in the later phase are suggested to have stemmed from the same pressure, making food resources more scarce, and deposits of them less common (assuming that special deposits have flesh on them when buried). More juvenile horse bones in the later period are also taken as evidence of greater exploitation of animals for food, although this could have resulted from a change in activity, for example horse breeding on site (Grant 1984a: 546).

Grant suggests that the low numbers of wild animals deposited mean hunting was not common, as in other Iron Age sites. This does not imply a great stress on the system of production. The birds that were recovered showed few butchery marks and a 'very narrow range of species' (Grant 1984a: 547). Might this instead be indicative of selection of specific species for deposition? The symbolism of wild and domestic animals differs in ethnographic literature (see section 1.3.6) and deliberate deposits may have reflected such a trend (see section 1.3.4). So hunting *may* have been common but the bones disposed of in different ways. This, however, can be only speculation.

Most other Iron Age sites mirror the predominance of sheep within the sample at Danebury. Grant (1984a: 543) suggests this may be due to the 'well drained chalkland' around Danebury. In Wessex and around the Thames valley, the highest proportions of sheep bones were found on sites on higher land, such as Danebury, Old Down Farm and Gussage-all-Saints (Grant 1984b: 103). This was thought to be due to the suitability of the more fertile valleys for cattle grazing; sites at Ashville, Farmoor and Odell may have offered too damp an environment for sheep grazing.

Maltby offers a review of the faunal assemblages from the Iron Age, in which he considers the husbandry techniques and species proportions. There are a few sites that show evidence of relatively high percentages of pig bones; examples are Groundwell Farm, Wiltshire, Croft Ambrey and Skeleton Green. These had been interpreted by Coy (1981) as sites with better environmental conditions for pig rearing, though Maltby suggests that contacts with the continent may also have played a part (Maltby 1996: 20). Otherwise the proportions and bone elements are reasonably consistent by site, which he suggests as indicative of a self-sufficient mixed economy.

At Danebury, the low numbers of sheep killed at the age of optimum meat production (MWS 17-27) would imply an emphasis on the production of wool and/or milk, while the high numbers of very young animals also suggest exploitation for milk and perhaps indicate that Danebury was used as a breeding centre (Grant 1984a: 508). However, other sites differ; at Owslebury the pit deposits contained remains from significantly older individuals than the enclosure ditch. The sheep killed at optimum age for meat occur in more downland, and later Iron Age, contexts (Maltby 1996: 22), possibly suggesting that in the upland locations at this time the pressure on animal husbandry was greater. Thus the age of animals may differ between sites and feature types, a factor that should be considered when only parts of a site have been excavated.

Pigs from open settlements have usually been killed at the age of optimum meat production, the stage when the pig will not put on more meat regardless of its food intake (this stage in modern breeds occurs at 9 months, but in the past was rather later (see Silver 1969)). The pigs from the hillfort sites of Danebury and Balksbury include high numbers of young or neonatal individuals which Maltby suggests may have resulted from the use of these sites as breeding centres (Maltby 1996), but this could again be the result of selective deposition.

High proportions of immature but almost fully grown cattle at later Iron Age open settlements are suggested by Grant (1982) to result from a split in management: the upland sites with young animals being used as calving centres, and the lowland sites used for rearing, and therefore sometimes culling. Maltby points out that farmsteads with large numbers of immature cattle are of later date than the majority of sites, so a chronological change might be indicated. He suggests that more sites need to be examined before accepting such a hypothesis (Maltby 1996: 21).

Hambledon (1998) completed a more exhaustive and wider regional study of the age structures and species proportions of animal populations, with regard to the height above sea level and geographical locations of the sites. Her conclusions are similar to Hill's (1995a) in that different sites sometimes have diverging species proportions and ages, but she also states that within Wessex the differences between hillforts and other settlements are less pronounced than elsewhere. Her conclusions are hampered by the paucity of sites with large animal bone assemblages outside the south of England.

These interpretations are, as Maltby (1985) says, dependent on further analysis of the specific contexts from which the bone is recovered. Issues of structured deposition (section 1.3.4) and the extent of excavation, as well as integration of other information, such as associations with finds and type of deposit, should help. The in-depth study of the butchery and depositional areas of the bone from Danebury, which is the purpose of this thesis, may significantly add to our knowledge by identifying any different areas of use within the hillfort. Butchery analysis may also be able to assist when defining changes over time, such as the greater pressure on resources suggested by Grant (1984a).

1.3.3 Spatial Patterning

Relevant studies of spatial patterning of artefacts and ecofacts occur mainly in three fields: ethnographic, historic and archaeological (the majority from early prehistory) studies; the methods and theory employed to investigate spatial distributions are diverse.

A type of study that is ideal for use with sites used by hunting communities, which leave behind little trace of their activity, and/or single-use sites, that can be examined in their entirety, is Binford's (1978) research into the discard of bones by the Nunamuit. He used a contemporary hunter-gatherer community that utilised lithic technology, to try to reconcile what would be found in the archaeological evidence (bone elements), with the living society that procured and consumed animals. The finds followed different patterns according to site type. He showed the bones at different sites to represent certain activities such as killing (where the parts regarded as waste were discarded), temporary occupation (where processing is started to facilitate the carrying home of the carcass) and permanent or semi-permanent settlement sites (where the meat is distributed and cooked). However, long term farming communities where rubbish is accumulated and items are deposited in deeper features are much more difficult to interpret in this way.

With reference to hunter-gatherer sites, Binford (1981) has also stated that bone processing waste is a good indicator of activity, as unlike tools, which can be re-used, waste is unlikely to be moved far from the place of its initial production and deposition. This is not necessarily the case in more complex societies, where the 'waste' may be discarded or redeposited outside activity areas or where bone parts are not regarded purely as waste but are imbued with meaning (both described in this section).

Studies of settlement ethnography have tended to consider the bone refuse in economic terms: for example, as dumps of waste in middens and as the remains of processing activities; primary bone refuse in hearths used by Kua San hunter-gatherer groups was assumed to be a result of food waste being deposited immediately prior to cooking and consumption (Bartram *et al.* 1991). Such analysis would be relevant to Danebury were it clear that purely economic activity was occurring, and that these were being fossilised in 'occupation' layers. The presence of 'special deposits' suggests that this is not necessarily the case (section 1.3.4), and that the bone may have been deposited in a complex manner in pits at least (no special deposits were identified in the layers that built up in quarry hollows and against the ramparts); a simple or direct activity separation in two dimensional spatial terms is possible but has not been recognised to date.

There is ample anthropological evidence for people symbolically structuring activities spatially. The Bororo of the Amazon basin have ceremonies in the male-inhabited centre of the enclosure, and the women are relegated to the periphery where they perform domestic tasks. The Marakwat of Kenya deposit ash by women's huts, and goat excrement beside the men's, to symbolise fertility and control, respectively (Levi-Strauss quoted in Parker Pearson 1996: 117). In both these examples gender is the key consideration, but they also show that the everyday can take on ritual or symbolic meaning (living areas for the Bororo, waste for the Marakwat). If found archaeologically, these would probably be construed as a living space and a ceremonial space in the former example, or in the latter as a waste dump and goat sheds in functional terms. It is however important to avoid over-simplifying spatial function using artefactual evidence. An interesting comparison can be seen in the 1st AD pits on the continent that contain ash (Green 1992: 105). Using the analyses above the presence of ash could be interpreted as resulting from fertility rites, or domestic waste activities according to the conceptual framework of the excavator. This highlights the need to take an inclusive look at deposits, to assess their associations and position, not just their contents.

Archaeological analysis of spatial patterning with relevance to animal bone studies has been undertaken in prehistoric and historic contexts. Studies on the Iron Age often fall into those of feature differentiation, for example differences between ditches and pits and upper and lower parts of pits (Grant 1984a; 1991a; Maltby 1995; Wait, 1985). Various excavation reports have included consideration of spatial patterns in bone remains, especially in well preserved Wessex chalkland sites. (Wilson 1986; Maltby 1981). Maltby (1985) found that at Winnall Down there was a spatial division between larger and smaller animals. Cow and horse were more commonly found in the external quarries and boundary ditches, while sheep and pig were more common in pits near to the structures. The effects of carnivores were also considered as a possible reason: dog activity was found to spread larger bones further than smaller ones (see also Ioannidou 1999).

Such studies were reconsidered and brought together by Wilson (1996). He also concluded that bones from larger animals were found at the periphery of the settlement and smaller ones, such as sheep and pig, were mostly found nearer the centre. He provided a functional explanation for this patterning, suggesting that the larger animals were butchered and their bones deposited at the periphery. Also the density of bone was found to be highest in the centre of the settlement at Wendens Ambo (Wilson 1978) and at Winnall Down (Maltby 1985). Examples that Wilson cites as back up to his claim can be re-examined with reference to the recently investigated topic of structured deposition. For instance, the concentration of bone in the centre and at the entrance to the enclosure at Mingies Ditch that Wilson noted may in fact be due more to a symbolic statement of separation between enclosed and external areas, than motives related to hygiene or ease of division/ deposition. Study of the place of deposition of currency bars suggests that the entrance and boundary area may carry symbolic significance (Hingley 1990). The discovery of animal burials in pits beneath the boundary ditches at Danebury suggests the same underlying belief system may be at work here.

The separation of large from smaller animals might also have been meaningful to the depositors. Sheep and pigs fulfil different economic functions to cattle and horses and may also have fulfilled very different social or ritual functions in society. The larger animals would have provided a very large quantity of meat to consume or store, more than even an extended family would be able to consume on one occasion. The smaller animals could have been slaughtered as provisions on a small scale (see Grant 2002). The secondary products from these animals would also have differed, the power provided by horse/cattle, wool and manure from pigs and sheep and milk from sheep and cattle. Their roles in life may have altered perceptions of them in death. The status in which animals are held is widely differing between societies (see section 1.3.6 and Tambiah 1969).

This evaluation does not underestimate the effects of carnivore action, or the need to remove rancid parts away from occupation areas and casual re-distribution of animal bone. But it does question the simplistic assumptions that the outside of the settlement is a place for the slaughter of large animals, while smaller ones could be 'fitted into' the central area for their death (Wilson 1996: 26).

Wilson (1996) states that the patterns of deposition he proposes are cross cultural, being found on medieval manor sites, and in non-industrial communities such as the Nuba (quoting Hodder 1982) where animal waste is deposited far from the living quarters. Assumptions of functionality of structures is also implicit in this analysis - the archaeological sites may well not have been inhabited at all, or for parts of the year. The Nuba are also noted by Hodder (1982) as having crania built into walls of granaries, those of pigs mostly female, and of cattle mostly male. This seems to be a cultural process in selective bone deposition that Wilson has rather glossed over in his interpretation of animal bone type and provenance.

Economic expedience was also cited as the influence behind the deposition of dogs and horses in peripheral ditches in 18th century Witney Place. Even though these animals were prized in their lifetime, once dead it is suggested that they no longer held any meaning for their owners (Wilson 1996: 78). What then of Victorian pet cemeteries, where favoured dogs and cats lie interred? These are far removed from the Iron Age, but are at least as relevant a context as 18th century Britain. Other Iron Age material from Hungary shows entire burials of horses, including one individual with an iron ring in its mouth, and are probably not results of an effort to be rid of a useless carcass as quickly as possible, but represent both effort in the digging of a burial pit, and status in the inclusion of grave goods (Jerem 1998).

In the attempt to be inclusive, Wilson's explanation is too selective. It would be dangerous to assume that the areas of a partially excavated settlement which are highest in sheep and pig bone are nearest the centre, and base further calculations on this, as spatial patterning from Iron Age sites investigated by Hingley (1990) shows (see part 1.3.3). Other periods offer similar segregation of deposit, for example Neolithic ceremonial enclosures (Pollard 1995). These contain deposits of differing nature in each area of the enclosure. None of these areas can be shown otherwise to be the focus of activity, and to base such an assumption on the species found is to ignore fundamental issues of the choice involved in bone deposition.

Halstead and colleagues (1978) investigated the spatial positions of animal bone elements from the Iron Age and Roman periods of occupation at Wendens Ambo, Essex. The small size of the sample (90kg from the Iron Age contexts) did not allow for analysis of the separation of the animal into butchered parts, or into individual bones. Instead the interpretation was based on an arbitrary division into skull, trunk and limbs. The restrictions thus created are significant, since the upper and lower limbs, for example, carry very different proportions of meat. Some of the conclusions are severely limited by the small sample size and the suggested greater proportion of limb bone on the outskirts (as opposed to meat bone in the centre) cannot be tested statistically. This type of investigation can, however, be carried out at Danebury where the sample size is so much larger.

The conclusions reached for Wendens Ambo suggest that table rubbish (younger and smaller animals, upper limbs, ribs, vertebrae, pelvis, scapula) was deposited periodically in linear ditches and pits, while the kitchen refuse (skulls, lower limbs, and bones especially of larger animals which demand more division for cooking) was found mainly in the periphery (Halstead *et al.* 1978: 128). This corroborates Wilson's findings, but not necessarily his interpretation. The deposition of smaller animals in the centre and larger at the periphery might have many meanings. Rather than a spatial division as postulated by Wilson, Halstead and colleagues suggested a temporal division to explain the dichotomy. This was based on the positions of sheep bone, which showed evidence of different parts being buried in the same place, and it was hypothesised that younger, smaller animals that could be butchered and cooked in the same place without need to preserve parts for later consumption could be deposited in one episode (Halstead *et al.* 1978: 123). It is also possible that the difference did not indicate simple spatial distribution, but that feature type was an important factor, with some bones destined for pits and others for ditches or gullies.

The presence of large numbers of skulls in some pits at Wendens Ambo suggests that, like Danebury, there may be some evidence of structured deposits, although the skulls could represent primary butchery waste. However, an interpretation of the deposits as resulting purely from food processing is too simplistic. An additional problem stems from the small sample size: in order to investigate the spatial distributions of parts the authors included bone which could only be divided into large/ medium/ small mammal, and the amalgamation of upper and lower limbs was retained. This makes the interpretation inconclusive; testing of this theory requires a much larger sample size. A site such as Danebury, with its 'special deposits' in pits, and other bone from layers and gullies around structures, is of a similar date, but large enough to provide a suitable analysis.

Meadows (1997) continued Wilson's discussion of butchery from early Romano-British periods at Barton Court Farm (Wilson 1986). She showed that at Barton Court Farm the density of bone is highest in the internal enclosure of the centre of the site. There is evidence for structuring of deposits again with mandibles in ditches apparently placed in distinct places and a concentration of the bones of horse and dog in ditches. It is possible that this apparent pattern of mandibles in fact results from the high density of this bone element, ensuring its survival where other bones were destroyed, but the presence of bone correlates with beaker distributions, suggesting that a clear pattern is indeed evident (Meadows 1997: 28). Meadows also suggests that in the late Iron Age, the centre of an enclosure was dedicated as public space, as opposed to the 'private' space at the periphery (Meadows 1999). Differences in the spatial distributions of animal bone waste at Danebury might confirm this, for example, public space may contain the remains of feasting, while private areas could contain smaller parts of animals eaten by families of households.

The deposits specifically denoted as special at Barton Court Farm (crania, articulated parts of, or whole, animals) were found in an internal ditch in the area of highest concentration of features and activity, interpreted as the main area of habitation. A division between north and south sides of the settlement became more pronounced in the Roman period, and is suggested to be 'a distinction between private domestic practices... and more public ceremonies away from the living area' (Meadows 1997: 33). So it is suggested that Iron Age practices mixed the public and the private, perhaps indicating that spatial divisions are less apparent in the Iron Age than in later periods.

The methodology used by Stokes (1996), in his investigation of the spatial patterning of animal bone from South Shields Roman Fort, uses as a basis the bone parts which can be seen to constitute discrete units after disarticulation. After consideration of the butchery from which he determined which bones would remain together, he looked at the frequencies of each butchery unit from each selected area of the site, and compared them. The final conclusion was that barrack blocks contained both table and processing waste, suggesting community butchery and cooking, carried out in small groups in the same place as food was eaten (Stokes 1996: 100). He carried out further analysis of Roman eating habits: 'Ritual made a very real difference to the way animals were made into food - a crucial element in the sacrifice was the sharing out of the victim among the participants. The division had to be conspicuously fair... the animals were simply divided into portions more or less equal in size' (Stokes 2000: 147). Although the carcasses were divided up into equal portions, the thoracic and lumbar vertebrae, pelvis and scapula were found only in the area of the house of the commandant. Stokes' evidence shows that, despite apparent equality in butchery methods, the distribution of bone elements can expose distinctions between residences of different status.

Stokes' method of looking at bone parts takes into account the way the carcass was divided as the basis for an analysis of the spatial distribution. However, this functional approach to consumption and deposition practices at South Shields does not take into account the problems of working through possible specific deposition practices (such as placement of 'special deposits') engendered by people, which is suggested to have happened at Danebury and other Iron Age sites (section 1.3.4).

Various spatial analyses have been undertaken on a two-dimensional level at Danebury, including for small finds (Cunliffe 1995: 41), pottery (Brown 1991: 281-2) and human bone (Walker 1984: 458-9). While small finds and pottery do not show any specific patterning by density, the human bones are found outside the main area of greatest pit density in the early phase. The analysis of pottery was based on grid squares, rather than individual pits, and while this gives a good impression of the overall densities, pits are individual entities and should be investigated as such. Animal bones also offer the potential for in-depth analysis based not only on presence or absence, but also the meat and symbolic values of particular bone elements.

For the Iron Age hillforts the numbers of pits and overall length of occupation are significant factors to be taken into account. Hill (1993) has suggested that only one or two pits would have been filled in a human lifetime, assuming a consistent deposition rate. At Winnall Down it is suggested that one would have been filled every 10 to 20 years (Hill 1995a). Cunliffe (1992) however suggests that 8 would have been open at any one time, filled at the rate of one a year. Grant (2002) uses detailed analysis of individual layers within a pit together with toothwear evidence to suggest that one of the large Danebury pits was filled over a period of just over eighteen months, from the late spring in one year to the winter of the following year. If this were the case, deposits dating from the same month, or even year, may have been made into a number of different pits. Stratified layers in pits may not be isolated deposits, but a random fraction of all the bones deposited within that particular time span.

Thus the spatial distribution must not just be considered as two-dimensional but as three-dimensional, and this is of pivotal importance in understanding bone distributions. If sections of the site were designated for certain activities over long periods of time then it is likely that patterns will emerge. If the deposits were formed of an amalgamation of remains or from small scale, one-off activities then they are likely to present a far more complex pattern. There has been little work produced which has been able to look at temporal differences on large sites to a high degree of definition and accuracy, since dating techniques and sample sizes often prove inadequate.

One example is Stopp (1999: 139) who has looked at how Iron Age pit deposits formed at a site in Switzerland, and concluded that, for the lower layers in pits, material was gathered together in a protected environment before deposition in pits. This was based on the intermingling of bone parts and the low numbers of matchable fragments. She has not looked specifically at spatial patterning among the deposits, except to say that the parts had been broken up before deposition. Unfortunately, no interpretation of the possible activities prior to deposition was undertaken.

Theoretical thought on the patterning of both artefacts and 'waste' products such as animal bone has concentrated on the potential of looking at divisions between interior and exterior/ front and back (Bruneaux 1988), centre and boundary (Hingley 1990), spatial division into sectors (Pollard 1995), and on types of feature (Hill 1995b) and the meaning and recognition of ritual. These concepts are further explored in the following section.

The only GIS based investigation of Danebury to date has been landscape, not artefact, based (Lock & Harris 1996). However, the potential of GIS for intra-site studies has also been noted (Llobera 1993), and is more fully described in section 4.1.

To summarise, there have been no studies directly comparable to this one, and at Danebury, spatial analyses of pottery and small finds have not been in as much detail as the methods that will be used in this thesis. The approach used by Stokes (1996) is the closest to that which will be employed here. The datasets for a Roman fort and Iron Age hillfort are, however, very different, meaning that analysis of Danebury will be less straightforward. Temporal as well as spatial analysis is required for pit deposits, and the absence of secure stratigraphic dating of pits further complicates the distribution pattern. However, the concept of identifying which bones were part of a butchery unit, and where these bones were consequently found was first used, to good effect, by Stokes. Many of the spatial studies that have considered Iron Age animal bone have centred around functional and taphonomic explanations (for example Halstead *et al.* 1978; Maltby 1985; Wilson 1996). While these are important and should be taken into consideration, they are not necessarily the only factors at work. The focus here will be on attempting to look beyond the taphonomic biases to the activities which took place before deposition, using inclusive analyses. Historical and ethnographic examples have tended to concentrate on identifying patterns of activity (for example Binford 1978; Meadows 1997; Stokes 1996); this study will attempt to join the two.

1.3.4 Structured Deposition

Early faunal studies centred on animals as environmental indicators, as relics of past human economic regimes. As techniques improved, animals could be aged and sexed (e.g. Silver 1969; Wilson *et al.* 1982; Grant 1982; von den Dreisch 1976), and their proportions and sizes more accurately estimated. This led to the development of sophisticated techniques for assessing the husbandry regimes from the recovered assemblages, in the form of the sex and death profiles of the herd. However the question of whether or not the recovered assemblage was representative of the economy was initially overlooked. Two strands of investigation have been followed to ascertain the biasing effects that may be present: natural taphonomy (see chapter 2) and human depositional choice, which is the concern of this chapter.

In the initial report on fauna from Danebury, some deposits of animals were seen as 'special' if they conformed to specific criteria: these included the cranium, articulated parts and whole animals apparently placed deliberately in pits (Grant 1984a). Grant suggests that the presence of whole animals of different ages and species, when found together, makes the chances of their being natural deaths very low (Grant 1984a: 542; Grant 1991b). The presence of sling stones and chalk blocks placed with the animals lends weight to the suspicion that there was ceremony involved, even if it were merely a waste deposit of a natural death or a diseased animal. The special deposits were also more frequently of species that were less well represented in the overall analysis (Grant 1984c).

Barrett suggests that animal and human partial skeletons in pits are symbolic of the death and rebirth which is epitomised by the agricultural cycle, a view which is in fact not far from Cunliffe's own (for example compare Barrett 1991 and Cunliffe 1995: 272), but Barrett suggests that the cycle must be embedded in the economic working of the site, and that this has not been addressed in the Danebury volumes (although it has been explored for the Environs sites). In contrast, Maltby (1985: 138) suggests that finds of large parts of animals deposited together represent nothing 'beyond what we should expect from sensible culling strategies'.

Wilson (1992: 341) has also disputed the evidence for special deposits, stating that they had been accepted 'without question' after the initial findings from Danebury. He accepts that animal bones found with burials and in shafts are ritual in origin, but argues that 'most of the criteria that identify Iron Age pit ritual are suspect' (Wilson 1992: 342). He suggests that taphonomic factors account for the presence of skull, articulated and whole skeletons as the pits preserve these unusual deposits better than other features. The presence of bones from younger animals in pits he also suggests to result from this factor, since these more fragile elements may have been less well preserved, and so less well represented, in layer deposits.

Wilson (1992) also states that there is insufficient documentation of associations of stone, artefacts and human bone. He says that the criteria for identification of ritual need to be better defined before ritual contents in Iron Age pits can be accepted definitively. I feel the emphasis of his critique is misplaced, and that Wilson is looking for a ritual or secular explanation, with no provision for a combination of the two. He does not dispute that what Grant calls 'special' deposits are unusual, but he wants them to fit into a predetermined scheme for 'ritual' deposits, which is, in the opinion of this author, too strict a means of defining deposits. This is especially true when it can be seen that communities in the Iron Age appeared to have different characteristics according to geographical location (see section 1.3.1.2), and that there is a huge range in the types of 'unusual' deposit (Grant 1984a: 542).

The difference in species proportions between defined special deposits and the bone regarded as waste, which is incorporated into the rest of the pit fill, is convincingly argued to be further evidence for the special nature of these deposits (Grant 1984a: 542; Hill 1995a: 57). Grant states that there is a higher proportion of less productive animals in terms of commodities (i.e. dogs and horses) in the pits containing special deposits. This, she says, may be due to a special status for these animals, or to the smaller economic impact which their loss would impart to the community (Grant 1984a: 542). Special deposits of the more economically important animals, such as cattle, show a lower incidence of whole animals which might also suggest this was the case. It could also be that horses and dogs may have been more symbolically meaningful and less utilitarian (companionship or hunting, for example, rather than wool and cheese production) or formed part of a different sociological category (a symbol of status rather than the essential provision of clothing or food) to sheep and cattle. Whichever is the case, it does seem that the deposits were being selected in some way.

Cunliffe (1992) suggests that pits may have contained special deposits that have since rotted, such as cheeses or hides. It is also possible that organs might have had significance and been used as special deposits - heart or lungs or even boned out muscle; see for example graves in prehistoric Sudan (Grant 2001). This would argue against Hill's assertions that pits with special deposits in them are different in other ways from those without, although there is as yet no evidence of organic special deposits. Hill (1995a) also takes a relatively arbitrary stance in arguing that there is little reason for us to regard skulls as special but not, for example, pelves. Some Gaulish sites appear to have afforded skulls special treatment (Bruneaux 1993) and Roman writers suggest that 'Celts' were fervent head-hunters. However, it is also documented that ethnographic groups can regard different parts of the skeleton as worthy of special status, for example sheep tibiae are of particular importance to some contemporary Mongol communities (Szynkiewicz 1990). Therefore it is not necessarily just skulls and articulated parts that would have been regarded as special.

Hill (1995a: 26) in fact believes that all deposited bones held some significance; he states that 'the very notion of waste in a subsistence economy can be questioned'. If the reasons behind deposition were functional, as proposed by Maltby (1985) and Wilson (1978) then why were some or all bones deposited in pits rather than further utilised as fuel, fertiliser or raw material for glue making and bone working? This explanation by itself is unconvincing, as it marginalises social aspects of consumption and deposition, such as choice and affluence.

Both Bradley (1985) and Hill (1995a) questioned the possibility that *any* deposit was fortuitously representative of the economic system in which it operated. Hill also states that the archaeological record is not a passive 'fall out' from past activities (albeit affected by factors such as canine gnawing, weathering or soil degradation, etc) but 'evidence for the specific practices... that reproduced past social life' (Hill 1995a: 125). He also states that an economic system could not operate independently of other cultural processes, and that patterns can be created by day-to-day management (Hill 1995a: 15), in addition to distinct rituals; a view also held by Lefebvre (1991). Therefore, although the majority of bones in pits were not recognised as special deposits, they were still deliberately deposited there, and should not automatically be assumed to be 'un-symbolic'.

Bradley (1985) had already suggested that artefacts that could have been re-used but were instead deposited were a form of offering. He thought this originated from gift giving, adapted so that items were removed from the cycle before the quantities being exchanged became too high. He was talking specifically about metal objects, but his arguments could be extended to animal remains that had not been fully exploited before deposition. In both cases a choice has been made to end the functional life of the artefact before absolutely necessary, although the reasons for this may not be overtly symbolic and could instead be simple dislike or lack of necessity. At Danebury, bone was not routinely exploited for marrow, and it is also possible that the special deposits may have still been fleshed (section 6.3). Bradley (1998) states that deposition in watery contexts prevented retrieval of wealth for later use, and the same would apply to a useable organic substance that had been buried; effectively it becomes a sacrifice. Wait (1985: 151) for example saw special deposits as entirely ritual sacrifices, citing Roman literature and ethnographic parallels, although these may not be reliable.

Another explanation for the intentional deposition of valuable or useful items is given by Sherratt (1991). He discusses the power of sacred items, and suggests that foods, for example, which had been used in some form of ceremony, would leave 'sacred waste'. This may have had to be disposed of in a ritually safe and appropriate manner, such as by burning, or even burying. Bone waste otherwise can easily be used in hearths as fuel, or on the fields as fertiliser. He suggests that 'with care, one might hope to discern various cycles of feasting, from domestic celebration to communal occasions requiring large scale slaughter/ sacrifice of animals and the brewing of drinks' (Sherratt 1991: 50). Maltby also says of a pit from Winnall Down containing many major meat bones: 'if these bones were processed at the same time, a substantial quantity of meat would have been made available.

It is probable that some means of preserving meat was employed, unless this meat was to be distributed immediately to a relatively large number of people' (Maltby 1985: 137). Although the emphasis is different, both Sherratt and Maltby suggest that deposits can in some cases directly reflect past activity (see also Grant 2002).

Hill (1995a: 24) holds a different opinion, stating that 'the archaeological record does not record the location of past activities but past disposal'. The activity that had been recorded is that of disposal, although the items from deposition would have been subject to other activities previously. Spatial patterns would not therefore necessarily closely reflect pre-depositional activity. Using Danebury as an example, it is possible to ascertain whether specific deposits in any way reflected prior activities, for example the creation of specific units of butchery (as discussed in section 1.3.3).

The very small minimum number of animals represented by the bone buried in pits again suggests the possibility that these were only a small proportion of the meat remains, and were perhaps in some way different to, or selected from, the bulk of the bone, as suggested by Hill (1995a: 60). At Danebury the minimum numbers of animals are very low (Grant 1984a: 546). For the entire life of the site (over 500 years), and the whole extent of settlement, an estimated minimum number of 4264 cows, sheep and pigs were deposited, or just over 8 individuals per year. Using species proportions from the site overall, we can propose that these comprised 6 sheep, one cow and a pig, a total net meat weight of 710kg (using Vigne 1991). At approximately 2 kg a day, this does not represent a great deal of food, although the hillfort may well only have been occupied on a seasonal basis or meat consumption have been an exceptional activity.

It is possible that this represents the total number of animals consumed in the Iron Age, but there has been no fieldwalking in the pasture area around Danebury, which could ascertain whether rubbish (including bones and pottery pieces) was deposited on the fields as fertiliser (Hampshire County Council, pers. comm.). In comparison, in 1950's Uganda, one chicken would feed a family for four days, and in England in the middle ages up to half of the year was spent in abstinence from meat (Fiddes 1991). It is not suggested that such low meat consumption was necessarily the case at Danebury, as it is quite possible that much of the remains from meat consumption was deposited in other areas (ditches perhaps, or on fields or thrown to the dogs suggested to have been present in small numbers at Danebury (Grant 1984a)) but it is worth bearing in mind that meat is not an efficient food to produce, and may have been a marginal element in the everyday diet.

However, if Hill's (1995a) theory that certain bone parts were 'reserved' for deposition during the ordinary process of butchery was right, then one might be able to detect patterning in the bone deposits, if particular elements had been selected. If this had occurred, the bone must have been in a 'safe' place, away from dogs or erosive elements, or the deposition must have been made very shortly after slaughter.

Pit deposits therefore may consist of a relatively small or large proportion of material which is not what would be expected of waste from 'secular' consumption, depending on whose interpretation one favours. Hill's theory has had repercussions in the analysis of recovered animal bone, which became to some authors reflective of specific 'behavioural' practices rather than, as previously thought, a reflection of past economic systems. The phenomenon of special deposits was seen to be widespread, with various Iron Age sites in Wessex showing animal bone of a supposed structured nature (Hill 1995a: 14). Smaller scale habitations like that at Barton Court Farm, Oxfordshire have similar types of deposit to Danebury. Here, although the settlement is dated to slightly later than Danebury and runs into the Romano-British period, there is evidence of special deposition of pig (Wilson 1986). There are also parallels with Iron Age Ashville in Oxfordshire, despite the original interpretation of articulated deposits as butchery waste in the base of pits (Parrington 1978).

There is great variance between different sites. Single special deposits at Danebury form 75% of cases, while special deposits at Winnall Down always occur in the same pit as others. This discrepancy may be caused by differing methodologies, especially since special deposits were only defined as excavations at Danebury progressed, implying that some from Danebury may have been overlooked. Other authors have largely followed the definition of special deposits made by Grant (1984a), so the nature of deposits are generally comparable, even though the incidence may not be. Thus a consideration of the intra-site patterning at Danebury does not necessarily provide a blueprint for the rest of the Southern British Iron Age, but should be regarded more as a set of findings with which to compare those from other sites.

Wait (1985) also looked at differences between special deposits from different types of settlement. He concluded that they occurred solely in pits, and skulls were the most common form of special deposit from any site. Hillforts and settlements had similar numbers of sheep and horses, while dogs were found mostly on settlements and pigs only from hillforts (Wait 1985: 251). Thus the setting and status of the site may influence depositional practice. However Danebury does not fall easily into one category, since it has ample evidence for both dogs *and* pigs as special deposits. It may be that this analysis can help to define some other similarities, in terms of animal bone deposition, between Danebury and other sites.

The ways in which these deposits can assist in understanding the thoughts and practices behind deposition are still unclear. Associations and differences can provide 'clues' which help in the (re)formation of our ideas about life in the Iron Age, and analysis of processes which occurred prior to certain types of disposal should also be useful. As James Hill asserts, thoughts and practices do not always coincide. He cites the example of the USA where 'there are very strong analogies to the effect that "all men are created equal"... yet our *behaviour* shows that [this is] not true. We would see evidence of this archaeologically, but not be able to infer the ideologies' (Hill 1994: 90). So even where patterns or differences are found, it is not always possible to directly infer ideologies, and the evidence for behavioural practice may be the closest we can get to actually understanding mindsets. However there is potential for defining differences between sites and periods, even if the actual philosophy behind the deposit has been lost.

Special deposits have been defined as 'animals... or parts of animals... which were not exploited... in the normal manner' (Wait 1985: 151). The difficulty comes when trying to identify what exactly *is* the normal manner (if one existed), and which parts of which sites show evidence of 'ordinary' consumption and deposits, unaffected by ritual behaviour.

The use of the word 'ritual' itself is problematic. I have used it here in a less formal context than that in which it is normally encountered, to describe any activity which is engendered in societal rules and is repeatable, conforming to an accepted meaning. By this account, activities such as Sunday lunch would assume some of the status of ritual. It could be argued that any or all activity, including deposition, is structured according to social trends, since it is impossible to act outside of one's own frame of reference, which will have been socially defined (Brück 1999). Thus a Christmas meal assumes a higher level of ritual than a Sunday lunch and the Sunday lunch has a higher ritual status than a weekday dinner. This topic is discussed further in chapter 6, with consideration of *degrees*, instead of *definitions*, of 'ritual'.

If deposits represent specifically non-functional depositional activities, they may bear very little relationship to the predominantly functional domestic or craft-based activities that form the basis of analysis in this thesis (cooking/ butchery etc). The investigation of functional activities is still relevant to the analysis of the 'non-functional' history of animal bones. It is impossible to investigate the spatial distributions of individual bones without first understanding the parts they were divided into and the associations they originally had. However, functional activities are often imbued with symbolic meaning, and indeed, many societies do not attempt to impose a strict division between the two. Economic practice may be inseparable from cultural practices. Barrett (1991: 2) states, for example, that all material culture is the residue of a significant system. It might be said that modern British society has an ideology based on rationalism, and therefore that our division of activities into ritual and secular is as culturally specific as a society that makes no distinction between the two (Hodder 1982). Therefore, what we see as functional activities (using butchery as an example) may have been as integral a part of, and as influenced by, a system of belief that might have produced special deposits.

Davidson provides a succinct example of the mingling of ritual and secular in consumption patterns. He states that in Classical Athens, 'Even the meat sold in the market... had been cut from animals that had been killed ritually' (Davidson 1997: 15). Here the meat was cut into equal sized portions for sharing, and was not butchered with any consideration for defined 'cuts' of meat. It therefore took on a different status to fish, which could be cut into fillets and appreciated by gourmands. He does not mention what happened to the resulting bone, but there is no indication that it was treated in any special way. However depositional practice in Iron Age Britain is suggested to be rather more complex. The discovery by Hingley (1990) that iron currency bars from Iron Age contexts are found at the terminals of ditches at the entrances of enclosures, led to the conclusion that items survived to be recovered *because* of, not *despite* burial, and that burial was a deliberate act possibly incorporating a high degree of ritual.

Pollard (1992) has shown structuring of deposits at Neolithic sites considered to be purely ritual in nature. At the Sanctuary, Overton Hill, Wiltshire, there is an east-west division in numbers of pig bone and these also cluster around one of the rings in the concentric circles (Pollard 1992). At Neolithic Woodhenge too, Pollard found clusters of artefactual material including bone. Pig bone was mainly found outside the structure, while cattle bone was found inside it, and the ditch terminals frequently contain animal bone, while other parts of the ditch contain human bone as the only artefactual deposit. Groups of bone containing burnt and unburned material are proposed to have been 'curated' before deposition, rather than burnt *in situ* (Pollard 1995: 141). The Neolithic date, 'ritual' nature and smaller scale of these examples inhibits direct comparison with Danebury, but as far as defining and describing a tradition of intentional, meaningful deposition goes, they are still important.

Therefore, the patterns of deposition shown in bone distributions as well as artefact studies (Hingley 1990), suggest that more was occurring than simple disposal of rubbish. For example children are more commonly buried centrally on non-hillfort sites (Hill 1995a: 12), and there are deposits of multiple animals in single pits (e.g. the 12 foxes, and single deer from one pit at Winklebury), and a predominance of certain species in other pits (e.g. raven at Winklebury (Fisher 1985: 29)).

In summary, there is ample evidence to suggest that not all pit deposits in the Iron Age were purely utilitarian in nature (Hill 1995a; Grant 1992; Barrett 1991). Some authors suggest that no surviving material reflected 'everyday' activities, but it has been argued here that everyday activities often incorporated symbolic meanings, even if deposits did not closely reflect activities. It is possible that all meat eating was an unusual activity. Caution must be practised when looking at butchery and spatial patterning at Danebury, in order to avoid simplification in analysis, or providing overly functional interpretations. However, taphonomy also played a part in forming patterns of bone distribution (Wilson 1992), and it is equally important to recognise differentiation between deposits that might be due to the poorer survival of certain bones, for instance those of younger animals or more fragile elements.

A useful addition to understanding the enigma of structured deposition, which can be provided by this thesis, is definition of the characteristics of the majority of bones in pits, and how (and how much) they differ from recognised special deposits and from the bones in ditches and occupation deposits. Differences in special deposits between sites suggest that other deposits may also differ by site. Also, considering the extent to which the butchery and spatial patterning of most bones are affected by the presence of special deposits can help us to understand how 'embedded' the special deposits were in everyday life.

1.3.5 Butchery Methods

At a broad perspective, it seems that butchery in Britain was community based at least from the Middle Ages up to the mid twentieth century. Differences in technique even in comparatively recent times can characterise habits of meat consumption. It also provides an understanding of the social context in which the butcher existed. This seems to have remained unchanged throughout the historical past from the later medieval period. Although it is recognised that the Iron Age is different in fundamental ways, it is still useful to compare techniques applied to the carcass, allowing for alterations in conformation brought about by selective breeding.

Contemporary analysis of animal processing enables understanding of techniques leading to butchery marks. Peck (1986) looked at abattoirs of different sizes and related the marks left on the bones to the competence of the butchers involved. He concluded that where there were copious marks the butcher was inexperienced, since most joints could be separated leaving no trace on the bone. This has implications for understanding butchery from Danebury, i.e. that all bones may have been butchered even though few might be marked.

Aspects of butchery, which are often archaeologically invisible, can also be gleaned from texts on meat production. For example, slaughter by slitting the throat may mark the hyoid but only in the case of a very deep cut, although pole-axing is attestable in archaeological contexts (Grant 1975). The killing is best undertaken after resting the animal, as stress introduces acidity into the muscles and renders them more difficult to preserve (Gerrard 1964: 207). The techniques of killing can also be explored: to retrieve a high proportion of the blood, sticking is advised before or immediately following death. Documentary evidence can also provide information on the role of butchers and the development of butchery as a specialised craft. A full time slaughterman may not have been required in societies where meat was only occasionally eaten: in 19th century rural Britain the pig sticker could be 'a thatcher by day, so killed at night' (Malcolmson & Mastoris 1998: 91). In the past, when meat was consumed in smaller quantities the killing became an event: 'pig killing was... a semi-public act, involving several people... and (as a rule) more as subsequent beneficiaries' (Malcolmson & Mastoris 1998: 89) and in this case the butcher played a certain social role. If butchers were rarely needed, then the level of consistency in butchery might vary, and this might be reflected in the archaeological remains.

To interpret butchery marks on the bones requires some anatomical knowledge of the positions of tendons and muscles. Marks close in spatial terms can serve very different purposes, for example the cut made to a metapodial during the severing of the ligament to remove the foot can look very similar to a cut which impacted on the metapodial during skinning. Where cutmarks are found in areas of muscle and ligament attachment they can be suggested to arise from meat stripping and disarticulation respectively. Specific butchery texts (e.g. Lawrie 1998; Ashbrook 1955; Hammond 1932; Nicholls 1917) are valuable for assisting butchery technique and cut mark interpretation, described in greater detail in chapter 3. The differentiation of butchery technique between species, demonstrated by these texts, means that species must be considered individually.

The butchery techniques undertaken at Danebury were not originally explored in detail or fully published, being intended for inclusion and elaboration in a further volume. The detailed study has not come to fruition, at the time of writing, although a brief summary has been published (Grant 1987). Most analyses of Iron Age sites provide only a cursory mention of the types of tools that could have been used, and the species that showed evidence of cuts from them. Even where butchery marks are published analysis is normally incomplete. No standardised system for recording butchery has yet been adopted, with questions raised about the ease of understanding for publication, necessity of recording the exact position of each mark, coupled with the desire to record all details for posterity. Attempts have been made by various authors to formulate computer compatible codes for recording butchery (Rixson 1989; Maltby pers. comm.; Hamilton, pers. com.) but none has been universally accepted. The illustrative technique is by far the easiest to comprehend, although it is time consuming. If a recording system could be decided on which satisfied the various demands, the topic would be made much more approachable for writer and reader alike.

Grant's interpretation of Iron Age butchery suggests a typical method of disarticulation at the joints (Grant 1987: 55). She suggests that the lack of burnt bone at Danebury implies boiling of meat, so the pottery evidence should therefore correspond to the size of parts the animals were divided into (see part 1.3.5.1). However, if the bones were defleshed then large parts of meat could have been roasted off the bone, although this is not a usual cooking method as bone conducts heat, making roasting more efficient. It is, however, perfectly possible to roast rolled joints which have been boned. Since the bones were disarticulated at most joints, the meat parts would be only as large as the anatomical part, i.e. that from the femur would only be as big as a ham, and could of course have been further divided.

Although the butchery recorded from the majority of Iron Age sites is not extensively published, there is some evidence for consistency. Comparisons are provided here between sites from central southern Britain, most notably Wessex and Hampshire in particular. In light of discussions into the extent of regional distinction in the British Iron Age (Bevan 1999), it has been decided to concentrate on those settlements of a similar geography in the initial analysis, and leave a wider interpretation to the final discussion. However the relative paucity of well documented sites from elsewhere in Britain will restrict comparison. Even the well documented sites often have the merest description of butchery, with the main aim being to describe the implement, not the method or meaning, of dissections.

For instance, the butchery evidence from Gussage-all-Saints is very limited, but a depression on one cattle skull was noted, similar to that caused during pole-axing. The dog bones showed evidence of skinning and defleshing (Harcourt 1979). Maltby (1985: 137) suggests that at another unenclosed settlement, Winnall Down, the larger animals were 'disarticulated and stripped of meat', and these were found together in large 'dumps' of bone in pits. The bones were those that bear a large proportion of meat, and were not split to extract the marrow. In this part of Britain, bones do not appear to have been commonly split for marrow extraction, nor chopped, although in the late Iron Age there is some evidence for the latter at least at Maiden Castle: cattle and horse were chopped into regular sizes. Sharples (1991: 150) suggests this pattern of butchery was intended to facilitate cooking in pots, citing an ethnographic parallel.

In general, Iron Age sites such as the farmstead sites at Barton Court Farm (Wilson 1986) and Ashville, Oxfordshire (Wilson 1978), and defended sites such as Maiden Castle (Armour-Chelu 1991) and Danebury (Grant 1984a) show habitual disarticulation. The majority of cuts are found in particular places indicating, for example, the common disarticulation of the scapula and humerus, and the removal of meat from the scapula blade. Thus there are similar marks on the bones at Danebury and Winnall Down (Maltby 1985).

Studies have been made of butchery from different periods and geographical areas (e.g. Luff 1994; Armour-Chelu 1993; Stokes 1993; Bunn 1981). These are useful since they contain practical descriptions that serve to assist understanding of butchery processes. For instance, in Luff's analysis of Egyptian butchery practice, she concludes that the absence of knife cut marks on the distal articulation of the humerus indicated that pig and cattle carcasses were stiff and straight legged when butchered, since this articular surface is only exposed when the joint is flexed, and that cutting through the ligament here is the easiest method of disarticulation. Incompetence or inexperience may have led to the same effect, but she noted that other joints have been disarticulated efficiently. Goats, which showed many knife cuts on the distal articulation, were probably butchered when freshly killed (Luff 1994: 168). It is of course possible that the bone simply had not been marked by the butchery at this location, or that cattle and pigs were disarticulated differently; caution must be used when drawing conclusions based on the absence of cut marks, since they may not occur on all, or even most, butchered bone.

Despite the useful points raised by this analysis, direct comparisons between sites of different geographic locations and time periods are naturally limited in most cases. However, Rixson (1989) and Binford (1981) provide useful general descriptions of butchery marks and their causes. Investigation of the morphology of butchery marks has been undertaken at macro and microscopic levels, and these studies are invaluable when identifying the tools that caused butchery marks found on the bones (Olsen & Shipman 1988; Shipman & Rose 1983)

1.3.5.1 Archaeological evidence for cooking and eating in the Iron Age

Agriculture played a large part in the eating patterns of Iron Age Britain. Grains and other vegetable matter are documented from Iron Age sites, as are a variety of domestic animal bones, and a small proportion of wild animal bone. Some cooking implements, such as spits, may be archaeologically invisible if made of wood, but pottery vessels are common. Ovens are not found at Danebury, although burnt daub is common and could be the remains of dismantled ovens; hearths were found inside some circular structures (Cunliffe & Poole 1991: 84-86). However, few of the bones from Danebury were burnt, as would be expected if meat were roasted on the bone (Kovacik 2000).

Coy suggested that roasting meat on the bone could cause an 'ivoried' effect; that is, bone which has the texture and appearance of ivory (Coy 1975). However, this interpretation was challenged, and she notes that the same effect could also be produced by rapid deposition (Coy 1987), so should instead serve as an indicator of human activity. This effect had not been recorded for the Danebury bone, and unfortunately, time constraints did not allow for further investigation of the incidence of burnt or ivoried bone, except for on a limited scale (chapter 2).

Analysis of pottery forms has the potential to aid our understanding of cooking methods. Pope (forthcoming), looking at vessel form and function in Iron Age Dorset, uses ethnographic analogy, vessel rim restriction, surface decoration and finish and residue analysis to propose four types of vessels: serving, processing, cooking and storage. The proportions of these can be used to define assemblages and look at activities and change, and she suggests predominant activities differ by settlement in the Iron Age. She notes that at Maiden Castle, the primary vessel form was for storage, which might suggest that the larger defended sites were indeed used for large scale storage. Pot size may also relate to the sizes of meat portions, if we assume that meat is being boiled; cooking pots at Danebury vary widely in size from 100-320mm in diameter (Brown 1995: 55), which would accommodate most sheep/goat and pig bone elements, but suggests that the largest bones of cattle would have been filleted prior to cooking. Although there is potential for this type of analysis, it does not fall within the scope of this thesis (but see section 6.1.1).

1.3.5.2 Animal bones in funerary contexts

Funerary deposits can in some cases provide valuable information about butchery cuts. For example, food offerings found in prehistoric graves from northern Dongola, Sudan were placed in the following specific portions: 'scapula and humerus (sometimes with the radius and ulna)... the tibia, calcaneum and astragalus; the ribs, with or without the sternum; the ribs and part of the vertebral column; all or part of the vertebral column; and the sternum alone' (Grant 2001: 549). Grant suggests the sternum may have been deposited with the heart, although this part would not survive archaeologically. These joints of meat may mirror those produced for the living, or they may be specific to funerary practice (although Grant points out that butchery techniques are often conservative in nature). Thus comparison of meat cuts in graves in the Iron Age with those interpreted from butchery marks might be informative.

Individual graves in Iron Age cemeteries in East Yorkshire often show the presence of animal parts (Stead 1991). It is uncertain whether these parts could represent habitual meat 'cuts', or a specific funerary rite either as a sacrifice or a funerary meal. The parts include pig mandibles, radius and ulna, and metacarpals (Stead 1991:141). Whole forelimbs have been found as special deposits at Danebury, and this could represent a particular ritual activity rather than mirroring animal disarticulation for consumption, something to be tested in this thesis. At Rudston the bones had been defleshed, so this was not a simple sacrificial offering but possibly resulted from a funeral feast followed by deposition of the bones, linking these deposits to consumption activity, if not everyday practices. However Hampshire and East Yorkshire were spatially and culturally separate in the Iron Age, so this may not provide a useful comparison.

In southern Dorset, Durotrigian burials with meat products consist of pigs in female graves and cattle in male burials, with sheep found in both (Whimster 1981). These are whole animals, such as found in pit deposits. A late Iron Age pit at Flagstones (Dorchester), in which was deposited an adult skeleton and infant skull, also contained articulated cattle and horse limbs (Hill 1995a: 121). The distinction between pits and burials appears to merge here, and articulated animal limbs and human remains are commonly found in pits at Danebury. Layers do not contain any recognised articulated deposits, and may represent a different butchery technique and consumption activity to pits.

In summary, it seems that although there is potential for understanding societies using butchery analysis, this method of investigation has not been fully embraced by archaeologists. This is probably due to the small sample numbers from available sites and time restrictions, but this study should be able to address the issue exhaustively using the substantial numbers of bone from Danebury. Most sites in the Iron Age in Southern Britain seem to have a similar method of butchery involving disarticulation at joints. However there may be inconsistencies in cooking, portion size, the intensity of use of the carcass (for marrow extraction, etc) and other butchery methods (including the consistency of types of mark) that could assist in drawing distinctions between sites and site types in terms of consumption activity and specialisation. The social role of the butcher, that is, whether the person was a dedicated craftsperson or performed butchery as necessary, could be inferred from the consistency of butchery techniques. Ritual aspects can also be addressed by comparing the cuts of meat created in butchery to those deposited in graves.

1.3.6 Animal Symbolism

Animals have been assigned many different roles and meanings throughout contemporary and ancient human societies. Ethnographic analogies are at best mind-openers and inferences made from archaeological data can only ever be tentative. Nevertheless, some of the diverse ways in which animals are regarded shows the extent and variety of the symbolism which humans impose upon the natural world, and that one should be open to what appear to be non-functional explanations.

Some of the archaeological evidence from Iron Age Gaul strongly argues for special treatment of some parts of animals or their physical remains. For example a 'shrine' at Gournay contained numerous bones from mature oxen, along with the remains of meat-bearing parts of young sheep and pig (Green 1992: 94). Other archaeological evidence for symbolic roles which animals play is found from Yorkshire. At Burton Fleming and Rudston Iron Age cemeteries, parts of animals are found in graves, and often it is particular parts which are found: at Barton Fleming the left foreleg of sheep was prominent; at Rudston half pig heads and forelimbs (Stead 1991). These species and bone elements might therefore carry some meaning, and deposits containing these combinations could be recognised in other features.

Historical archaeology offers ways in which to place meat consumption in a social framework. The definitions of animals alter according to the rites and needs of the society that defined them. For example, French Catholic colonies in Quebec classified the beaver as a fish in the 17th century as it 'spends most of its time in water' (Scott 1996: 346), thus permitting consumption of this animal on fast days, when other food in the new colonies was scarce. Households in Quebec were found to differ considerably in their animal bone assemblages, and nationalities were inferred from these findings. This type of research has a bearing on prehistoric periods, especially in considerations of Danebury where the site has been interpreted as 'belonging' to many different households (Hill 1995a) or to one controlling hierarchy (Cunliffe 1991).

There is an extensive ethnographical literature concerning the ways animals are treated and considered. This has included tamed/ wild oppositions (Levi-Strauss 1978: 472) and the reasons for the perceived divisions (Tambiah 1969). This has a bearing on how the animals are treated both in life and in death, and what are considered acceptable uses and means of consumption. The Karam of New Guinea give a special status to the pig and dog, which straddle the border between wild and tame, and to the cassowary which, although considered wild, is signified different due to its appearance (including 'human'-like legs) (Bulner 1967: 12). As a result of the special status of these animals specific rites are established around their consumption. The pigs' stomach and mouth cannot be eaten by men, for example, though women are permitted to consume these parts. The killer of the cassowary must eat its heart to return the spirit to the forest: archaeologically such divisions would be impossible to detect.

The Nuer of Sudan consider cattle as part of the community, in direct opposition to the 'domain of the wild creatures' (Rawson n.d.: 40). The Bedouin, when sacrificing cattle, do so at a sacred place, and leave the bones there in gullies and 'waste container', while the parts unconsumed in the ritual are taken back to the home, resulting in spatial separation of the parts (Klenk 1995: 64). The diverse parts in the gullies are therefore those eaten first at the ritual slaughter site. The symbolic choice in eating of different parts is evident in other societies. The inhabitants of Buquata share food according to ritual: species is the first consideration and mutton is of the highest status. Of the carcass, the head and sternum carry the most value (Grantham 1995: 75). This could be archaeologically visible, if different places are used for the deposition of remains of different status.

The social sciences have also contributed to the discussions of the symbolic value of animals, mostly in examining the rites and taboos involved with the consumption of meat. Douglas for example considers the ways in which food is prepared for consumption, and the transformation from living animal to dead meat. She looks at the Jewish process of slaughter, where blood is a metaphor for life, so must be drained from the animal before consumption. The 'life' is seen to revert to God if the slaughter occurs in a holy place (Douglas 1975: 270). She also considers the prohibition of eating pig as a reflection of the desire for one community to stand apart from others, the pig being chosen for its perceived difference: like the forbidden rabbit and camel, the pig has no cloven hoof (in Leviticus 11: 2-3). She also considers the combination of food in meals to be significant. The temperature, components and order of dishes contribute to the hierarchy. For instance, the food served to different people will differ in composition (liquid/ solid), heat (hot to friends, cold to acquaintances) and order (a small dish first, the main in the middle and another small dish to finish). The social context of the edible animal and its component parts alters depending on who is eating it.

Binford calculated a meat utility index on the basis of what bones carried the most calorific meat, and a preference index which ranked the bones in order of desirability to the consumer, in this case the hunting society of the Nunamuit. The economic and perceived values were shown to be wildly diverging, highlighting the need for a regard of social values in any consideration of meat consumption patterns (Binford 1978).

'Curation' and selection of animal parts for later deposition have been suggested for Neolithic monuments (Pollard 1995), but can also be seen in more domestic contexts ethnographically. For example the Mongols keep sheep tibiae in the roofs of their houses to ensure fertility (Szynkiewicz 1990) while the Mesakin hang head bones of goats or cattle in or above the granary entrances (Hodder 1982). These bones are kept separate from the rest of the bones which are deposited outside the enclosure.

Animal food has often held a different status from plant food, and so the remains from each may have been treated in a different manner, and this could have led to deposition in different places. In India people eat different amounts of meat according to status and context. Upper caste Hindus do not eat meat, although lower caste communities may, and this occurrence should be preserved in the material record. Some vegetarian farmers eat the meat of small animals when in private (Goody 1982: 127) but not in the village. The distinction between these public and private areas may also provide differences in faunal incidence. Bones may, therefore, be more symbolically loaded than, for instance, plant remains, and this could lead to different places or procedures for deposition.

Thus we conclude that there is evidence of special treatment of animal bones from Iron Age and ethnographic contexts, and therefore that bone deposition patterns from Danebury must be considered with an open mind for both functional and non-functional explanations. Particular bone elements or species may have held a different or ritual status, and bones that resulted from consumption of an overtly ritual nature might be deposited in a different place to those that did not. Different people may have eaten different parts or species, although the status of meat parts would not necessarily be what we would expect from meat or marrow content, or current meat values. Nonetheless, ethnographic analogy cannot be used as a direct explanation for archaeological patterning. The diversity of human behaviour, and the partial, distorted, nature of archaeological assemblages make direct comparisons unreliable. It is, however, likely that some form of pattern was present if the inhabitants of the hillfort consisted of different social classes, and if activities held different ritual status. This pattern may be visible archaeologically if deposition was similarly segregated.

1.3.7 Conclusions

Many research issues have been raised here. Danebury has been at the centre of a debate concerning the role of hillforts, interpreted variously as economic power centres, communal gathering places and symbolic enclosures. The exact nature of the relationship between Danebury and its surrounding settlements is still disputed and will be addressed in this project through analysis of the scales of consumption and degrees of craft specialisation between sites. However regional diversity is strong, and sites outside southern Britain may not be able to usefully contribute to this debate. The animal husbandry methods and butchery techniques at Danebury are (as far as can be assessed using current knowledge) similar to the majority of sites in Iron Age Wessex. Can any difference in butchery, cooking and meat consumption be recognised between sites that might be indicative of different status or function? Is there a difference in the extent of specialisation of butchery at different sites?

There is a lack of comprehensive, systematic butchery investigation and recording. Such a body of work from Danebury would assist interpretation at other sites where sample size is smaller and there is therefore less butchery evidence, and provide a means by which to assess differences between sites. Further to this, there is a lack of systematic investigation of spatial patterns from complex Iron Age sites. At Danebury, there is no evidence for spatial patterning of small finds or pottery, but more comprehensive analyses will be undertaken here, and in any case, bone remains may have held a different status from other artefactual debris.

Two-dimensional investigation of animal bone has been used to good effect on Roman sites (Stokes 1996), and with the application of powerful spatial data programs such as GIS, detailed spatial investigation can also be carried out on the extremely large sample at Danebury. Evidence for specialisation in industrial or craft activity would be suggested by spatial segregation of activities, and similarly, status differences of meat foodstuffs could also be established from the spatial segregation of particular bone parts. In addition, the investigation of bone element distribution by feature type could assist in defining the relative status of sites - animal bone assemblages from some sites were recovered mainly from ditches (e.g. Mingies Ditch) and at others from pits (e.g. Danebury); are the depositional differences between these sites (outlined in section 1.3.3) in fact due to differential deposition into pits and layers?

However, simple two-dimensional analysis may be inadequate for the task of unravelling the complex deposition patterns at Danebury. Differences within individual features must also be addressed, since pit deposits consist of many separate layers that could have resulted from the deposition of the remains of different, temporally separate, activities. A key issue is whether or not deposits reflect different activities. If so, it might be possible to distinguish different consumption activities, and perhaps to suggest the scale of consumption in different areas or times, or indeed on different sites.

Other aspects of social life, such as symbolism and ritual activity involving animal bone, have been shown to affect two and three-dimensional distributions of the relevant bone elements in some societies. It is probable that some kind of ritual activity existed in the Iron Age, and that functional interpretations may not provide the complete story; certain, repeated bone element associations might be meaningful and should be looked for. An important aim of this thesis is to identify what differences, if any, existed between the majority of bone elements and those found in association with special deposits. This should enable us to better understand the nature of 'special' and 'everyday' deposition in the Iron Age, and to identify differences between sites that may have a basis in deposition, as well as consumption, activity.

2 METHODOLOGY

The main areas to be investigated were identified in chapter 1. The initial investigation of butchery would inform the secondary analysis of the distribution of bone parts, which itself would take two forms: a basic two dimensional analysis of pit content and then three dimensional analysis to investigate smaller more discrete groups of assemblages within the pits. This thesis is divided into three main sections of investigation: butchery, two-dimensional spatial distribution of animal bone and three-dimensional spatial distribution of animal bone. These were carried out consecutively as the methodologies for the separate analyses were in part based on results from the previous sections. The thesis was thought to flow better in this way, and the argument to be presented more concisely. Each of chapters 3, 4 and 5 are structured as hypothesis, methodology, results, discussion and conclusion, with a final chapter, chapter 6, combining all three strands of the analysis.

Throughout the thesis technical terms for parts of particular bones have been avoided, unless their presence was necessary to clarify the prose. In such cases the terms are included in the glossary. The omission of specific terminology was intended to avoid confusion, for example where authors use different terms for the same area of bone, and most importantly to make the work more accessible to the non-specialist.

Certain words have been used throughout, for example 'proximal' and 'distal' (referring to the top and bottom parts of the bone); where they were thought to be unavoidable. Complex vocabulary to indicate certain parts of specific bones (such as the olecranon fossa, described by the OED as the depression in the humerus into which the olecranon (the proximal part of the ulna) fits when the arm is extended) has generally been avoided where a more simple expression can suffice. Where the use of technical terms has been necessary for clarity (for example, calling the articular surface on the pelvis the acetabulum), a description has been provided in the glossary.

The main emphasis of the work is the interpretation, not description, of butchery marks. Thus those readers interested in the exact positions of the cuts can refer to the diagrams, or to the original archive (held by Annie Grant). The focus of the text is on the purpose of the marks, not a description of their location.

2.1 SAMPLE AREA

The sample chosen for investigation was a strip across the site, grid north-south. This was thought ideal as it covered all of the 'functional areas' (storage, housing and ritual) defined by Cunliffe (figure 2.1), and provided a continuous area that could provide a direct comparison. It was hoped that any distinction between the peripheries and centre of the site could also be investigated. The sample area covers about half of the excavated area, a quarter of the site; the area was excavated in the first series of excavations, from 1969 to 1978.

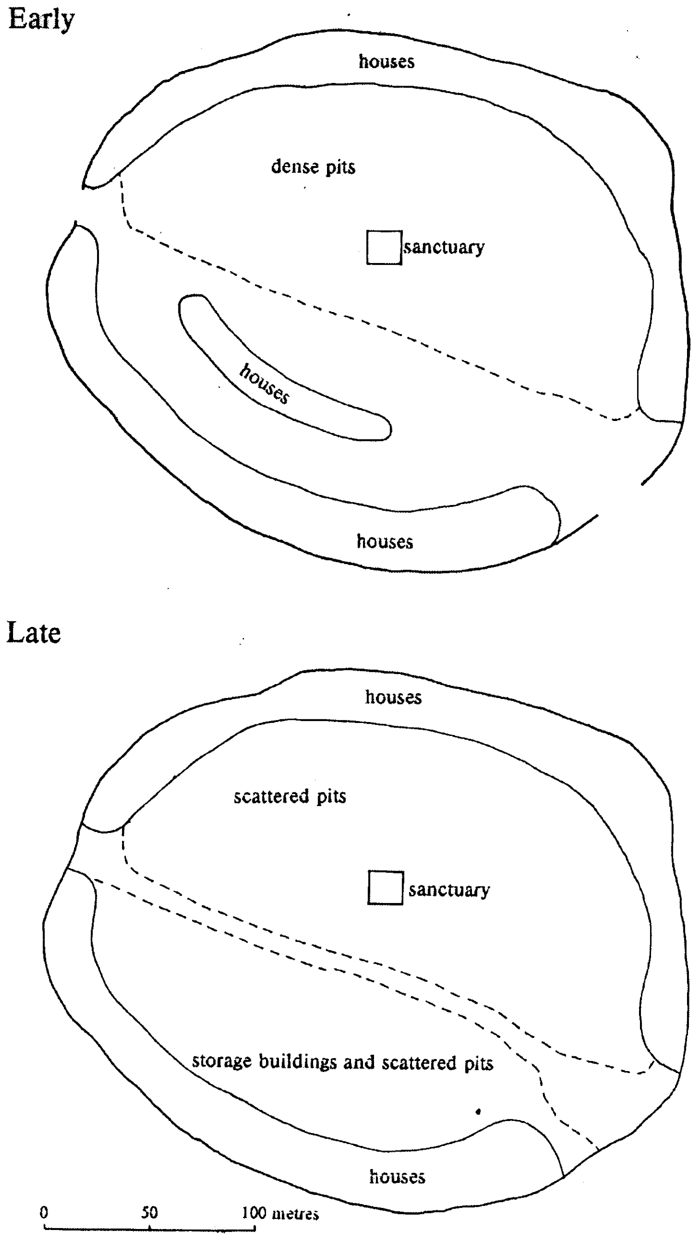


Figure 2.1: Functional areas in the early and later phases at Danebury. After: Cunliffe 1995: 41.

2.2 DATING THE BONE MATERIAL

Ceramic phase (cp)	Corresponding Dates	Phase
Cp3	470-360 BC	Early
Cp4-5	360-310 BC	Early
Cp6	310-270 BC	Middle
Cp7	270-50 BC	Late
Cp8-9	50 BC-50 AD	Latest

Table 2.1: The dating at Danebury, as defined by Cunliffe 1995: 18.

The deposits were dated to 'ceramic phases' (cp) by association with pottery, for which a sequence was developed (Cunliffe 1995: 18). The dating of ceramic phases 3-9 is shown in table 2.1, which also indicates the broad grouping into early, middle and late phases (defined by Cunliffe 1995: 23-25).

Since each bone in the database available to me was dated to ceramic phase it was decided to investigate the animal bone evidence by individual ceramic phase, where this could be determined. The phases could then be compared separately, in order to identify any changes that might be missed if data was lumped into larger groups. Thus phases 4, 5 and 6 could be investigated separately. This method provides the potential for testing whether animal bone shows differences in composition or character which was not found using other analyses. The phases could then be amalgamated if no differences were shown, an easier process than attempting to split phases that had initially been combined. Some phases had to be amalgamated, such as 1-3 and 7-8, since the vast majority of bones from these phases could not be more precisely dated. There were no bones dated to cp9.

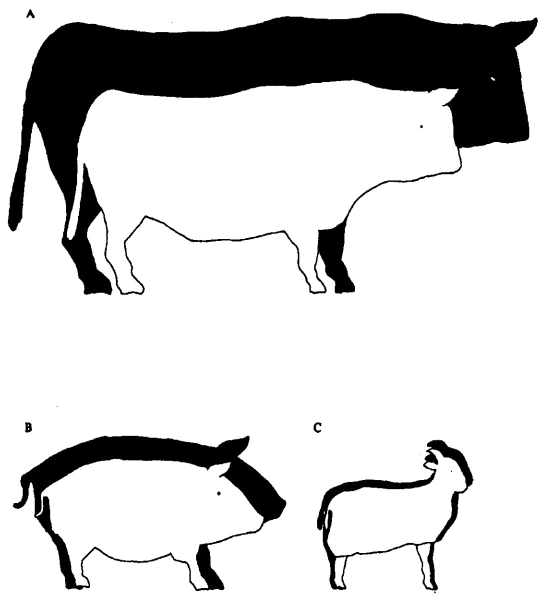
2.3 THE EXISTING DATA SET

2.3.1 Feature selection

The bone from Danebury was recorded in two databases, that from pits and that from layers. The layers consisted of all features except pits, i.e. rampart build up, quarry hollow fills, occupation layers, etc. The diversity of feature type, and the presence of structured or special deposits in pits, led to the decision to investigate the two types of feature separately. Differences had also been noted between ditch and pit deposits by other authors (Maltby 1985: 99; Grant 1991a: 449) and suggested to be a result of preservational, depositional or cultural (butchery) factors. The differences between the types of deposit at Danebury could be integrated into this existing body of knowledge.

2.3.2 Bone selection

The large quantity of animal bone data from Danebury meant that it was impractical to manipulate all species information at once. The pig was chosen, at just over 10% of the identified sample (a total of 10,963 fragments), to test the methodologies and hypotheses and refine them before any other species (with larger samples) were also investigated. Cattle were chosen to complement the investigation of pig butchery since they were of a larger size (figure 2.2) and it was thought butchery technique could be influenced by size as well as species.



Cattle were better represented than pigs and comprised 21,025 fragments. Sheep were the best represented species, at 62,359 identified fragments; time did not allow for investigation of this species.

Figure 2.2: Relative average sizes of adult animals at Danebury (white; foreground) compared to modern domestic species (black; background). Animal outlines after Green (1992). A=Cattle, B=Pig, C=Sheep.

2.3.3 Grant's bone records

The animal bone records were available on a spreadsheet, and each identified fragment included information on species, bone type, epiphyseal fusion and bone fragmentation, as recorded by Annie Grant. Table 2.2 gives an example of some entries in the database.

ID no	Species	No	Bone	R/L	Prox	F/U	Sh1	Sh2	Sh3	Sh4	Sh5	Dist	F/U	Artic	Butch	GP	GSh	Gd	Burnt	Erod	Disease	Ftr	Ftr No	Layer	Phase
69020	OX	3	VERT		0		0	4	0	0	0	0		0	0				0	0	0	P	23	1	7
69021	OX	1	CALC	L	4		0	0	4	0	0	0		0	0				0	0	0	P	23	1	7
69022	OX	1	UMOL		0		1	0	0	0	0	0		0	0				0	0	0	P	23	1	7
69023	OX	1	SKULL		0		3	0	0	0	0	0		0	0				0	0	0	P	23	1	7
69024	OX	1	TIB		0		0	0	0	0	4	4	F	0	0				0	0	0	P	23	1	7
69025	OX	2	UPM		0		1	0	0	0	0	0		0	0				0	0	0	P	23	1	7
69031	OX	1	UMOL		0		1	0	0	0	0	0		0	0				0	0	0	P	23	2	7
69032	OX	1	LMOL		0		1	0	0	0	0	0		0	0				0	0	0	P	23	2	7
69033	OX	1	THOR		0	F	4	4	0	0	0	0	F	0	0				0	0	0	P	23	2	7
69034	OX	1	LUMB		0	F	4	4	0	0	0	0	F	0	0				0	0	0	P	23	2	7

Table 2.2: An example of the database entries for cattle bone, available for use in this study.

Most records were given numerical values, with the exception of the species, bone element, left or right side, fusion status and feature type, which were abbreviated. In the above examples, cattle were called OX, the tibia coded TIB, left called L, fused coded F and pits coded P. A diagram is provided in the appendices to indicate which bone element is located where in the skeleton. The fields from Prox to Dist indicate the completeness of the bone: the bone is normally divided into seven recorded parts, so the epiphyses are recorded separately and the shaft divided into five parts. A value of 1 indicates complete, 2 over 50% and 3 under 50%. 4 indicates some bone is present but not how much. Some bones showed different recording patterns, for example the pelvis was split into ilium, isheum and acetabulum, while the phalanges and teeth, for example, were recorded only in two fields.

The sample area includes the pits excavated, and therefore analysed, earliest. These earlier records can be less comprehensive than the later ones: Grant recorded 9.6% of the bone from the first series of excavations (1969-1978) with a '4' to indicate presence of an uncertain quantity of bone, instead of '1', '2' or '3' to indicate completeness. This forms approximately 10% of the bone from the sample area, or 5% of the whole excavated area. This more limited recording still indicates the presence or absence of each part of the bone, so aspects such as fragmentation can still be considered. Also, in the same first tenth of the records, ribs were not assigned to species, making the investigation of numbers of butchered ribs difficult. It should therefore be remembered that ribs may have been butchered more frequently than the records suggest. Both of these biasing aspects apply equally to all species and relative comparisons between them and between phases should not be affected.

Butchery marks were recorded in a separate field as codes: a '1' meant the mark had been sketched, '2' that it was a cut mark and '3' a chop mark. The drawings of marks were filed on cards, while the marks just recorded as a 2 or 3 indicated the same cut type as the majority of the drawn marks. Chapter 3 gives examples and a full description of the sketched marks.

The author recorded a complete pit of over 1000 bones, which had been omitted from the original recording, using these methods. This aided familiarity with the recording methods, and gave an understanding of the overall condition of bone from each layer of the pit.

2.3.4 Knight's reanalysis of butchery mark incidence

For any study to be credible a good understanding of the nature and limitations of the original data is necessary. While the identification and recording of the bone and butchery marks recovered from the sample area were undertaken by Annie Grant, the detailed study of the butchery was undertaken from these records by the present author. The original records described the presence and nature of the butchery marks, and usually included individual sketches of the marks recognised. Dr Grant thought it was possible that some butchery marks may have been missed, as butchery was only one of many parameters recorded from the considerable sample of bone fragments (over 240,000).

To test the extent of differences between the two researchers, four pits from different phases were selected for investigation. All of these were recorded as containing butchered pig bone, and had been both excavated and analysed at a similar time in 1974, and were from similar areas (in the centre just south of the road). The author looked at the assemblages for these pits and bone element and frequency of butchery marks was recorded. This was then compared to the recorded bone from the original database. The database was not consulted first in case this influenced the analysis.

No additional butchery marks on pig bones were identified by the present writer from pits 576 and 599. In pit 593 one additional butchery mark was found on a pig ilium. In pit 596 a mark on a pig astragalus had been initially overlooked in the first analysis (see table 2.3). Since similar marks on the astragalus and pelves were noted originally in other pits, it does not seem likely from this analysis that the recording of butchery on pig bones was biased towards or against particular bones, although some marks may have been overlooked.

	PIT	PHASE	BUTCHERY MARKS IDENTIFIED BY GRANT	ADDITIONAL BUTCHERY MARKS IDENTIFIED BY KNIGHT	NUMBER OF PIG, CATTLE OR SHEEP BONE IN EACH PIT
PIG	576	6	Astragalus		9
	593	1-3	Vertebra Pelvis	Pelvis (ilium)	4
	596	7	Radius	Astragalus	7
	599	4	Ulna		5
CATTLE	576	6	Tarsal	Vertebra	10
	593	1-3		Ulna Thoracic vertebra	2
	596	7		Carpal	3
	599	4	Lumbar vertebra	Rib (3)	10
SHEEP	576	6	Astragalus Humerus	Ulna	59
	593	1-3			16
	596	7	Carpal Scapula	Femur Metatarsal	36
	599	4	Tibia	Femur (2) Tibia Scapula (2) Pelvis (2) Ribs (6)	102

Table 2.3: Incidence of butchery marks recorded on pig, cattle and sheep bone by Grant and Knight (Pits 576, 593, 596 & 599).

On cattle bone, of seven butchery marks recognised by the author, only two were in the original records. In pit 599, marks on three ribs were missed, although this probably relates to not recording ribs to species in the early identifications. In this pit, one mark on a lumber vertebra was noted, which I missed. These larger bones may not have needed such careful inspection to identify species, so the butchery was probably less comprehensively recorded.

Additional sheep bone butchery marks were noted from three of the four pits analysed. In pit 596 the current writer overlooked a mark on a scapula.

Although only a limited reanalysis was undertaken, several key points are suggested:

a). a significant number of butchery marks was not recorded in the original database;

b). more butchery marks from sheep and cattle were missed than those from pigs;

c). there does not seem to be a bone-element based bias in the original recording;

d). there are almost certainly more butchery marks on ribs of all species than have been noted.

However, the reanalysis was undertaken on pits investigated before the recording system had been finalised. Ribs, for example, were not assigned to species; and the bone fragmentation was not recorded in full detail. It is likely that a smaller proportion of butchery marks was missed from pits examined later when ribs were assigned a species and bone fragmentation was recorded in full.

2.4 BONE CONDITION AND TAPHONOMY

Inevitably, a range of taphonomic factors will have influenced the nature of the bone sample analysed for this study. These are outlined below.

2.4.1 Bone Recovery

Sieving was not routine during the excavation of Danebury, so bias in the form of lack of young or small bones may have been introduced. This is reflected in the low incidence of smaller bones such as the tarsals and carpals (see Grant 1984a: 496-7). This can be compensated for when looking at the presence or absence of different bones by species, as large and small species are not directly compared.

The majority of pits were fully excavated and this is useful for analysis of which activities led to different deposits (see chapter 5). The incidence of erosion was low (see below) and the bone was in chalk subsoil and generally of excellent condition.

2.4.2 Bone Condition

Canine activity is not well represented at Danebury. The incidence of gnawing on bone from the pit sample analysed in this study is only 0.2% for proximal parts, 0.08% for shaft fragments and 0.3% on distal parts. This is very low and suggests that the bones were deposited soon after use, and covered quickly. Even in occupation deposits the incidence of erosion and gnawing was low, for example, bone from layers in circular structure 20 showed no evidence of gnawing and only 2% erosion from 490 bone fragments. In layers overall the incidence of gnawing was 2.7% for cattle and between 2.6% and 3.5% for pigs, far more than in pits, but nevertheless in very good condition.

Dogs were almost certainly present in the hillfort as their bones were recovered, and it is possible that some bones were entirely digested by or removed from the hillfort by dogs. If so, this need not have influenced the butchery mark incidence, as all bone parts were recovered in the expected proportions if one assumes no parts were taken off site (Grant 1984a: 544).

The low rate of erosion at 1% of the bone in the pits (166 of 15,647 bone fragments) and 2.2% from deposits comprising occupation levels of circular structure 20, suggests that bone was not routinely left around for periods before being tidied away into ditches or pits. Instead it appears that at Danebury bones were deposited and covered up in a short space of time (and see Grant 1984a: 196).

This indicates that butchery marks were not likely to be obscured or lost by surface erosion or gnawing.

2.4.3 Fragmentation of Bone

The incidence of complete bone can be a useful indicator of bone condition, butchery techniques and disposal methods. The proportion of complete long bones was calculated from the original database by Annie Grant and is shown in table 2.4. 'Complete' bones are those where at least part of the proximal and distal parts of the same bone were present, and are calculated as a proportion of the total number of bones with either the proximal or the distal (or both) parts present for each species.

A number of trends is apparent from table 2.4. It appears that in pits the bone is generally more complete than in layers. This could be a consequence of differential survival with bone in the layers subject to more trampling after deposition. The bones with the highest percentages of complete examples are often the densest, for example the metapodials (Brain 1981), while the less sturdy bones such as the femur show a relatively low incidence of completeness.

Apparent differences can be seen between species: in most cases, there is a higher incidence of complete pig bones than cattle and sheep. This does not seem to be related to species size, as in the pit deposits the proportions of complete bone from cattle and sheep are very similar. The difference in incidence of complete bone between species does not seem to be a result of preservational differences either. Pig bone is softer than that of the other species and would be expected to show a lower incidence of complete bone, especially since the incidence of young animals is high at Danebury. Cooking differences could provide the reason for the difference: if pig meat was roasted on the bone less often than cattle and sheep, then it would be less brittle and so more likely to remain whole. Otherwise, butchery could be the cause, if for some reason pigs were less often chopped up, but instead cooked in whole joints or carcasses.

Bone	PITS				LAYERS			
Sheep	**Early**	**Middle**	**Late 7**	**Late 8**	**Early**	**Middle**	**Late 7**	**Late 8**
Humerus	14.1	12.5	13.5	22.6	13.2	5.6	4.7	9.1
Radius	18.7	18.0	18.5	20.0	11.5	11.0	10.3	15.2
Metacarpal	25.4	29.1	26.9	9.4	11.4	17.7	17.6	8.6
Femur	8.4	9.7	9.1	6.5	4.0	3.7	7.1	4.7
Tibia	8.7	8.1	7.2	1.3	1.1	1.7	2.7	0.8
Metatarsal	29.0	23.5	23.5	5.3	10.0	13.3	9.0	5.6
Metapodial	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0
Total	**15.4**	**14.7**	**14.5**	**9.7**	**8.1**	**7.2**	**7.5**	**6.7**
Sample size	2060	2302	7754	279	406	1078	3677	403
Cattle	**Early**	**Middle**	**Late 7**	**Late 8**	**Early**	**Middle**	**Late 7**	**Late 8**
Humerus	12.5	13.2	9.2	7.7	7.7	0.0	1.6	8.0
Radius	16.7	16.2	15.8	4.8	21.1	9.8	5.5	0.0
Metacarpal	32.9	33.9	29.5	0.0	38.5	13.3	12.5	0.0
Femur	12.0	17.3	7.8	7.1	12.5	5.3	1.4	0.0
Tibia	14.0	19.7	10.1	6.3	9.1	6.5	1.5	0.0
Metatarsal	28.3	35.3	24.7	40.0	28.6	24.2	13.1	11.1
Metapodial	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	**16.2**	**20.0**	**13.5**	**9.9**	**17.0**	**7.9**	**4.7**	**2.8**
Sample size	579	490	1731	81	123	278	827	108
Pig	**Early**	**Middle**	**Late 7**	**Late 8**	**Early**	**Middle**	**Late 7**	**Late 8**
Humerus	23.2	27.6	13.2	0.0	0.0	6.7	3.6	0.0
Radius	30.4	47.7	22.7	20.0	0.0	10.0	9.9	33.3
Metacarpal	89.5	85.9	64.9	0.0	33.3	66.7	48.8	60.0
Femur	25.4	27.6	12.3	0.0	0.0	8.0	4.0	0.0
Tibia	19.8	30.2	13.2	0.0	12.5	0.0	3.3	0.0
Metatarsal	70.3	84.9	58.6		50.0	44.4	34.1	50.0
Metapodial	24.5	31.0	43.6	25.0	0.0	12.5	13.3	100.0
Total	**34.4**	**44.6**	**26.1**	**6.7**	**9.0**	**17.4**	**10.7**	**18.4**
Sample size	410	495	705	30	67	178	553	49

Table 2.4: Percentage of complete long bones by phase and feature type: data from Grant, pers. comm.

Another overall trend is the general decrease in numbers of complete bone over time. The only exceptions are the sheep and pig bone in layers: the former remains relatively constant, while for the latter, there is a clear pattern of more complete bone over time. The smaller sample in this section may be the cause of the disparity, or the layers might have been receiving a different type of deposit. The decrease in numbers of complete bone over time could be due to a more intensive method of butchery, for the production of smaller joints of meat. Grant's analysis (1984a: 504) shows that there were no significant differences in the proportions of mature animals kept in different phases, which might have influenced the age at death for sheep or pigs, although cattle do appear to have been kept for longer (1984a: 512). There is no evidence to suggest more gnawing or erosion in the later phases so it is suggested that bone was intentionally divided up in the later Iron Age.

There is no evidence from Danebury that bone was routinely split for marrow: the author investigated 5 pits (576, 593, 596, 599 and 2426) covering the early, middle and late phases for evidence of ancient chopping through or breaking up of bone, which had been overlooked in the original recording. This could be indicated only by a small mark at the edge of the break since the bone can be nicked then force applied to break it (O'Connor 2000). In the five pits, none of this type of mark was noted, so it is suggested that the incidence of deliberate breaking of the bone was low, at least in these five pits, and probably also in the remainder of the site. Although analysis of fracture patterns to indicate bone breakage when 'green' (Outram 2001; Vehik 1977) was not undertaken due to time restrictions, the completeness of the bones and lack of evidence for splitting them with tools suggests that marrow extraction was not routinely practised.

The proportions of complete bone at Danebury suggest that different animals were butchered in different ways, and more intensively over time, although overall the incidence of complete bone is not exceptionally high, and lower than that recorded at, for example, the Roman site at Portchester (Grant 1975: 391).

2.4.4 Bone Working

There is evidence of bone working from Danebury, and the removal of certain bones for working may have influenced the proportion of bone elements recovered and their spatial distributions. Parts of the skeleton can be used for particular artefacts, for example cattle scapulae blades can be used for buttons, and sheep metapodials for gouges.

At Danebury a variety of items made of bone and antler was recovered, including combs, needles, toggles, gouges, awls and miscellaneous items. The species or bone element used could not be determined for many of these. However some worked bones show distinctive parts and also working debris can indicate which bones were used. Table 2.5 shows which bones were worked in the early investigations, from which my sample area is derived.

Species/ Bone	Tibia	Metapodial	Femur	Ulna	Ribs	Canine	Fibula
Sheep	30	30	1				
Ox		7	2	1	8		
Horse		5					
Pig						1	1

Table 2.5: Frequency of different bone elements identified as used in bone working at Danebury excavations 1969-1978.

Only 1.3% of the total number of Iron Age bone recovered from Danebury were worked. This is a fairly insignificant proportion and perhaps indicates a low percentage of the bone being used for working. However, bone objects could have been taken, traded or deposited off-site. If this were the case, certain elements would be under-represented, which is not so (Grant 1984a: 544). Further analysis of bone working with relation to spatial distribution is considered in chapter 4.

Proportions of worked bones at the other two sites investigated were lower: at Nettlebank Copse four pieces of worked bone were found (0.02% of the assemblage). At Suddern Farm, 0.2% of bone from the Iron Age was worked. Bone working thus may not play a large part in biasing the proportions and spatial distributions of bone elements.

2.4.5 Possible Effects of Cooking on Bone Survival at Danebury

Small scale investigations into the different tensile properties of cooked and raw bone have shown that roasted bone is more fragile than raw or boiled bone (Pearce & Luff 1994: 54). However, the excellent state of preservation and lack of evidence for charring (1.5% of cattle and pig bone) suggests that bone was not roasted at Danebury. Coy suggested that an 'ivoried' appearance to bones indicates that they have been roasted (Coy 1975). The contents of one pit was re-examined to look for evidence of such bone, but no examples were found amongst the 614 identified bones, and so it is not suggested that meat on the bone at Danebury was commonly roasted. It is possible that roasted bones were rare as they were more easily destroyed, but this is improbable when the condition of the bone is considered.

2.5 CONCLUSIONS

The sample area consists of a complete section across the site, but was mainly excavated in the initial years, so the computerised database does not always show the completeness of bones. However it was thought better to have a continuous sample than a staggered one, and the large number of bones should minimise bias. Small sample size in the middle phases necessitated their amalgamation, but they were short phases and merging them forms more comparable time spans (and sample sizes) to the early and later period.

Damaging taphonomic effects seem to be limited to erosion on bones from the upper layers in pits, and occupation layers. The functional explanations proposed by Wilson for spatial patterns to bone appear to be too simplistic to apply to Danebury (see part 1.3.3). Bias may have been introduced by a lack of sieving, and this should be remembered in interpretation.

3 IRON AGE BUTCHERY AT DANEBURY

The methodology for recording and interpreting butchery is presented here, followed by the investigation and discussion of butchery techniques at Danebury. The aim of this chapter of the thesis is to determine what parts the animals were divided into, in order to then assess where these parts (represented by the bone) are found spatially (chapters 4 and 5). The butchery marks are investigated by species, by phase and by feature type, in order to determine any differences to feed into the spatial analysis, but also to provide information on differences that may be representative of social change or diversity. For example the deposits in pits may have been more structured, or the deposits in different phases may be indicative of the consumptions of large or small scale meals. The coded butchery marks are recorded in Appendix 2.

A butchery experiment was performed, and is described in Appendix 3. It aims to identify the potential of different tool types, to assess the influence the tool type may have had on the butchery process, and to enable comparison of the positions of butchery marks created during each process with the interpretations made for the Danebury material.

3.1 METHODOLOGY

There is surprisingly little in the archaeological literature relating to butchery techniques, especially in site reports. They mainly contain comments on the possible tools used and the placement of marks (Grant 1984a; Locker 1990; Hamilton-Dyer & Maltby 2000), or the broad description of body parts that would be produced (Grant 1975; Maltby 1985) rather than the route of division and distribution of the carcass, and quite often butchery is not covered at all (Rackham 1987). This is perhaps to be expected, given the limited time and resources allotted to post-excavation, and to the small sizes of samples from rescue excavations. Exceptions are found for example from Lincoln (Dobney *et al* n.d.) and Ashville (Wilson 1978) where attempts to put the butchery in context are presented. At York integration of the butchery into the overall interpretation of sites provides a good synopsis of the processes (O'Connor 1984; Bond & O'Connor 1999) though again not at a suitable level of detail for comparative purposes.

The main problem as far as this project is concerned appears to be the lack of detail in published reports for the Iron Age, which makes any comparison between sites difficult, if not impossible, especially for generally less well-represented species such as pig. It will often also be partial due to the difficulties of reconciling different recording conventions. A comprehensive approach to the archaeological study of animal butchery has not been undertaken, although many methods have been suggested (described in section 3.1.1). The absence of recorded data or difficulty of accessing and interpreting them makes an inclusive comparative study unworkable at present. However the record for Danebury is present in full in archive form and is thorough enough to form a reliable basis.

To achieve a repeatable, accurate record of the marks is the first aim in such a task. Coding of marks is common in computerised systems and one has been designed by Jones and colleagues (n.d.). However, these are often time consuming to interpret and no overall method has yet been adopted, although several have been suggested. Dobney and Reilly (1988) suggested a method for the recording of marks in zones. This was followed up by Rixson (1989) who described a means of recording based on composite diagrams of individual bones, and by May (1990) who concluded that Dobney and Reilly's method was scientific but could not be interpreted fully in the absence of a pictorial record. O'Connor also suggests a diagrammatic representation can be successful (O'Connor 2000: 47). A pictorial record would effectively preclude the need for an arbitrary zoning of bone areas.

To record the butchery at Danebury it was decided to use a numeric code to record as much detail as possible for future use, but also to include an interpretative code so as to incorporate objectivity and interpretation. Pictorial representation was also used as a means of investigation and of display.

3.1.1 Existing Butchery Records

The butchery marks on bones had been recorded by Annie Grant as the bone was identified, and either drawn or, if the cut was representative of a common technique, given a numeric value. The drawings were interpreted and the mark characteristics recorded in a card catalogue. Figure 3.1 shows a copy of one of the recording cards. The bone illustrated, a pig femur, shows two cuts on its head, resulting from the process of disarticulating the femur from the pelvis.

Once codes for the present study had been devised (Appendix 1), the marks found on the archaeological bones could be coded and the values entered into a relational database that could tie into the main database. This was intended to provide an easily accessible record which could be queried. It was tested for ease, robustness and flexibility by asking specific questions, such as: how many marks indicate skinning activity? Which bones show more than one type of mark? The butchery method derived for pigs was then applied to cattle to see how different the cuts were and whether the coding was robust enough to use on animals of different sizes and builds.

3.1.2 Interpreting Butchery Marks

In order to interpret and understand the butchery marks it is necessary to take account of the muscle conformation surrounding the bone. To identify disarticulation marks, the positions and attachments of muscles and ligaments were extracted from anatomical texts, and drawn onto bones from as many angles as required. Then the positions of the butchery marks were overlain to check co-incidence. Knife disarticulation targets the ligaments so as to enable separation of the bones. Division of the carcass by cleaver produces a very different type of mark, heavy and deep, which can easily be distinguished. Such butchery can disarticulate roughly at joints or chop through bone.

Filleting is likely to be evidenced by horizontal or angled marks across the shafts of the bone where muscle was thickest, and is expected to be concentrated on bones with convex or concave surfaces. Combinations of marks may occur together. For example one butchered pig pelvis bears marks on the ilium for filleting, and around the acetabulum for disarticulation from the femur. Skinning marks might show on the lower limb bones and across the metapodials, where there is only a thin covering of tissue around the bone. Some areas of the carcass carry much flesh, and it is likely that butchery will not have any trace on the bone (see figure 3.6).

In order to attain a fuller understanding of carcass conformation, the author visited a butcher to watch the secondary and tertiary butchery of a maiden heifer (i.e. one having borne no offspring), a sheep and a pig. Primary butchery was performed at the abattoir, and secondary and tertiary butchery took place at the same time, since the meat was to be sold for immediate consumption. If intended for preservation or further dissemination, the secondary and tertiary butchery processes would be separated. By watching the disarticulation and filleting of the three main species, differences between them could be ascertained and recorded. The frequency of cuts and their positions on the bone were also noted, and are explained in full in section 3.2.9. This aided understanding of why marks fell where they did, and assisted in interpretation of the butchery marks from Danebury.

3.1.3 Coding Butchery Marks

The aim of the coding system was to record the butchery in an accessible form which would allow interrogation. It can be difficult to assign butchery marks to a specific character. In designing the database, the marks were coded with increasing definition in separate fields so that different levels of detail could be chosen, for example, cuts to the limb, cuts to the bone, cuts to the proximal or distal end, etc. To facilitate interpretation, each mark was given a possible 'function' which was established not on the basis of a single factor but on a series of judgements which would be difficult to include in the coding - force of cut, angle, exact position - without unwieldy complication. Some general rules do apply: skinning activity creates lateral marks to the midshaft of lower limb bones, filleting creates vertical or diagonal marks on the shafts of bone, and disarticulation forms angled marks at articulations. Though a useful heuristic device it is important to emphasise that there are not hard and fast rules, and further information on, for example, position and force, needs to be considered.

A numbered code was developed (see table 3.1), starting with coarse and ending with fine detail, progressively narrowing the position of the mark down from general body part (A) to more specific body part (B). The bone (C) and position of the mark on it (D) were then determined. Carcass divisions are driven by anatomy, so some parts are more likely to show marks for disarticulation (for example the distal scapula) and some marks for filleting (for example the humerus shaft). Bones were divided into zones with this in mind (figures 3.2, 3.3, 3.4 and 3.5). Using the ulna as an example, area 1 is more likely to show marks that resulted from disarticulation, as this is where the ligament joins the ulna to the humerus (see figure 3.4). Area 2 is also likely to bear disarticulation marks, but was designated separately in order to facilitate distinctions between different butchery techniques. Area 3 is most likely to bear horizontal marks from skinning, and perhaps vertical or diagonal cuts for filleting, whilst area 4 is where any evidence for separation from the lower meat-bearing distal part of the limb might be expected.

The orientation (E) (front, back, medial, lateral) was then noted. The type of mark (F) (cut, chop, saw) was included to facilitate investigation of the different techniques used for dismemberment. The purpose of the mark (G) (disarticulation, chops through, skinning and filleting) was inferred from all the characteristics recorded but also from the depth, direction, orientation, type and precise place of the cut. This could be modified or omitted quite easily if a different interpretation was made later. The number of marks in each position was also noted (H). This enabled the skill, or precision, of the butcher's cuts to be assessed (see Peck 1986). An unknown (unrecorded) butchery mark can be coded as '9' to indicate that a cut was present but had not been further defined.

A	1:head		2:torso		3:forelimb		4:hindlimb		5:limb
B	1:upper	2:lower mandible	1:upper	2:lower	1:upper	2:lower	1 upper	2 lower	2:lower
C	0:cranium 1:hyoid		0:sternum 1:scapula 2:cervical 3:thoracic 7:atlas 8:axis	4:lumbar 5:caudal 6:pelvis 9:vertebra	1:humerus 2:radius 3:ulna	3:carpal 4:meta carpal	1:femur 2:tibia 3:fibula	1:astragalus 2:calcaneum 3:tarsal 4:metatarsal	5:first phalange 6:second phal 7:third phal 8:patella
D	area of bone (see diagrams, figures 3.2 - 3.5).								
E	1 anterior 2 posterior 3 medial 4 lateral 5 dorsal 6 ventral								
F	1 chop 2 cut 3 saw								
G	1 skinning 2 disarticulation 3 filleting 4 portioning 5 organ removal 6 bone working								
H	number of same type of marks on this bone (99= more than one)								

Table 3.1: Coding for recording the position and purpose of butchery marks on pig bone; from coarse to fine detail. '9' in fields E-H refers to unknown data.

The most important strength is the facility the system provides to choose a specific level of definition, enabling the investigator to choose the level of detail a given query demands. For instance, the butchery on meaty or non-meaty portions of the limbs can be defined in a low resolution query, while at a very high level of detail the number of marks in the same position on the distal end of a specific bone can also be investigated, to see how co-incident butchery marks are. The subjectivity of the analysis can therefore be controlled, by excluding certain fields.

This methodology is very fast to use once the operator has familiarised themselves with the method. However, the more subjective interpretations rely on the recorder having an in-depth knowledge of the anatomy and physiology of the animal. The main muscle and ligament positions can be determined from attachments shown in anatomical texts (for example, Thompson 1896; Senning 1937; Sisson & Hillman 1975; Currey 1984), but this takes time and these texts do not provide a complete record. If only the factual information is recorded, the subtle details required for interpretation may be lacking though the information is correct. It is not easy to reinterpret the purpose of the mark without looking at the bone or its drawn record again, or expanding the database with the danger then of over-complication. The coding was designed to be as adaptable as possible to enable further questions to be asked at greater levels of detail as the investigation progressed.

The main use of the butchery database in this investigation is to ask questions of the types of marks (for chopping through, filleting, disarticulating, etc) and where these are found. It is thus easy to compare proportions of mark types in, for example, early phase pits and late phase pits, or to compare the incidence of filleting in pits and layers. The system provides a basis for comparison between, for example, phase and feature type but also between different sites.

Details of the main butchery processes are given below, with a description of the marks that are likely to result. Appendix 1 summarises the information, showing the codes for the marks which each of the main butchery processes would produce on the bone.

3.1.3.1 Slaughter

Two methods of slaughter are commonly in use. **Poleaxing** is performed by punching a hole into the brain with a heavy implement:

> " a sledgehammer with a bolt some three or four inches in length on one side... would have made a neat hole in the beasts skull killing it outright" (Anon 1975: 33).

The result would be a hole through the frontal part of the skull. This is reliable evidence but is seldom recognised due to the fragile and therefore usually fragmented nature of the cranial bone. One example of a possible pole-axed ox skull, from an Iron Age pit at Gussage All Saints, is noted by Harcourt (1979: 159).

In **sticking** a knife is plunged into the throat to open the blood vessel, often after stunning to allow the blood to run freely for collection and later use e.g. in black pudding. Historical sources say the knife should not touch the bone (Malcolmson & Mastoris 1998: 95), but there is a possibility of marking the hyoid. However, this bone can also cut by decapitation, so this type of mark has a low reliability. Cuts on the hyoid cannot necessarily be considered as representative of slaughter.

3.1.3.2 Primary butchery

Decapitation, the removal of the head, is current practice and also well known in the past. Pigs' heads contain relatively more edible meat than cattle or sheep, and so the patterns may be different between species. The head has been used as a delicacy, where a hog's head was prepared for sale by stuffing with meat, boiling and inserting glass eyes (Douglas 1924: 148).

The marks representative of decapitation are easy to identify and can be reliably interpreted. They can be found on the occipital condyles, the atlas and the axis. Marks may also be seen on the hyoid, in the vicinity of the throat, but these are less reliable as indicators of decapitation as they may be confused with marks produced during sticking. Horizontal cuts to the sides of the atlas and axis are more likely to have resulted from filleting, but vertical cuts and those found on the caudal and cervical ends of the atlas and axis are more likely to represent decapitation.

Feet removal: as the feet contain very little meat, in modern butchery they are normally regarded as waste and disposed of after removal. However, pigs' feet have been used in various dishes, including stews (Anon 1985: 31) and jelly (Finney 1908: 65; Henderson 1799: 368).

Feet may be taken off either by disarticulation at the epiphyses of the tarsals, carpals, metapodials and phalanges, or chopped through these bones. Marks on these bones are not reliable indicators due to the possibility of confusion with skinning, though skinning can be effected by shallower cuts so marks are less likely to be made.

Skinning marks: Skinning may take place before or during the removal of the head and feet: the latter event sometimes involves leaving the head and feet on the skin during tanning. Pigs' skin is more difficult to remove than that of sheep and cattle (R. Boulton pers comm), but is soft and can be used in clothing. It can also be eaten, so skinning of modern animals is less likely to involve pigs than cattle or sheep, although boar skin is not as soft and is covered with much tougher hair.

The bones which are not covered by a great deal of flesh, such as the metapodials, are most likely to be marked, as cuts on more fleshy parts are unlikely to go through to the bone (figure 3.6). Horizontal marks can be expected where skinning starts, either at the trotters or further up the limb, possibly with longitudinal marks along the lower parts of limb bones (figure 3.7). Cuts to the head could be regarded as skinning marks if they are situated where there is little flesh, such as across the frontal part. Cuts to the stomach would not be visible, nor would cuts on the neck, which, especially on a pig, is covered with too much muscle for cuts to penetrate through to the bone.

3.1.3.3 Preparation and portioning

Removal of organs: most of the organs can be used as food, including intestines for sausages, kidneys, lungs, liver *etc.*. Cobbett states that 'here, in the mere offal... [of a pig] there is food, and delicate food, too, for a large family for a week' (Cobbett 1979: 111; also see Seymour 1974; Vigne 1991) .

The removal of offal is normally invisible archaeologically, as most organs can be removed through the stomach cavity. The removal of the eyes can result in scrapes around the orbit, and brain removal can be suggested from evidence of split skulls. Chops to remove the brain might be similar to those for portioning the skull, so this type of mark is unreliable. However, scrapes around the orbit are reliable, as it would be unlikely that this mark would have been produced by any other activity.

Chops through bone or ligaments to split the carcass into required sizes can occur on any bone, and from a purely practical viewpoint, would be expected to occur near the epiphysis or through the weakest part of the bone. In smaller animals the bone can be left inside the meat and still be cooked efficiently, but larger animals are often filleted which reduces size and therefore fuel costs.

On the head, cuts through the skull or mandible to divide the animal into smaller pieces are reliable indicators of portioning, with the exception of splitting the skull through the brain cavity, which may be for organ removal. The fragility of the skull means these marks may not be recognised.

On the limb bones, cuts through the midshaft of the bone probably represent portioning.

On the torso, vertebrae may have transverse processes cut off during removal from the ribs, or may be cut in half or split across their anterior or posterior articulations during separation from other vertebrae or into chunks of spinal material. Longitudinal chops through vertebrae may indicate the splitting of the animal into two halves. Ribs may have been chopped off at their articulation with the spine, or chopped in half to portion the ribcage. In a young animal, ribs can be cut through with a knife. Scapulae could be chopped through along or across the blade. The pelvis could be cut through the ilium, ischium or pubis. The resulting marks normally provide fairly unambiguous evidence of portioning.

Disarticulation at joints can be used to separate the carcass into smaller anatomically dictated parts without chopping through bone. Fine cutmarks normally result, since little force is necessary to divide the bones if cuts are precisely placed on ligaments.

The removal of the mandible from the skull may leave marks where the two join, ie at the articulation between the condyle of the mandible and the skull underneath and posterior to the orbit. The recorded marks are unambiguous.

Cuts on the epiphyses of limb bones may be reliably interpreted as resulting from disarticulation; those further up the shaft may have been intended for disarticulation, but were misplaced, or may be confused with filleting marks, so these may be ambiguous. The femur from layer 551, illustrated previously in figure 3.1, shows a reliable disarticulation mark, and would be coded 4 (hind limb), 1 (upper part), 1 (femur), 1 (proximal), 3 (medial), 2 (cut), 2 (disarticulation), 2 (two marks), see Appendix 1.

Cuts on the scapula and pelvis around the articulation with the humeral and femoral head may have been created during removal of the limbs. Separation of the scapula and pelvis from the spinal column results in cuts to the dorsal or medial side of these bones. Marks on the ilium are likely to result from meat filleting as are marks on the ventral or lateral side of the ischium. Cuts that are not on or bordering the articular surface are unreliable indicators of disarticulation as they may have been created during filleting.

Filleting of meat prior to cooking mainly occurs on larger animals today. Sheep and pig often have bone left in joints, as it helps to cook meat more thoroughly (R. Wood pers comm). In cattle, the larger bones are normally removed.

Marks may be made along the shafts of bones, where there is a covering of muscle, and are more likely to be made lengthways or diagonally in order to fillet more efficiently by taking advantage of the striation of the muscle.

Headmeat from the cheek and across the frontal part of the head, as well as from the tongue, is particularly substantial in pigs. It can be removed by targeting certain areas where the muscle attaches, for example at the zygomatic process and the mandiblular angle. The resulting marks are reliable indicators of the activity.

Meat bearing parts of the limbs, especially upper limbs, and the upper parts of lower limbs, may show marks where muscle tissue is, or starts to become, more abundant. The marks that result are unambiguous.

Meat can be removed from the vertebrae along the spine, from the scapula blade and from the pelvis. Some marks from these activities, for example on the distal scapula, could be mistaken for disarticulation marks. However the interpretation is generally reliable as the angle of marks can help to define the activity: a vertebra with longitudinal cuts would probably have been filleted, while horizontal cuts are more likely to have resulted from disarticulation activity.

3.1.3.4 Consumption and other activities

In order to utilise meat still on the bone after filleting or initial consumption, the bone can be **boiled** for stock. This activity is very difficult to demonstrate as boiling does not affect the appearance of the bone, although extended periods of boiling can soften bone, making it more liable to fragmentation (Pearce & Luff 1994: 55).

Marrow extraction would result in a high degree of fragmentation. Ribs from young animals, for example, may be consumed entirely in this process as the bone can be chewed and swallowed in order to consume the marrow, and some Western desert Aborigines grind the cooked meat on the bone and consume it all (S. Heald pers. comm.; Gould 1980: 13-14). Bone may be split to remove marrow, sometimes after burning which weakens the tensile strength of the bone (Dobney *et al* n.d.).

The main methods of **preservation** are smoking, salting or drying. Some meat is preserved with the bone intact, for example in hams. Hams may be suspended from the femur, but archaeologically only disarticulation marks are likely to be visible. Trotters can be preserved in their own jelly (Finney 1908: 65) and the only marks likely to be produced by this activity are disarticulation marks at the proximal and distal articulations of the metapodials. While no unusual marks are likely to be found from the preservation activities described above, the bone will be 'in use' for longer and so may have a different distribution pattern (see part 4.8). Pierced scapulae from Roman Lincoln are suggested to have resulted from preserving the shoulder (Dobney *et al* n.d.: 26-7) by hanging the meat by the hole in the bone, but no such marks have been found at Danebury.

The bone is softer after boiling and more brittle after roasting (Coy 1975; Pearce & Luff 1994), so cutting boiled meat from the bone is more likely to result in marks if the knife impacts on the bone. However, cooked meat is less tensile, so removing it from the bone would be easier and could be effected in ways which would not require a knife (tearing, cutting, pulling etc.). It is therefore suggested eating cooked meat would not necessarily create marks, and that any marks which were visible are more likely to have resulted from filleting raw meat.

3.1.3.5 Industrial activity

At Danebury, the bones that had been worked were recorded as small finds, so are not present in the faunal database; the bones identified to element and species are given in part 2.4.4. Other activities that may not have been noticed are given below.

Gluemaking would be difficult to evidence, as the bone would be boiled down and may then be fragmented.

Tanning would require the skinning of the animal; skinning marks as described in Appendix 1 may be found on the head and feet bones. The feet may have been taken off with the hide, and disarticulation marks on the phalanges or metapodials may have resulted.

3.1.4 Tools used for butchery

The tools found at Danebury that may have been used for butchery include iron knives and saws, and possibly flint tools (Cunliffe & Poole 1991: 336-7). No cleaver type tools were in evidence, although some of the knives were large enough to have been used to chop through bone. Saws may be used to cut through bones, and are often used for this purpose today, although iron saws are softer that steel ones and would blunt more rapidly. Appendix 3 explores the use of flint and iron tools in butchery.

3.1.5 Unmarked bone

Non-marked bone may have been butchered in an identical fashion to marked bone, but less vigorously or more meticulously. The protective cover over the bone surface (the periosteum) means that only a very small proportion of cuts may mark the bone, though more are likely where the bone shape is complex, for example the distal humerus (M. Wood pers. comm.) This has important methodological implications, particularly in respect of any discussion of the incidence of cut marks or of particular butchery processes (see Appendix 3). Bone without marks may still be from carcasses that were extensively butchered.

Alternatively, it is possible that non- marked bone resulted from cooking whole animals, a method which would allow the cooked meat to be pulled from the bone. Bones often fall apart in the course of cooking as the ligaments denature (R. Boulton pers. com), leaving no need for further butchery. It is also possible that meat would have been carved, and if it were, this is also unlikely to be archaeologically visible, since roasted bone is more resistant to cutting (Pearce & Luff 1994).

3.1.6 Summary

Detailed records of butchery are often missing from published reports, and there is a need to record butchery in an accessible form, preferably one which is universally accepted. Previous coding methods have been complex and are time consuming to interpret. A code was developed which incorporated a field for interpretations, so that the activity (skinning, disarticulation, filleting, etc) could be included as well as factual information, giving the author's own interpretation of the marks while also allowing re-interpretation. The records were tiered from coarse detail (which part of the carcass) to fine (exact position of the cuts) so that the investigation could be targeted according to scale: characteristics such as the relative frequencies of marks on each bone could be investigated by phase or feature type.

The first section in this chapter describes the incidence of butchery, and the types of butchery marks on pig bones at Danebury; then interpretation of the marks and changes over the phases and between features are identified. The features are investigated separately in order to define the extent and nature of any difference between pits, which may contain structured or special deposits, and layers, which might be more representative of 'ordinary' disposal. The overall divisions of the carcass are described as these will be used as the basis for spatial investigation.

Possible biasing factors, such as fragility of the bone, are also addressed. The extent to which the robusticity (and therefore age) of bone may have affected the butchery patterns was investigated by linking the butchery database to the overall database, and checking co-incidence of butchery marks on bone from young and mature animals.

The pig butchery is followed by similar description of the cattle butchery. This is followed by a comparison of pig and cattle butchery at two sites around Danebury, investigated by Cunliffe in the Danebury Environs programme of excavations (Cunliffe 2000). The differences in butchery and consumption between the environs sites and Danebury are then described, in an attempt to provide information about their relationship to each other.

3.2 PIG BUTCHERY AT DANEBURY

3.2.1 Incidence of butchery marks

	LAYERS				PITS				TOTAL
CERAMIC PHASE	Total bone fragments	% of all bone fragments	total butchered bone	% of bone butchered	Total bone fragments	% of all bone fragments	total butchered bone	% of bone butchered	
1-3	**270**	**7.2**	**11**	**4.1**	**1651**	**23.6**	**55**	**3.3**	**3.4**
4-6	**825**	**22.1**	**24**	**2.9**	**1724**	**24.6**	**48**	**2.8**	**2.8**
7-8	**2630**	**70.6**	**60**	**2.3**	**3623**	**51.8**	**110**	**3.0**	**2.7**
Total	3725		95	2.6	6998		213	3.0	2.9

Table 3.2: Pig butchery incidence by phase: teeth and unassigned fragments of skull are excluded, as are bones that are undated or insecurely dated (e.g. to cp 6-8).

The overall incidence of butchery marks observed on pig bones is relatively low, at 2.9% of identified bone (table 3.2). Butchery marks are found on a very small proportion of all bones, and the variation of a few percent between the phases and features may not be significant. In the early phases (1-3) there was a higher incidence in layers (4.1%), but by the late phase (7-8) the incidence had dropped to 2.3% in layers, but showed little difference in pits. Indeed, statistical tests (χ^2) showed no significant difference between phases in pits (P=0.668, df2), but a significant difference in layers (P=0.174, df2). The only statistically significant difference in incidence found between pits and layers was found in the late phase, although when all pit and all layer contexts were compared, a significant difference in incidence was found (P=0.157, df1).

Phase	EARLY (%)		MIDDLE (%)		LATE (%)	
Feature	Pits	Layers	Pits	Layers	Pits	Layers
Chop	20	13	8	12	14	18
Cut	63	50	68	76	63	62
Skin	2	25	8	0	1	3
Fillet	15	13	16	12	22	18
Total (no.)	**55**	**11**	**48**	**23**	**110**	**60**

Table 3.3: Pig butchery: incidence of types of mark as a percentage of the total numbers of butchery marks.

The incidence of different mark types shown in table 3.3 is broadly similar across phase and feature, although there is a slight increase in filleting marks over time in both pits and layers. This increase is not statistically significant for pits (P= 0.619 at 2 degrees of freedom), but the layers did not contain enough material to test all mark types.

3.2.2 Butchery incidence by bone element

It can be seen from table 3.4 that certain bone elements, especially the tarsals at the astragalus and calcaneum, and the cervical vertebrae, show a high incidence of butchery throughout the phases. This must reflect the separation of the feet from the upper limb and the head from the torso. These marks suggest that removal of the feet and head was frequently carried out, but also that such butchery was particularly likely to leave marks on the bone. As might be expected, there are also numerous marks to the main meat bearing parts such as the scapula, humerus, pelvis and lumbar vertebrae, and to a lesser extent on the radius and ulna in the middle and late phases.

	EARLY			MIDDLE			LATE		
	Total	Butchered	Butchery %	Total	Butchered	Butchery %	Total	Butchered	Butchery %
Cranium	424	0	0.0	353	2	0.6	956	8	0.8
Mandible	119	3	2.5	129	2	1.6	310	3	1.0
Atlas	24	4	16.7	21	6	28.6	42	5	12.0
Axis	10	3	30	7	0	0	15	1	6.7
Scapula	81	6	7.4	67	3	4.5	181	11	6.1
Humerus	80	6	7.5	87	3	3.4	196	18	9.2
Radius	58	2	3.4	65	3	4.6	128	4	3.1
Ulna	49	2	4.1	53	3	5.7	131	8	6.1
Pelvis	58	5	8.6	85	4	4.7	158	15	9.5
Femur	71	3	4.2	98	2	2.0	147	7	4.8
Tibia	79	1	1.3	86	2	2.3	188	4	2.1
Ast/calc	80	10	12.5	81	9	11.1	140	10	7.1
Metac	37	1	2.7	64	0	0.0	101	0	0.0
Metat	41	0	0.0	53	1	1.9	70	1	1.4
Thoracic vertebrae	178	8	4.5	129	6	4.7	262	13	5.0
Lumbar vertebrae	72	6	8.3	35	4	11.4	95	5	5.3
Phalanges	125	1	0.8	213	1	0.5	235	0	0.0
Total	1586	62	3.9	1626	54	3.3	3355	116	3.3

Table 3.4: Pig butchery in pits at Danebury by bone element. Elements with no evidence for butchery in any phase have been excluded.
Deeper shading indicates higher incidence of butchery (shading graded at 2.5 % intervals).

The exception to this is the femur, possibly due to its fragility, although the femur is almost as well represented in early phase pits as the humerus (Grant 1984a: 515). Other usually poorly represented bone, such as the phalanges, also show a low incidence of butchery although this is probably due to the lack of meat on these parts.

The lack of marks on the cranium could be due to the fragility of this bone and difficulties involved in identifying fragmentary skull parts. It is possible that the scarcity of marks on this part in the early phase is due to small sample size, although there are marks on the skull from the middle phase, despite a lower sample size here than in the early period.

3.2.3 Pig butchery: pits

3.2.3.1 Pig butchery: early phase pits (figure 3.8)

Head: Central splitting is evidenced in one mandible and the only other evidence of butchery from the early period is a horizontal cut on the lateral back of the ramus. This is interpreted as resulting from the removal of the masseter muscle, which is fairly substantial in pigs.

Torso: Cuts on the atlas run across its dorsal surface, at right angles to the spine. The axis also shows examples of cuts for disarticulation across the ventral surface, parallel to the spine, and vertically on the side of the body. These both suggest cutting between the atlas and axis, probably during the removal of the head, and possibly to avoid cutting into the skull. One thoracic vertebra has a heavy cut on the side, perpendicular to the spine, as if to portion the thorax into parts. Another such mark is found on a lumbar vertebra and some of these also display marks on the dorsal surface parallel to the spine. These latter marks probably result from stripping of the flesh from either side of the spine, and where the cut falls on the transverse process, from removal from the side of the vertebra too.

There do not seem to be any cuts on the ribs, though the difficulty of assigning ribs to species may have resulted in fewer being recorded, and in the earlier records they were not recorded to species (see chapter 2).

Forelimb: A variety of marks was found on the scapula. Some are on the ventral side across the neck and some cut transversely across the blade. The latter are interpreted as filleting marks produced after the forepart had been separated, as is a cut on the top of the spine. Those cuts nearest to and across the neck are likely to have resulted from disarticulation of the scapula from the humerus. Other marks probably resulting from the same activity are found on the anterior surface cutting into the glenoid border.

Five slightly different positions of marks on the humerus, on different aspects and at different angles, all represent the disarticulation of the humerus distally from the radius and ulna. The proximal articular surface of the ulna also shows marks on the medial side indicative of the disarticulation from the humerus. One chop mark on the distal articulation of the humerus shows a heavier or cruder separation technique.

Hindlimb: Cuts are found in many different positions on the pelvis. Cuts across the ilium and ischium may represent meat removal, following disarticulation of the femur, which is evidenced by cuts along the pubis and on the medial side of the acetabular border.

There are very few marks on the femur, despite the fact that this bone was almost as common as the humerus (table 3.4). Like the humerus, the cuts lie horizontally on the lateral surface, possibly resulting from disarticulation from the tibia. As the butchery of 'meaty' parts generally leaves fewer marks on the bone in modern practice (May 1990), it may be concluded that the meat was stripped from this part, leaving no trace. However, this does not explain the relatively greater incidence of butchery on the humerus.

Marks on the astragalus and calcaneum suggest the removal of feet at this point. Cuts on the lateral surface of the calcaneum shaft suggest disarticulation from the tibia, and are mirrored by heavy horizontal cuts on the medial and anterior side of the calcaneum (the latter lower down). The astragalus has horizontal cuts to match, on its medial side.

One cut was noted on the dorsal side of a first phalange. This is likely to represent hoof removal, and there may be some significance in the separation of the metapodial from the hoof, both of which bear little meat and are generally removed together early on in modern butchery. It is possible that this cut could represent skinning, but the position of the cut to the distal epiphysis is more suggestive of disarticulation. There is no other evidence of skinning, on the head for example, and skinning marks are more likely to have been made further up the leg.

3.2.3.2 Pig butchery in pits: middle phases (figures 3.8 and 3.9)

Head: In phase 4 there is a unique example of a cut around the orbit (see figure 3.8), which could have resulted from eye removal. It is hard to envisage another reason for this marking, as the removal of head meat would demand cuts below the orbit, not on it.

In phase 5, cuts were noted on the inside of the jaw, midway up the ramus. These probably resulted from disarticulation of the jaw from the skull (see figure 3.9).

In phase 6 (figure 3.9) there was evidence of cuts (inside the mandible), further down, near the angle. These may have resulted from disarticulation from the skull, while finer vertical cutmarks could represent muscle or tongue removal.

Torso: In phase 4, marks on the atlas are similar to those made in the early phase, and may have resulted from the separation of atlas from axis during the removal of the head. A phase 4 lumbar vertebra shows evidence of cuts intended to separate it from its neighbouring vertebra. A cut across the sternum is likely to have resulted from exposure of the ribcage when opening the torso to remove the internal organs.

In phase 5 pit deposits there are similar cuts to lumbar vertebrae, though there is no parallel in phase 6 bone.

Marks on bone from phase 6 are small in number, but a cut across the ventral surface of the atlas appears to have been intended to separate the skull from the spine at the occipital condyle.

Forelimb: Marks on phase 4 bones again correspond to those from the early phases. Cuts along the caudal and cranial borders of the scapula blade suggest muscle stripping, while the cut across the posterior surface of the neck again represents disarticulation of the scapula from the humerus at this point (also found in phase 6).

A phase 5 bone has a disarticulation cut across the articular surface- a different cut for the same purpose.

Butchery marks on the humeri from phase 5 are similar to those of early phases: cuts across the distal epiphysis probably resulted from disarticulation of the radius and humerus. Marks on this bone in phase 6 pits have more in common with those from the late phase, occurring mainly on the lateral surface, but again probably resulting from disarticulation with the lower limb. A unique example from phase 6 bears marks across the centre of the shaft. On the lateral side one probably represents removal of the triceps, and on the anterior, another represents the removal of the pectoral muscle.

Cuts are relatively rare on the lower limb. In phase 4, marks are found on the lateral side of the ulna, on the articular surface, and probably result from disarticulation from the humerus, as these match cuts on the proximal surface of the radius. Cuts on a phase 6 carpal suggest disarticulation of the foot at this joint.

Other marks on the lower forelimb lie across the shaft of the radius and are from a phase 6 pit. These may represent skinning, coinciding with those midshaft on the ulna's lateral side. It is unlikely that this cut was made during skinning since it would not have needed to be so deep. Otherwise it could be argued that they represent meat stripping as this is where the muscle attaches and the cut may have been made while cutting into the start of the muscle mass.

Hindlimb: The cuts on phase 4 pelves correspond to those of the early phase. These are the cuts for disarticulation of the femur, and those on the ilium caused by meat stripping. Those from phase 5 show chopping to separate the femur from the pelvis. Again phase 6 is different, with no cuts recorded on the pelvis.

Very few marks are found on the femur: only two phase 6 bones with marks for filleting of meat were found. However there are 802 pig bones from phase 6, compared to 504 from phase 4 and 236 from phase 5. Overall there are 24 butchered bones in phase 6 contexts compared to 14 in phase 4 and 10 in phase 5, so it is possible that lack of evidence for femur butchery from phases 4 and 5 is due to the smaller sample. The absence of cuts on phase 6 pelves thus may be significant.

No cuts are recorded on the tibia or fibula, but cuts on the calcaneum are common. In phase 4 these are found horizontally on the anterior and posterior sides, to disarticulate the lower limb from the upper parts of the limb, leaving the tarsals with the hoof. In phase 5 cuts are noted on the distal epiphysis, on the lateral and anterior sides, probably resulting from the removal of the foot from the metapodials downwards, leaving the tarsals with the upper limb. These marks are mirrored in phase 5 by cuts horizontally on the proximal metatarsals which were probably created during disarticulation. The different positions of cuts in the middle phases may be significant as evidence of different techniques in place or different butchers. It is likely here that the varied positions of cuts represent no more than normal variations produced by one butchery technique, since the exact positions of bone and joints within the flesh are often difficult to predict.

3.2.3.3 Pig butchery in pits: late phase (figure 3.10)

Head: There is evidence for the splitting of the head centrally along the skull and between the two halves of the mandible. Splitting of the entire carcass into two symmetrical halves facilitates the removal of the skull from the mandible. In this case, splitting may have been necessary to remove the brain. Cuts under the orbit are common and probably result from removal of the masseter muscle.

Torso: There are cuts on the atlas on the ventral surface, running parallel to the spine. These might represent stripping of the muscle from the upper body of the pig. There is also evidence of many cuts and chops to separate vertebrae from the skull and from each other.

The varied nature of these cuts may reflect the larger sample for the period, but also could demonstrate the presence of differing techniques or people. Thoracic vertebrae have cuts along the spine representative of meat stripping. On the lumbar vertebrae, however, cuts are more varied, ranging from those on the transverse processes, to chop through and remove ribs (the ribs also show evidence of having been chopped through to portion them), to those on the body to split the trunk into portions, and on the spine, to fillet meat.

Forelimb: The scapula shows evidence for disarticulation, with cuts across the neck on the anterior and posterior surfaces. There is one cut across the spine, almost at the terminus, which must have resulted in the removal of the levator muscles to the spine. This suggests filleting.

The humerus also bears marks of knife disarticulation around the proximal epiphysis. There are filleting marks on the posterior and medial and lateral sides, and further evidence of disarticulation at the distal epiphysis, on the medial and lateral sides only.

These are mirrored by the cuts on the anterior proximal ulna, anterior, posterior and medial radius and the articulation, and on the ulna's posterior shaft and articular surface for removal of the humerus from the lower limb bones. Possible skinning marks are also recorded midshaft on the ulna, though not the radius.

Hindlimb: Cuts on the pelvis are similar to those from earlier phases, and are found across the ilium and ischium, probably resulting from meat removal. Marks are found on the acetabular border on the medial side and on the pubis, for femoral disarticulation.

Marks on the femur occur just below the head, on the lateral and anterior sides and are interpreted as disarticulation from the pelvis. There are few horizontal cuts on the distal articular surface for disarticulation from the tibia.

Disarticulation marks on the tibia are found on the medial side, cut vertically into the epiphysis, and across the fibula on the medial and lateral sides. There are horizontal marks near the base of the fibula and these probably represent skinning. On the anterior side of one tibia are heavy chops, probably splitting the bone in half.

Diagonal cuts on the anterior calcaneum suggest disarticulation. There are also cuts horizontally across the posterior astragalus, which probably resulted from disarticulation of the astragalus from the lower foot. Other evidence of cuts on the hoof was found on the distal articulation of a metatarsal. This would suggest that phalanges were being separated from the rest of the foot.

3.2.3.4 Pig butchery in pits: summary

Interpretation of the butchery marks suggests that skinning occurred only during the later periods, when it is evidenced by cuts across the lower limb bones. This might suggest either the introduction of a new process (skinning), or of a new technique for doing so. Alternatively, the force of the cuts may have been increased in this period, leaving marks on the bone when previously the process had been carried out without leaving any cuts.

The units produced from butchery evidenced in pits are relatively small and have an anatomical basis. Evidence of more divisions of the spine in the early and late periods compared to the middle phases indicates the use of smaller vessels in cooking. However, apparent differences may be due to the small sample size for middle phase contexts.

Evidence for the removal of the head is found in all phases except 5. The head is removed at the atlas/ axis division, rather than nearer to the skull, except in phase 6, where chops hit the occipital condyle and are unusual in their position and force. Marks for filleting of the meat from the skull are found in phase 4 and the late phase, while removal of meat from the spine, limbs and torso are common in all phases except phase 5.

3.2.3.5 Change over time

Although there is a predominance of techniques of disarticulation rather than chopping through bones in all phases, there is some variation within this general scheme. Butchery marks from phase 4 contexts tend to be similar to those of the early phase. Most marks from these periods are very similar, with the exception of a unique cut around the orbit in phase 4. There is, however, an absence of some significant marks in phase 4 deposits, such as the filleting marks on the masseter, splitting of the mandible, cuts to disarticulate the hooves from the metapodials, and chop marks in general. Butchery marks from phases 5 and 6 appear very different, though what this owes to small sample size is unclear. The late phase is different again, with skinning marks, chops through and cuts on the head more common. The disarticulation marks in this period are extremely consistent.

Comparison of the periods shows the early and late to be superficially similar (see table 3.3), but there are some evident differences. For example there is no evidence of the cutting of the cranium in the early phase pits (although there is evidence from layers and postholes). Cuts for decapitation in the early phase also avoid the skull, occurring on the axis and only the distal part of the atlas.

Overall there are more distinct differences in the butchery of the skull than of any other bone. This may reflect the 'special' status of the skull proposed by Grant (1984a: 533). If the skull was deliberately treated in a particular manner (for example, detached carefully, avoiding butchery marks) in the pit deposits of certain phases, this could be reflected in the pattern of butchery observed. This is further discussed in chapter 6.

Another difference in the middle period is the lower proportion of cuts on the distal metapodials and the phalanges. Such cuts on bones from other phases are interpreted as removal of the hoof. The small sample size may be a factor, so while it is possible that in the middle phases a different technique was prevalent, small differences such as this could simply be variations due to slight differences in the techniques of individual butchers.

A greater variety of cuts in the later phases, on bones such as the humerus, might imply that these parts were more often butchered in the late phase than in the earlier phases. However a greater variety of cuts is to be expected in the late phase since there are more bones in the sample.

3.2.3.6 Pig carcass divisions from pits

The interpretation of the butchery cuts indicates that the main method of pig butchery is disarticulation at joints. Such butchery would produce relatively small units of meat, especially as the pigs were normally killed when quite young (see section 2.4.3). Figures 3.11, 3.12 and 3.13 show the relative sizes of the meat parts that would be produced from the butchery, using disarticulation cuts and chop marks, i.e., excluding filleting cuts.

Chops through the humerus, pelvis and tibia observed in deposits from layers (and one from a late period pit), provide a contrast; they would result in relatively smaller joints of meat at an earlier stage of butchery. However the size of the animal is also an important factor: a large animal would need more butchery to produce joints of an equivalent size to those of a small animal. The number of chops found along the spine of the differently sized animals may vary according to whether the size of meat or specific cuts of the animal are important. The state of bone fusion can give some indication of the age; the relationship between the age (and so size) of animals and butchery technique is tested in part 3.2.7.

In the late period, chops to remove the head are found in pit and layer deposits, and evidence of splitting in pit deposits: these are probably due to primary and secondary butchery respectively. There is a possibility that skulls are split to remove organs or to portion the parts into smaller pieces, as the meat from the head is fairly substantial in pigs: a whole head provides over 2kg in modern animals (see Appendix 3).

It is difficult to determine whether in those phases where the cut marks suggest little division of the carcass, there was a tradition which demanded less cutting up of animals, or there is simply an issue of sample size. There may be some interesting patterns that suggest the small sample size is not a real shortcoming. In the pits of phase 6 few divisions are suggested, although this phase contains more bone than phase 4, in which the butchery suggested a greater number of carcass divisions. Conversely, the layers of the middle phase have few examples suggesting carcass division, with phase four having the least. There is little evidence for carcass division in the early and late phase pits but they differ in, for example, the incidence of evidence for hoof removal on bone from pit contexts. In the late phases the evidence for carcass divisions is very similar in pits and layers.

3.2.3.7 The sequence of dismemberment of pigs from pit deposits

The sequence of dismemberment is particularly difficult to identify. Here a sequence is proposed using evidence from the butchery. Assumptions are flagged as such.

Early phase

a). Removal of head and feet.

Ethnographic and historical analogy suggests that the feet were removed as part of primary butchery. Trotters were separated at the proximal phalanges.

b). Primary division

Removal of the limbs at the proximal femur and humerus scapula certainly occurred. It is suggested that this happened before the removal of the lower limbs, as it would be unwieldy to separate the radius from the humerus, for example, while the latter was attached to the main body. The occurrence of knife marks all round the distal part of the humerus and femur would suggest that limbs could be turned and therefore were not still part of the carcass.

c). Further disarticulation

The scapula and pelvis were then removed from the torso, and the tibia and radius/ulna from the upper limb parts. Vertebrae were probably split singly or into chunks after the removal of the limbs.

d). Filleting

Meat was removed from the vertebrae, scapula, pelvis and mandible.

There is no evidence for further processing such as marrow removal.

Middle phases

There is insufficient evidence of butchery to provide detailed sequences for butchery in the middle phases. The middle phases appear to be similar to the early phase.

Late phase

a). Removal of head and feet; skinning may take place at the same time or immediately before or after.

The feet were probably removed, either at the phalanges or metapodials. Metapodials may have been removed after the phalanges or with the phalanges and separated from them later, possibly for bone working (see part 2.4.4).

b). Primary division

Removal of the limbs at proximal femur and humerus again occurred. Again it is suggested that this happened before the removal of the lower limbs. In layers the carcass may have been split longitudinally down the spine, sometimes splitting the body of the vertebrae in two.

c). Further disarticulation

The scapula and pelvis were probably then removed from the torso, and the tibia and radius/ulna from the femur and humerus. The metapodials would now be removed from the limb or from the phalanges.

Ribs might then have been separated from the vertebral column, and the vertebrae split into chunks or individual joints

d). Filleting

Meat might then have been stripped from the vertebrae, scapula, pelvis, humerus and skull.

e). Further processing

One chopped tibia from this phase may have resulted from marrow processing or chopping to portion the parts without filleting. This rapid division is not a common method in Iron Age sites and could have been influenced by Roman techniques, which employ chopping more commonly. Larger animals such as cattle also tend to show more evidence of chopping, and the tibia could have been from a large pig.

Further processing could also include brain removal and other activities such as glue making which are hard to demonstrate archaeologically.

3.2.4 Pig butchery: layers

Here the layer material is presented mainly in terms of the difference in butchery compared to the material from pits, as there are a smaller number of bones with cuts from layers, and the nature of the evidence from these two features is generally similar. The incidence of butchery is discussed below, followed by the detailed discussion of butchery marks by phase.

Table 3.5 shows the incidence of butchery by bone. Some bones appear to have a high incidence across the phases, for example the atlas and humerus, which is no doubt due to the position of these bones in the carcass. The atlas for example is often cut when removing the head from the body, and the humerus when removing the less meaty lower limb from the very meaty upper limb. There is no evidence for butchery of metapodials in any of the phases, suggesting that these parts were not targeted in butchery at Danebury. However there are some variations in butchery incidence between the phases, which cannot be explained by such functional reasons.

	EARLY			MIDDLE			LATE		
	Total	Butchered	Butchery %	Total	Butchered	Butchery %	Total	Butchered	Butchery %
Cranium	46	3	6.5	196	2	1.0	515	9	1.7
Mandible	27	0	0	83	1	1.2	265	2	0.8
Atlas	6	2	33.3	12	1	8.3	30	3	10.0
Axis	1	0	0	5	1	20.0	7	0	0
Scapula	10	1	10.0	47	2	4.3	160	8	5
Humerus	16	1	6.3	45	4	8.9	151	10	6.6
Radius	7	0	0	30	0	0	90	3	3.3
Ulna	3	0	0	28	0	0	92	6	6.6
Pelvis	6	0	0	42	5	11.1	123	8	6.5
Femur	15	0	0	25	3	12.0	106	6	5.7
Tibia	16	0	0	31	0	0	133	0	0
Ast/calc	8	1	13.0	28	4	14.3	83	2	2.4
Metac	6	0	0	21	0	0	46	0	0
Metat	4	0	0	18	0	0	45	0	0
Thoracic vert	17	0	0	38	1	2.6	83	1	1.2
Lumbar vert	22	2	9.0	28	0	0	65	2	3.1
Phalanges	13	1	7.7	28	0	0	98	0	0
Total	223	11	4.9	705	24	3.4	2092	60	2.9

Table 3.5: Pig butchery in layers at Danebury by bone element. Elements with no evidence for butchery in layers or pits have been excluded.
Deeper shading indicates higher incidence of butchery (shading graded at 2.5 % intervals).

Differences between phases are most apparent in butchery to the head and feet, the limbs and the vertebrae. In the early phase, butchery to the cranium is relatively frequent, while in the middle and late phases there is a very low incidence. Butchery on the atlas and axis is frequent throughout the layer deposits, but more so in the early periods. The butchery to the tarsals and phalanges is also relatively more common in the early and middle phases with fewer marks in the late phase. This could suggest that in the early periods there is more emphasis on removing the less meaty head and feet than in the later phases.

On the limbs, there is frequent evidence of butchery to the scapula and humerus throughout the phases. However the rest of the limbs show no evidence of butchery in the early phase at all. By the late phase, all limb elements except the tibia show a similar incidence of butchery, possibly indicating that the carcass was being cut into smaller pieces in this period. The high incidence of butchery on the pelvis and femur in the middle phases could also be of importance: maybe these meat-bearing parts were cut up but the lower limbs left intact to be cooked on the bone.

The vertebrae also show a different incidence of butchery by phase, with a higher incidence of butchery on lumbar vertebrae in the early phase than the late and middle phases. Butchery of thoracic vertebrae is at a low incidence throughout. The small numbers of examples of vertebrae may influence the results here: there is evidence of butchery on only six of the vertebrae from all layers.

So, it appears that in the early phases, head and feet bones were butchered more intensively than the rest of the carcass, gradually changing so that by the late phase butchery was more consistent throughout the carcass, with a similar frequency on the upper limb bones. This might indicate that larger parts of the carcass were cooked in the early phases, becoming smaller in the later phases.

3.2.4.1 Pig butchery in layers: early phase (figure 3.8)

Such little evidence of butchery as was found from the early phase layers correlates with that in the pits: the disarticulation of the head at the atlas, the cutting up of the spine and the filleting of meat from it. There are cuts to the skull around the orbit and above the toothrow, interpreted here and in pit contexts as removal of head meat. Although only a small number of cuts was recorded, there is a contrast with those from pit contexts, where cuts on the body, especially the limbs, are relatively common, but there are none on the cranium.

3.2.4.2 Pig butchery in layers: middle phases (figures 3.8 and 3.9)

There are no marks recorded on bone from phase 4 layers. There is a clear correlation between marks on pig bone from pits and layers in phase 5. Cuts suggest the removal of the feet at the tarsals, and the disarticulation of the hind limb at the pelvis. Other cuts, such as those resulting from separation at the distal humerus, are rather varied in position, suggesting that the butchers were less practised or that butchery was not at this time a specialised craft. They are also found more frequently, possibly because this bone part survives relatively well.

In phase 6 layers there are fewer cuts than on bone from pits, but again a greater intensity of marks on certain joints. There are cuts on the middle and upper cervical vertebrae possibly for decapitation and/ or portioning the neck. There are cuts to disarticulate the scapula and humerus and the femur and tibia, and there are many different positions of knife and chop cuts separating the femur from the pelvis. There are no marks on the skull, though this may be due to small numbers of bone from this phase. There are none of the filleting cuts on the mandible, femur and humerus, common on the pit material. Bones from layers include more examples of disarticulation on, for example, the upper limb joints.

3.2.4.3 Pig butchery in layers: late phase (figure 3.10)

In the latest phases the pit and layer butchery marks are more similar than in other phases, although this could, to an extent, be due to larger numbers in the late phase providing more examples of all types of cut. Evidence of filleting of the meat from the bone is noted on a higher proportion of the bone from layers, but on fewer bone elements, and may represent a difference in butchery technique between the two feature types, where different bones are targeted for meat stripping.

There are similar cuts on bone from both feature types, including those to disarticulate the major long bones of the limb from each other, and possible skinning marks on the radius. In both types of context the spine appears to have been chopped into manageable units, the head removed at the atlas or axis, and it seems, split to remove the brain; the masseter muscle was removed by cutting under the orbit and on the lateral mandible. On bone from layer deposits, the cuts which hit the mandibular ascending ramus might have resulted as the follow through of a blow to disarticulate the head at the atlas. Longitudinal splitting of the carcass into two symmetrical parts may be evidenced by a split vertebra in addition to the split skull; there is no evidence for such splitting from pit deposits.

3.2.4.4 Pig butchery in layers: summary

Overall the pig butchery from layers differs in only minor ways to that from pits, the differences consisting mainly of increased incidence of knife cuts for disarticulation on the joints and filleting marks on the bone shafts. Chop marks are found especially in the late phase for portioning and meat stripping, for example on the head and vertebrae. Possible skinning marks are found across the lower limbs.

In the early phase butchery marks from layers are generally very similar to those from pits. An exception is the fairly common cuts to the cranium on bone from layers, found on bone from pit deposits until the late phase, despite the larger amount of bone from pits. A cut around the eye in phase 4 provides the only evidence of cuts in early- middle phase crania butchery. This difference between pits and layers is tentative but if verified by other species, suggests that, in the early phase at least, the material dumped in different feature types resulted from different activities. It is possible, for example, that skulls in pits were deposited still fleshed, or that meat was removed without using knives, perhaps by boiling whole.

The overall impression from the middle phase layer data is that of a more careless division in a less proscribed way: bones from layers have marks in more positions but for the same purposes. This could suggest some sort of change in the butchery methods used in this phase. Marks are concentrated on certain key areas (the distal humerus in phase 5 and the proximal femur in phase 6), which suggests common disarticulation at these points, as in other phases and features. Slightly poorer preservation in layers may have resulted in the recovery of the most common types of cut but not the infrequent ones, if a number of the bones with marks on them had their surface eroded.

Why butchery on one particular joint is more common in one phase than in another is difficult to understand, although sample size may be a significant factor. It is difficult to determine whether the cuts in the middle period do represent a change in butchery technique. Overall the middle phases provide a considerably larger sample than the early phase, but still offer no evidence for filleting or chopping through bones or vertebrae, suggesting that the meat was being cooked on the bone, and possibly therefore being eaten by large groups of people.

In the late phase there appears to be a more intensive use of the carcass, also suggested by the bone from the pits. Some longitudinal splitting is evidenced on vertebrae as well as the skull, although this is not common. Filleting marks are present which could suggest that the animals were being divided up at an earlier stage and possibly for distribution to more or smaller groups of people. Filleting marks are not found on the hind limb bones in the layers, nor on the fore limb bones except the scapula. It is not likely that poorer preservation in layers eroded the surface of the less robust bone and led to filleting evidence being restricted to certain parts, since the difference was minimal.

However, layer material overall shows only slightly less evidence for butchery than pit material (2.5% compared to 2.8%), and in the late phase the difference is statistically insignificant. It is thus possible that certain practices have been preserved in certain deposits- the limb bones from layers may have been more commonly cooked with meat attached and then distributed, while pit deposits contain bone deposited directly after butchery before the meat was cooked. Alternatively the evidence from layers may be from animals split into relatively smaller parts, and so may be the remains of meals of those of lower status (if meat eating had high status). The differences between pits and layers are however fairly slight.

There is no evidence in any period of splitting bone for marrow extraction, suggesting a fairly unintensive use of the carcass.

3.2.4.5 Pig carcass divisions from layers

The relative scarcity of the marks from the layer material makes this a difficult topic to address. Where divisions can be postulated, they are often found in the same positions as those from the pit deposits. One possible difference is seen in the early phase, where the cervical vertebrae are separated from the thoracic, as is the case in late phase pit and layer material. This could be suggestive of the carcass being split into more parts in early layer deposits, possibly a result of smaller parts being required in certain contexts. Remains from these activities could then have been specifically deposited in layers. This trend may have been reversed in the middle- late phases where the layers appear to have less intensively butchered contents. Any differences are tentative due to the small sample size: there are only 11 butchered pig bones from early phase layers, although there are 55 in the early phase pits and 60 in late phase layers.

3.2.5 Differences between features: pit and layer comparisons

3.2.5.1 Differences between features: early phase

There are so few examples of butchery from layers in the early phase it is difficult to offer meaningful comparisons. Similarities include evidence for primary butchery such as the removal of the hooves at the first phalange and tarsals, and the removal of the head at the atlas and axis in both types of context.

Secondary butchery such as the disarticulation of the limb joints at the distal scapula and between the lumbar vertebrae is seen on pit and layer material. Other disarticulation marks, such as those on the proximal and distal femur, which are found on bone from pits are not found in layers, though as layers contain less than one sixth the number of bones found in pits, this may not be significant. Disarticulation marks on the occipital condyles of the skull are found on bone from layers, but not from pits; this may derive from different treatments of the head in different contexts.

Tertiary butchery is represented by marks indicating filleting on bones from both pits and layers. Bones from pits also show filleting which does not occur on layer bone, for example the removal of the cheek muscle from the mandible, but there is also - and more significantly - some filleting marks on layer bone that are not evidenced on pit material. Skull bone from layers bear marks for the removal of the masseter, while the vertebrae show fine marks across the spine representing meat stripping from either side of an intact spinal column.

It is difficult to determine whether the lack of marks for disarticulation in the layer material results from the smaller sample or is indicative of butchery into larger pieces. The generally younger animals from the pits (see section 3.2.8) would have needed less disarticulation to divide into manageable chunks, so age does not appear to be a factor, as there are more remains from the smaller younger animals in pits.

3.2.5.2 Differences between features: middle phase

There are no butchery marks from layers in phase 4. Sample size may be a significant factor (there are only 137 bones in phase 4 layers), but equally small sample sizes do show evidence of butchery: in phase 5 layers 5 of 137 bones are butchered. A lack of evidence for butchered bone from layers might then suggest some different process at work.

The marks from phase 5 features are very few in number, and concentrate on the disarticulation of the humerus from the radius, with 3 different types of mark for this purpose in the layer deposits. Other marks coincide with those from the pit material.

Phase 6 has the largest middle phase sample. The pits therefore show more evidence of primary butchery and this could indicate a differential depositional activity where layers do not contain material from animals that had been skinned. Again, the possibility of cuts not marking the bone make such negative conclusions extremely unreliable.

The separation of the femur from the pelvis in layer material is evidenced by a variety of cuts. There are none on the animals from pits although these are often younger, therefore probably smaller (see section 3.2.8), so might not require as much butchery to produce comparable sized meat portions to the older animals deposited in layers. Apart from cuts on the distal scapula from disarticulation, which are common to both feature groups, there are other differences in the rest of the marks. Cuts to separate the femur from the pelvis and the tibia, for example, are only found on the bones from layers.

Filleting marks are absent from bones in layers. In pit deposits, filleting of the meat from the humerus, femur and mandible suggests that meat was cooked off the joint, while in the layers the deposits may be remains of meat cooked on the bone.

Thus there appear to be differences between butchery processes on the bone deposited in the two feature types in this phase, with layers showing more evidence of division at primary and secondary butchery points and less tertiary butchery. This could be a reflection of consumption habits: perhaps bone that was deposited in layers had been cooked with the meat on, and that from pits had been filleted before cooking.

3.2.5.3 Differences between features: late phase

There is a slightly lower incidence of butchery on the later phase layer bones: 2.3%, compared to 3.0% from the pits. Where found, the marks interpreted as skinning marks are identical between feature types, as are those from primary butchery: removing the feet at the tarsal (and at the phalanges in pits) and the head at the occipital condyles. Chops through the tibia and atlas are found only in pits.

Evidence for secondary butchery, portioning, also appears to be similar between feature types. Chops through bone are proportionally slightly more frequent in layer material. Rough portioning by chopping occurs on the vertebrae of both features, but splitting of the skull, presumably for brain extraction, is more common on the layer material.

Cuts made during filleting are similar where found, but seen on a greater proportion of the bone in pits. The skull shows evidence of similar butchery in both feature types, though with a greater variety of marks from the layer material.

The greater variety of marks on the bones recovered from layers, such as the evidence for removal of cheek meat and disarticulation of the pelvis, skull and humerus, could suggest that two different butchery processes were in practice. Alternatively it is possible that more people could have been involved in the butchery of animals deposited in layers, creating a greater variety of cuts on the bones from these features.

Statistical analysis is required to check that the perceived differences in this phase are significant, but sample size limits the scope for such analysis for this species. Overall there seems to be little difference in butchery techniques between the features in the late phase.

3.2.6 Pig butchery conclusions

There appears to be a good correlation of butchery techniques between feature types in the late phase, and a poorer correlation in the middle and early ones. A possible hypothesis to explain this could be that the increasing homogeneity between the features over time is potentially linked to a less specialised deposition in pits, or less importance given to the specific depositional context. This is explored further in the discussion. However, the smaller numbers of bones and butchery examples in the earlier periods might account for the apparent differences. In the later phases the differences between pit and layer deposits are illustrated only by a greater variety of marks on a relatively larger percentage of bones in the layers, not by differences in the placement of butchery marks. In the earlier phases differences between feature types might be explained as an adaptation of butchery to the older and larger pigs in the pits. These would require more butchery to produce similarly sized meat parts to younger, smaller animals, leading to different patterns between feature types.

Particular differences include evidence for the utilisation of the head meat: the skull shows marks made during filleting of meat only in the layers in early and middle phases, but in both feature types in the late phase. The evidence for the removal of the eye in the phase 4 pit deposit is the exception: this is not strictly the same process, although the eyes can be eaten. The removal of hooves at the phalanges, rather than or in addition to the metapodials, occurs only in early and late phase pits, and only in early layer deposits. The difference may be the result of smaller cuts being produced, so the trotters could be cooked separately, or of personal differences in techniques used by different butchers.

Less evidence for filleting in the early and middle phase layer deposits could suggest these deposits were made after meat had been cooked on the bone, while those from the pits had been filleted at the time of butchery.

In respect of carcass divisions, there is very little variety between feature types, and it seems that the cuts of meat produced are similar in both, although the placement of cuts may differ. Cuts for separation of the cervical and thoracic vertebrae in the early layers and late pits may have served to produce smaller meat parts in these contexts. This may be reflected by the evidence for cuts to remove ribs from vertebrae and metapodials from phalanges in the late phase pits.

These potential patterns are tentative due to the often small numbers of examples. It is only by considering more species that true distinctions may be identified.

3.2.7 Biasing factors: Age of pigs that had been butchered

Animal size was investigated to see if it affected the butchery patterns. Smaller carcasses require less butchery to produce standard sizes of meat parts, whereas larger carcasses require more butchery. Also younger bones are more fragile so may be under-represented, although such bias is unlikely to affect this analysis, since bone preservation was very good at Danebury.

The average sizes of mature pigs at Danebury ranged between 64.4-73.8 cm in height (using Matolcsi 1970), a difference of 9.4cm. However, the main determinant of size is the age of the animal. Immature animals will have been significantly smaller than the average mature pig (68.9cm), and the presence of younger animals can be identified from the fusion status of certain bones. The hind limb was chosen for investigation, since the pelvis, femur and tibia fuse at different ages, allowing identification of butchered bones from animals under 12 months (the age at fusion of the pelvis), over 24 months (the age at fusion of the distal tibia) and over 42 months (the age at fusion of the proximal and distal femur).

Chop marks were investigated first to see if portioning activity was more common on bones of mature individuals, but the small numbers of bone which could both be aged *and* bore butchery marks hindered this investigation. Of the bones bearing chop marks indicating cutting through joints, only the pelves could be aged. Filleting marks were also considered, as they might be expected on bones from larger animals, as these carry more meat.

Phase	Chopped pelves		Filleted pelves		% of pelves in this context which were fused	Total number of pelves in this context
	Total number	Fusion status	Total number	Fusion status		
Early	1	Fused	1	Fused	58	52
Middle	1	Unfused	1	Fused	54	35
Late	1	Fused	4	Fused	64	187

Table 3.6: Fusion status of butchered pig pelves (pits and layers).

Unfortunately, chop marks were found on only two fused and one unfused pelvis (table 3.6), Filleting marks were found only on fused pelves throughout the phases, although there were only six examples. The relatively high proportion of chopped and filleted pelves in comparison to the unfused pelves suggests that there was a greater concentration of butchery on the bones of the larger animals. However, as the pelvis is a bone that fuses relatively early (12 months for modern animals, Silver 1969), the findings have limited significance.

In the early and middle phases, there were no butchered distal tibiae with fusion data. In the late phase two butchered distal tibiae were fused; one had been chopped and the other had knife cuts indication disarticulation. Both were from pits, where in the late phase only 28% of tibiae were fused. The distal tibia fuses at 24 months in modern animals (Silver 1969). It can be suggested that butchered examples were more likely to be fused and therefore larger, supporting the hypothesis that larger (older) animals are more likely to be butchered than smaller (younger) ones.

There were only four butchered femora recovered from the early and middle phases. Where butchery evidence could be related to fusion, these were all unfused bones. However, both proximal and distal epiphyses fuse late in modern pigs (42 months, Silver 1969), and the vast majority of pigs from all phases had been slaughtered before reaching this age.

In the late phase, six out of seven butchered femora were from animals whose fusion of this bone was not yet completed. All but one butchery cut was related to disarticulation, a process that is likely to have been carried out on all but the smallest of animals.

The number of bones which were butchered and could be aged was very small, and this makes the results of this analysis very tentative. However, overall it appears that older and therefore larger animals were subject to more butchery. Thus the age profiles of animals in different contexts could affect the interpretation of butchery and therefore of spatial patterning of the parts produced from butchery.

3.2.8 Biasing factors: Ages of pigs in pits and layers

The age at death profiles of pigs from layers and pits were investigated in order to see if any difference between these features might have impacted on the incidence of butchery marks or spatial patterns: a carcass cut into more parts might be distributed more widely. Epiphyseal fusion analysis was chosen to investigate the relative ages, and to compare the age at death profiles from the pits and layers.

PITS		Early			Middle			Late		
Age at fusion*	Bone	F	UF	%F	F	UF	%F	F	UF	%F
1 yr	Scapula D	16	14	**53**	17	20	**46**	46	36	**56**
	Humerus D	10	22	**31**	9	28	**24**	64	51	**56**
	Radius P	17	19	**47**	16	26	**39**	46	38	**55**
	2nd phalange	19	24	**44**	33	42	**44**	55	34	**62**
	All	**62**	**79**	**44**	**75**	**116**	**39**	**211**	**159**	**57**
2 - 2 ¼ yrs	Metacarpal D	5	19	**21**	0	57	**0**	4	67	**6**
	Metatarsal D	3	28	**10**	4	46	**8**	8	46	**15**
	Metapodial D	6	38	**14**	1	28	**36**	6	52	**10**
	1st phalange	31	46	**40**	20	106	**16**	45	92	**33**
	Tibia D	8	38	**17**	7	39	**15**	30	71	**30**
	Calcaneum P	5	25	**17**	4	28	**13**	7	50	**12**
	All	**58**	**194**	**23**	**36**	**304**	**11**	**100**	**378**	**12**
3 ½ yrs	Humerus P	0	27	**0**	2	27	**7**	2	41	**5**
	Radius D	2	26	**7**	1	38	**3**	3	53	**6**
	Ulna P	0	21	**0**	0	30	**0**	1	52	**2**
	Femur P	1	33	**3**	0	45	**0**	1	45	**2**
	Femur D	4	32	**11**	2	56	**3**	2	65	**3**
	Tibia P	3	31	**10**	1	36	**3**	1	43	**2**
	All	**10**	**170**	**6**	**6**	**232**	**3**	**10**	**299**	**3**

Table 3.7: Age at death of pigs from pit deposits at Danebury. * Silver 1969.

There seems to be a consistency through the phases in the kill patterns of pig from pits. Approximately 40-55% of animals survived their first year (table 3.7), with the number of animals reaching the age of two years dropping to 11-23%, and only a very small proportion reaching the age of three and a half years. The majority of animals died early, before their second year.

In the layer deposits, the pattern is slightly different, with most animals (c.75-80%) surviving their first year, approximately a third reaching their second year, and between 10 and 25%

reaching the age of three and a half years (table 3.8). This suggests that pig bones disposed of in layers were from animals on average older and therefore larger than those deposited in pits.

In both pits and layers the average age at death after the first year appears slightly lower in the later periods. To form similar sized meat units, more butchery would therefore have been required in the earlier phases. As can be seen in part 3.2.8 this is not the case, and in fact animals are less butchered in the early phases in pits. This suggests that the size of the animal was not the only determinant of the extent of butchery that it received; in the earlier phases larger pieces of meat may have been required.

LAYERS		Early			Middle			Late		
Age at fusion*	Bone	F	UF	%F	F	UF	%F	F	UF	%F
1 yr	Scapula D	3	0	**100**	21	2	**91**	52	10	**84**
	Humerus D	3	1	**75**	13	8	**62**	46	18	**85**
	Radius P	3	2	**60**	15	3	**83**	42	9	**82**
	2nd phalange	4	1	**80**	9	1	**90**	22	8	**73**
	All	**13**	**4**	**76**	**58**	**14**	**81**	**162**	**45**	**78**
2 - 2 ¼ yrs	Metacarpal D	0	2	**0**	1	14	**7**	3	20	**13**
	Metatarsal D	1	1	**50**	3	5	**38**	2	16	**11**
	Metapodial D	1	1	**50**	1	5	**17**	2	21	**9**
	1st phalange	3	3	**50**	8	8	**50**	29	33	**47**
	Tibia D	2	2	**50**	8	4	**67**	23	33	**41**
	Calcaneum P	1	3	**25**	2	4	**33**	1	30	**3**
	All	**8**	**12**	**40**	**23**	**40**	**37**	**57**	**133**	**30**
3 ½ yrs	Humerus P	0	1	**0**	2	8	**20**	1	15	**7**
	Radius D				0	8	**0**	1	16	**6**
	Ulna P	0	1	**0**	0	5	**0**	3	13	**23**
	Femur P	2	4	**33**	1	4	**20**	4	22	**15**
	Femur D	2	2	**50**	2	10	**17**	4	30	**12**
	Tibia P	0	3	**0**	0	8	**0**	4	16	**20**
	All	**4**	**11**	**27**	**5**	**43**	**10**	**17**	**112**	**13**

Table 3.8: Age at death of pigs from layer deposits at Danebury. * Silver 1969.

3.2.9 Contemporary butchery of pigs

The purpose of investigating contemporary butchery was threefold. Firstly it was hoped to enable the author to check the interpretations made from the Danebury material. For instance, cuts to the distal lateral femur had been interpreted as arising from disarticulation, so when the femur was being disarticulated from the tibia in modern butchery, the position of the knife and any cuts or places where cuts would be likely to fall could be noted and compared to the cuts from the Iron Age material. Secondly, it was anticipated that watching the butchery of three species of animal would enhance understanding of the process of butchery, including differences due to conformation and size of the animal. Thirdly, I needed to develop my comprehension of ligament and muscle conformation in order to build upon the knowledge gained from anatomical texts, to facilitate further interpretations of butchery for other species.

The author visited M. Woods organic butchers in Leicester to witness the butchery of a half cow, half pig and a whole lamb. All of these animals were young when slaughtered, the heifer 29 months, the lamb 9 months and the pig 4 months of age. These may have been significantly larger than Iron Age examples, although Mr Woods noted the cow was small for its age. He uses traditional methods for division and secondary processing (e.g. sausage making), and knows the age and provenance of each animal carcass. The marks produced from different processes were recorded, as were the places where disarticulation occurred.

3.2.9.1 Primary butchery

This followed a similar pattern to the Iron Age examples from Danebury. In modern butchery the trotters are removed at the proximal metapodial. However, cuts on the first phalange at Danebury suggest that, here, the metapodials remained on the lower limb, or a separate cut was produced that consisted only of the metapodials and their associated meat. Mr Wood recalled people buying this cut in the past for food, and noted that although there was little meat on them, even the ligaments broke down into soft edible parts when sufficiently cooked. Mr Wood removed the head exposing the occipital condyles and the atlas, though no marks were produced in this process. The periosteum protects the bone to a certain degree, and it would be possible to carefully butcher and fillet a whole animal leaving no trace on the skeleton (Guilday *et al* 1962).

3.2.9.2 Secondary butchery

The secondary division of the carcass produced butchery marks that were comparable with the Danebury material on certain joints. For example many marks across the distal articulation of the femur were made during separation from the tibia (marks are also found on the proximal tibia). There were also filleting marks along the femur shaft, and cuts on its proximal end produced during separation from the pelvis. The scapula also shows disarticulation marks around the distal epiphysis, with cuts along the blade created during boning out (an example of this type of cut on a cattle scapula is illustrated in figure 3.14).

Some joints were more difficult to disarticulate than others. Mr Wood stated that pigs' legs altered position during transport. This made it difficult to accurately predict the location of the joint between the distal scapula and the proximal humerus, which is covered by a considerable quantity of meat. He used a cleaver to cut through the flesh and then a knife to disarticulate the bones from each other. He found the joint first time, and attributed this to practice. Potentially though, this separation could result in many marks around this area as the joint was searched for, either due to inexperience or shifting in position of the leg after death. This might explain the proliferation of marks on many of the Iron Age distal humeri. Mr Wood had difficulty locating the joint between the trotters and the metapodials, and cut through the distal metatarsal. However this was due to his lack of recent practice at this cut, since the current method is to remove 'unproductive' parts of the leg at the tarsals and carpals.

3.2.9.2 Tertiary butchery

Tertiary division shows some differences, for example the cuts on the spine and transverse processes of the pig vertebrae from Danebury. These were thought to result from filleting meat either side of the vertebral spine, from the back of the animal. This differs from modern methods, which for sheep involve filleting the meat off the bone from the outside of the ribcage, leaving one cut of meat and the intact ribcage (illustrated in figure 3.15). For pigs, the ribs are sawn through the middle, the flesh filleted from the bottom half (figure 3.16) and each vertebra separated leaving meat on the vertebra and top half of the rib as a 'chop'. Mr Wood kindly offered to attempt to take meat from the back of a pig, leaving its vertebrae and ribs intact. This left more meat on the lower part of the ribs than would normally have resulted, but he said it was relatively simple once he had got used to the shape of the bone. Fine cut marks were made on the medial surface of the ribs during this process.

There was also a distinct difference in the position of cuts on the pelvis and proximal humerus. In the modern examples the cuts are designed to reflect the quality of the meat for roasting. The rump at the back of the pelvis is of higher quality than at the front, and so a saw on the ilium further towards the anterior/dorsal part of the pelvis produces a larger cut of the higher quality meat than disarticulation further back towards the tail. The proximal humeral articulation is sawn through, instead of being disarticulated at the proximal joint, for the same reason. Thus, there is a different system in place for Iron Age divisions, suggesting that the same basis of economic variance has changed, or that it held no meaning in the Iron Age.

Mr Wood offered to remove the eye, a task he had practised in his training in order to improve his knife skills. This produces a very distinctive cut around the orbit which is extremely similar to one from Danebury illustrated in figure 3.8. He suggested that the eye would have been removed not to eat but because it tasted unpleasant when cooked. A substantial quantity of meat was removed from the maxillary and mandibular region (figure 3.17; see Appendix 3 for weights).

3.2.9.4 Comparison with Danebury

The parts that an Iron Age pig may have been divided into before deposition in late phase pit deposits clearly coincide with contemporary examples (see figure 3.18: gross divisions are made by chops and/or saws). Late phased pits were chosen as these have the most evidence of butchery due to greater numbers of examples. The removal of the limbs occurs in the same place, as do the primary butchery marks from trotter and head removal. The chop through a tibia found in a late pit is more similar to the cuts on contemporary lambs limbs where the humerus and tibia are left in the meat and separated from the rest of the limb. This could be because the smaller size of Iron Age pigs makes them of a similar size to modern sheep (figure 2.2), although this modern animal was a lamb, while the particular example given above was from an Iron Age pig of over one year old.

In modern practice the rump is of a higher value than the ribs, and so the two parts are carefully separated. The importance of cutting correctly is emphasised by Gerrard (1964), who notes that the loin is 75% of the total value of the animal, and the flank 25%. The profit made by the butcher depends on where the cut between them is made (1964: 255). There is no evidence for this type of practice in the Iron Age, and nor should we expect it to have been a consideration for the butcher(s) at Danebury. Once filleted, the resulting meat may have held different values depending on where it had come from, but there is no evidence for chopping through the pelvis to separate parts.

At Danebury, there are divisions through the vertebrae, although it is not possible to determine exactly where on the spine these fell, and the ribs appear to have been removed at their articulation with the vertebrae. This is a very different method to that of contemporary butchers, who saw through the ribs and fillet the bottom halves to isolate the belly meat, then cut between the vertebrae and adjoining upper parts of the ribs to form chops.

Similar filleting methods are demonstrated by the cuts on the skull and limbs of the modern and Iron Age pigs. The removal of the eye and cheek meat from the mandible and the skull are similar. The pelvis, scapula and humerus from pigs at Danebury appear to have been filleted in the same manner as the contemporary carcass. Numerous marks are found on the scapula and pelvis, which are difficult to remove. There is no evidence for filleting of meat from the lower limbs or femur at Danebury, though this does not mean it did not happen. It is possible that the lowest parts of the limbs were not filleted but cooked with the meat on, as these form relatively small joints that would not be difficult to cook with the bone inside, and the meat on the femur could be preserved as a joint of ham. Again the main difference between modern butchery and that interpreted for Danebury is the torso, where in the Iron Age the vertebrae are filleted, instead of being chopped apart and cooked on the bone as is current practice.

It is possible to cut easily through ligaments between bones, and some cases desirable to do so:

> 'As would be expected in a craft based on primitive custom, there appears to be a broad, general correlation between all these [butchery techniques], based on the skeleton of the animal. No individual, not even an ancient Briton, would go to the trouble of chopping through a bone if it were possible to find a convenient joint which could be severed with far less physical effort' Gerrard 1964: 28.

Although Gerrard clearly believes that this is the case, it is demonstrable that for certain reasons at certain times, this has not been the accepted method. For example in Roman butchery, animals were divided into equally sized parts by chopping through (Stokes 2000; Maltby 1979). He also goes on to say that the pelvis is an exception and can be cut through, which is not strictly true. The disarticulation of animals based on anatomy is practised at Danebury, but whether it is for ease or other reasons it is not yet possible to say.

By using disarticulation to a greater extent than chopping or sawing through in the Iron Age, blunting of tools would be lessened, so that metal implements might last longer. Alternatively, saving time by chopping and sawing rather than disarticulating awkwardly shaped bones, was not so important in the Iron Age as in modern butchery. Maybe cooking small boneless meat parts, which would save on fuel, was more important.

3.2.9.5 Conclusions

The major difference between contemporary and Iron Age butchery is the greater use of disarticulation at Danebury. In many cases, it seems that most bones were disarticulated: 'a single bone... reflecting only the envelope of meat with which it alone was associated' (Gilbert & Singer 1982: 26). This could imply a lesser concern with the differing values of meat as determined by texture and cooking techniques, inability to easily chop through bone, or a desire not to. Many of the differences could be explained by technological differences, since steel tools will saw and chop through bones with far less attrition to the blade than those of iron tools. The effect that tool types may have had on the butchery process is explored in the butchery experiment (Appendix 3).

The greater amount of meat left on modern ribs when attempting to replicate Iron Age patterns, suggests that the food value of these bones, for use in soups, etc., was higher in the Iron Age. These may have formed a separate cut, if we assume that meat consumption was low, or if meat consumption was high, may have been discarded, perhaps as a form of conspicuous consumption.

3.3 CATTLE BUTCHERY AT DANEBURY

3.3.1 Incidence of butchery marks

Overall, the incidence of butchery marks is consistently low (table 3.9), but there is a slight increase in incidence in the pits (from 1.3% in the early period to 2.6% in the late phase) and a relative decrease in incidence in the layers (from 3.7 to 2.5%). While this may partly be a bias due to the smaller sample size for layers in the earlier phases, it is probably not the case for the pits, which in the earliest phases make up 23% of the pit material. Although the difference in butchery incidence may appear small, the proportion of bone with butchery marks in the late phase is double that of the early phase, which may be significant.

CERAMIC PHASE	LAYERS				PITS				TOTAL
	Total bone fragments	% of all bone fragments	total no. butchered bone	% of bone butchered	Total bone fragments	% of all bone fragments	total no. butchered bone	% of bone butchered	
1-3	542	10	20	3.7	4621	23	62	1.3	1.6
4-6	1264	23	27	2.1	3460	17	56	1.6	1.8
7-8	3806	68	96	2.5	11826	59	304	2.6	2.6
TOTAL	5612		143	2.5	19907		422	2.1	2.2

Table 3.9: Cattle butchery incidence by phase: teeth and unassigned fragments of skull are excluded, as are bones that are undated or insecurely dated (e.g. to cp 6-8).

The overall pattern suggests that butchery incidence in pits and layers became more similar, as is the case for the pig bones (see part 3.2.1). Table 3.10 shows that pit and layer material shows statistical evidence of a change in the incidence of butchery over time ($\alpha = 0.05$).

	Layer material: all phases	Pit material: all phases	Early phase: layer and pit	Middle phase: layer and pit	Late phase: layer and pit
P=	0.156	0.000	0.000	0.239	0.096
df	2	2	1	1	1

Table 3.10: χ^2 testing of similarity in cattle butchery incidence between phases and features.

Statistical analysis also shows that there was a significant difference in butchery incidence between pits and layers in all phases (table 3.10). The slightly higher incidence of butchery in layers might indicate that the bone deposited in layers suffered more, or less careful, butchery. Poorer preservation of the layer material provides the expectation that marks on bone from layers would suffer from surface erosion, and thus make marks less noticeable.

3.3.2 Types of mark

	EARLY mark type (%)		MIDDLE mark type (%)		LATE mark type (%)	
	Pits	Layers	Pits	Layers	Pits	Layers
Chop	30	17	21	23	24	26
Cut	34	39	60	38	49	56
Skin	4	0	2	8	2	4
Fillet	32	44	17	31	25	14

Table 3.11: Cattle butchery at Danebury: incidence of types of mark.

The numbers of types of marks are too small to perform chi-squared tests to identify differences between pits and layers. However, qualitative observation suggests that in the early period there are proportionately fewer chopmarks and more filleting marks in the layer deposits than in the pits (table 3.11). The middle phase shows fewer cutmarks and more filleting marks in layers. The overall impression is one of difference between feature types in the early periods leading to similarity in the latest phase.

Butchery incidence is variable through phase, but in pits there is slightly less chopping and filleting, and more disarticulation, over time. In the layers there are fewer filleting marks and more chops and disarticulation cuts over time. The pattern is probably indistinct due to small assemblage numbers. Detailed investigation of marks must be completed before any conclusions can be drawn.

3.3.3 Cattle butchery: pits

3.3.3.1 Butchery incidence by bone element

On the forelimbs and cranium, the incidence of butchery seems to replicate the overall pattern, i.e. a higher incidence of butchery in the late phase (table 3.12). This is not the case for most bones of the hind limb or the spine, and these two major parts of the carcass may have been subject to different processes. If, for example, cooking or preserving meat on the femur was more prevalent than filleting, this might explain the relatively lower incidence of cut marks on the upper part of the hind limbs.

Other differences between bone elements may be due mainly to the anatomy of cattle. The commonest cuts are on the tarsals for disarticulating the feet from the body, and on the distal scapula for disarticulating the forelimb from the torso. These may be more frequently observed because these joints are difficult to locate or disarticulate, as well as being places where disarticulation normally or frequently occurs. Cuts to the tarsals are probably also common because these bones are situated at the point in the limb where the meat mass starts. Below this point there is very little meat, which make the tarsals a suitable target for cuts to remove the relatively unproductive lower parts. The lack of muscle covering also means that blades may impact on the bone more often.

	EARLY			MIDDLE			LATE		
	Total	Butchered	Butchery %	Total	Butchered	Butchery %	Total	Butchered	Butchery %
Cranium	1057	2	**0.2**	590	0	**0.0**	2257	11	**0.5**
Horncore	49	4	**8.2**	55	1	**1.8**	196	11	**5.6**
Mandible	170	3	**1.8**	157	3	**1.9**	633	13	**2.1**
Atlas	33	1	**3.0**	19	3	**15.8**	101	9	**9.2**
Axis	15	0	**0**	8	0	**0**	68	4	**5.9**
Scapula	116	6	**5.2**	144	6	**4.2**	462	38	**8.2**
Humerus	122	5	**4.1**	106	9	**8.5**	394	43	**10.9**
Radius	99	1	**1.0**	99	3	**3.0**	379	25	**6.6**
Ulna	55	1	**1.8**	57	3	**5.3**	222	12	**5.4**
Pelvis	136	7	**5.1**	113	5	**4.4**	451	23	**5.1**
Femur	109	9	**8.3**	81	1	**1.2**	393	14	**3.6**
Tibia	86	0	**0.0**	76	3	**3.9**	342	9	**2.6**
Ast/calc	83	19	**22.9**	80	10	**12.5**	302	41	**13.6**
Metac	72	3	**4.2**	62	2	**3.2**	231	8	**3.5**
Metat	45	0	**0.0**	51	0	**0.0**	225	14	**6.2**
Rib	268	0	**0.0**	218	0	**0.0**	704	1	**0.1**
Thoracic	244	6	**2.5**	157	9	**5.7**	1093	38	**3.5**
Lumbar	130	6	**4.6**	86	9	**10.5**	434	16	**3.7**
Phalanges	210	8	**3.8**	156	2	**1.3**	500	15	**3.0**
Total	3594	92	**2.6**	2837	66	**2.3**	10478	369	**3.5**

Table 3.12: Cattle butchery in pits at Danebury by bone element. Elements with no evidence for butchery in any phase have been excluded.
Deeper shading indicates higher incidence of butchery (shading graded at 2.5% intervals).

There is a relatively high incidence of butchery on middle phased vertebrae. This may again be anomalous, due to smaller samples from this phase, but it is also possible that a different butchery process was undertaken in these phases (for example the longitudinal splitting of the carcass) or, perhaps, of a difference in the performance of persons butchering.

3.3.3.2 Cattle butchery in pits: early phase (figure 3.8)

The position of marks on the head suggests skinning had taken place. Cuts on the side of the mandible below the toothrow may have been caused during filleting of the meat from the cheek. However, their position towards the front of the head, where there is little muscle, suggests they were more likely to have been made during skinning. Marks on the mandibular angle are likely to have been caused during filleting of meat from the side of the head. The horncore appears to have been chopped through at the base but also further up through the midshaft of the horncore, implying that consistency was not of paramount importance. A chopmark on the ascending ramus may have been made during the separation of the mandible from the skull. A cut on the hyoid probably occurred when the head was removed: its position correlates well with the position of cuts on the occipital condyles and proximal atlas, which were probably made during decapitation.

On the bones from the torso there is evidence of chops on cervical and thoracic vertebrae to separate them from one another. A longitudinal chop on a cervical vertebra may have been made during flesh removal at the neck, or possibly to split the carcass, although it is not centrally placed. A cut on the transverse process of a lumbar vertebra probably occurred during meat stripping from this bone. Only one cut from filleting was found on the scapula, on the lateral part of the blade. Numerous cuts and chops were found on scapulae, across the distal articulation and into the glenoid border, again most likely a result of disarticulation from the humerus.

One chop on the anterior side of a distal scapula may have been made during disarticulation from the humerus, although cuts into the scapula spine are likely to have resulted from meat stripping or perhaps portioning. Pelves in this phase also have many cuts and one chop on the acetabulum, made during disarticulation from the femur. A chop across the dorsal aspect of an ischium may have been made during portioning. One cut on the pubis is positioned too far from the articulation with the femur to represent disarticulation, and it is probable that this mark was made when filleting the bone out.

The forelimbs show evidence of knife disarticulation on the proximal and distal humerus. Only one mark was present on a radius shaft, presumably from filleting. Some cuts on the carpals are likely to have resulted from disarticulation at the metacarpals. One metacarpal had been split with a chop, possibly to enable the removal of marrow, or during bone working. Cuts on the proximal first phalange may have been created during foot removal, and those cuts across the shaft of the first and second phalanges possibly occurred during skinning, as there is no meat on this part and they are too far from the epiphyses to indicate disarticulation.

Cuts from separating the pelvis from the hind limb are recorded on the proximal femur, and those on the distal epiphyses of the femur were probably made while separating the femur from the tibia. A cut on the lateral side of a distal femur was probably the result of filleting activity rather than disarticulation, which one would expect to be targeted closer to the epiphysis. Cuts on the astragalus were almost certainly produced during disarticulation, while chops into the calcaneum were probably also made during separation of the feet.

3.3.3.3 Cattle butchery in pits: middle phases (figures 3.8 and 3.9)

The only cuts on the head bones are from phase six, where there is one cut on the base of a horncore, probably made while removing the horncase from the skull, and another cut under the orbit, made while removing cheek meat from the head. This mark is not firmly dated and it is possible that the pit it was excavated from was in fact phase 8 in date. Numerous cuts made during disarticulation from the skull are found on the mandible.

There are cuts on bones from the torso in all three of the middle phases. In phase 4 the lumbar vertebrae are chopped apart and the transverse processes chopped off in order to portion the spine. A knife cut on the underside of one of the transverse processes may have resulted from filleting activity. A cut to the atlas probably happened during decapitation. Cuts on the scapula blade and neck are consistent with filleting and disarticulation from the forelimb. One cut on the pelvis was probably also caused during disarticulation. A heavy cut into the ribs midway along the shaft may have been another method of portioning (illustrated in figure 3.8).

In phase 5 there are cuts on the cervical vertebrae which probably resulted from removal of the head or portioning of the neck, and further cuts from disarticulation of thoracic vertebrae. Three transverse processes had been broken from lumbar vertebrae. It is unclear how this happened, but as these particular bones were articulated it may have been accidental breakage caused during or after deposition, rather than as part of a butchery process. It is possible that breaks were made deliberately in order to divide parts manually (see Appendix 3). In this case the breakage could have occurred while removing the spine from the ribcage. There are no cuts recorded on the scapula or pelvis.

In phase 6 there are longitudinal cuts from filleting on the dorsal aspect of an axis, and a chop made during the separation of the third from the fourth cervical vertebra, possibly indicating decapitation. Cuts from filleting or possibly gutting are in evidence on the ventral side of a thoracic vertebra and on the ventral aspect of the transverse process of a lumbar vertebra. A cut on the articular surface of a thoracic vertebra was probably caused during disarticulation of this from the neighbouring bone in order to portion the spine. Marks on the scapula differ to those from the earlier phases, with evidence of two types of chop: one through the neck, and another to split the blade along its length. Two cuts from disarticulation are found on the distal part, one on the lateral and one the medial side. On the pelvis, cuts from disarticulation of the femur are found on the acetabular ridge, while a chop through the pubis may have resulted from portioning of the pelvis. Cuts midway along the ilium on its dorsal side probably resulted from filleting of this part, as they are not close to the articulation.

Knife disarticulation took place at the distal humerus in all phases, and is noted on the proximal ulna in phase 6. In phases 4 and 5 filleting marks were also noted along the ulna shaft, and in phase 6 a chop was made into its distal articulation. In a phase 5 pit, one cut for disarticulation was recorded on the proximal humerus of an articulated part-limb, which included all elements from the humerus to the first phalange. The latter also showed evidence of deliberate disarticulation.

On the radius, butchery marks included a chop into the proximal articulation in phase 4 and evidence of cuts to both epiphyses for disarticulation in phase 6. Also in phase 6, one radius showed evidence of numerous parallel cuts along its posterior aspect, interpreted as filleting marks. The considerable number of marks on a single bone suggests that the butcher filleting meat from this bone was less experienced or careful than the majority of butchers. Alternatively, this type of marking could have resulted from cleaning the bone surface of fleshy parts. Cuts were recorded on the distal first phalange in phase 4 and the distal metacarpal in phase 6. Since they were found at the epiphyses, both presumably resulted from removal of the hooves, though it is possible they were made during skinning. One cut across the shaft of a first phalange in phase 4 gives firmer evidence for skinning.

There are relatively few cuts on hind limb bones. In phase 4 one cut mark on the distal femur is interpreted as evidence for filleting, although it was possibly made during disarticulation. Another cut on a distal tibia in this phase is likely to have resulted from disarticulation from the lower limb. Cuts on proximal calcanea in phase 6 pit deposits were probably created during separation of the lower from the upper limb. Many bones with cut marks are not firmly dated and may have been from middle or later periods, which makes interpretation difficult. However, the cuts which fall into this category (a cut on the patella and chop into the proximal tibia, probably both for disarticulating the femur from the tibia, and cuts from filleting on the tibial shaft) are all also in evidence from the later phase. Filleting is also in evidence on a tibia from phase 5 pits.

3.3.3.4 Cattle butchery in pits: late phase (figure 3.10)

In the late phase the nature of the butchery marks alters. Chopmarks are far more common than in earlier phases, especially those splitting bones, although chops through articulations were also in evidence.

A variety of cut types was noted on skull bones. Skinning marks were found on the frontal bone and across the pre-maxilla. Marks created during filleting of the cheek meat were recorded around the orbit and on the mandible. Cuts and chops around the mandibular condyle, on the lateral and medial surfaces, and cuts on the medial side of the angle and ramus may have been caused during disarticulation or removal of the tongue. Cuts on the occipital condyles probably resulted from decapitation, and there are cuts consistent with this interpretation on several atlases. Cuts into the base of horn cores were probably made during the removal of the horn case or core from the skull. Cuts on the dorsal aspect of the hyoid may have been made during decapitation, and those on the sides of the hyoid from decapitation or possibly gutting. One chop mark was recorded on the medial aspect of the ramus, made by chopping into the head from its dorsal aspect. This may have occurred during disarticulation, tongue removal or while attempting to split the mandible longitudinally.

The bones of the torso also show evidence for the use of different implement types and activities. Knife cuts from disarticulation are found on the ventral and dorsal surfaces of the atlas, on the thoracic and lumbar vertebrae (presumably made when dividing the spine into smaller portions) and on the sacrum (in order to remove it from lumbar vertebrae, although this could possibly indicate skinning). A cut on the dorsal (sternum) end of one of the ribs may have been made when splitting the ribcage open lengthwise for gutting.

A variety of chop marks was noted on the torso from this phase. Longitudinal chops, presumably caused when splitting the animal in half, were recorded on the atlas and axis, the lumbar vertebrae and the sacrum. The initial separation of the spine from the ribcage was effected by chops into the articulation of the rib with the vertebrae. Other chop marks on the middle of the ribs probably resulted from further portioning of the ribcage. Transverse chops to divide the spine into sections were identified on thoracic, cervical, lumbar and sacral vertebrae. Chops were also found on the spine and transverse processes of thoracic vertebrae, presumably made unintentionally during this process.

Chops splitting the body of the vertebrae from the transverse processes could have been caused during rough filleting from the spinal column, leaving the transverse processes in the meat. Cut marks from filleting the animal's back and sides are found on the sides of the cervical, sacral and lumbar vertebrae and the sides and spines of the thoracic vertebrae. Fine cutmarks from filleting activity are also found on the midshaft of the ribs, caused during meat stripping from the outside of the ribcage.

Knife cuts on the neck and distal articular edge (glenoid border) of some scapulae were made during disarticulation from the humerus, while cutmarks on the lateral side of the blade and the spine probably resulted from the removal of meat. Cuts may be more frequently made on the scapula than other bones during butchery as the scapula is an awkward shape to fillet. One transverse chop into a scapula spine may have been made during portioning, or was possibly intended to chop through the articulation of the humerus and scapula, but missed.

Pelves show numerous knife cuts on the acetabulum for disarticulation from the femur, and one cut on the pubis may also be a result of this activity. Cuts resulting from filleting can be seen on the medial and lateral sides of the ilium and ischium. Chops on the acetabular border, through the pubis and into the ilium, all most probably result from disarticulation of the femur.

Knife cuts on forelimb bones created during filleting include oblique fine parallel cuts on the midshaft of the humerus and the radius. Cuts on the proximal ulna may also have been from filleting, although there is little flesh here and it is more likely that they resulted from disarticulation. The humerus has many cuts and chops around its distal articulation. Other evidence for disarticulation takes the form of knife cuts on the proximal humerus, distal radius, carpals, proximal metacarpals and the proximal and distal first and second phalanges.

Marks from chopping were recorded on the proximal metacarpals, thought to have resulted from separation of the feet from the upper limb. A chop which split the shaft of a second phalange transversely may have resulted from rapid or crude foot removal, while longitudinal chops along the metacarpals and the first and second phalange might have been caused during the splitting of the metapodial for marrow, or possibly bone working. The phalanges and metapodials may still have been articulated when this occurred, with the phalanges chopped incidentally.

Marks interpreted as cuts from filleting are also found on the hind limb on the femur and tibia. Disarticulation marks are found on both epiphyses of femora, tibiae, astragali, calcaneum and metatarsals. Chop marks made during the disarticulation of these bone elements are also found on the distal femur and proximal tibia, and on an astragalus and distal metatarsal. Chops had split a metatarsal and metacarpal longitudinally. Both chops were presumably made for marrow removal or bone working.

3.3.3.5 Cattle bone in pits: summary

Head: As was the case with the pig bones (section 3.2.5.1), there are some evident differences in butchery between the early and later phase deposits. In the early phase there is no evidence of cuts on the cranium, and cuts on the head are only recorded on the horncore and the mandible. There are no cuts on the skull or mandible in periods 4 and 5 except one cut on the occipital condyles. By phase 6 there is possible evidence for butchery on the skull, just underneath the orbit, as well as on the mandible and horncore. However, this skull bone may date to phase 8, so evidence for butchery of the cranium is only definite in the late phase.

In the late phase there are several cuts on or around the pre-maxillae, orbit and frontal bone of the skull. These indicate skinning and filleting. On the mandible, cuts from the removal of cheek meat and disarticulation from the cranium occur throughout the phases. Evidence for decapitation by disarticulation at the occipital condyles and atlas is present in both the early and late phases. Skinning evidence is apparent only on the mandible in the early period though it is also found on the cranium in the late phase. Cuts on the hyoid are present in early and later periods.

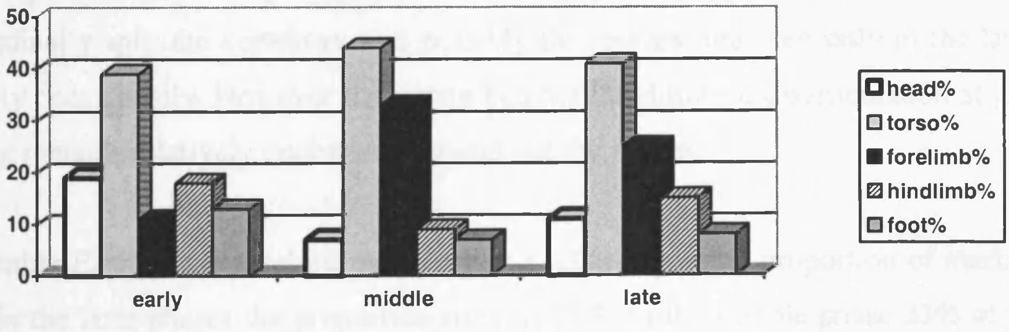


Figure 3.19: Percentage of bodily distribution of butchery marks by phase: cattle. 'Foot' refers to the phalanges and metapodial parts of both fore and hind limbs.

Torso: The incidence of cuts on bones from the torso is broadly similar across phases (see figures 3.8-3.10). However the range of cuts is more restricted in the earlier period, where they consist mainly of chops to separate the spine into chunks, chops and cuts to separate the limbs from the main body and filleting marks on the scapula, pelvis and vertebrae. In the middle phases the sample is smaller so there is less evidence for butchery techniques. However a slight change in the types of marks is evident: a cut through the ribs in phase 4 indicates portioning of the torso was occurring. While there is less evidence overall for disarticulation of the limbs, all the middle phases indicate this was still taking place.

The most pronounced difference is the use of a heavy implement to chop through the scapula in phase 6, where the scapula is chopped longitudinally along the blade and transversely across the neck. These chops replace filleting and knife disarticulation, the commonest types of marks in the other phases. A chop through the pubis is also evident in phase 6 pit deposits. So, a greater degree of bone division could be interpreted for this phase. In the late phase, filleting cuts on the scapula and pelvis are more prevalent than in previous phases. The cuts for disarticulation and chops are, however, much the same as in earlier periods.

In the late phase butchery evidence is more extensive, due probably to the greater numbers of bones from this period (see table 3.9). Cuts from filleting are found on all four sections of the spine, on all parts of the vertebrae (the body, spinous process and transverse processes) and on the ribs. This implies an intensive use of the meat, which appears to have been removed in small chunks. There are many disarticulation marks, from separating the vertebrae from one another and from the head and sacrum/pelvis. Chops are again frequently observed, on the vertebrae from the splitting of the spine, through the transverse processes when removing meat (and maybe ribs) from the sides of the animal, and through the ribs in order to portion the rib cage with bone intact. Chops that appear to have been intended to longitudinally split the vertebrae, and possibly the carcass, are seen only in the late phase, and only occasionally. However the strong butchery tradition of disarticulation at joints and filleting remains relatively unchanged throughout the phases.

Forelimbs: Early phase forelimb bones show a relatively small proportion of marks (11%), while in the later phases the proportion rises to 25%. In the middle phase 33% of forelimb bones are butchered. This is likely to be a product of the differently sized samples, as 15% and 13% of the bone comes from early and middle phases respectively, and 72% from the late phase. However it could possibly be suggestive of a change in butchery practice during the middle phases.

In the early period there are no recorded marks from filleting on the forelimb bones. This contrasts with the middle and late periods where filleting marks are found on the humerus (phases 4/5) and on the radius (phase 6), with numerous examples in the late phase on humerus, radius and ulna. It could be inferred that in the early phase, meat was more frequently cooked on the bone rather than filleted. However, it is more likely that filleting did not cut the bone on the fewer numbers of forelimb bones in the early phases. Chops or cuts on the epiphyses of the humerus, radius and metacarpals in the early period suggest that these were all disarticulated. Disarticulation was also practised in the middle and late phases, although in phases 4 and 5 there is no evidence of separation of bone elements between the humerus and second phalange. It is however possible that this is due to small sample size.

Chops and cuts created during disarticulation of the humerus and radius are the most common type of butchery mark, and in the latest phase marks for this purpose are not consistently placed, displaying variation in position and depth. One chop on cattle bone in the late period suggests that the humerus was split longitudinally from the distal epiphysis. Presumably this occurred after the removal of the radius, and would have enabled marrow extraction. Skinning marks on the shafts of the first and second phalanges are found from all phases, but skinning marks possibly increased in diversity in the late phase, where they are also seen on the metapodials.

Hindlimbs: Disarticulation resulted in marks on both epiphyses of femora and tibiae in the early and late phases. In the middle phases, however, there are considerably fewer marks on the upper hind limb. This may be attributable to small sample size in this phase. Circumstantial evidence for disarticulation of the femur and tibia is found in the form of cuts on the pelvis (phase 4), patella (inconclusively dated to phase 5), proximal and distal tibia (inconclusively dated to phase 6) and pelvis and calcaneum (phase 6). It is therefore likely that femur and tibia were disarticulated, although the evidence is inferred, not absolute.

Filleting marks on the tibia, radius and ulna became more numerous in the later phases. Filleting of the tibia is only in evidence from phase 5 onwards, while filleting cuts on the femur are present throughout (with the exception of phases 5-6). This could imply more intensive use of the meat after the early phase, with flesh stripped from those parts which bear smaller quantities of meat. Additionally, by the latest phase there is evidence that metatarsals were split, probably during the extraction of marrow. The implication is that there was indeed an increase in intensification of carcass utilisation in the latest phases. The production of smaller parts of meat may indicate that less meat was being eaten, or more frequently eaten but in smaller quantities.

3.3.3.5 Cattle carcass divisions from pits (figures 3.11, 3.12 and 3.13)

The major carcass divisions were interpreted from the points on the skeleton where disarticulation was evidenced. Qualitative assessment of the divisions suggests, not surprisingly, that cattle were divided into more parts than pig: the larger size of cattle probably accounts for the greater number of divisions. However, the recorded incidence of butchery is similar between the species. Some additional divisions were found for cattle carcasses. These are not limited to certain phases, and they include splitting early phase metapodials, removing the feet at the proximal and distal metapodials and possibly disarticulation at the second phalange. Chops through the pelvis are also evident and the vertebrae (including cervical vertebrae) were split into chunks.

Butchery techniques for carcass division were similar in the early phase and phase 4 pits. The smaller sample size provided a more limited range of marks in phase 4. However, differences include division of the spine and chops through the ribs to divide the ribcage into sections in phase 4. Phase 5 again has only a few marks, but they are similar to those of phase 4. Phase 6 shows evidence of the first incidence of chopping through the scapula, transversely and longitudinally, in addition to the portioning activity on the spine and ribs mentioned above.

In the late phase there is a greater variety of butchery marks resulting from carcass division. In addition to the greater incidence of chops splitting the bone, cuts were also noted running longitudinally down the spine. The pelvis had been split into numerous parts and the ribs chopped and disarticulated from the spine, in a manner similar to that of the previous phases.

The greater diversity of cuts in the later phase may be due to larger sample size, but it is also possible that this indicates a significant change in butchery technique: a less rigid butchery technique may have been adopted. Maybe more meat parts were demanded from each carcass due increasing pressure on food resources. Perhaps (meat) eating had become family, rather than community, based.

3.3.4 Cattle butchery: layers

The small numbers of butchery recorded on each bone element almost certainly introduce bias into the analysis, especially in the early period. However, certain elements show a consistently high incidence of butchery in all three periods, for instance the astragalus and calcaneum (table 3.13). Other elements show a high incidence in some periods only. The humerus for example has a high incidence of butchery in the middle and late phases but none in the early phase. Other bones which bear a large quantity of meat, such as the femur, show a different pattern: the femur has no recorded butchery marks in the middle period and little in the late phase; the incidence of butchery marks on the pelvis is relatively consistent through each period.

The largest sample, from the late period, indicates a high concentration of cuts on the atlas and tarsals, interpreted as evidence for decapitation and the removal of feet from the carcass. There is a lower but relatively consistent incidence of butchery marks on the meat-bearing bones. The lack of any apparent patterning in the early and middle phases suggests that here the sample size is too small for detailed investigation, and indeed, several of the bone elements are represented by only a few fragments.

	EARLY			MIDDLE			LATE		
	Total	Butchered	Butchery %	Total	Butchered	Butchery %	Total	Butchered	Butchery %
Cranium	51	0	0	147	2	1.4	383	2	0.5
Horncore	7	1	14.3	29	1	3.4	52	0	0
Mandible	40	3	7.5	44	0	0	200	2	1.0
Atlas	7	0	0	14	1	7.1	36	5	13.9
Axis	1	0	0	8	1	12.5	35	1	2.9
Scapula	26	2	7.7	49	2	4.1	219	8	3.7
Humerus	26	0	0	67	9	13.4	214	14	6.5
Radius	19	2	10.5	51	3	5.9	165	6	3.6
Ulna	11	0	0	25	1	4	78	4	5.1
Pelvis	21	1	4.7	65	3	4.6	196	12	6.1
Femur	16	1	6.3	37	0	0	164	4	2.4
Tibia	22	1	4.5	46	2	4.4	152	1	0.7
Ast/calc	12	1	8.3	50	6	12	154	24	15.6
Metac	13	1	7.7	29	1	3.4	124	1	0.8
Metat	20	0	0	33	0	0	93	3	3.2
Rib	13	0	0	19	1	5.3	5	0	0
Thoracic	25	0	0	84	1	1.2	236	2	0.8
Lumbar	10	0	0	28	3	10.7	65	5	7.7
Phalanges	55	9	16.4	81	3	3.7	186	2	1.1
Total	395	22	5.6	906	40	4.4	2757	96	3.5

Table 3.13: Cattle butchery in layers at Danebury by bone element. Elements with no evidence for butchery have been excluded. Multiple mark types on a single bone are recorded separately.
Deeper shading indicates higher incidence of butchery (shading graded at 2.5 % intervals).

3.3.4.1 Cattle butchery in layers: early phase (figure 3.8)

There are relatively few types of mark on the layer material, possibly due to their slightly poorer preservation (Grant 1991: 447), but more likely to be due to the smaller numbers from layer deposits. Cuts are found from the disarticulation of the mandible from the cranium, and from the separation of the limbs from the feet and torso (on the distal scapula, proximal femur, distal metacarpals and distal tibia). Marks made during filleting are found only on the mandible, while skinning activity probably marked the first phalange. A cut on the base of the horncore was probably made during removal of the horn core or casing from the skull.

3.3.4.2 Cattle butchery in layers: middle phases (figures 3.8 and 3.9)

In phase 4 there is evidence for filleting on the humerus and the tibia. Evidence for filleting is also found on bone from phase 6 layers on the scapula, radius and skull. In the middle phases there is evidence for disarticulation on the distal humerus. This joint shows evidence of disarticulation activity in all phases, and while its robusticity may have contributed to the high numbers of butchery marks found on this part, it is likely that this joint was habitually disarticulated. Phase 6 layer deposits have the most examples of disarticulation of the middle phases, with cuts on the mandible, distal scapula, pelvis and tibia. There is no evidence of cuts made while separating the femur from the tibia.

Skinning activity marked the frontal part of the skull and the shaft of the first phalanges of phase 4 material. Chop marks in the middle phase are found only on bone from phase 6 where there was evidence that the horncore had been cut into. Other chop marks are found on the cervical and lumbar vertebrae, probably from portioning the spine, and on the pelvis, probably made when separating it from the spine.

3.3.4.3 Cattle butchery in layers: late phase (figure 3.10)

In the late phase there are slightly more chops, both to portion the bones and to replace disarticulation at joints. Chops for the latter purpose are found on the mandible, distal humerus, distal radius, distal first phalange, distal femur and calcaneum. Chops for portioning the carcass are found on the cervical vertebrae, scapulae, metatarsals (possibly to remove the feet), pelves (across the pubis and ilium), and transversely across the thoracic, lumbar and sacral vertebrae.

Evidence for filleting is less frequent than in the early phase, but cuts are found below the orbit, on the cervical, thoracic, lumbar and sacral vertebrae, and on the radius, pelvis and tibia. This suggests that meat was being filleted from the bone in tandem with chopping activities to portion elements. Marks interpreted as evidence of skinning are found on the frontal part of the cranium and across metatarsal or tarsal shafts. Cuts on the caudal vertebrae may have disarticulated the tail, or were possibly caused during skinning or even filleting (though the latter would have been intensive work for a small amount of meat). Marks made during disarticulation were recognised on many bones, including the mandible, occipital condyles, distal scapula, humerus, metacarpals, femur, pelvis, lumbar vertebrae, patella and tarsals.

3.3.4.4 Cattle butchery in layers: summary

The smaller number of bone from the early phase makes comparisons of butchery techniques difficult. Some marks are extremely common, such as the cuts for disarticulation of the humerus from the scapula, the pelvis from the femur and the mandible from the skull. The incidence of, and techniques for, removal of the feet appear to be fairly consistent. However, chopping was introduced in the late phase, to disarticulate and to portion the bones rather than fillet them. Evidence for filleting drops considerably in the late phase. Marks are found on the cranium throughout, either from skinning or meat stripping.

Significant changes in butchery technique appear in the late period. The use of chopping, the presence of cuts on bones (e.g. caudal vertebrae) that were not previously marked, and cuts to separate the tibia from the femur, suggest a more intensive use of the carcass than in the earlier phases. A greater variety of cuts recorded on vertebral bodies and transverse processes in the late phases may also reflect increasing intensity as well as a larger number of bones. The introduction of chops to divide joints, which were earlier disarticulated by knife, suggests that the use of cleavers or choppers in butchery had become more common. Evidence for longitudinal division of the carcass is also present in the form of longitudinally split vertebrae.

3.3.4.5 Cattle carcass divisions from layers (figures 3.11, 3.12 and 3.13)

There is relatively little evidence for butchery in the earlier phases of layer material. Phases 3-5 contained bone that showed evidence for disarticulation at some but certainly not all joints. This is probably due to the smaller numbers of cattle bone in these phases (see table 3.9).

Phase 6 bones, however, show evidence of the longitudinal splitting of the vertebral spine, and chops to divide the pelvis into pieces. Chop marks are not present in the earlier phases and their presence in the late phase may indicate the introduction of a new technique or a relaxation of the existing one.

In the late phase there is evidence for more chops through bone in order to portion the pelvis, scapula, spine and tibia. It is possible that these were chopped in order to extract marrow, although they are not split longitudinally, which would facilitate marrow removal, and there is no evidence for longitudinal splitting of the metapodials. Chops into scapulae, which do not contain much marrow, appear to have been intended for portioning the shoulder prior to or instead of deboning. Table 3.11 shows that in the late phase, layer material shows a proportional decrease in filleting, and it may be that the meat was being cooked on the bone in smaller parts.

Overall, it seems that butchery noted on the cattle bones in late phase layers was designed to produce smaller meat units than in earlier phases.

3.3.5 Sequence of dismemberment: pits and layers

Determining the order of dismemberment is a subjective matter, and is hypothetical to a certain extent.

3.3.5.1 Sequence of dismemberment: early phase

Slaughter may have taken the form of an incision to the throat, causing the marks on the hyoid. However, it is possible that these cuts were made during decapitation. There is no evidence at Danebury for other archaeologically visible means of slaughter, for example pole-axing. Removal of the horncase is suggested from cuts around the base of the horncore. Cuts across the first phalange and the anterior part of the mandible suggest skinning. The head and hooves may have been removed around the same time, interpreted from cuts on the occipital condyles and proximal or distal metapodials. The internal organs were probably also removed at this time. As there are no marks indicating the opening up of the ribcage, it is likely that the internal organs were taken from the stomach cavity.

A chop into a cervical vertebra suggests that the carcass may have been split longitudinally, presumably after skinning and evisceration had taken place. There are however relatively few such chops recorded, and it may be that these resulted from chopping up individual sections of vertebrae, not splitting the whole animal. Other chops and knife marks suggest that the vertebral spine was split into sections and the limbs disarticulated. The pelvis and scapula also appear to have been chopped into sections, probably prior to or instead of meat stripping.

Meat removal from the mandible, scapula, lumbar vertebrae, pelvis and femur generally followed. The humerus, radius and tibia do not show such marks and although there is comparatively little meat on the radius and tibia, the humerus is a principal meat bearing bone. The forelimb therefore could have been cooked in large joints, although the smaller number of bones dated to the early phase may have led to an under-representation of filleting activity.

3.3.5.2 Sequence of dismemberment: middle phase

The middle phases do not have enough evidence of butchery to allow interpretation of the order of butchery although such evidence as exists suggests a similar method to the early phase. There is some suggestion of filleting of the forelimb being more common in the middle phase.

3.3.5.3 Sequence of dismemberment: late phase

The cuts on the hyoid suggest that the method of slaughter for cattle may have been slitting the throat. The horncase was probably removed by cutting around the base of the horncore, or cutting it off. If the latter occurred before removing the hide, the skinning process would be made easier. To obtain the largest area of hide, skinning probably took place before decapitation, followed by removal of the head and hooves. There is no evidence that the feet and head bones remained on the hide while it was processed. The cuts on the vertebrae suggest that the carcass was then split longitudinally, probably after removal of the internal organs.

The carcass was then further divided. The limbs were removed at the pelvis and scapula, the mandible from the cranium and the tail taken off at the sacrum or caudal vertebrae. After removal of the ribs, either whole or in sections, the spine was divided up. It is not known to what extent, and while it is possible that in most cases the vertebrae were individually separated from each other, there were also some deposits of articulated chunks of vertebrae. The limbs were further divided at the joints, and the metapodials separated from the phalanges and/ or upper limbs. In a small number of cases the metapodials were split, presumably for marrow extraction, or bone tool manufacture (see section 2.4.4).

Additional processing involved filleting meat from the bone. The skull was filleted, as were the scapula, vertebrae and ribs. Filleted bones may have been used in soups to utilise the marrow and remaining meat pieces. Also some meat bearing bones, for example the pelvis, were chopped into smaller pieces, in order either to cook the bulk of the meat on the bone, or maybe to utilise the meat which still adhered after filleting. These processes may have followed the initial dissemination of main meat parts.

The chronology of butchery processes is difficult to ascertain, and it is hoped that the investigation of the distribution of parts can suggest the extent of redistribution of the carcass, and possibly also indicate the stage/s in butchery that redistribution took place.

3.3.6 Differences between features: pit and layer butchery comparisons

Certain aspects of butchery technique are constant between feature types, such as the cuts for disarticulation on the distal humerus and mandibular condyle. However there are certain differences between features.

There is no evidence of cuts to the skull in the early phase pits and layers, which are present on the skull bone from middle and late phase layer, but not pit, deposits.

Cuts on the torso bones are least frequently observed in the early phased layers (figure 3.8). However the small numbers of bone from these contexts probably account for this. As all the butchery marks noted from the early phase layer material are also in evidence in the early phase pits, it appears that any differences are not evident from the recorded marks. In phase 4, cuts are again similar in both pits and layers, with the exception of one cut on a skull in a layer deposit, from skinning. Evidence for filleting is slightly more frequent in the layer deposits but again there are very few examples for comparison.

In phase 6 layer deposits there are no chops for portioning meat on the bone, as are often found on material from the pit deposits. Instead filleting marks are more often found, suggesting that if a new convention of chopping had been adopted, it was not practised on the animals deposited in layers.

In the late phase chop marks on bone are found from both layers and pits. Skull bones from both feature types bear cut marks from skinning and filleting. The greater number of filleting marks found on the bones from pit deposits suggest a greater intensity of meat use from these carcasses. This suggestion may be verified by additional evidence from pits, including the splitting of metapodials (possibly for marrow) and chops through ribs and larger bones such as the pelvis. These suggest that pits contained bone remains from smaller units of meat.

3.3.7 Differences between features: pit and layer carcass divisions

In the early phase, there is a consistency in butchery marks from layers and pits, so although there is little evidence for carcass division, it cannot be said that there is a difference between feature types. Phases 4 and 5 also show similar butchery in layers and pits.

In phase 6 the feature types show similar butchery, with chops through bone and disarticulation of most elements, although in layer deposits there appears to be less division of the hind limb.

In the late phase there are again many chops to divide up the spine and scapula, and to split the carcass longitudinally, resulting in greater division of the skeleton than in previous phases. The layer material does not appear to have as much evidence of bone splitting as the pits, and it may be that the layers contained remains of cattle carcasses that had been less intensively exploited for food or industrial activities.

Overall there are few differences between the pit and layer material in terms of carcass division. However the change over time may be important and is paralleled by the pig bone (see chapter 3.2.6).

3.4 COMPARISON OF CATTLE AND PIG BUTCHERY

A slightly higher proportion of cattle than pig humeri had cut marks on the distal articulation, indicating that this joint had been open during butchery, and therefore that the animal had been freshly killed (Luff 1994). For both species, there is evidence that cuts for disarticulation occurred all around the distal humerus, with pig bones showing 2 of 16 cuts on the articulation, and cattle bones with 7 of 36 cuts on the articular surface. Luff also suggests that cuts on the lateral, medial and posterior surfaces of the humerus may have resulted from inexperienced or incompetent butchers, but the consistency in technique shown by the majority of butchery marks suggest this is not the case. In some instances, though not all, cattle and to a greater extent pigs may have been stiff when butchered.

It was anticipated that the incidence of butchery on the cattle bones would be higher than that on the pig bones, due to their larger size and the greater quantity of meat recoverable from them. That this is not the case, and that butchery actually appears to be less frequent on cattle bones, is interesting and possible explanations are suggested below.

The selective breeding of animals in the recent past has altered the size and conformation of animals. In the Iron Age, the relative sizes and conformation of cattle and pig were closer (Grant 1984a: 463; Knight 2001) since pigs were probably more active and contained a lower proportion of fat. Thus the two species would not have required such differing techniques of butchery as they have done since the 'improvements' in animal breeding in the seventeenth century.

Alternatively, it is possible that there was only one legitimate butchery method at Danebury, which disregarded species differences. A very brief examination of butchery from dog and horse bone showed they were butchered in a similar manner to pigs, with disarticulation cuts frequently found on the distal scapula and tarsals, for example. Further investigation of this observation is beyond the scope of this thesis, but it is quite possible that the same butchery procedure was followed for each species, either for ease or through habit.

There are significant correlations between the butchery techniques used on the two species. Both show a well-organised, consistent technique of disarticulation in the early period, with some differences between feature types. In the later phase there is an increasing similarity between deposits for both species, and a greater intensity of division and carcass use. The pig bones show less evidence of butchery marks to chop through the larger meat bearing parts such as the scapula and pelvis, and it is possible that this may be a result of their smaller size. Cattle bones often show evidence of chops through joints, for example at the humerus-radius articulation, but this is less common on pig bone. The overall incidence of butchery on pig and cattle bone varies by phase, and in fact the overall incidence is higher in pigs (tables 3.2 and 3.9), so it should not be taken for granted that the smaller animals will necessarily be subject to less intensive butchery.

More effort is required to divide cattle joints, demonstrated, for example, by deep chops into the pelvic acetabulum. Symbolic/ sociological reasons may also have played a part: the pig and the cow may have served different purposes, and so different techniques or tools could have been used for them. It is also possible that different species were butchered by different people and for consumption at different occasions.

3.5 BUTCHERY FROM THE DANEBURY ENVIRONS SITES

3.5.1 Recording methods

The sites chosen for this analysis are described in the literature review (chapter 1.3.1.3). Julie Hamilton recorded butchery marks in detailed sketches and a coded database. I interpreted the marks she had sketched onto card files and transferred them onto the same skeleton diagrams as had been used for the Danebury butchery analysis. The lack of butchery marks shown on ribs and vertebrae (see figures 3.20 and 3.21) derives from the recording method. Most of these bones were not assigned to species.

Here, all deposits that were not pits have been labelled 'layers' to provide sufficient comparative data. These deposits include quarry and ditch fills.

3.5.2 Nettlebank Copse

3.5.2.1 Incidence of butchery:

In phase 1 (early Iron Age settlement), butchery marks were only found on bones from pits. In phase 2 (the late Iron Age banjo enclosure) they were only from ditches. This pattern reflects the dominant feature type at the settlement during each phase of occupation. Thus there was no opportunity to investigate differences between feature types in individual phases. The transfer from pit to ditch deposits upon reoccupation in the late Iron Age suggests that any differences in butchery techniques are part of an overall change in depositional practice, and could reflect that change. Julie Hamilton recorded the incidence of butchery by bone element. The small numbers involved mean that these interpretations can only be tentative, and in the main, statistical testing cannot be carried out.

	Period	Total bone no.	Butchered bone no.	% of bones butchered	P
PIG	Early Iron Age	431	15	**3.5**	0.729
	Late Iron Age	538	21	**3.9**	
CATTLE	Early Iron Age	270	36	**13.3**	0.001
	Late Iron Age	1101	78	**7.1**	

Table 3.14: Incidence of butchered pig bone at Nettlebank Copse (values from Julie Hamilton) and probability of the difference in incidence between phases being significant using Chi-Squared tests.

Pigs show a consistent incidence of butchery across phases (table 3.14: 1df, $\alpha=0.05$), similar to the pits and layers at Danebury. Statistical analysis suggests that the incidence of butchery in the early phase shows no difference between Nettlebank Copse and Danebury (P=0.835, df2), but a significant difference in the late phase (P=0.067, df2). The cattle show a statistically significant decrease in butchery incidence (P=0.001, df1).

As Hamilton (2000c: 110) states that bone in the late phase was in worse condition, preservational differences were investigated in order to ascertain whether these had contributed to the higher incidence of cattle butchery recognition in the early phase. The early phase bone was almost as poorly preserved at that from the late phase, especially in the uppermost parts of pits where up to 85% of bone had been eroded by rootlets. These bones showed fewer butchery and gnawing marks than those in the lower pit deposits, and Hamilton concludes that some information had been lost due to bone surface modification (Hamilton 2000c: 103). However the overall incidence of gnawing was in fact higher in the late phase. If surface erosion had obscured marks from gnawing and butchery activity, the opposite pattern would be expected. This suggests that preservational bias was not necessarily an issue at this site, although it could be suggested then that gnawing had obscured some butchery marks.

The apparent decrease in butchery over time could instead have resulted from various other influences. Dogs may have had greater access to butchered bone in layers than in pits (Hamilton 2000c: 110) thus providing more evidence of gnawing in the layer-dominated late phase, Alternatively butchery techniques may have been refined so the joint could be more carefully located and disarticulated in the late phase, requiring fewer butchery marks, or there may have been a genuine decrease in the numbers of bone which were butchered, for the production of larger joints, or by butchering smaller animals. However, the majority of individuals were mature in both periods, so size was probably not a factor.

3.5.2.2 Pig butchery at Nettlebank Copse

From Hamilton's figures, the humerus, femur and pelvis appear to have been most frequently butchered in the later phase, and the vertebrae, tibia, astragalus and metapodials in the earlier phase (table 3.15). The skull shows a similar incidence of butchery in both phases. Hamilton also showed that the percentage of whole bones was considerably lower in the later phase (with the exception of metapodials and phalanges). These two pieces of evidence combined suggest some fundamental change had occurred. It seems that meat-bearing bones were more intensively butchered in the late phase, and could suggest a more intensive exploitation of pig carcasses. The lower numbers of whole bone in the late phase could imply marrow extraction was taking place, and this also suggests more intensive use of the carcass.

	Early phase			Late phase		
	NISP	Butchered	% Butchered	NISP	Butchered	% Butchered
Skull frag.	41	1	2.4	64	1	1.6
Mandible	26	3	11.5	65	4	6.2
Scapula	15	3	20.0	36	2	5.6
Humerus	11		0.0	44	7	15.9
Radius	14	2	14.3	13	1	7.7
Ulna	8		0.0	20	1	5.0
Pelvis	7		0.0	11	2	18.2
Femur	5		0.0	24	2	8.3
Tibia	9	1	11.1	12		0.0
Astragalus	3	1	33.3	2		0.0
Metatarsal	7	1	14.3	3		0.0
Metapodial	6		0.0	3		0.0
Vertebra	56	3	5.4	44		0.0
Rib	72		0.0	49		0.0
Total	280	15	5.4	390	20	5.1

Table 3.15: Butchery incidence on pig bone from Nettlebank Copse. Elements that do not show evidence of butchery in either phase have been omitted. Source: Hamilton, pers comm.

Phase 1 (early)

Disarticulation of limb bones seems to have been practised, with the separation of the scapula from the humerus, the femur from the pelvis and the feet at the tarsals (see figure 3.21). The phalanges seem to have been separated from the distal metapodials by chopping. Filleting was common on the torso, limbs and head. Possible skinning marks on the metapodials were also noted.

Phase 2 (late)

Disarticulation is interpreted from marks on the mandible, scapula, humerus and pelvis, and there are also chops to separate the humerus from the radius (see figure 3.21). Filleting marks are found on the pelvis, femur, humerus and skull. There are no skinning marks evident.

Comparison of pig butchery between phases

In both phases the humerus was removed from the scapula and radius/ulna, and the mandible separated from the jaw by a chop in the early phase and knife cut in the late. The parts produced were apparently very similar, but the types of marks do differ slightly. In the late phase there are more chopmarks around meaty parts, particularly the humeral-radial joint. However in the early phase chopmarks are found only on extremities (the mandible and trotters). This is probably due to small sample size, although there are other possible explanations. Cleavers may have been used for primary butchery in the early phase, but in the late phase used for a wider range of different tasks, such as division of meat parts.

Marks representative of filleting activity coincide only on the head, where the cheek meat appears to have been removed. Marks on the inside of the mandible suggest the removal of the tongue, as does a cut on a tooth in the late phase. Other filleting marks are found on the meat bearing bones. In the early phase these are found on the scapula, radius, vertebrae, pelvis and tibia. The lack of filleting marks on the meat-rich femur and humerus in the early phase might indicate the roasting or salting/smoking of these joints. Corroborating this suggestion, 2.1% of the pig bones are burnt in the early phase, but only 0.4% in the late Iron Age. The filleting evidence on late phase meat bearing bone perhaps resulted from a demand for smaller units of meat. Meat could have been left on the smaller bones (radii, tibiae, vertebrae etc.), but removed from the humerus and femur as, complete, these would carry too much meat for a single portion.

There is no taphonomic reason why cuts to the humeri or femora would not be preserved in the early phase pits but would be present in the layer material. There are four times as many humeri and femora in the late phase layer material. It is possible that pits contained only certain parts of the carcasses and that the main meat bearing parts were disposed of elsewhere.

Skinning marks are found only on the early phase bones. This could be an artificial taphonomic difference, as bone where skinning marks are likely to be found are the cranium and phalanges, small or fragile bones which may have been damaged or overlooked in the more abraded ditch deposits.

3.5.2.3 Cattle butchery at Nettlebank Copse

Again Julie Hamilton had recorded the incidence of butchery for each bone element (table 3.16). Despite the small sample, there are distinct similarities to the pig data. Again in the late phase marks were less common on the trotters and more common on the vertebrae and humerus.

	Early phase			Late phase		
	NISP	Butchered	% Butchered	NISP	Butchered	% Butchered
Horn core	3		0.0	5	1	20.0
Skull frag.	46	5	10.9	161	9	5.6
Mandible	47	9	19.1	193	23	11.9
Scapula	15	2	13.3	48	7	14.6
Humerus	6		0.0	57	15	26.3
Radius	9	2	22.2	41	5	12.2
Ulna	5	1	20.0	31	3	9.7
Pelvis	17	4	23.5	60	3	5.0
Femur	4	2	50.0	24	1	4.2
Tibia	3		0.0	40	5	12.5
Astragalus	2	1	50.0	19	3	15.8
Calcaneum	7	3	42.9	15	2	13.3
Metatarsal	10	1	10.0	34		0.0
Phal1	2	1	50.0	11	2	18.2
Vertebra	9	2	22.2	20	2	10.0
Total	185	33	17.8	759	81	10.7

Table 3.16: Butchery incidence on cattle bone from Nettlebank Copse. Elements that do not show evidence of butchery in either phase have been omitted. Source: Hamilton, pers comm.

Phase 1 (early)

Light cuts across the frontal part of the skull and on the phalanges suggest skinning activity. Marks on the mandible, scapula, radius, tibia and tarsals suggest a technique based on disarticulation, although chop marks on the pelvis, mandible and metapodials also resulted from separating bone using heavier implements (figure 3.21). Differential recording might cause this effect. Definitions of chops and cuts are subjective and analysts' classifications may differ. In this instance Hamilton was 'conservative' about defining heavy cuts as chops (Hamilton pers. comm.), and Grant usually recorded heavy cuts as 'cut' in the database, although a note was added to the sketch to illustrate the force of the cut. Thus it is likely that the two records are not too divergent.

Filleting marks are found on meat bearing parts such as the scapula, pelvis and femur, and also on the radius and skull.

Phase 2 (late)

Evidence for skinning was found on the phalanges and the frontal part of the skull (figure 3.21). Disarticulation of the mandible from the skull is in evidence, and marks from disarticulation activity are also recorded on the scapula, humerus, radius, pelvis, tibia and tarsals. Chop marks are found in similar locations to the knife cuts made during disarticulation, for example on the distal humerus and proximal radius. Chops through the bone made during portioning are also found on the horn core, the cervical vertebrae and meat bearing bones such as the scapula and pelvis. Filleting had marked the main meat-bearing bones and the head, though not the pelvis and scapula which had been portioned by chopping.

Comparison of cattle butchery between phases

Chop marks on late phase bones are found on the horncore, cervical vertebrae and limbs (the scapula, pelvis and humeral-radial joint have been chopped through). This pattern bears some similarity to that noted for pig bone, where chop marks on the limbs and pelvis are evident only in the late phase. One chop on a scapula spine could inadvertently have been made whilst removing flesh quickly or been intended to portion the meat on the bone.

Primary butchery methods appear to be similar, including the removal of the hooves at the tarsals and carpals by knife. The disarticulation pattern also corresponds between the phases, with separation of the limb bones at both the humerus-scapula and humerus-radius joints and the proximal and distal femur. However there is an absence of cuts on the humerus itself in the early phase, which is also the case for the pig humeri. While this may be an effect of the small sample size, it could also suggest that the humerus and its attached meat were used as a whole joint, larger than that generally produced in the later period.

Another difference is the absence of filleting marks on the scapula and pelvis in the later phase. Possibly the meat from these parts was cooked on the bone, especially since there is evidence for chop marks *through* the scapula and pelvis, which would have divided them into manageable parts without filleting. Some chops on the pelvis in the earlier period could have resulted from portioning of large meaty sections, but were probably intended to divide the limb from the trunk, as the chops were made close to the acetabulum. Other filleting marks coincide between phases, except for those on the tibia. On this bone there are no filleting cuts in the early phase, but this may be due to the smaller sample in the early phase (N=3) compared to the later phase (N=40).

Skinning appears to have occurred in both phases, with evidence of knife cuts across the frontal part of the skull and on the phalanges/ metacarpals.

3.5.3 Suddern Farm

Throughout the phases at Suddern Farm the bulk of the material originated from pits, but in the late Iron Age and Roman periods animal bone was also recovered from the ditch and working hollows, respectively.

3.5.3.1 Incidence of butchery

	Total bone no.	Butchered bone	Unbutchered bone	% bones butchered
EIA pit	498	1	497	**0.2**
MIA pit	142	4	138	**2.8**
LIA pit	48	4	44	**8.3**
LIA layer	45	3	42	**6.7**

Table 3.17: Incidence of butchered pig bone at Suddern Farm.

The incidence of butchery on pig bones varies substantially between phases, possibly due to relatively small numbers (see table 3.17). Gnawing incidence suggests that preservation was poorer in the later periods, with 8.3% gnawed bone in the late Iron Age, with only 1% in the early phase (Hamilton 2000b). However, the incidence of unidentified fragments *decreases* over time, from 57.1% in the early phase to 30.9 in the late phase pits (Hamilton 2000b: 176), indicating that bone was less fragmented and/ or better preserved in the late phase. The incidence of butchery on ox bone rises in the late phase, which could also be taken as evidence for better surface preservation. It may be, of course, that the greater incidence of gnawing in the late phase has obscured further butchery marks which are hence unrecorded. However, the incidence of butchery on pig bone decreases, suggesting that gnawing was not consistent across species, and suggesting that it did not unduly influence the recognition of butchery marks.

The consistency between features and periods, which is present at Danebury and Nettlebank Copse, is not apparent here. Instead the incidence of butchery seems to rise throughout the Iron Age in pits. In the layer deposits there is a similar incidence of butchery as in pits. Small sample size may account for the variation, with only a few butchered examples from each type and date of deposit. Otherwise it is possible that the pattern suggests division of the carcass into smaller parts in the later Iron Age (see part 3.5.5).

	Total bone no.	Butch bone no.	Unbutchered bone no.	% bones butchered	P
EIA pit	355	48	307	**13.5**	
MIA pit	1101	104	997	**9.4**	0.031
LIA pit	418	34	384	**8.1**	
LIA layer	271	46	225	**17.0**	0.000

Table 3.18: Incidence of butchered cattle bone at Suddern Farm (values from Julie Hamilton) and probability of the difference in incidence between phases being significant using Chi-Squared tests.

Conversely the cattle show a statistically significant decrease in the frequency of butchery marks over time in both pits (P=0.031, 2df, $\alpha = 0.05$) and layers (ditches) (P=0.000, 1df, $\alpha = 0.05$), indicating real change (table 3.18). The incidence is still very much higher than that at Danebury where the average is just 2.1% in pits and 2.2% in layers. The incidence is also higher in layers than in pits, although again it decreases over time. The difference in butchery marks may be due to canine gnawing of the bone surface (although this is not likely to be the main cause, see above), or have been caused by a change in cooking methods, for example the introduction or increased incidence of either roasting large joints or preserving substantial meaty parts on the bone. The types and positions of marks are elucidated below to further investigate the butchery practice.

3.5.3.2 Pig butchery at Suddern Farm

The numbers of butchered pig bone from Suddern Farm are extremely small. The early phase does not provide much evidence for butchery practice, but what exists corresponds to that from the middle Iron Age (figure 3.20). There is a slight difference between middle and late phase butchery methods at Nettlebank Copse. Middle Iron Age butchery appears similar to that from Danebury: the disarticulation of trotters from limbs, limbs from the torso and further subdivision of the limbs was practised at both. However in the late Iron Age pits at Nettlebank Copse the only recorded filleting marks are on the upper forelimb. In late Iron Age layers there is more evidence of butchery including disarticulation of the distal humerus and filleting of the pelvis, scapula and mandible. The sample is too small to substantiate any alleged change, but of possible significance is the scarcity of evidence for disarticulation in the later pits, in preference for filleting, suggesting smaller meat parts were produced.

3.5.3.3 Cattle butchery at Suddern Farm

	Total	Butchered	Butchery %
Cranium	521	34	6.5
Mandible	213	46	21.6
Scapula	92	38	41.3
Humerus	91	45	49.5
Radius	91	20	22.0
Ulna	55	4	7.3
Pelvis	85	24	28.2
Femur	70	27	38.6
Tibia	69	16	23.2
Ast/calc	128	53	41.4
Metac	50	17	34.0
Metat	71	18	25.4
Thoracic	93	14	15.1
Lumbar	67	2	3.0
Phalanges	131	37	26.6
Total	1827	395	21.6

Table 3.19: Incidence of cuts to cattle bone at Suddern Farm from all Iron Age phases. Source: Hamilton, pers. comm. Shading graded at 10% intervals.

Hamilton's analysis indicates a far greater incidence of marks on cattle bone than pig (compare tables 3.17 and 3.18). She calculated butchery incidence by bone element for the whole Iron Age (table 3.19). The humerus has the highest percentage of marks, followed by the scapula, femur and astragalus. Frequent cuts on the tarsals are to be expected, since they are often disarticulated during foot removal, and are covered by a very thin layer of flesh, which is easily cut through. However, the large number of marks on the meat bearing bones indicates either that cuts for disarticulation are more forceful then needed, or that these parts are being fairly heavily processed, with meat routinely filleted, resulting in more cuts along the shaft of the upper limb bones. A more detailed investigation of the positions of marks by phase is presented below and illustrated in figure 3.20.

Early Iron Age pits

Skinning is interpreted from cuts across the upper first phalange shaft and across the frontal part of the skull. This differs to the early Danebury pit deposits where there are cuts on the mandible but not on the skull. Cuts from disarticulation are found on the epiphyses of all meat bearing bones and also on the metapodials and phalanges. Filleting marks are found on the scapula, humerus, femur and tibia, as well as on the head.

Middle Iron Age pits

Cuts across the shaft of phalanges and metapodials, and on the frontal and premaxilla of the skull, suggest skinning. There is a proliferation of cuts at the epiphyses of long bones, and also on the cervical vertebrae and tarsals, for disarticulation. Chopmarks are also found. They appear to have been used to chop through joints, on the cervical vertebrae, proximal radius, pelvis and tarsals. Other chopmarks include those through the scapula for portioning, some into the underside of the jaw, possibly to expose the tongue, and on the skull to remove the horncore. Filleting marks are found in similar places to the early material, but are more common and found on more bone elements, including the pelvis, vertebrae and radius, though not the skull.

Late Iron Age pits

Skinning marks are found on the metapodials and the frontal part of the skull. Marks for disarticulation are found on the mandible, atlas, cervical vertebrae, scapula, distal humerus, proximal radius, femur, tarsals and possibly on the phalanges (if these are not skinning marks). They are not found on the femoral/tibial joint or the pelvis. Filleting marks are present on the shafts of the main meat-bearing bones including the maxilla, pelvis, femur, tibia, scapula, humerus and radius. Chopmarks are infrequently recorded but are present on the mandible, proximal metatarsals and occipital condyles of the skull for disarticulation, and on the neck of the scapula, where the chops orientation might be indicative of meat removal or rough portioning. One chop that removed a horncore impacted on the skull.

The parts produced were very similar to those in the early and middle phases, with the exception of the hind limbs (there is no evidence in this phase for separation of the tibia and femur) and the neck (marks suggest it may have been a separate cut in this phase). The numbers of bone are fewer than in the middle period and similar to the early period, but the percentage of bone butchered is much lower.

Late Iron Age layers

The butchery evidence from layers is noticeably different to that from pits. Chop marks are more frequently observed, with chops across the proximal femur, pubis, atlas and mandible, all probably from disarticulation. There are also chopmarks in places where it is unlikely disarticulation was intended, such as through the radius and into the base of the angle of the mandible. Portioning most easily explains the former. The latter may have resulted from chopping through to remove the tongue, or may have been a miss-hit made when attempting to remove the head. It could also have occurred from breakage of the mandible to remove marrow.

Disarticulation marks are found in similar positions to chopmarks on the atlas, mandible and pelvis. They are also found on the tarsals, carpals, humeral/radial joint, scapula and possibly also on the distal metapodials.

Filleting is very common with numerous marks on the long bones, scapula and mandible (interior and exterior). Marks that may have resulted from skinning are also found on the pelvis and maxilla, as well as some on the metapodials. One metapodial has heavy transverse cuts along its length. It is hard to imagine what these were intended for. Skinning would not require such force or repetition, and they are in the wrong position for disarticulation. There is very little meat available here so it is not likely that the marks where made when filleting. Possibly the bone was stripped, maybe in preparation for bone working.

Skinning can be suggested from the cuts across the frontal part of the skull and the shaft of the first phalange, and possibly also from the numerous cuts on the metapodials, although these may be disarticulation marks.

The parts produced are very similar to those seen in the pit material, although the means of production (implements) were different. The high frequency of cuts on mandibles in the layers is the most striking difference to pit deposits, from which none was recorded.

Comparison between phases

Skinning: The evidence for skinning is consistent throughout all phases and context types.

Disarticulation: Disarticulation marks are similar throughout, in their placement if not frequency. The separation of the humerus from the scapula, for example, occurs on the scapula throughout, but on the proximal humerus in only early and middle phases. Also the cuts on the proximal tibia to separate it from the femur are only present in the early phase. These may well be simply a consequence of small sample size. However the lower incidence of cuts to these meat-bearing bones in the late Iron Age might suggest that larger parts were being produced. The much higher incidence of filleting marks in the layer material suggests that in layer material, the meat parts had been smaller. Evidence for disarticulation of the mandible with a knife also increases over time, though a chop noted from a middle phase pit was probably from the same activity.

Filleting: Filleting marks are relatively similar in incidence and position throughout the Iron Age phases and features.

Chop marks: The incidence of chop marks increases through time, with none in the early period and 11% in the late period. They are even more common in the middle period. In the late period, layer deposits from ditches are found as well as pits at Suddern Farm. Chop marks are common in both of these, and are found in similar positions. The late phase layers, which built up in ditches, provide evidence of very many chops. These are the most common type of mark in this phase, where for the first time they are frequently used both in order to portion the animal prior to filleting and to remove marrow after meat stripping.

Some chops in middle and late phase pits and layers seem to have been intended to fillet meat from the animal, as well as to separate at articulations. This indicates a more rapid method of meat removal, and contrasts with the evidence from Danebury.

The decreasing incidence of butchery in the pits over time is difficult to explain. It may be the result of variation in sample sizes, but could otherwise indicate that fewer cuts were being made by knives due to a more efficient or new method, or that larger parts were being produced. The very high incidence of butchery in the late layers may be due to the large proportion of filleting marks present in this phase, which indicates that small meat pieces or clean bones were required.

3.6 BUTCHERY FROM BALKSBURY CAMP

In order to compare the butchery pattern at Danebury to that from another hilltop site in Hampshire, to provide an indication of how these sites might have related to each other, Balksbury Camp was chosen since it is superficially similar in size and morphology to Danebury and has an accessible butchery record for the animal bone. It is slightly larger than Danebury (Wainwright & Davies 1995: 1), located approximately 8km NNE and was defended by a single earthwork, which may have fallen into disuse by the Iron Age (Wainwright & Davies 1995: 107). The other sites used as comparative datasets are both undefended settlements, and Nettlebank Copse was much smaller than Danebury

(Nettlebank Copse is 0.25 ha, and Suddern Farm 2.2 ha). Both Danebury and Balksbury were large-scale excavations; surface stripping removed 2ha of topsoil from Balksbury, compared to the 3ha of a total 5.3 ha at Danebury. The greatest concentration of features, including pits and circular structures, at Balksbury lies in the centre of the site, as is the case for early periods at Danebury. Some other features are present in more peripheral areas, but the eastern part of the site had been built on, so was unexcavated.

Balksbury has evidence of occupation throughout the Iron Age, in the centre of the settlement at least. Pottery dates the early period to 900-400, and the middle- late period to 400 BC-AD50. By the later phase the settlement showed no evidence of housing and use was concentrated in the central area where pits were filled (Wainwright & Davies 1995: 19). Its use may have differed considerably from Danebury in the later part of the Iron Age. Pits are of a similar nature to those at Danebury, filled with occupation debris, some containing carbonised grain and daub (Wainwright & Davies 1995: 16). Numerous stratigraphic layers filled pits, ranging from four to 15 per pit. 27 pits from the early phase were excavated, and 90 from the middle-late phase. Butchery marks were only recorded from bone found in pits, so no comparisons could be made between feature types.

3.6.1 Archives and recording code

The bone was recorded and written up by Mark Maltby (Maltby 1995), and detailed records of the butchery marks placed in the archive at the Faunal Remains Unit in Southampton. These records were coded according to specifications laid out in an unpublished Ancient Monuments Laboratory Report (Jones *et al* n.d.). The author decoded these records and transcribed the marks onto diagrams of pig and cattle skeletons, adding an interpretative element, the assumed function of the cut.

3.6.2 Butchery marks in the early phase

3.6.2.1 Pig

The only cut marks recorded from the early phase were filleting marks from knives on the proximal-middle femur (N=1) and the midshaft of the humerus (N=1). The incidence of cut marks is 4% (2/45).

3.6.2.2 Cattle

Butchery marks were found on 30.8% of cattle bones in this period. Cuts were found on most parts of the carcass (table 3.20; figure 3.21). Marks from skinning were recorded on the mandible (and possibly on the lower limbs, though these were more likely to have resulted from filleting or disarticulation). Disarticulation marks were found on the distal scapula, distal humerus and distal radius (and possibly proximal metacarpal), and on the pelvis, distal femur, and tarsals. Filleting marks were relatively uncommon and found only on the scapula, pelvis and radius.

EIA Ox	Total	Butchered	**Butchered%**	Chop	**Chopped%**	Disarticulated	**Disarticulated%**	Filleted	**Filleted%**	Skin	**Skin%**
Skull	27	0	**0**								
Jaw	24	1	**4**							1	**100**
Scapula	44	6		1	**17**	3	**50**	2	**33**		
Humerus		6		5	**83**	1	**17**				
Radius		6	**50**	3	**50**	2	**33**	1	**17**		
Ulna		4				4	**100**				
Pelvis	32	7				5	**71**	2	**29**		
Femur		1	**25**			1	**100**				
Tibia		0									
Ast/calc	2	1	**50**			1	**100**				
Metac	15	2		1	**50**	1	**50**				
Metat		2	**27**	1	**50**	1	**50**				
Rib	5	0	**0**								
Total, inc vert/phals	177	36	**20**	11	**31**	19	**53**	5	**14**	1	**3**

Table 3.20: Cattle butchery from early Iron Age Balksbury: cut type and frequency from bone in pits.

Chopmarks to remove the lower limbs, to separate the humerus from the radius and to portion the scapula were found. Those on the metapodials probably occurred during removal of the feet. Overall, chop marks are less common than knife marks for disarticulation, however they occur on some bones (humeri and feet). Filleting marks are relatively rare.

3.6.3 Butchery marks in the middle-late phase

3.6.3.1 Pig

There were more bones from this phase, with a similar butchery incidence to Danbury at 3%. It appears that joints were disarticulated using knives at the pelvis, distal scapula and distal humerus (figure 3.21). Filleting marks were found on the scapula, humerus, radius, pelvis and tibia. One chop across a mandible was possibly intended to split the bone for marrow.

In this period pig bones show more evidence of filleting and chopping (table 3.21), although this is probably simply a more accurate reflection of the butchery techniques, provided by a larger sample size. The disarticulation and filleting marks are similar between the phases.

MIA Pig	Total	Butchered	**Butchered%**	Chop	**Chopped%**	Disartic	**Disartic%**	Filleted	**Filleted%**
Skull	66	1	**2**					1	**100**
Jaw	54	1	**1**	1	**100**				
Scapula		8				6	**75**	2	**25**
Humerus	126	6				3	**50**	3	**50**
Radius		1	**13**			1	**100**		
Ulna		1				1	**100**		
Pelvis	101	3				1	**33**	2	**66**
Femur		0	**4**						
Tibia		1						1	**100**
Ast/calc	34	0	**0**						
Metac	88	0							
Metat		0	**0**						
Rib	91	0	**0**						
Total (inc vert/phals)	810	22	**3**	1	**5**	12	**55**	9	**40**

Table 3.21: Pig butchery from middle-late Iron Age Balksbury: cut type and frequency from bone in pits.

3.6.3.2 Cattle

13.4% of cattle bones were recorded with butchery marks in this phase. Cattle bones showed more evidence of filleting in this phase, with examples on all meat bearing bones. Also more bone elements showed evidence of chopping, even though the butchery incidence overall was lower. All joints disarticulated by knives also showed chops for the same purpose, while other chops removed the horncore, portioned the ilium and split the mandible and a metatarsal. This pattern of processing is like that in the middle phase layers and the later features at Danebury (compare figures 3.9, 3.10 and 3.21).

The types of cuts are largely similar in this period to the early Iron Age deposits at Balksbury (table 3.22). A lower percentage of chops is found overall, although again they are concentrated on certain bones (in this case the feet and skull). Poor preservation may have led to the prevalence of butchery marks on certain parts: the skull, foot and upper hind limb bones have less evidence of butchery, and these are more fragile parts, or small bones which may have been overlooked in excavation. However the mandible is a dense bone and with relatively few marks (17 in total), so it is unlikely that preservational bias affected the recognition of butchery marks.

MIA Ox	Total	Butchered	**Butchered%**	Chop	**Chopped%**	Disarticulated	**Disarticulated %**	Filleted	**Filleted%**	Skin	**Skin%**
Skull	190	5	**2.6**	4	**80**					1	**20**
Jaw	205	15	**7**	3	**20**	7	**47**	3	**20**	2	**13**
Scapula		21		2	**10**	15	**71**	4	**19**		
Humerus	353	44		5	**11**	29	**66**	10	**23**		
Radius		18	**27**	3	**17**	13	**72**	2	**11**		
Ulna		12		1	**8**	10	**78**	1	**8**		
Pelvis		25		2	**8**	19	**76**	4	**16**		
Femur	257	14	**20**			11	**79**	3	**21**		
Tibia		13		1	**8**	9	**69**	3	**23**		
Ast/calc	38	8	**21**			8	**100**				
Metac	146	6		3	**50**	3	**50**				
Metat		18	**16**	7	**39**	11	**61**				
Rib	6	2	**33**					2	**100**		
Total (inc vert/phals)	1499	201	**13**	31	**15**	135	**67**	32	**16**	3	**2**

Table 3.22: Cattle butchery from middle-late Iron Age Balksbury: types and frequency of cut from bone in pits.

3.7 BUTCHERY COMPARISONS BETWEEN DANEBURY, BALKSBURY AND THE DANEBURY ENVIRONS SITES.

Some difficulty in directly comparing phases between sites was encountered, due to the different chronological frameworks followed by different researchers. Figure 3.23 shows the correlation between site phases, using Cunliffe's (1995) chronology as a basis.

	Danebury (Cunliffe's categories)		Danebury (this analysis)		Balksbury		Suddern Farm		Nettlebank Copse	
	cp	dates	cp	dates	cp	dates	cp	dates	cp	dates
EARLY	3-4	470-310	1-3	470-360	1-3/4	900-400	3-4	470-310	3-4	470-310
MIDDLE	5-6	310-270	4-6	360-270	3/4-7	400-50	5-6	310-270		
LATE	7	270-50	7-8	270BC-AD50						
LATEST	8-9	50BC-AD50					8-9	50BC-AD50	8-9	50BC-AD50

Table 3.23: Comparative chronologies for selected sites. All dates are BC unless otherwise specified. Empty cells indicate absence of butchery and/or occupation evidence.

As explained in section 2.2, the phasing used to divide the animal bone into chronological periods in this project differed to that used by Cunliffe (1995: 24) for Danebury, and to that used by Cunliffe and Poole (2000a: 201) for Suddern Farm and Nettlebank Copse. A different scheme again was in use at Balksbury (Wainwright & Davies 1995: 108), with the result that often phases are not directly comparable. For instance, the late phase I defined for the butchery analysis covers a very long timespan due to the significant proportion of bones that could be dated only to ceramic phase (cp) 7/8. This means that my late phase overlaps with both the late and latest phase at Danebury and the later part of the middle-late phase at Balkbsury, but only the very latest phase at Suddern Farm and Nettlebank Copse. Therefore only broad comparisons can be made between sites in the later Iron Age. However, the middle-late phase at Balksbury (equivalent to cp 4-7 at Danebury) provides useful information for a period which otherwise has relatively little evidence of occupation on relatively small farmsteads. Butchery data for this period are entirely absent at Nettlebank Copse, for example, and there is also an absence of occupation evidence for cp 7 at Suddern Farm. The early phases are more easily comparable, although the end dates are slightly divergent: 400BC at Balksbury, 360BC for my analysis and 310 at Danebury and the Danebury Environs sites.

Another difficulty presented by this analysis is estimating the effect of inter-analyst difference when identifying butchery marks. Time did not allow for a detailed comparison of the actual butchery marks on bones from the sites investigated here; such an analysis is a complete topic in itself, and one which would be worthy of further study elsewhere.

3.7.1 Comparison of Nettlebank Copse and Suddern Farm

3.7.1.1 Pigs

The incidence of butchery at Nettlebank Copse is much more comparable to Danebury than is Suddern Farm. It has a similar incidence of butchery throughout the early and late Iron Age, in both pits and ditches, as does Danebury. However, Danebury shows a slightly lower incidence overall in layers, which is not noted at Nettlebank Copse.

The incidence of butchery at Suddern Farm is very irregular, increasing from 0.2% in the early Iron Age to 8.3% in the late Iron Age pits. Small sample size may be producing a bias, as the late Iron Age pits have only 4 examples of butchery of 48 pig bone fragments in total.

There is a conspicuously low butchery incidence in the early Iron Age pits, which may be interpreted as evidence for a more careful cutting technique in this period, and/or leaving more or all of the meat on the bone. This is backed up by the above interpretations, which suggest that disarticulation was the main method of butchery practised in the early period, and filleting in the late period, with both activities taking place in the middle phase. This appears to denote a gradual change in butchery, if it is not merely an artefact of the small sample size. Corroborative work with other species will aid interpretation.

It is possible that, as carcasses became more intensively divided up and boning out became more common, more marks were left on the shafts (from filleting) as well as on epiphyses (from disarticulation). Table 3.24 illustrates the apparent replacement of disarticulation cuts in the early phase, with chops (in layers) and filleting marks (in pits and layers) in the late phase, at Suddern Farm. It is possible that filleting marks may be underrepresented in the layers due to poor preservation in these features, as filleting marks are often fairly light. Thus filleting *could* have been common in both layers and pits in the late phase.

		Early pit Total no.	**Early pit % marks**	Middle pit. Total no.	**Middle pit % marks**	Late pit Total no.	**Late pit % marks**	Late layer Total no.	**Late layer % marks**
NC	Chop	2	**9**					2	**8**
	Cut	3	**13**					11	**46**
	Skin	2	**9**					0	**0**
	Fillet	16	**70**					11	**46**
SF	Chop	0	**0**	0	**0**	0	**0**	2	**40**
	Cut	1	**100**	4	**80**	0	**0**	1	**20**
	Skin	0	**0**	0	**0**	0	**0**	0	**0**
	Fillet	0	**0**	1	**20**	5	**100**	2	**40**

Table 3.24: Pig butchery from Nettlebank Copse (NC) and Suddern Farm (SF): types of marks.

3.7.1.2 Cattle

The greater numbers of cattle bones generated a larger sample of butchery, and this may have contributed to the more consistent pattern which is seen between the two sites for this species. However, both species show a similar rate of decrease in butchery incidence between the early and late Iron Age, 13.5% to 8.1% at Suddern Farm and 13.3% to 7.1% at Nettlebank Copse. This trend continued into the Roman period at Suddern Farm, where the incidence fell from 8% to 5.5% in pits and 17% to 6.9% in layers from the late Iron Age to the Roman period. As stated previously, this might be suggestive of a change in butchery technique, possibly also indicated by an increased use of chops in the Roman period.

The parts produced do not differ significantly by period, though the types of marks do. It can be suggested that, although similar techniques were being used, butchery was becoming less intense or more skilled. Additionally, the higher incidence of chops on the later phase bone may have decreased the number of recognised cuts of meat. There is normally no need to chop more than once through an articulation, resulting in fewer marks and increasing the possibility that the mark could be missed: if it severs the bone it may be mistaken for a break.

The absence of cuts to separate the tibia from the femur on the later examples may imply that larger parts were required, resulting in fewer cuts. There are very few cuts on the hind limbs of the cattle in the later phase. The numbers of individual cut types are too small for statistical analysis. However, it is clear that there is a correlation between the two sites in the early and late Iron Age. The only difference is that Suddern Farm does not have chops recorded for the early phase.

		Early pit Total no	**Early pit % marks**	Middle pit Total no	**Middle pit % marks**	Late pit Total no	**Late pit % marks**	Late layer Total no	**Late layer % marks**
NC	Chop	6	**14**					7	**13**
	Cut	9	**20**					16	**30**
	Skin	7	**16**					6	**14**
	Fillet	22	**50**					25	**46**
SF	Chop	0	**0**	12	**17**	5	**11**	7	**11**
	Cut	19	**37**	30	**43**	18	**40**	18	**30**
	Skin	8	**16**	4	**6**	6	**13**	5	**8**
	Fillet	24	**47**	24	**34**	16	**36**	31	**51**

Table 3.25: Cattle butchery at Nettlebank Copse (NC) and Suddern Farm (SF): types of marks.

At Suddern Farm, low numbers made it impossible to determine statistically how similar the cut types were between phases. However, table 3.25 indicates that the values are all generally similar. The pig bone material also demonstrates a change in the late Iron Age from disarticulation to filleting (in pits) and chopping (in layers). Apparently, then, there was a difference in butchery between features, but consistency between phases, with the layer material distinct from the pit material regardless of period.

The Nettlebank Copse deposits, which have only one feature type per phase, cannot be investigated in this manner. In the late Iron Age the cut types from Nettlebank Copse ditches are more similar to those from Suddern Farm pits (both dominant feature types, from which the majority of the bone was recovered). The types of cuts occur in very similar proportions in the early and late Iron Age at Nettlebank Copse ($P = 0.730$ at 3 degrees of freedom, $\alpha = 0.05$). Portioning chops from the late phase at Nettlebank Copse are probably part of the same process of creating more meat from one carcass as is in evidence at Suddern Farm, where the carcass divisions become more numerous over time.

The proportions of mark types in the late phase at Nettlebank Copse and the late phase pits at Sudden Farm are statistically similar ($P = 0.654$, 3df, $\alpha = 0.05$). However, as different parts of the animal were subject to butchery at the two sites, different modes of consumption may have been operating. At Nettlebank Copse pelves and scapulae were chopped through rather than filleted out; the same activity is indicated in only one late Iron Age pit at Suddern Farm. The butchery evidence from both feature types at Nettlebank Copse resembles that from pits at Suddern Farm, and it seems that there was no system of differential deposition at Nettlebank Copse.

3.7.2 Comparison of the Environs sites to Danebury

3.7.2.1 Pigs

As stated in section 3.5.2.1, the incidence of butchery at Nettlebank Copse is comparable to that at Danebury, fairly constant throughout phases and not significantly different between features. However, at Suddern Farm the incidence of butchery rises significantly over time. It has been suggested that this resulted from more filleting to produce smaller parts, a possibility also suggested, at a smaller scale, for Danebury.

At Suddern Farm and Danebury, the types of mark corresponded best in the early and middle periods (figures 3.8, 3.9 and 3.20), where disarticulation was most common, followed by filleting marks. By the later period at Suddern Farm, filleting predominated in the pits, and chops and filleting in the layers. This differs to the late period at Danebury, where the types of marks did not alter greatly through the phases. The proposition by Cunliffe, that different processes were taking place at the two settlements by the late Iron Age, appears to be supported by this interpretation (Cunliffe 2000: 188).

In the early period at Nettlebank Copse, a large number of the butchery marks was from meat filleting, while by the later period cut marks for disarticulation had become equally dominant. At Danebury relatively few filleting marks were recorded in the early or late phase. At Nettlebank Copse, then, the relative proportions of different types of butchery mark became more similar to the Danebury material in the late phase, though filleting was always more common at Nettlebank Copse.

At Nettlebank Copse the positions and types of cut marks are similar in many ways to both pit and layer deposits at Danebury. Disarticulation and filleting marks are recorded in similar places on the same bones. However, at Nettlebank Copse, particularly in the early period, there are proportionately more cuts for filleting on the less meaty parts such as the radius and tibia. In the later phase filleting marks do not occur on these smaller bone elements and are instead found on the pelvis, femur and humerus, which carry more meat. This could suggest that in the early phase the more meaty parts were preserved, or roasted on the bone for large-scale consumption, and bones without much meat on them were filleted. In the late phase, maybe smaller pieces were required overall, necessitating the filleting of bones bearing substantial quantities of meat.

The higher incidence of disarticulation using cuts and chops on the bones in the later phase at Nettlebank Copse relates to more intensive carcass division at the expense of meat filleting. The disarticulated parts may have been cooked with the meat on the bone, especially those parts carrying smaller volumes of meat (the lower limbs for example). This could mean that the early phase carcasses were more often cooked in larger parts, implying that consumption activity involved more people, or that filleting occurred after cooking, when the meat could be more easily removed from the bone without marking it. Only 2% of bone was burnt at Nettlebank Copse, so evidence for roasting on the bone is negligible (Hamilton 2000c: 104), but parts may have been boiled.

Butchery marks indicate that at Nettlebank Copse the mandible was disarticulated from the skull, and the head was filleted in both early and late phases. Conversely, in the early phase pits at Danebury, decapitated heads may have been deposited while fleshed, often with the mandible left on. There is a variety of possible explanations for this difference, including that the heads were cooked whole at Danebury before deposited (where mandibles are not present in articulation), or that they were deposited with flesh intact. At Nettlebank Copse, it seems that the meat from the head was utilised, and probably cooked off the bone.

Suddern Farm butchery patterns more closely resemble the Danebury material. In the early phase at Suddern Farm the only mark found is on the neck of the scapula, one of the commonest marks in the pits at Danebury at this time. In the middle phase marks again coincide with those from bone in Danebury pits, with filleting marks on the humerus and evidence for disarticulation of the femur, tarsals, scapula and humerus from adjoining bones. At Suddern Farm there are proportionately more filleting marks in the late phase, in positions paralleled by Danebury material: on the scapula and humerus. The similarity in terms of marks and incidence at Danebury and Suddern Farm suggests that the same butchery processes were occurring at both of these sites.

3.7.2.2 Cattle

At Nettlebank Copse, butchery practice was fairly consistent between phases. Here, fewer chops and cuts, and more filleting marks were recorded than at Danebury. This ties in to the explanation offered above (section 3.7.2.2), suggesting that the meat was filleted more often (or more obviously) than at Danebury, possibly indicating that meat parts were divided into more parts for more people, and therefore smaller quantities were eaten by individuals. There are also more skinning marks at Nettlebank Copse, maybe indicating less competent butchers. The relative lack of cuts on skulls at Danebury suggests that the meat from the head was less often utilised.

At Suddern Farm the types of mark on bone from early pits appear to correspond better to those from the early layers at Danebury. In the late phase Suddern Farm does not resemble the pattern in pits or layers at Danebury, which shows consistency between features, with less evidence of filleting and more chop marks. Could it be that in the early period the pits at Suddern Farm served as repositories for similar material to that deposited in the layers at Danebury? The change evident in the later period at Suddern Farm may reflect the impact of greater contact with Roman influences. This may have affected Suddern Farm, which continued to be occupied into the Roman period, but not Danebury.

Early phase

The Nettlebank Copse cattle seem to have been subject to similar butchery as those from Danebury. The exception is the cranium, where evidence of butchery is absent at Danebury but common at Nettlebank Copse. Otherwise, there is a correlation between marks, including disarticulation of limb and head bones, chops through the pelvis and into the mandible, and filleting of the scapula, pelvis, femur and mandible.

The pattern from Suddern Farm is different, and although it again involves cuts for skinning and filleting on the cranium, there are no chop marks, and a relatively higher incidence of filleting on the main meat bearing bones (except the pelvis). There is no evidence for separation of the mandible from the cranium, unlike that from the Danebury. It appears that at Suddern Farm there was more filleting and less division of the carcass. This could suggest larger parts were cooked, followed by filleting in order to feed large groups of people. Alternatively it could be that more bones were deposited fleshed, as special deposits, and of the remainder, the meat was taken from the bone and eaten in small pieces.

Middle phase

The Danebury middle phase material (cp 4-6) was amalgamated to make this phase more comparable to Suddern Farm. The butchery techniques at these two sites seem to coincide better in the middle Iron Age. The most obvious difference is that, as with the early phase, the pit material from Danebury lacks the cuts to the cranium that are common at Suddern Farm. Chop and disarticulation marks generally coincide in placement, although the incidence of chopmarks at Danebury is twice as frequent as at Suddern Farm. The exception is again the cranium, on which no chop marks are recorded from Danebury. The proliferation of marks at Suddern Farm could suggest a less organised butchery practice, illustrated by the greater variety of chop marks on the head. The presence of filleting marks on the majority of the bones might suggest more intensive defleshing at Suddern Farm, although the placement of most marks did not differ.

Late phase

Again the disarticulation marks at all sites generally coincide, with the exception of the femur-tibia joint at Suddern Farm, where both pits and layers show no evidence of disarticulation. The hind limb may have formed a whole roasted joint, but it is perhaps more likely that the fragile nature of this part reduced the number of butchery marks recorded here. The relative lack of distinction between late phase pits and layers at Danebury is mirrored at Suddern Farm, where the positions and types of cut are very similar.

Nettlebank Copse butchery from ditch deposits appears to be similar to that from pits at Danebury, with filleting marks on the mandible and femur. However, like the Danebury layer deposits, filleting on the pelvis and scapula is limited or absent at Nettlebank Copse. However differences are very limited and it is likely that the overall similarity of the majority of cuts reflects the more homogenous butchery technique of the late Iron Age.

3.7.2.3 Summary

The butchery investigation revealed Nettlebank Copse to be similar to Danebury throughout, except for a higher incidence of cuts to the skull at the former site in both species in the early phase, suggesting that Nettlebank Copse (and Suddern Farm) did not respect the distinction between pit and layer material seen at Danebury. Cattle bones had a much higher incidence of butchery than at Danebury, possibly indicating that the cattle from Nettlebank Copse were more intensively butchered, especially in the earlier phase. The greater occurrence of butchery is probably not related to the size of the animals, which were of a similar age profile. At both sites a minority of animals was killed before the age of 18 months, with 40% living to at least 4 years (Hamilton 2000c 107; Grant 1984a: 463).

Slightly more filleting marks on the cattle bones from Nettlebank Copse may indicate greater intensity of carcass use, and maybe related to eating meat in smaller quantities, possibly in smaller groups or lower status groups. The pig bones showed an increasing similarity in cut types over time, and meat parts became smaller. If the site had been used for festivals/ feasting as Cunliffe suggests, the meat parts consumed were not demonstrably different in size or conformation (Cunliffe 2000: 188). It is possible that they were eaten in larger numbers, but there is no evidence for different butchery techniques. Hamilton's suggestion that the site changed use over time, based on age profiles (Hamilton 2000c: 112), is also not reflected in the butchery evidence.

The position of butchery marks on pig bone was similar at Suddern Farm and Danebury throughout all Iron Age periods. However there was a much greater incidence of filleting marks over time at Suddern Farm, resulting in more, smaller parts. This could be used as evidence for Cunliffe's theory that Suddern Farm was relatively high status in the early Iron Age, as the meat parts were bigger and therefore more ostentatious. It could also suggest that modes of eating were different, with larger amounts being consumed at a time, possibly by the entire community. The pattern is very similar to Danebury in the early period, perhaps reflecting similar characteristics of these two sites at this time.

The cattle butchery suggests a similar pattern to that seen on the Danebury layer material. The layers at Suddern Farm provided much more evidence of filleting, implying that smaller meat cuts were produced, to distribute to more people. In the early period more filleting marks and fewer chopmarks at Suddern Farm than at Danebury indicate different processes, linked to the more intense processing of carcasses at Suddern Farm, and possibly to its lower status. However, there was a higher proportion of older cattle at Suddern Farm (60% over 3 years old at death, compared to 40% at Danebury, Hamilton 2000b: 184; Grant 1984a: 187). In the middle period there was a greater variety of cut marks at Suddern Farm, and this could relate to the site's 'abandonment', when a change in population, and so potentially of butchery techniques, may have taken place.

In the late period there appeared to be little difference between the cuts from pits and layers at Suddern Farm, but they coincided well with the pit deposits from Danebury. This may indicate a correspondence or close link between the two sites, as suggested by Cunliffe who proposed a shift in population from the hillfort to the settlement. No specific evidence of feasting is suggested, which might argue against the interpretation of Suddern Farm as a high status site.

3.7.3 Comparison of Balksbury to the Danebury Environs sites

In the middle-late phase at Balksbury, a period for which there is little evidence at Suddern Farm and none at Nettlebank Copse, the butchery pattern roughly follows that for the early phase at Balksbury, with disarticulation marks the most common, and a relatively small proportion of chop and filleting marks. A very slightly higher proportion of chops and much higher proportion of filleting marks are recorded for cattle at Suddern Farm (tables 3.22 and 3.25), suggesting that the meat pieces at Balksbury were larger than at Suddern Farm; perhaps more akin to those at Danebury. However, the positions of cut marks on middle Iron Age bone at Balksbury do not differ markedly to those at Suddern Farm, and the higher incidence of chops *through* bone at Balksbury may be a product of the larger time-span covered (including a later phase: cp 7). From this evidence it would appear that meat consumption practice at Balksbury in the middle Iron Age was less like that of farmsteads and more similar to the pattern of consumption at Danebury, although the techniques employed were similar.

3.7.4 Comparison of Balksbury and Danebury

The pig bones provide very little evidence to use in comparisons for the early phase. The lack of butchery marks suggests that the carcass was less divided, but is in fact probably a result of small sample size (N=45). In the middle period a high proportion of cuts to indicate filleting is recorded, possibly indicating a greater degree of meat division and the production of smaller parts.

The incidence of cattle butchery marks is much higher at Balksbury than Danebury, while there is little difference in the proportion of butchered pig bone between the two sites. The higher incidence of butchery marks on cattle at Balksbury than at Danebury can be explained in a variety of ways: the butcher was less experienced or more rushed; the demand for meat was greater and the cattle had to feed more people; the cattle were larger at Balksbury; the butchery implement left more distinctive marks; the faunal analyst spent more time analysing these bones; there were more 'special deposits', so less butchery would have been performed on these articulated parts; the bones were thoroughly 'cleaned' before deposition or the bone surface exposed in order to break the bone for marrow. We can discount some of these explanations: the butchery was recorded at the same time as the rest of the faunal information, by feature, and so there is no reason why more time would have been spent on a particular species; the cattle were more commonly chopped at Danebury, and it has been argued in chapter 2 that chop marks may be more likely to be missed if they cut right through the bone; if the butcher was rushed or inexperienced this is not reflected in the pig bone; Maltby mentions special deposits, but says there is not enough evidence for them so it is therefore unlikely that they were more common than at Danebury (Maltby 1995: 109).

Thus we are left with several possible reasons for the difference, including an increased demand for meat, cleaning of the bone (possibly related to breakage and therefore an increased demand for marrow as well as flesh) and the size of the cattle. Maltby states that cattle in Iron Age contexts at Balksbury were usually killed when mature, unlike Danebury (Grant 1984a: 511), so their larger size may have contributed to the greater incidence of butchery (Maltby 1995: 85). The difference in butchery incidence is so great though, that it is reasonable to suggest that cattle were less carefully or more intensively butchered.

A small proportion of butchery marks were from chopping in the middle-late period at Balksbury. Chops were concentrated on the skull and feet, maybe for rapid removal of the less meaty parts from the carcass. At Danebury a higher proportion of bone elements in the middle-late period were chopped and filleted, and thus it could be suggested that meat was split into smaller portions than at Balksbury. The Balksbury middle-late Iron Age cattle butchery is more reminiscent of the early-middle phased material at Danebury, where a relatively low incidence of chops and filleting marks suggested that meat was not divided up into very small pieces. The intensified butchery process that is seen in the late phases at Danebury is not evident in the middle-late phases at Balksbury, perhaps suggesting that Balksbury fulfilled a different role. However, the lack of evidence for very late phases at Balksbury may have influenced this pattern; the intensification of butchery at Danebury may have occurred mainly in cp 8 deposits, which are not represented at Balksbury.

There is very little evidence of cuts to cattle crania in the early phase at Balksbury, as at Danebury, and such as are found were probably made during skinning, not meat removal. From the middle-late period at Balksbury there were many cuts to the skull, including disarticulation, chop and filleting marks. Although the sample size for this period is much larger than for the early phase, there is a substantially higher incidence of chops to the cranium in pit features at middle-late Iron Age Balksbury than at Danebury in this period. The only such chops found in pits at Danebury are those to remove the horn. It is possible that the higher incidence of chopping skulls at Balksbury resulted from a different butchery tradition, where the same parts were targeted for disarticulation or filleting, but different techniques or heavier tools were used. This could suggest that each settlement, hillfort or area had a dedicated butcher in residence.

At Balksbury there were findings of articulated animals, explained by Maltby as early deaths representative of on-site breeding (Maltby 1995: 109) but which could be called special deposits. Balksbury deposits may have held some special significance as it is proposed Danebury did; cattle crania only begin to show food-related butchery marks (rather than those from skinning) in the middle-late phase, suggesting that, after the early phase, animal heads at Balksbury did not hold any particular significance. Cuts indicative of meat utilisation on the skull were also not recorded from Danebury until after the early phase (cp 6), but it is of course impossible to clearly define the phase at which cuts on skulls started to appear since the middle-late periods at Balksbury overlap with the middle phases at Danebury (both contain cp 6).

There is no evidence that the Bronze Age defensive earthworks at Balksbury were maintained in the Iron Age, contrasting with Danebury, although in the early Iron Age the defences were probably still imposing. Maltby suggests that there is very little difference between the faunal remains at Balksbury and smaller settlements, for example Old Down Farm, Lain's Farm and Winnall Down (Maltby 1995: 109). This conclusion fits well with the interpretations given here, which suggests Balksbury and Danebury had different butchers, but similar consumption and deposition practices.

3.8 CONCLUSIONS OF BUTCHERY ANALYSIS

In this chapter the records of butchery marks on the animal bone from Danebury have been interpreted in detail, by phase and by feature type. There have been no significant differences in butchery technique identified between contexts, although some subtle differences may be present. Without investigation of the sheep butchery, which is more numerous than the cattle and pig, it is difficult to say whether apparent differences, for example in butchery on the cranium, are due to smaller sample sizes in the earlier periods, or that further differences have been obscured by the very large numbers of bone from the late phase (longer than any of the other phases at 230 years).

However, it is necessary to work with what information we have, albeit with provisos, such as the degree of influence which variable sample sizes may have on the assemblage. It is likely in this case that merging the early and middle phases would simply create a more homogenous assemblage. While this may in fact better reflect the nature of the butchery and carcass divisions, it would be simplistic at this stage to combine the phases further before investigation of the spatial distribution has taken place. After spatial investigation has been performed, it may then be possible to examine whether there is any real difference between the phases or feature types.

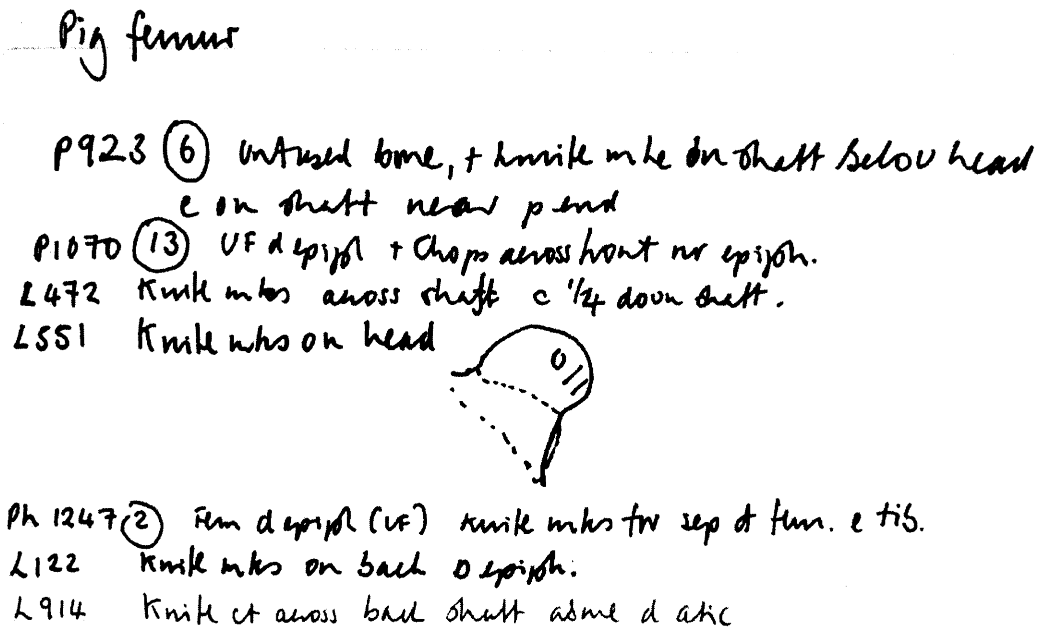
On a complete carcass, the small proportion of bone cut when a skilled butcher is performing the butchery suggest that those recorded may represent only a tiny proportion of the actual incisions made. We cannot know for certain whether or not the recorded cuts are representative. However, the marks do appear to be relatively consistent, even by species, so we must for this investigation assume that they are representative.

In the late phase, smaller cuts of meat and more intensive filleting could suggest greater intensity of use of the carcass. The incidence of cuts to the articular parts of the distal humerus is similar between species and phase, suggesting that cattle and pigs were regularly disarticulated when recently slaughtered, although perhaps a higher proportion of carcasses may have been stiff when butchered in the later phases.

The carcass divisions identified from the butchery marks are relatively consistent over time at Danebury. This means that much of the spatial analysis can be undertaken using the same divisions. Cattle may require more divisions when considering the spatial patterning of the smaller parts, for instance where individual bones are chopped through. In this case different parts of the bone may be found in different locations, but the coarse divisions (e.g. upper hind limb bone etc.) will be the same.

The butchery evidence from the Danebury Environs sites and Balksbury provides a comparative set of data with which the processes interpreted to be taking place at Danebury may be compared. Differences between the sites may be indicative of different social activities. The production of smaller meat parts in the later periods at Danebury may suggest that meat was more scarce, and the population larger. It could also suggest that the community ate more plant-based food. If meat eating equated wealth, it could be surmised that the community became less wealthy. That other sites, such as Nettlebank Copse, were producing smaller parts earlier on suggests that they may have been under more pressure for resources, or of lower status.

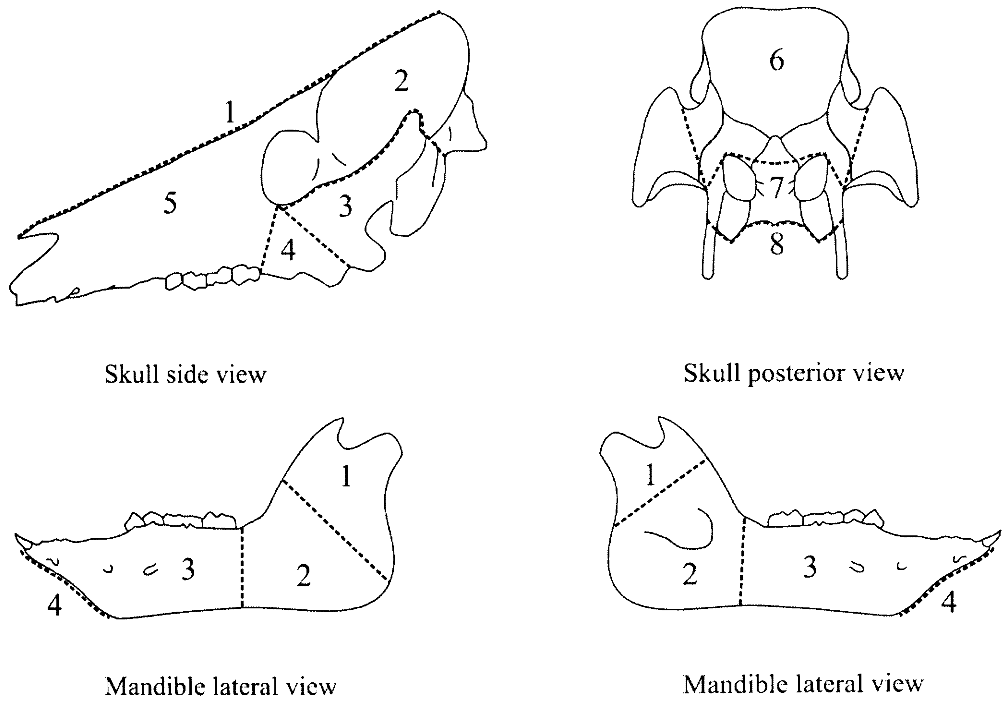
The absence of cut marks on the skulls in pits in early phases at Danebury is not followed by the other sites, except possibly Balksbury. Although slight evidence, this pattern holds true for both pig and cattle bones, and could indicate that early Iron Age Danebury and Balksbury were special places, or at least places where different activities took place, the remains of which were deposited in pits. The practitioners of the activities, though, may have been different people.

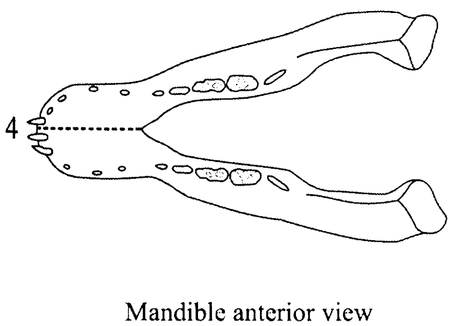

Pig femur

P923 (6) unfused bone, + knife mks on shaft below head
c on shaft near p end
P1070 (13) UF d epiph + chops across front nr epiph.
L472 Knife mks across shaft c ¼ down shaft.
L551 Knife mks on head

Ph 1247 (2) Fem d epiph (UF) knife mks for sep of fem. & tib.
L122 Knife mks on back d epiph.
L914 Knife ct across back shaft above d artic

Figure 3.1: Image of an original catalogue card for butchery recording, completed by Annie Grant during the Identification of the Danebury bone assemblage.





A code of 1 on the skull and 4 on the mandible indicate longitudinal splitting of the bone.

Figure 3.2: Codes for bone element zones: head.

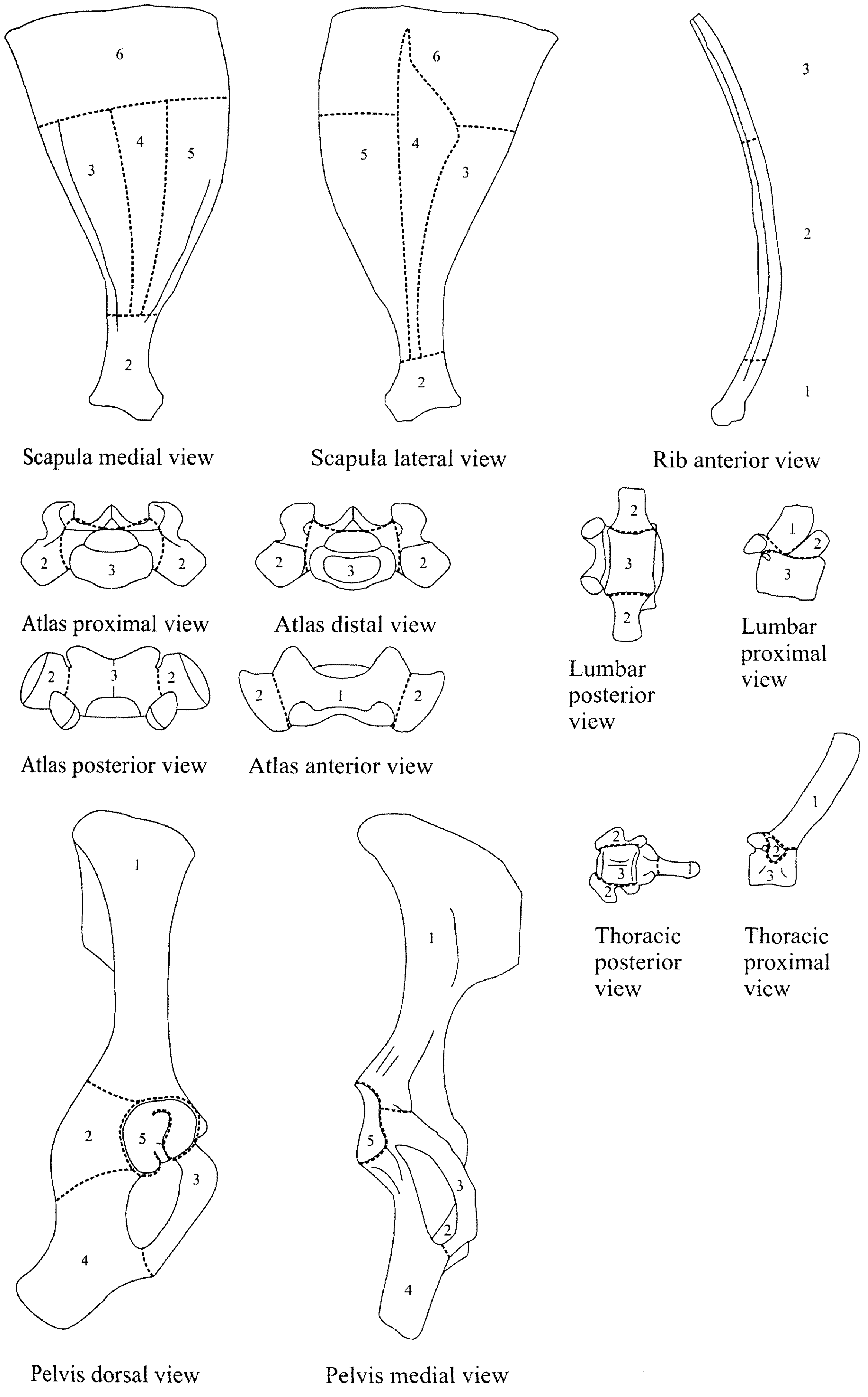


Figure 3.3: Codes for bone element zones: torso.

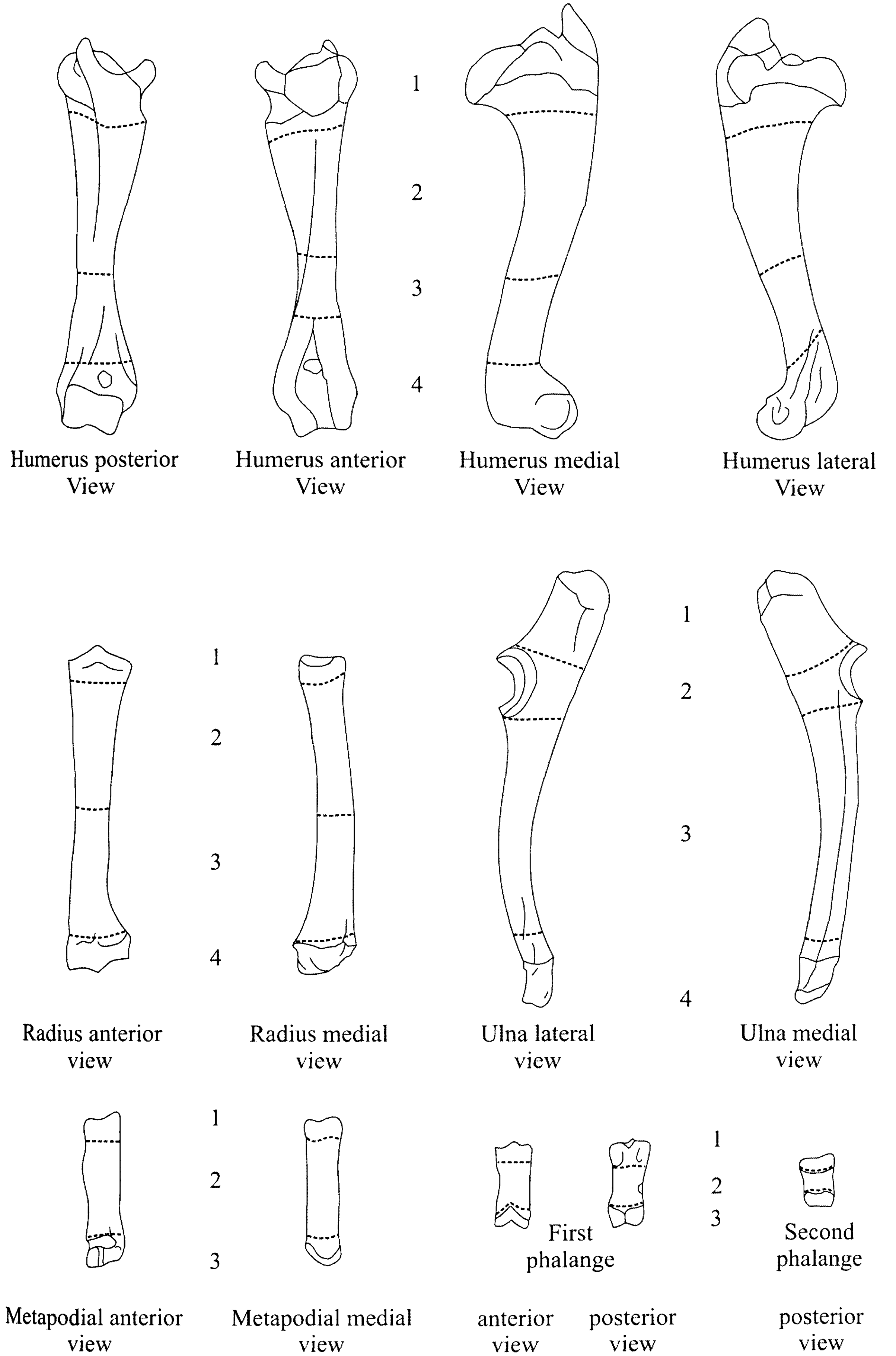


Figure 3.4: Codes for bone element zones: forelimb, metapodials and phalanges.

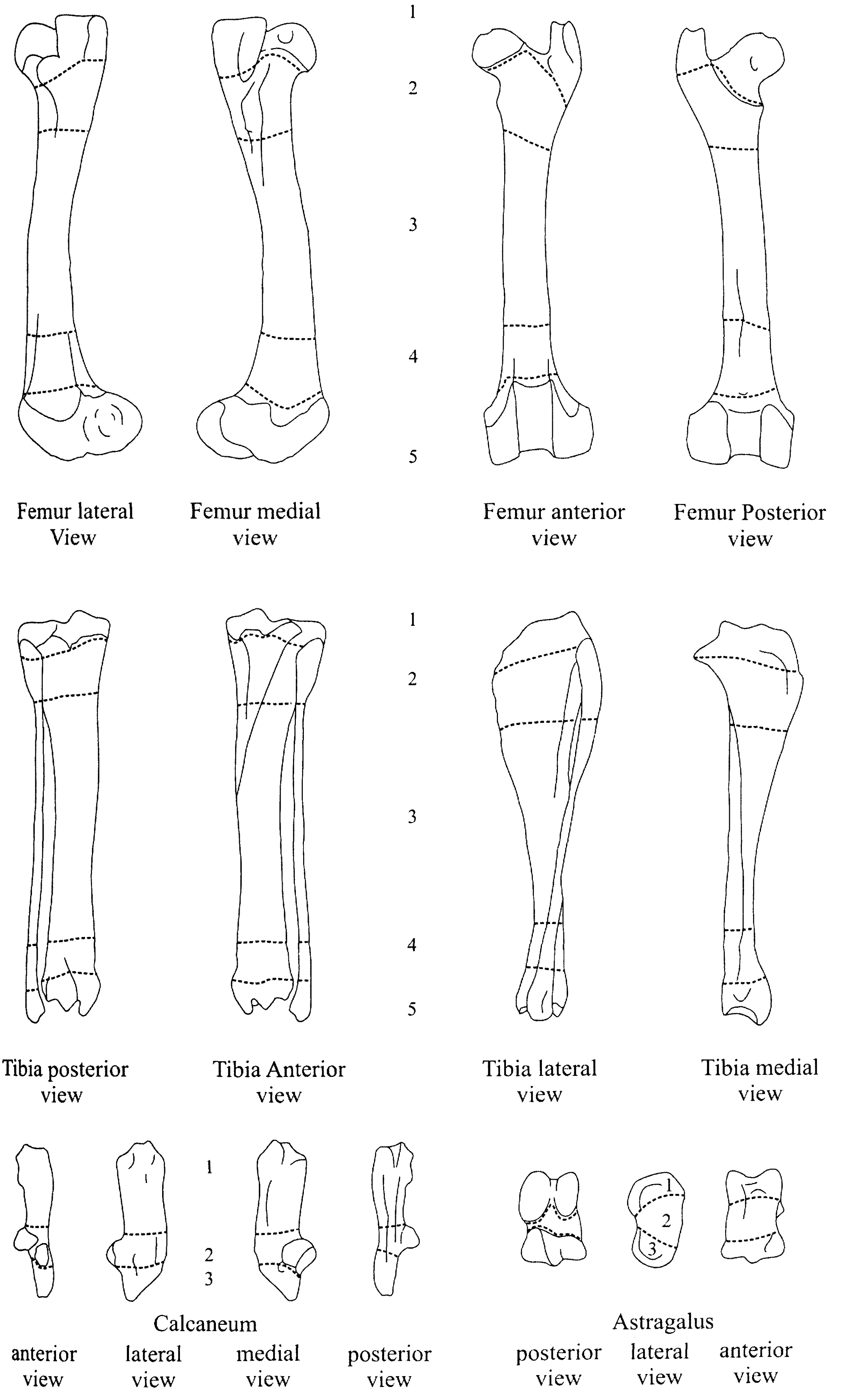


Figure 3.5: Codes for bone element zones: hindlimb.

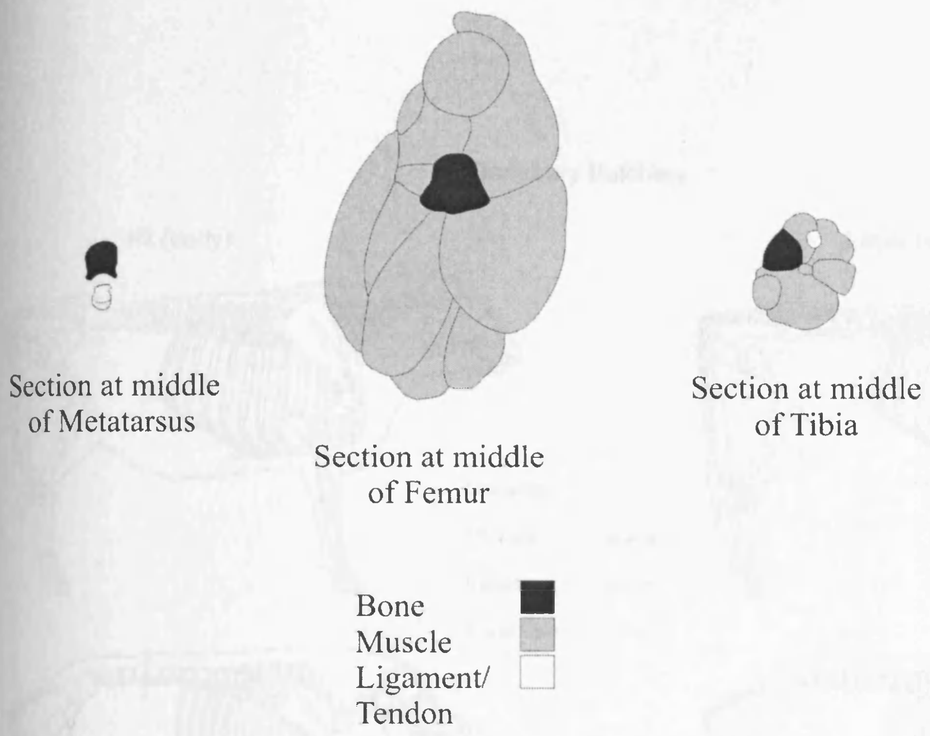


Figure 3.6: Flesh covering on bone elements of a horse hind limb. After: Thompson 1896: plate XXXIII.

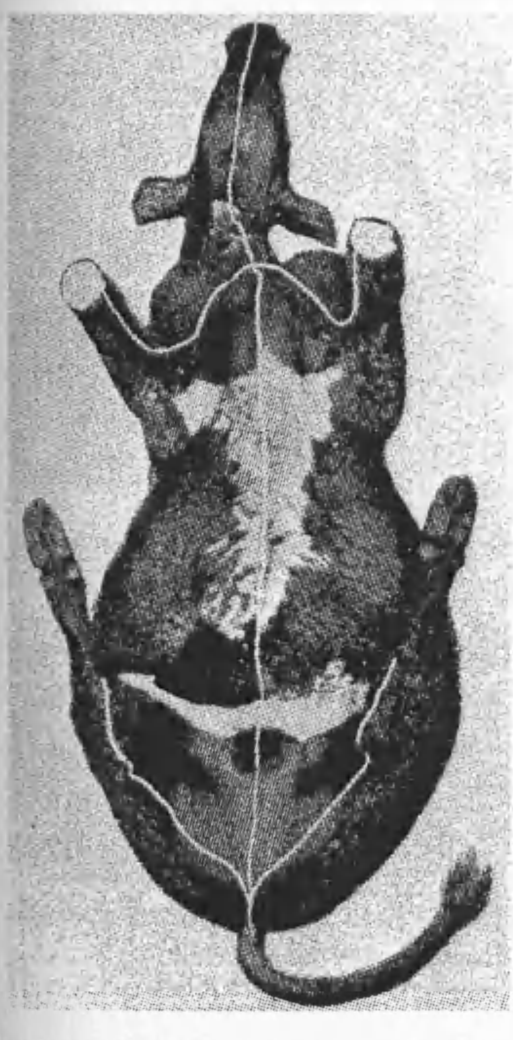


Figure 3.7: Positions for scoring the hide of a modern ox in preparation for skinning. Source: Gerrard 1964: 77.

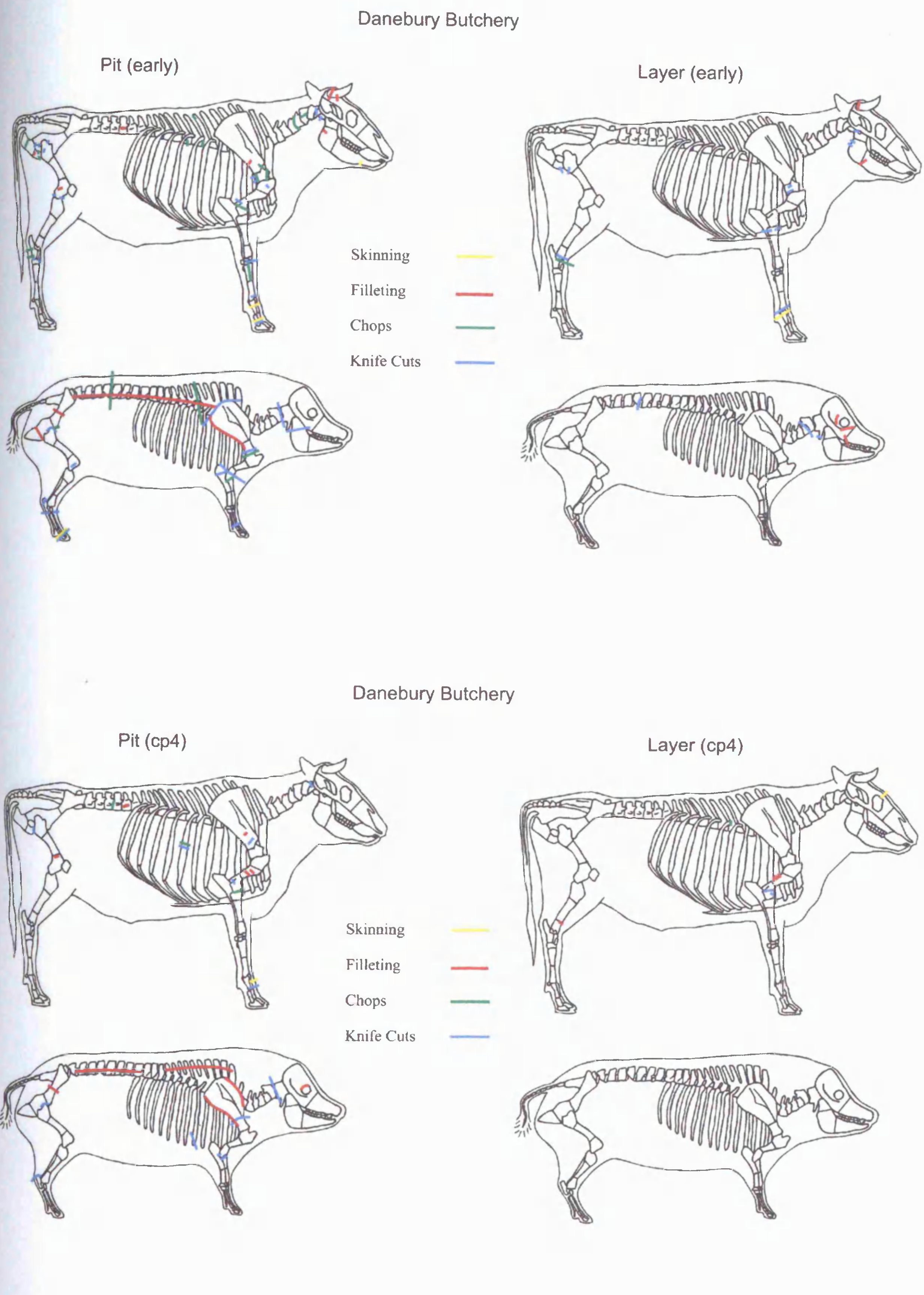


Figure 3.8: Butchery marks in the early phase and phase 4 at Danebury.

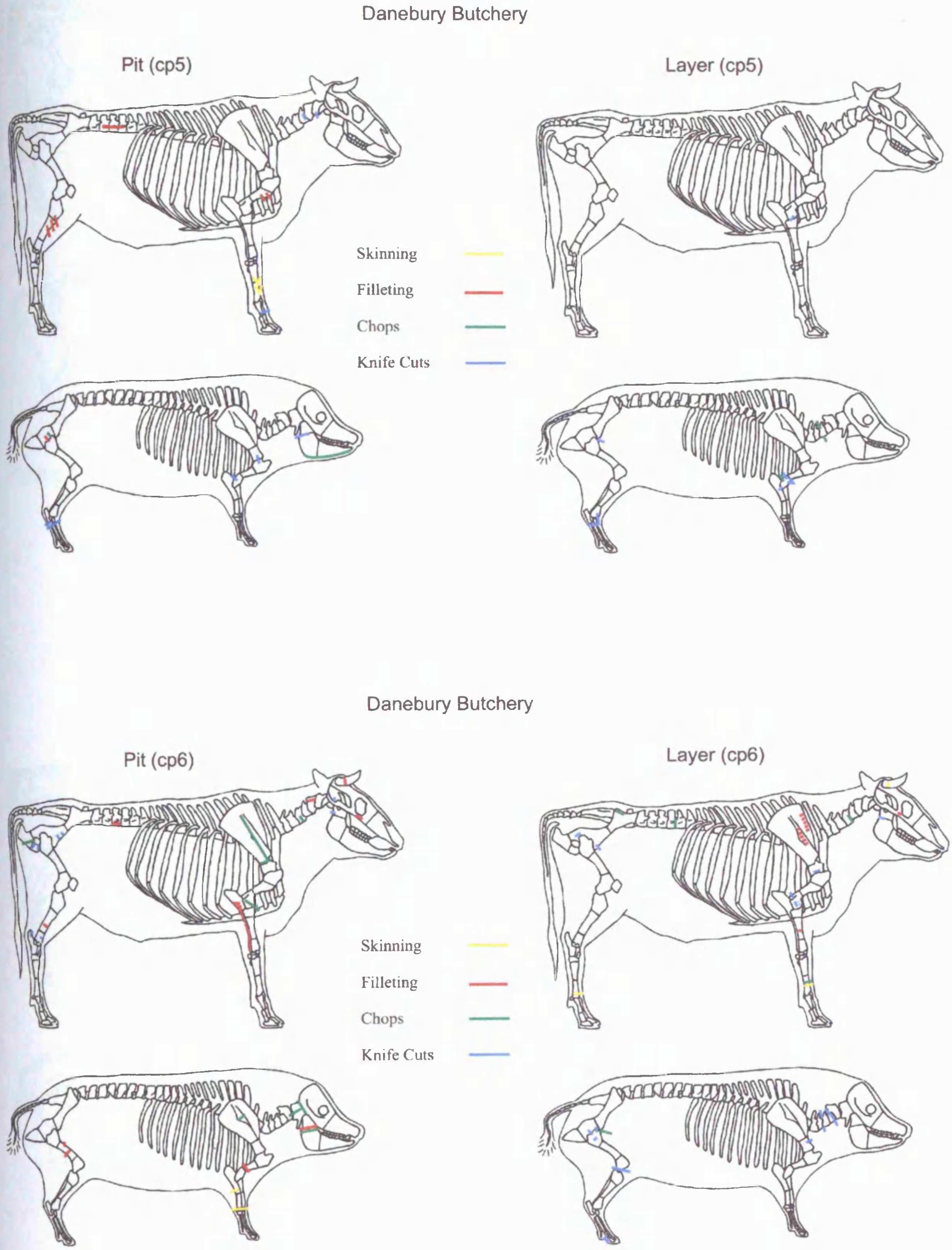


Figure 3.9: Butchery marks in middle phases 5 and 6 at Danebury.

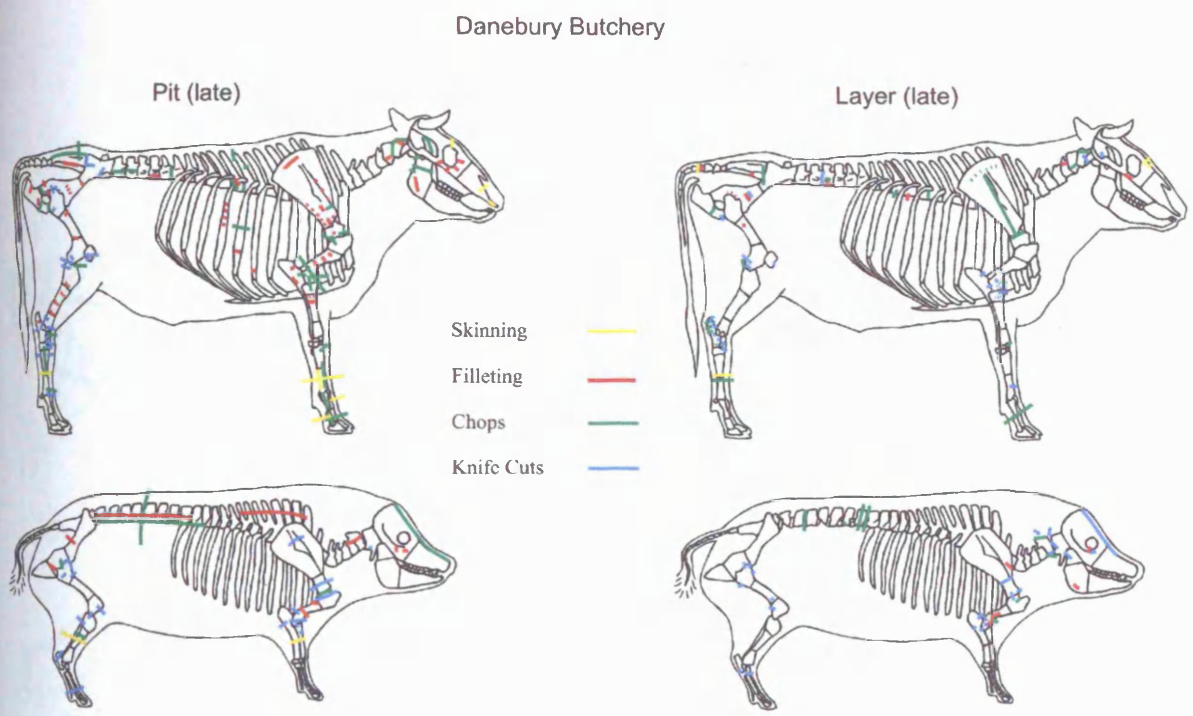


Figure 3.10: Butchery marks in the late phase at Danebury.

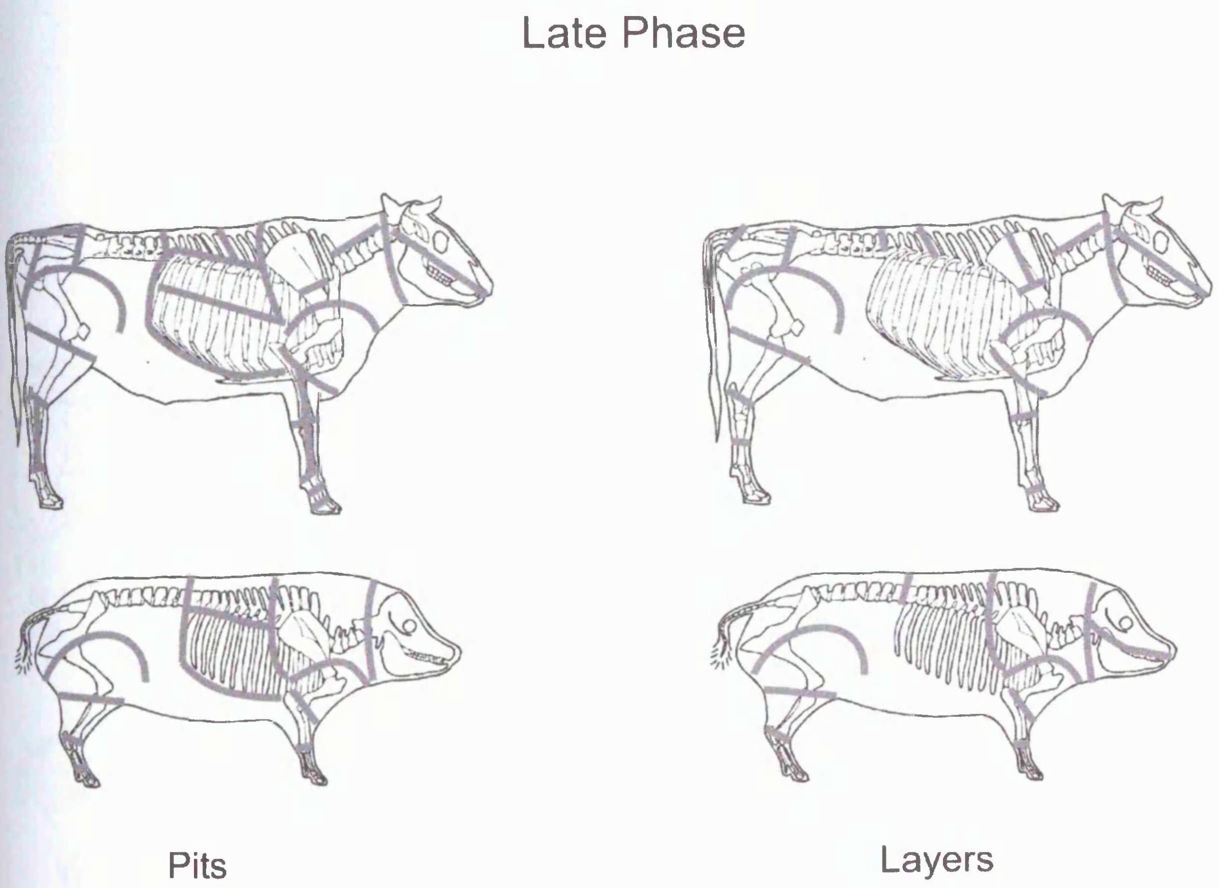


Figure 3.11: Carcass divisions in the late phase at Danebury.

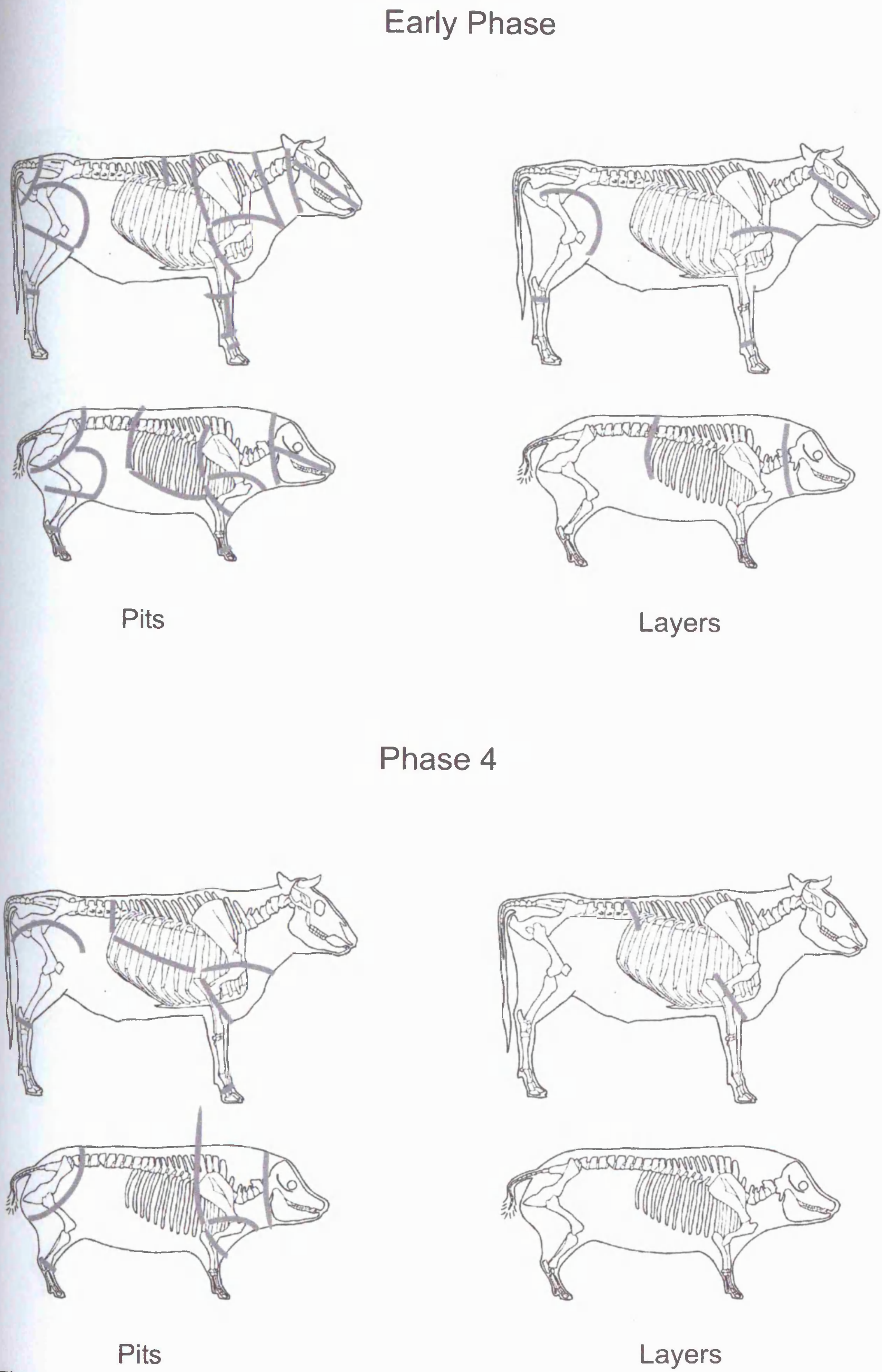


Figure 3.12: Carcass divisions in the early phase and cp 4 at Danebury

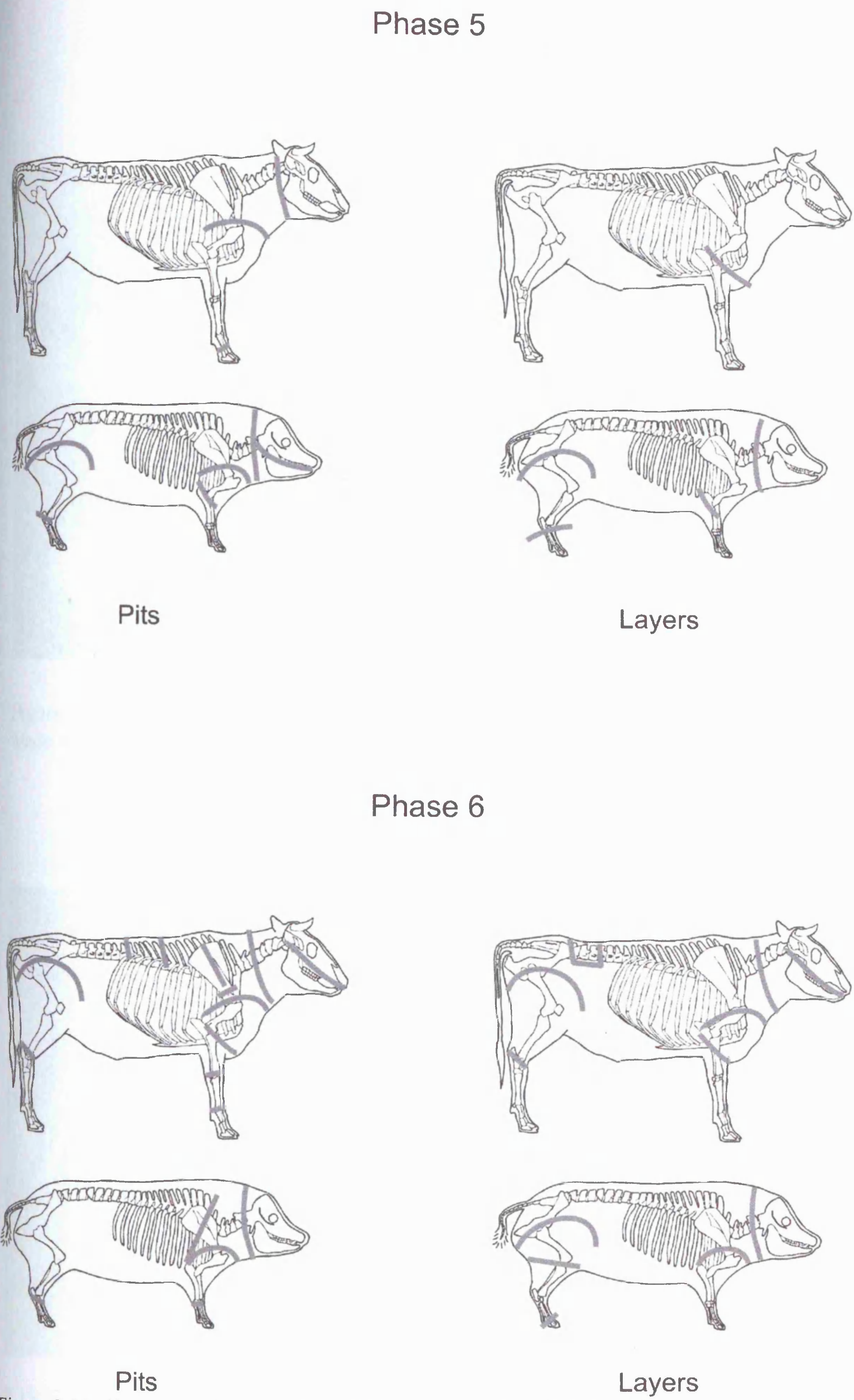


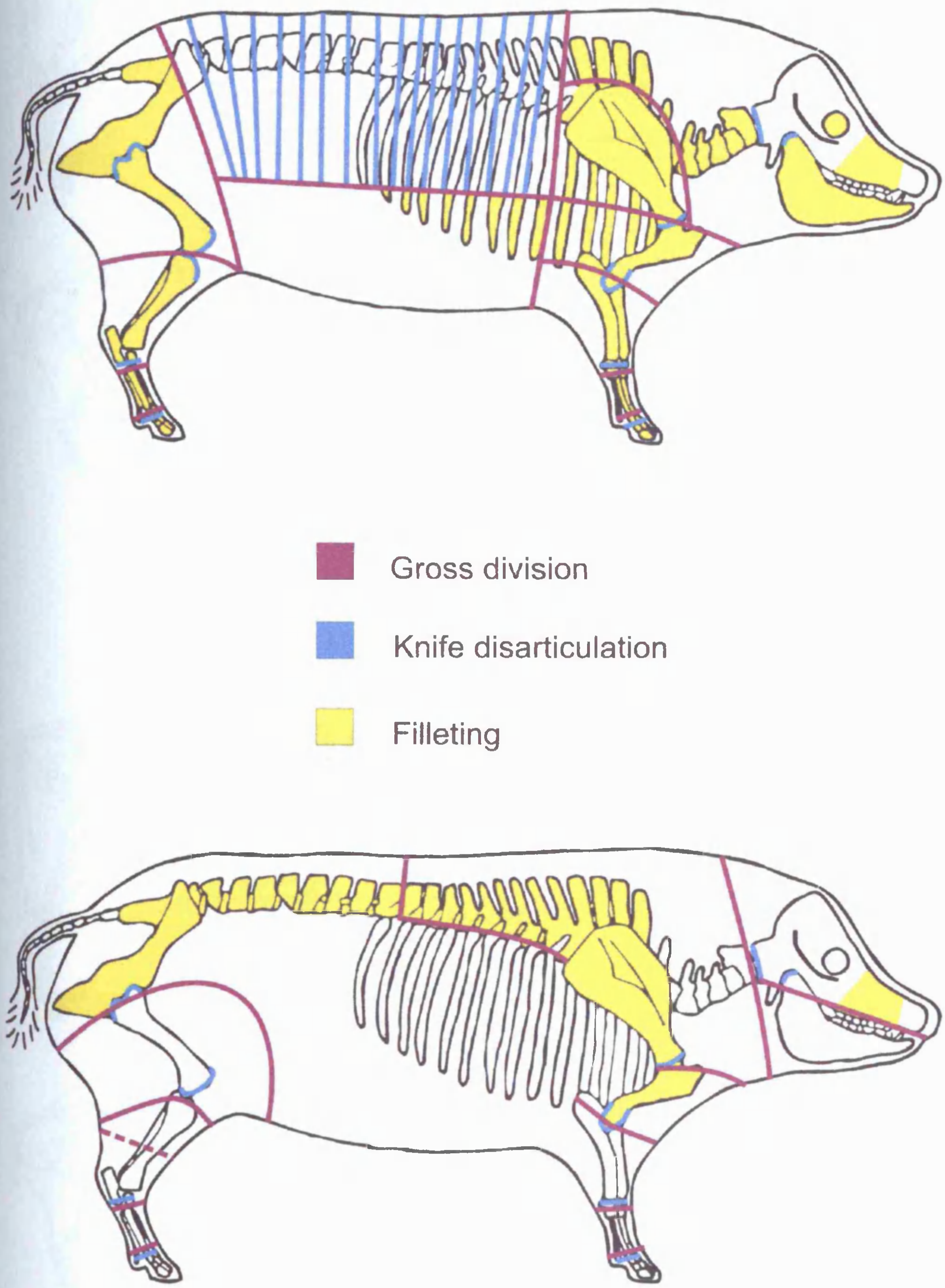
Figure 3.13: Carcass divisions in the middle phases cp 5 and cp 6 at Danebury.

Figure 3.14: A cattle scapula, with the positions of longitudinal filleting marks visible on the blade where the periosteum had been cut through.

3.15: Filleting the meat from the outside of a lamb ribcage.

3.16: Filleting the meat from a sawn-through pig ribcage.

3.17: Pig head, halved and with the mandible removed: Michael Woods is removing the remains of the masseter muscle from the maxilla.



3.18: Divisions of the carcass and filleting prior to cooking of pig bone from late Iron Age pit deposits (above) and modern traditional butchers (below).

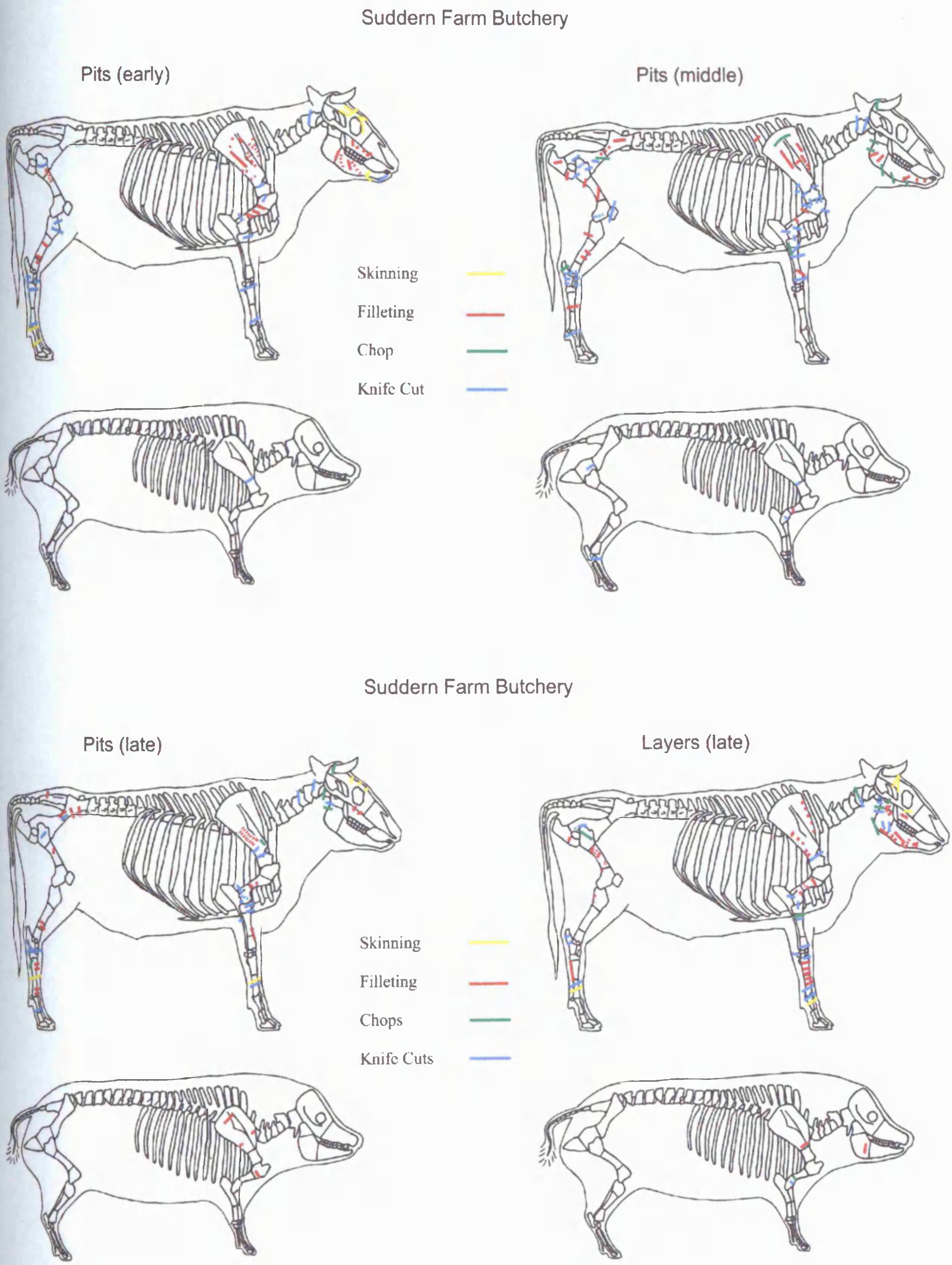
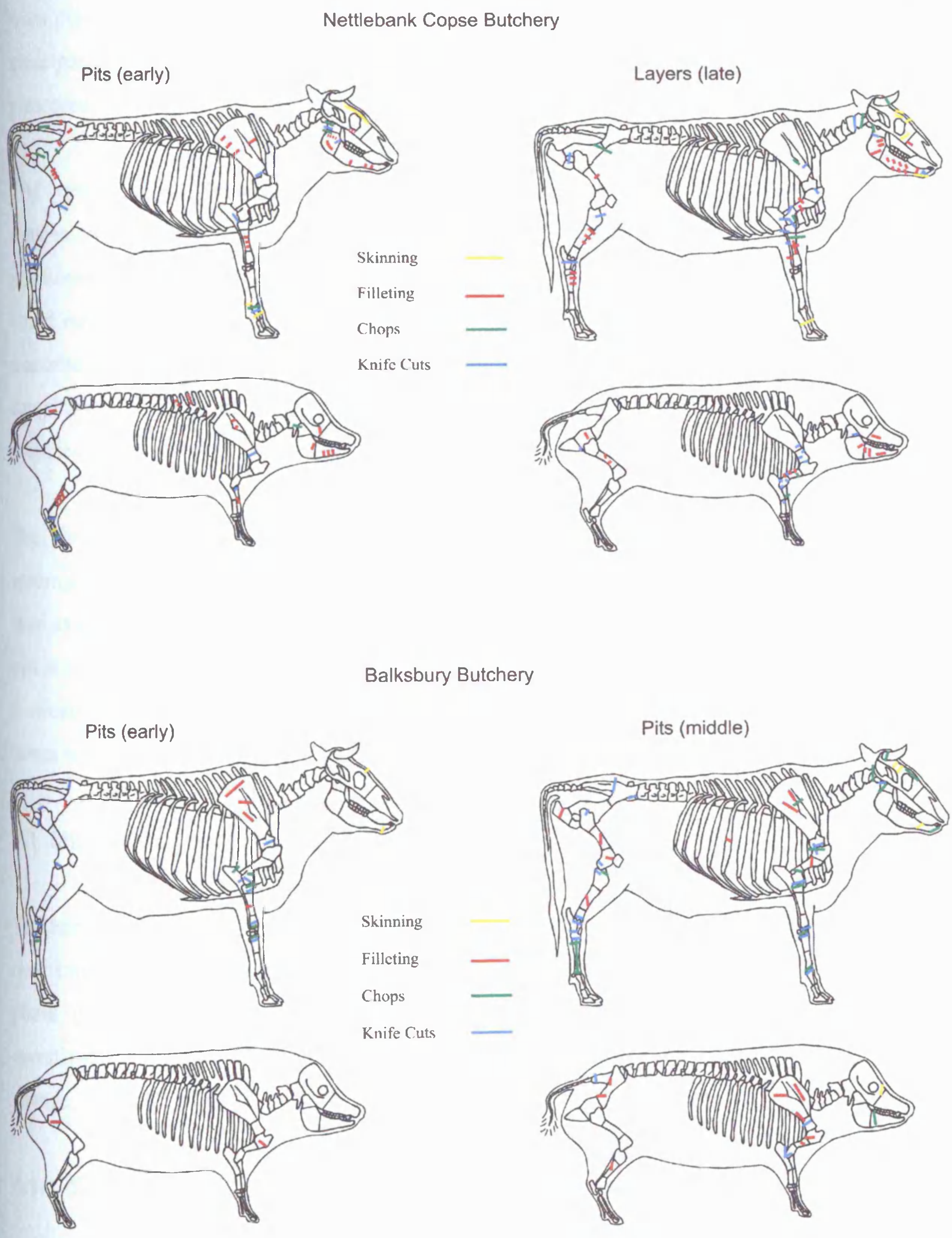


Figure 3.20: Butchery at Suddern Farm.



3.21: Butchery at Nettlebank Copse and Balksbury.

4 SPATIAL PATTERNING: TWO DIMENSIONAL

The butchery analysis has provided an in-depth understanding of the meat cuts produced from pig and cattle carcasses. In this chapter, the investigation of the spatial positioning of these parts will be described and discussed. A methodology for spatial investigation will be presented, followed by the results of the spatial analysis of pig and cattle bone.

The spatial investigation is divided into two sections: two-dimensional and three-dimensional. The two dimensional part uses the selected sample area to investigate the positions of different bones by pit. The intention here is to display overall trends, which could indicate that certain parts of the site were used for specific functions: waste disposal, manufacturing, or consumption activity, for example. The layers built up around the rampart can also be investigated in this way, although at a much coarser level of detail as layers are often less tightly defined and sometimes very extensive.

The three dimensional investigation will investigate layers within the pits, with the assumption that the separate layers represent separate episodes of activity. Here the intention is to assess differences between layers, to understand how homogenous the deposits within pits were, and to elucidate the exact nature (waste/ feasting, etc) of any temporal differences between deposits. Other issues can also be addressed, for instance the characteristics of bones found in the proximity of special deposits.

4.1 METHODOLOGY FOR SPATIAL INVESTIGATION

The bone has been split into early, middle and late phases in order to distinguish changes over time. Cunliffe suggests the 'functional areas' altered location from the early to late phase (Cunliffe 1995: 24), so where possible, the middle phases (cp 4-6) were also investigated, in order to flag any differences in deposition during this possible period of change.

4.1.1 Selecting the bone elements to investigate spatially

The carcass divisions, illustrated and outlined in chapter three, often resulted in the complete disarticulation of each individual bone. However sometimes a combination of bones (such as the metapodials and phalanges) or a part of a bone (for example the distal part of a tibia) formed a specific 'unit'. It was decided that the most comprehensive manner of investigation would be to consider distributions initially at a gross scale (head, forelimb, hindlimb, torso) then in increasingly finer detail (individual bones or parts of bones).

The locations of primary butchery segments would be the starting point, so initially the head, fore limb, hind limb and torso bones would be mapped, to identify any areas or pits where these clustered. A pit containing large quantities of head and feet bones could be interpreted as containing the remains of primary butchery. Limb bones would first be investigated as whole limbs, then as upper and lower limbs, and then as individual bones. This would give an increasing magnitude of detail as the investigation progressed, to identify for example:

- Any part of the site that contained a high proportion of limb bones
- Any part of the site that contained a high proportion of fore limb bone
- Any part of the site that contained a high proportion of upper fore limb bone
- Any part of the site that contained a high proportion of humeri

Thus if a portion of the site contained a large number of fore and hind limb bones, but few lower limb bones, it could be interpreted as an area where the more 'meaty' parts were deposited, and perhaps a place where consumption activity was based.

Pig bones were investigated first using this method. The methodology was refined and adapted for the cattle bone, allowed for by the larger sample from this species.

4.1.1.1 Pig bone elements

The relatively small size of the pig bone sample, compared to that of the cattle, meant that relatively few complete bones were present to use in the analysis. It was therefore necessary to use all bone fragments, in order to provide a large enough sample. The possible biases from using fragmented bone are discussed below.

4.1.1.2 Cattle bone elements

The same method of analysis could have been applied to cattle bone, but a large sample of bone from this species (for pits) enabled the investigation of body part locations to be refined. Well-represented and robust bones were assigned as representatives of individual butchery 'units', considerably reducing the amount of time taken when selecting the appropriate bones for analysis.

The major divisions produced from cattle carcasses are suggested as follows: the head, hooves, upper limbs, lower limbs, ribs and thoracic/ lumbar vertebrae.

One bone element was chosen from each unit, and a diagnostic zone on each of these bones was selected for spatial distribution analysis. The specific part was always dense with a high survival rate. Thus, the **occipital condyles** and **mandibular toothrow** were chosen for the upper and lower parts of the head, the **first phalange** for the feet, the **distal metapodials** for the lower limbs, the **distal femur/ humerus** for the upper limbs, the **pelvic acetabulum** for the posterior, and **distal scapula** for the anterior part of the torso. The poor survival and the lack of species identification of the ribs and vertebrae exclude them from this analysis.

To ensure repetition of fragmented elements was avoided, only those bones showing more than 50% of the designated part were included.

4.1.2 Possible bias from young bone

It was thought that a high proportion of bone from younger animals could affect an analysis that used all bone fragments (in this case the pig bone). Bone from immature animals degrades more quickly than that from older individuals (Lyman 1994), resulting in the relatively more fragments recorded per bone from older animals. Selected pig bones were investigated to see if the location of complete bones differed from that of all fragments (part 4.2.3).

4.1.3 Possible bias from fragmented bone

Assessment of the extent to which the use of restricted bone parts to test distributions (as used for the cattle bone) could affect the results was also required. The results from total numbers of humerus and femur fragments were compared to those from restricted bone zones (distal humeri and femora).

4.1.4 Spatial data manipulation: the use of a GIS for intra-site analysis

4.1.4.1 Theoretical issues

The obvious advantage of using a Geographic Information System in this study lies with its ability to articulate and analyse the locational component of any spatially referenced dataset. Its ability to handle large volumes of spatially referenced data makes it ideal for intra-site analysis, where a large area has been excavated, and when there are very large numbers of artefacts (Gillings & Wise 1990). In analysing the spatial component of any given dataset the

GIS is also able to integrate and employ all of the related attribute data we have relating to those locations. This makes it exceptionally useful for undertaking complex spatial queries, for example isolating the spatial occurrences of a specific type of bone or bone showing certain butchery characteristics. At Danebury this is especially important because we have a considerable amount of information *about* each bone, recorded in separate fields in the overall database.

It is appreciated that by using GIS as essentially a query tool in the present study, only a small proportion of its potential is utilised. However, one of the great advantages of such systems is their inherent flexibility. Whilst the range of analyses undertaken here is restricted to detailed query and limited spatial statistical analysis, the current database provides the ideal platform upon which to undertake a more detailed programme of spatial analysis and modelling operations (for example buffering around selected zones), which can help to further refine the querying process but is beyond the scope of this thesis.

In using GIS it is important to realise that GIS were not developed for archaeological use, being designed originally as geographic tools for land management applications such as predicting environmental impacts and determining land use, etc. In saying this, the predominance of spatially referenced data in archaeology make the systems ideally suited for both artefactual and landscape archaeology. While the former relates mainly to simple query operations, for example thematic distribution maps and plotting findspots (for example in SMR data), applications in the latter class engage a fuller complement of the GIS's range of analytical tools: for examples of the range of analyses possible using GIS see Gillings & Wise (1990) or Wheatley and Gillings (2002). Relevant applied methods include Lock & Harris (1996), Llobera (1993) and Dooney (1997).

A theoretical problem arises when using GIS as a tool for spatial display, one that is also pertinent to distribution mapping. This is the discrepancy in perspective between the researcher, who looks at simplified or narrowly categorised data, and that of the person or community that created the material being studied. A two-dimensional approach serves to widen the gap by distancing the researcher from the context of the original deposition. To some extent this mode of questioning is unavoidable, but its effects can be tempered by incorporating contextual information.

A more pivotal problem with this study is the huge timespan involved. The consecutive layers formed in pit deposits mean that viewing the site in a two-dimensional way is flawed.

The lack of stratigraphic information means that pits are dated by ceramic phases, and cannot be sequenced in relation to each other. This adds another difficulty when undertaking spatial analysis, as it is not possible to determine which, and how many, pits were open at one time.

Both of these issues can be addressed when investigating deposits in three dimensions. This allows more direct analysis of individual periods of deposition, by looking at vertical spatial patterns, and also facilitates identification of specific activities. Thus it is possible to look at the patterning in a more immediate manner.

4.1.4.2 Practical application

After the body parts were defined and the approximate sequence of their production estimated, the primary divisions were investigated using a GIS system.

The bulk of the data manipulation was performed in the spreadsheet which Grant's original computerised records had been transferred to (Microsoft Excel 2000). Table 2.2 illustrates a sample page. The data from pits and layers were already in separate files. For the purposes of this investigation, the data were split into appropriate sections. The first was species, so that pig and cattle bone could be extracted from the rest of the (unexamined) species. Then the bone was split into phases (see part 2.2) corresponding to ceramic phases 1-3, 4, 5, 6 and 7-8. Material from ceramic phases 4, 5 and 6 was amalgamated, forming one 'middle' phase, since these phases contained relatively few bones. It also makes comparison with other sites more straightforward. The late phase is relatively long at 310 years, which accounts for its larger bone sample.

For reasons explained in section 2.2, the phasing I used does not correspond exactly to that of Cunliffe, who split the site into early period cp 3-5 (up to 310BC) and late period cp 6-7 (Cunliffe 1995: 18). While his method provides a simpler dataset, any difference in the middle period(s) would be glossed over. Also, the bones dating to the last 100 years before the Roman conquest (cp 8-9) would form an extremely small sample, not useful in the present study which aims to elucidate time trends and patterns. The large quantity of bone in pits which could only be dated to cp7-8 would have to be omitted if strictly adhering to Cunliffe's categorisation.

Once the bones had been split into period based groups, the data were filtered to select the appropriate bone(s) and tables were produced using a pivot chart. For each query, pits were assigned values according to their content. For example a pit or layer containing ten distal humeri would be assigned a value of 10. The original records contained information not just on the presence or absence of bone 'zones', but the degree of completeness of each of the 7 zones on major bones, of which the distal epiphysis is one. A code was used for complete (1), over 50% (2) and under 50% (3) of each of these areas, so bones less than 50% complete could be filtered out.

The frequency of distal humeri in each pit or layer could then be listed, and the resulting table saved as a database 4 file, which can be linked directly to the feature's location within the GIS (ArcView). The main mode of spatial enquiry involved pit location, for which points and/or the surface area can be used to define each pit (see end of this section for explanation of layer location). As a result ArcView was chosen as it combines a vector-based spatial data model, capable of representing the pits in such a fashion, with powerful querying capabilities (Environmental Systems Research Institute 1997).

The spatial position of each pit was obtained from co-ordinates in another spreadsheet. Danebury was excavated on a grid system (A-T), so pit co-ordinates were prefixed by a letter according to the grid in which they were located. These grid letters were given an X-Y value, calculated from the plans. This file of co-ordinates along with unique pit identifier code (pit number) was then converted by ArcView into a series of clearly labelled point locations corresponding to the pits. However, only a sample was required, so using the selection tool in ArcView, the sample area was highlighted and those pits inside the sample were selected. These were saved as a separate vector data layer (in ArcView terminology a shape file, also referred to as a theme). The pit points could then be linked to particular properties, contained in the database file (in the above example, the value of 10) using the unique identifier codes associated with both GIS points and database entries.

A 'graduated symbol' was used to display the values, which could demonstrate the relative numbers of bones from each pit by altering the size of the point. The flexibility of GIS meant that it was easy to display pits according to different variables or properties. For example each pit could be displayed according to the numbers of specific bone types it contained. This could be as an absolute number or standard deviation. Standard deviation was originally used for most analyses, so the size of the pit point was related to the deviation from the mean value of bones per pit. This display did not in any of the distributions differ from the absolute numbers, and as a result in the present discussion absolute numbers are usually displayed in order to indicate the size of the sample.

The default display in the Arcview system for number categories is 'natural breaks' which chooses five discrete numeric ranges. This method has the advantage of singling out pits that contained unusually large or small quantities of bone. Initially I chose to use 'equal intervals' which enabled a direct comparison to be made between analyses. It soon became clear that this option often masked differences between the majority of pits when one pit contained a large quantity of bones. In these cases, there were few or no pits in the mid-range and a vast amount in the smallest category, so it was decided to use 'natural breaks' as defined by ArcView.

An additional advantage of using GIS is the ability to integrate other thematic layers of spatially referenced information into the analytical environment. For example the earthworks and Cunliffe's overall breakdown into functional categories by phase (housing, ritual and storage) could be displayed alongside the selected pit locations. They can also be used to further refine the querying possibilities, for example, all pits in the 'housing' area can be selected.

The displays could be viewed or exported from the GIS using templates as publication quality layouts. The author designed a template to produce a suitable scale, north arrow, key and heading. These could not be printed directly but were exported as Windows metafiles (or as bitmaps and manipulated in Paint) for insertion into a Word document.

Unlike the pits, it was often impossible to locate layers (built up in quarries and hollows) precisely from the archive. Often the layers were amorphous and/ or widespread so a precise co-ordinate was not appropriate. Layer positions were narrowed down as far as possible using archival data, but it was not possible to pinpoint them any more closely than to the 10x10m grid in which they were excavated. The grid was reproduced in ArcView using the fishnet command, which required the orientation of the grid (N-S) and the number of units wide each grid square was to be (10m).

After the bone distributions were displayed, nearest neighbour analysis was carried out on these patterns where appropriate. Nearest neighbour analysis tests the hypothesis that there is a random distribution of points (in this case selected pits) within an area (here, the section of the site selected as a sample). The number of points, area under consideration and mean distance of points from their nearest neighbour are used in a formula to calculate the R value (description of the distribution). An R value of 1 indicates a random pattern, values over 1 indicate a uniform pattern and those under 1 indicate a clustered pattern. A clustered pattern would suggest that certain bone elements were deposited close to each other and so were structured in some way. It is however unreliable when the number of points numbers less than 30 (Ebdon 1985), and so in many cases it has not been possible to use it.

This analysis was undertaken using a specially designed programme run within ArcView (a script) that was imported from the www.esri.com ArcView resources website, and incorporated into the project. A thematic layer consisting of one polygon, the outline of the sample area, was created (as a shape file). This was used to define the limits of the analysis. It, and a shape file created from the selected pits, were run through the script. The resulting 'R' value was then displayed in a message box, together with the number of features that were accounted for in the analysis.

The distribution of all pig bone fragments in the sample area was examined first, to provide a basis for comparison of the pits containing particular elements. A surprisingly even distribution of pig bone was seen across the sample area. The statistical analysis confirmed that there was no tendency to cluster, and that this was a random distribution.

4.2 INVESTIGATION OF SPATIAL DISTRIBUTION OF PIG BONE IN PITS

4.2.1 Early Phase

Statistically, the distribution of all pits in the early phase is not clustered (and see figure 4.1a). By eye, it can be seen that there is a higher density in the centre of the site, which diminishes towards the northern periphery and just below the centre to the south. The densest concentration is that around the so-called 'ritual' structure in the centre. There are few early phase pits found in the periphery (defined by Cunliffe as an area of housing).

The distribution of all pig bone fragments in the sample area was examined next, to provide a basis for comparison of the pits containing particular elements. A relatively even distribution of pig bone was seen across the sample area (figure 4.1b), although the densest concentration of bones is found in the central part, where the greatest numbers of pits are located in this phase. The statistical analysis confirmed that there was no tendency to cluster.

Certain pits have a large number of bones in them, and these are also found in the most central parts.

Head

The positions of all fragments from the skull (cranium and mandible) were investigated first (figure 4.1c). These showed a similar distribution to the total pig bone. There is however one pit in the centre which shows a significantly higher number of fragments. This is pit 740, which contains the remains of at least two pig heads, in layers 3 and 4.

When looked at separately, the upper cranial bone and lower mandibular bones are both found in roughly similar distributions to the total pig bones (figures 4.1d and 4.2a). However, the positions of cranial and mandible fragments do not always correspond. It appears that while there is no obvious correlation of upper and lower head parts in the same pits, there is also no definite segregation of the two in different parts of the site: in some pits these bones are found together, while other pits contain either one or the other body part.

The teeth were omitted from the above analysis due to the possible influence large numbers of loose teeth might have on the results. The distribution of loose teeth closely mirrors that of the rest of the skull fragments (figure 4.2b), suggesting that teeth became loose after deposition, or that deposits containing loose teeth were made universally. Pits with a large number of teeth are normally those that contain many pig bones, although they do not necessarily contain many cranial fragments (figure 4.1d).

The atlas and axis distribution is extremely scattered, and there are not many examples (figure 4.2c). They are more common in the central area than the south or north, but there is one pit in the southern half that contains several examples. The majority are found singly, suggesting that these bones had been extremely widely scattered. There is little correlation between the positions of cervical vertebrae and skull fragments, which suggests that these two parts were distributed and/or deposited separately.

Torso

The distribution of all torso bone fragments reflects the distribution of all pig bone, with the upper and lower sections showing a very similar distribution both to each other and to the overall pattern (figures 4.1a & 4.3a, 4.3b and 4.3c). When rib and vertebral fragments were investigated, they showed an extremely similar distribution to the overall pattern (figure

4.3d). Throughout this analysis, one pit consistently contained many examples, probably caused by a special deposit of a pig in pit 674 (see below).

Fore limb

The total numbers of forelimb bone fragments have a similar distribution to the overall pig bones, again showing an especially large number of examples in pit 674, with fewer elsewhere (figure 4.4a). Pit 674 contains 555 bone fragments, of which 205 are from pigs, attributable to a special deposit of a pig in layer 4. This pit also contains more lower than upper forelimb parts, which is unusual since most pits give the opposite pattern. Lower forelimb bones are only found in 12 pits: two in the southern part and the remainder in the centre of the site. Upper forelimb bone fragments have a wider distribution (figures 4.4b and 4.4c). While this might suggest that the upper, meatier, parts were distributed for consumption, and the less meaty parts filleted and deposited immediately after butchery, it is perhaps more likely that the lower limb bone distribution is restricted due to the problems of assigning phalanges and fragmented metapodials to fore or hind limb. Many lower limb bones have been omitted and are described below ('feet'). There is nothing to suggest that there was differential disposal of upper and lower fore limb bones within the site, as both are concentrated in areas with more pig bones overall.

Hind limb

Again the distribution of hind limb bones appears to mimic that of all pig bone, with more examples in pit 674, and the rest scattered widely although with a concentration in the central area (figure 4.5a).

The upper parts of the hind limb have a similar distribution to the overall hind limb distribution (figure 4.5b). The lower limb bones are found in the southern half in slightly greater densities than the northern half, but the number of examples is too small to indicate deliberate patterning (figure 4.5c).

Feet

Bones from the trotters which could not be assigned to fore or hind limbs (the phalanges and broken axial and abaxial metapodials) are found in similar distributions to the overall pattern (figure 4.5d). Three pits in a cluster show considerably more examples than the others, but these are also pits with particularly large numbers of all bone elements.

Summary of pig bone in the early phase

There appears to be very little patterning in pig bone distribution. Upper and lower limbs are scattered across the sample area, but those pits with larger numbers of upper parts do not generally contain many lower parts as well, suggesting that these parts of the carcass were separated following preliminary disarticulation. The atlas and axis distribution is also less focussed on the central area than the skull parts. These two bones are almost always found singly in pits. This corroborates the above suggestion that the carcass was widely dispersed across the hillfort, with bones that are found close together in the skeleton but parts of different butchery units often recovered from different pits.

4.2.2 Middle Phases

Middle phases did not contain enough examples of individual pig bone elements for spatial investigation of this species. The distribution of pits in this phase is described in part 4.3.2.

4.2.3 Late Phase

Nearest neighbour analysis tells us that that pits in the late phase are statistically random in distribution. By eye, pits appear to be slightly less dense in the centre than in the northern periphery and southern part of the sample (figure 4.6a). A similar pattern is produced when the numbers of pig bone in these pits are displayed (figure 4.6b). There is no clustering of the pits that contain large numbers of bone fragments.

There are two pits from which a very large number of pig bones was recovered, one in the south and one situated centrally. These both contained articulated remains, each of at least two individuals; this partly accounts for the high numbers of pig bones recovered.

Head

The positions of all skull fragments did not show any clusters, and instead paralleled the overall distribution of pits. The two pits that contained a large number of bones overall also contained a large number of skull fragments. The mandible is very dense and does not fragment as easily as cranial bone. However mandible fragments have a similar, scattered, distribution as the cranial bones, suggesting that fragmentation did not greatly influence the distribution, and perhaps that much of the fragmentation occurred post-deposition.

In the late phase pits there was no butchery evidence to suggest separation of the mandible from the skull. The locations of cranial bones do not however match those of mandible fragments, as they would if they had been deposited together. Separation must therefore have occurred at some point before deposition, though the process did not mark the bone.

Torso

The bones from the torso show a similar distribution to that of all pig bone. The upper parts (cervical and thoracic vertebrae) show slightly more clustering than the lower (lumbar and sacral vertebrae), with a few pits containing large numbers of upper vertebral parts, and the remainder with small numbers (figure 4.6c and 4.6d). Numerous single examples of lower vertebrae are found. It is possible that the 'lower' part of the spine was split up into separate vertebrae, like chops, while the 'upper' vertebrae (which are more difficult to disarticulate) were split into chunks of several bones.

The pelvis and scapula are virtually identical in distribution to the total numbers of torso bone, and are scattered across the sample area in the same manner as all pig bone fragments in this phase.

Fore limbs

The distribution of fore limb bone fragments closely mirrors that of the total pig bone, with large numbers of examples in the pits containing bones found in articulation, and a random distribution across the rest of the site (figures 4.7a and 4.1a). The lower forelimbs were not widely distributed but were concentrated in certain pits (figure 4.7c). They did not seem to be found in small quantities all across the site. In comparison, the upper parts of the forelimb have a much more scattered distribution. Again this is probably due to the relatively small numbers of lower limb bones which could be assigned to fore or hind quarters, although it is possible that there was a patterning in the distribution of this carcass part (see early phase).

Hind limbs

Overall the hind limb bones were evenly distributed, although inevitably the pits containing articulated examples produced higher numbers. The upper and lower parts of the hind limbs had similar distributions, and individual bones were often found singly.

Feet

The phalanges and metapodial parts which could not be assigned to fore or hind limbs have a very even distribution in respect of the overall distribution of pits. Some pits contain several examples, but on investigation these pits were found to contain the bones from feet that were probably deposited whole (figure 4.7d).

The large number of bones in this phase enables investigation of the effects of bone fragmentation. The positions of whole bones were displayed in order to contrast the location of complete examples to that of fragmentary bone. It can be seen in figure 4.8a that whole bones are found scattered across the site, and they are found in equivalent positions to the fragmented examples.

Summary of pig bone in the late phase

There is no evidence to suggest any restriction or zoning of areas of deposition in the late phase. Fragmentation is not likely to have affected the results, as fragmented examples and whole bones have very similar distributions. Much of the bone fragmentation may have occurred post-deposition. Although upper and lower parts of limbs are found in similar distributions across the site, they are often not found in the same pits, indicating that they were separated before deposition. Lumbar vertebrae were more likely to be individually deposited, while thoracic vertebrae are more often found in groups. It is possible that lower forelimbs were more concentrated in particular parts of the site, but this apparent patterning may be a result of the exclusion of bones from the lower limb and foot that could not be assigned to fore or hind limb.

4.3 INVESTIGATION OF SPATIAL DISTRIBUTION OF CATTLE BONE IN PITS

4.3.1 Early phase

The overall pattern of cattle bone distribution in the early period is broadly similar whether using all bone fragments or just looking at a restricted range of bone parts (distal humerus representing upper forelimb, etc.). Figure 4.8 shows that while the distributions of both are similar, the restricted bone analysis appears to place the majority of cattle bones in the southern section of the sample area. The northern half is characterised by a greater number of pits containing only a few bones (under 10). So, while the restricted bone analysis appears at first glance to indicate an under-representation in the northern area, it is clear that the major factor determining the overall distribution is the presence in the southern half of a large number of cattle bones in six pits.

These pits are in the area to which Cunliffe did not assign a function (1995: 42) (see figure 4.8b). It may be that this area attracted different types of deposits- perhaps the remains of more complete cattle carcasses- than the northernmost part. When compared to the locations of pits in the early phase, it is clear that the pits with large numbers of cattle bone in them were not concentrated in the part of the site where pits were most dense. However, nearest neighbour analysis offered no evidence of clustering of cattle bone parts. It was thought probable that these pits contained special deposits, which would both increase the numbers of bones and explain the results of the restricted fragment analysis (as the bones are more likely to be whole). However this was not always the case (see section 4.3.4).

Cattle occipital condyles are infrequently found in early phase pits, with a roughly similar distribution to mandibles. Both follow the overall pattern of cattle bone disarticulation, of scattered pits concentrated centrally (figure 4.9a). One pit has several examples of both mandibles and occipital condyles (figure 4.9b). This is pit 674 in the north part of the southern area, which also contained large numbers of pig bone.

The distal scapula and distal humerus have completely different distributions: of the 16 pits with either bone in, none coincide (figures 4.9c and 4.9d). It is likely therefore that the scapula and humerus were separated after disarticulation and deposited in different pits. Similarly, of the 17 pits containing either the distal femur or pelvic acetabulum, only two contained examples of both (figures 4.10a and 4.10b). This again indicates separation of these elements from one another prior to deposition, although the smaller numbers of examples here suggest caution in this interpretation.

Metapodial parts are concentrated in the southern area, with none in the northernmost part where the majority of pits is located. They are not only found in pits with large numbers of bone but are well distributed in this southern area. First phalanges are also concentrated in the south but there is also a relatively even scatter across the rest of the site, in direct proportion to the total numbers of cattle bones (figure 4.10c, 4.10d and 4.11a). Thus the head and feet bones are not concentrated in any one area.

Comparison of the distribution of upper and lower limb bones shows that although they are found in similar areas, they are not often found in the same pits. Of the ten pits in which distal humeri were found, only three also contained distal metacarpals. A similar pattern is established for hind limb bones. This suggests that the metapodials were divided from the meaty parts of the upper limbs before deposition. It may be worth noting that the upper limbs are more frequently located in the northern sector of the site than the lower limb bones.

Summary of cattle bone in the early phase

Most pits in the early phase contain some cattle bone, but those with the most numbers of cattle bone are mainly found in the southern half of the site. The reason is not simply that these are larger or more densely filled pits, as this pattern is not seen for pig bone. The methods of analysis have not influenced the pattern: using all fragments does not alter the result, nor does the use of equal interval counts in defining numerical distinctions rather than natural breaks. It seems instead that large numbers of cattle bone were deposited in some pits in the southern half of the site, rather than in the more densely pitted central area. The southern part, where the large numbers of cattle bone were located, has not been given a function by Cunliffe, although other areas were defined as storage, housing or ritual in nature. The significance of the unusually large quantities of cattle bone in the 'unassigned' area is further discussed in part 4.4.

The bones representative of upper and lower limbs were generally not found in the same pits, nor were the upper and lower parts of the head and torso. It is therefore suggested that the cattle carcasses were extensively re-distributed after butchery and before burial. However there do not appear to be designated areas for disposal of particular parts of the carcass (e.g. butchery waste, meat joints, etc.).

4.3.2 Middle phases

Cattle bones are scattered more evenly across the sample area in the middle phases than in the early phase. There is a slightly greater concentration in the central-southern part and a small cluster in the northern periphery, with relatively fewer in the central-northern area. However nearest neighbour analysis indicates that there is not significant clustering anywhere in the sample area.

Head and foot bones are evenly distributed. The positions of distal metapodials do not correlate well with the first phalange; five pits contained examples of both, but 15 had only one or the other bone. The limb bones are spread evenly over the sample area, but humeri and scapulae are not found together, nor are femora and pelves.

In the middle phase pits, selected cattle bone fragments do not have a distinctive patterning, although the separation of the bone elements indicates that the carcass had been divided up prior to deposition. There does not appear to be any difference in distribution of bone elements compared to the early phase.

4.3.3 Late phase

The overall distribution of cattle bone in the late phase is scattered (figure 4.11a). There are cattle bones in pits evenly spread throughout the functional areas. One pit, 761, is situated in the central part and has the largest number of examples.

Mandibles are distributed evenly in proportion to the total numbers of cattle bone. The occipital condyles are found mainly in the northern half of the sample area, again with the central pit showing most examples (figure 4.11c). Numbers are too small to suggest patterning, and nearest neighbour analysis did not indicate any clustering.

The first phalange distribution is equally scattered, and corresponds to head bone fragments in only six pits (figure 4.11d). Metapodials are also distributed widely, although it may be worth noting that there are no distal metacarpals in the pit with the largest number of cattle bones. However, there is no evidence to suggest that 'waste' bones were being deposited exclusively in the same pits or in a certain area, since occipital condyles, metapodials and phalanges are both widely distributed.

Distal humeri and femora show a scattered distribution. The distribution of distal scapulae differs slightly from distal humeri: in some pits they coincide (9) but in some they do not (25) (figures 12a and 12b). Similarly, the femur and pelvis are found together in 10 pits, but 19 pits contain either one or the other bone (figures 12c and 12d).

Again there does not appear to be any evidence for segregation of specific parts in certain areas. The bones have been widely dispersed before deposition.

4.3.4 Conclusions

Throughout the phases cattle bones were evenly distributed across the sample area, with no clustering or segregation of parts. Cattle bones were most numerous outside the main area of concentration of pits in the early phase, and were found in very large quantities in several pits. This pattern is the opposite to that for cattle bones in middle and late phase pits, and pig bones in early and late phases; in these phases bone distribution was directly proportional to pit distribution.

The location of large quantities of cattle bone outside the main pitted areas and areas with circular structures may be important. Initially I assumed these pits contained special deposits of cattle or calves, which would account for the higher numbers of bone. However, on investigation, two of the six prolific pits did not contain any articulated bone. Of the others, pit 674 contained nine skull fragments from one individual, pit 63 contained six articulated foot bones, and pits 664 and 587 three fragments of cranium each. This is certainly not enough to account for the large numbers in each. Instead it is proposed that these pits contained large quantities of cattle bone either because they were located in an area where cattle butchery and consumption were taking place on a large scale, or because they happened to be open at the time the cattle were consumed and deposited.

The location of skeletally conjoining bone elements in separate pits suggests that after butchery the carcass parts were distributed before deposition in different pits and thus some time passed between butchery and consumption. The extent of redistribution is further examined by looking at the difference between vertical deposits within the pits (chapter 5).

4.4 DIFFERENCES IN DISTRIBUTION BETWEEN CATTLE AND PIG BONES

It is probable that both species were divided and the carcass parts significantly distributed after butchery. In the early phase it is possible that cattle were treated differently from pigs; they were possibly butchered and consumed in a separate area, or they may have been deposited in a specific area (the south of the site). A whole ox would provide a large quantity of meat, which would need to be consumed relatively quickly or preserved before it spoiled. Thus in the early phase it could be that the remains of cattle eaten by large groups of people were deposited in the southern part of the site, and that patterns of consumption in the northern part were different.

4.5 TWO DIMENSIONAL ANALYSIS OF CAT, DOG, BIRD AND DEER BONES AND SPECIAL ANIMAL DEPOSITS

All fragments were included in the analysis, as the bones from these species were scarce. Sheep and horses were not included, as the intention of this section was to isolate any possible differences in depositional practice between the domestic species already investigated and the more unusual animals and deposits.

4.5.1 Early phase

Bird bones are concentrated exclusively in the southern section of the site (figure 13a). This differs from the overall pattern, but mirrored cattle bone distribution. Red deer are infrequently found in the sample area. Only one example was found and this was from the southern half (figure 14a). Dog bone is found mainly in the centre of the site, the area of the densest concentration of pits (figure 13c). No cat bone was found in the early phase, although in the middle phases some is present in the southern half. Special deposits are found in the southern half of the sample only (figure 14a).

4.5.2 Late phase

Bird bones are concentrated in the southern half but there is one example in the far north (figure 13b). This distribution echoes that of the early period but also conforms to the distribution of all pits in the late period. Red deer bones are found in small numbers in the northern half of the site (figure 14b). Dog bone is again located in direct proportion to the concentration of all pits in this phase, with relatively few in the centre and the majority around the periphery (figure 13d). Cat bones are found in small numbers with two examples in two pits in the north and south peripheries. Special deposits are found in the southern and northern peripheries, but not in the centre (figure 14d).

4.5.3 Comparison of animal bone distribution between phases

The bird bone in the early phase is concentrated in the southern half. This contrasts with the main area of concentration of pits and pig bone and could imply a depositional pattern for these animals that is similar to cattle in this phase, but different from the main pattern of bone distribution. In the late phase bird bone locations are very scattered, but replicate the overall distribution of bone. The small numbers of bird bones make drawing a conclusion difficult, but it seems that the bird and cattle bones may have been treated differently to the majority of the other bone in the early period, but were not afforded any special treatment in the late phase.

Red deer bones were very rarely found, and occur in pits in the southern half in the early period and in those in the northern half in the late phase. Again, any conclusions reached from this are extremely tentative, as bones were incorporated into deposits very infrequently. However from the limited evidence it could be suggested that different systems were in operation in the early and late phases, and that in the early period the deer bones do not follow the same pattern as the majority of the rest of the bone in terms of their distribution.

Dog bones are more numerous, and it may be for this reason that their distribution appears to follow roughly the same spread as the majority of the bone in both phases. However, if not a symptom of sample size differences, it could imply that dogs had a more similar status to sheep and pig, as a domesticated animal.

Cat bones are rare, and are absent from the sample area in the early period. However their distribution in the middle period mirrors that of red deer and bird bones; they are found exclusively in the southern half. In the late period cat bone is found in both peripheries in proportion to the distribution of late phase pits.

Special deposits are found outside the main area of pit concentration in the early phase, but are found in similar proportions to the majority of animal bone in the late phase. They do not appear in the same areas as the 'ritual' structures in either phase.

In summary, the bones of red deer, birds and cats are found outside the main area of pit concentration in the early phase, but their distribution mirrors the overall pattern in the late phase. This could suggest that while they have some sort of special or different status in the early period this has diminished or disappeared by the later phase. Special deposits also follow this pattern, as does much of the cattle bone. This could support Cunliffe's suggestion that the nature of use altered midway through the Iron Age occupation, and it looks likely that there was some difference between the north and south parts, at least in the early period. The blending of 'ritual' and 'secular' activities, which Cunliffe envisaged for the late phase, is corroborated by animal bone distributions, which seem to be homogenous in the late phase (Cunliffe 1995: 25).

Dogs appear to follow the same pattern as the majority of the animal bone overall and this suggests that they were not given special status at any time.

4.6 TWO-DIMENSIONAL DISTRIBUTION OF LAYER MATERIAL

Fragment counts were used for these analyses as the numbers of whole examples are too low to provide any comparative data. Here the late phase material is investigated first, as the early phase produced so little material.

4.6.1 Late phase

4.6.1.1 Pig

First the total number of pig bone found in each grid was displayed (figure 4.15b). This showed a large number of bone fragments in D12, a moderate number in C82 and a low number (1-13) in the remaining grid squares (see figure 4.15a for location of grids).

Fore limb bones were found in the greatest numbers in D12 and C82 in a similar proportion to the rest of the pig bone, except the radius, which was not found in C82. Hind limb bones are found in very low numbers (figures 4.15c and 4.15d), but in similar proportions to the rest of the bone. This suggests that the bone elements were not segregated in one area or hollow, but were scattered. Pelves and femoral fragments were found in the same grids, suggesting that they had not been widely distributed before deposition. However, the large size of the grids ($100m^2$) means that results based on analysis of the extent of bone element distribution in layers are less significant than for pit deposits.

4.6.1.2 Cattle

Cattle bone fragments for the late phase have a similar distribution to those of pigs (figures 4.16a and 4.15b). Grids D12, C73 and C82 contain the most cattle and pig bone. The forelimbs are dispersed across the area, in similar proportions to the total numbers (figures 4.16a, 4.16b and 4.16c). However, the humerus and scapula fragments are concentrated in different grids (C82 and D12 respectively). This suggests that these carcass elements had been spread widely before deposition, although the numbers of bone are too small for firm conclusions.

Cattle pelves, tibiae and femora are spread across the area evenly (figure 4.16d), so it is not possible to suggest that the carcasses had been extensively distributed after preliminary butchery. However, the large size of the 10x10m grids means that carcasses could still have been widely scattered prior to deposition.

4.6.2 Early phase

4.6.2.1 Pig

There were very few bones in this sample, only seven fragments in two grids. These both included 'meaty' and 'waste' bones in equal proportion (table 5.1 defines bone as of high, low or medium meat value; here those of high and medium meat values are called 'meat' bones, and those of low meat value, 'waste'). There were not enough examples to investigate the extent of bone dissemination.

4.6.2.2 Cattle

Cattle bones were found in five grids, although a total of only 25 bones was recovered in this period. When all cattle bone fragments were displayed there appeared to be a concentration in two grids, C71 and D12 (figure 4.17a). When 'meat' and 'waste' bones were displayed, the concentrations remained in approximately the same positions, but with more 'waste' bones in D22, and more 'meat' bones observed in C72 (figures 4.17b and 4.17c). Unfortunately, this sample is too small to draw any conclusions.

Cattle humerus and radius fragments were not found in adjacent grids, with the humerus in grid squares C71 and C72 (figure 4.17d) and the radius found in grid D12 only. The separation of these parts could suggest the widespread dissemination of the carcass, although again the numbers are too small for any conclusions to be made.

4.6.2.3 Comparison between species in the early phase

Overall both species appear to show a scattered distribution of all parts, with no correlation between the humerus and radius. This suggests that the parts had been deposited after dissemination from the carcass and not directly after butchery/ eating. Small sample size hindered analysis, so the possible differential deposition of bones from more meat bearing parts of the cattle carcasses cannot be established.

4.6.3 Summary of pig and cattle bone in layers

Very small numbers of pig and cattle bone in the early phase make interpretations inconclusive. Although possible segregation of 'meaty' parts could be suggested, no conclusions are drawn here.

The majority of the bones are concentrated in the north-eastern part of the sample area. When species and bone element are considered separately, the observed pattern is unaltered. There is no evidence that certain bones were deposited in particular areas. Grid areas are too large to enable interpretation of the extent of distribution of the carcass parts, but there is no suggestion that skeletally adjacent bones are found together in deposits.

4.7 CONCLUSIONS OF TWO- DIMENSIONAL SPATIAL ANALYSIS

From the analysis carried out in Arcview, there is relatively little evidence for patterning across the hillfort at the broad level of the content of entire pits and the layers in $100m^2$ grids. In none of the distributions of bone elements did nearest neighbour analysis show a tendency to cluster; this would have indicated that pit content varied according to location. Nor is there any evidence that certain parts, for example 'meat' and 'waste' bone, were concentrated in particular areas. In general, the functional areas as defined by Cunliffe do not appear to contain specific carcass parts, but bone densities are instead directly proportional to the areas of densest concentration of pits or layers by phase.

The exception to this seems to be cattle and the less well represented animals in the early phase. Their bones are found outside the main area of pits, and in the case of cattle bone, often in large quantities (though not usually as articulated skeletons). This suggests differences in deposition between species, and perhaps that the pits with large numbers of cattle bone in them were specific repositories for this species (and maybe also birds). It may be that in the early phase cattle were more often feasted upon, so their bones would be more likely to be deposited in large quantities. This differentiation is not found in the late phase, suggesting that activities that had been taking place in the earlier period had ceased.

Special deposits are not found near the 'ritual' structure or 'sanctuary', but are in the early phase located outside the area of densest pit location, much the same as the cattle and bird bone concentrations. In the later period special deposits are found in direct proportion to where pits are most concentrated. Thus, in the early phase only, special deposits, birds and large quantities of cattle bones were placed in different areas to the majority of the bone. These deposits may have been produced by special activities that had ceased or lost their status by the late period.

Dogs are clustered in the same places as pig and cattle in all phases, which suggests no special status for this species.

Bones were often observed singly, and bones from the same primary or secondary butchery division (such as the feet or forelimbs) are not necessarily found together in the same pit or layer. The radius and humerus for instance are not consistently found in the same pits. However there is some indication that thoracic vertebrae are found in clusters within pits, and are less frequently found singly than lumbar vertebrae. This may be related to butchery or consumption activity, where the thoracic vertebrae are left in chunks and the lumbar vertebrae are split into individual chops.

There is no evidence that bone working had an effect on the distributions. Dumps of bone working waste could be expected to include cattle ribs, metapodials and femora (section 2.4.4), but no pits contained large quantities of any of these bones. Similarly, these bone elements were not noticeably absent, as would be expected had they been worked and taken off site.

The macro scale of this investigation may have obscured many patterns. In some cases, the amalgamation of numerous layers within one pit may have obscured the nature of the individual episodes of deposition that filled the pit. It is possible that the numerous layers filling individual pits have totally different characteristics to each other. Investigation of these layers separately may show more evidence of specific activities than pits as a whole, and this is the focus of the next chapter.

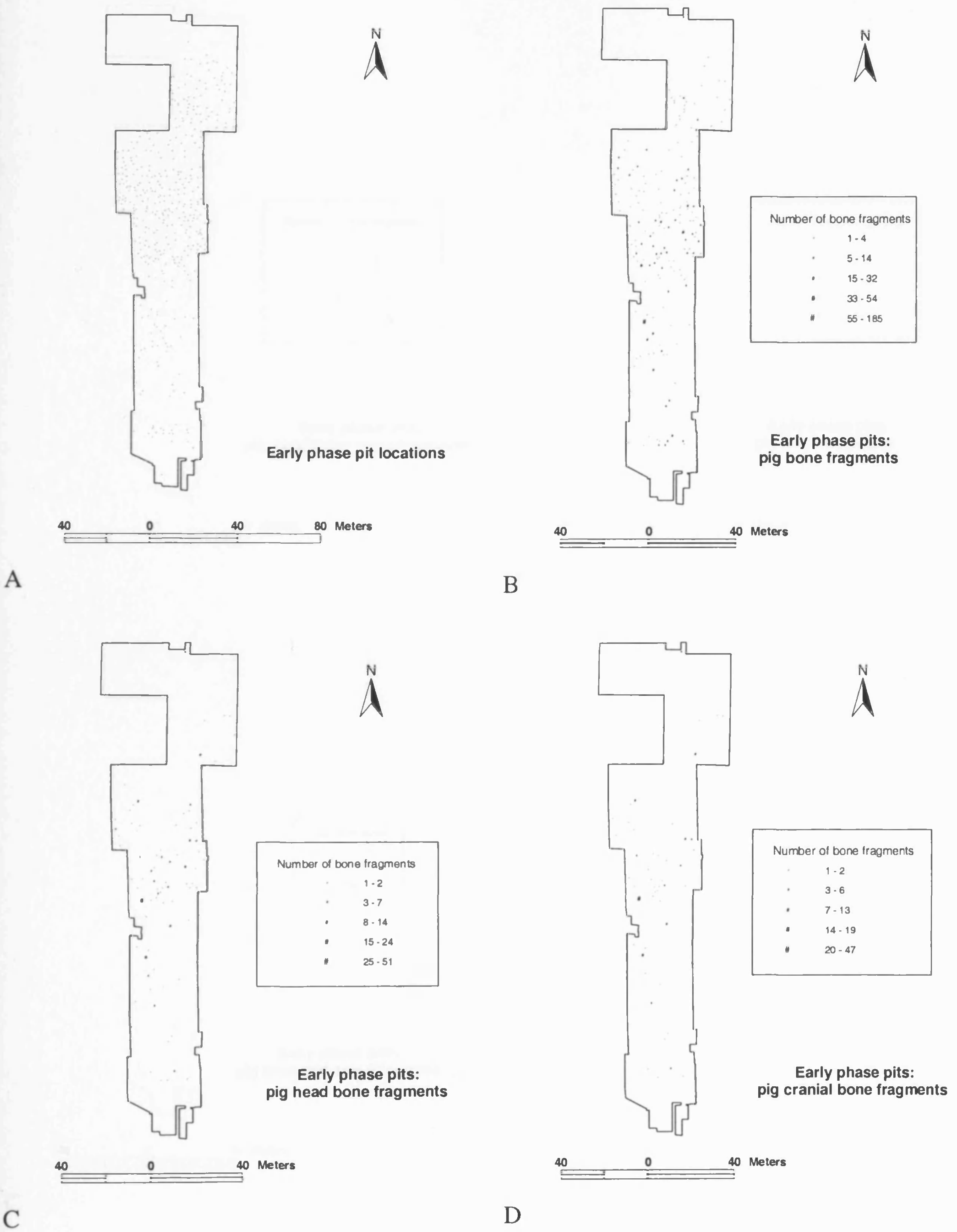
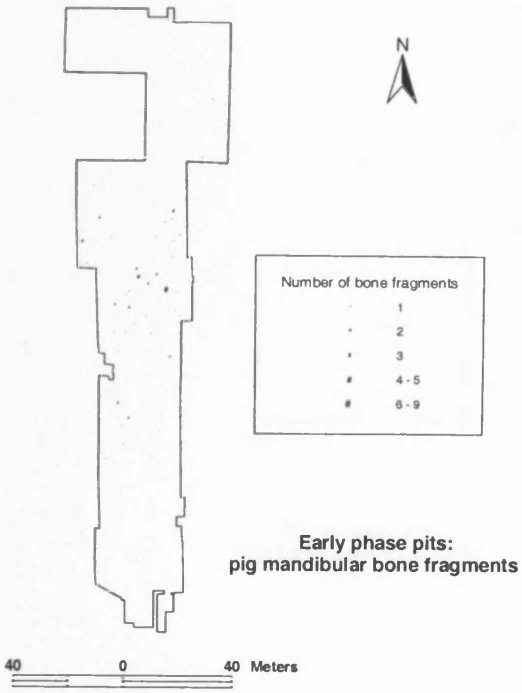


Figure 4.1: Positions of pits and pig bone cranial fragments in the early phase.



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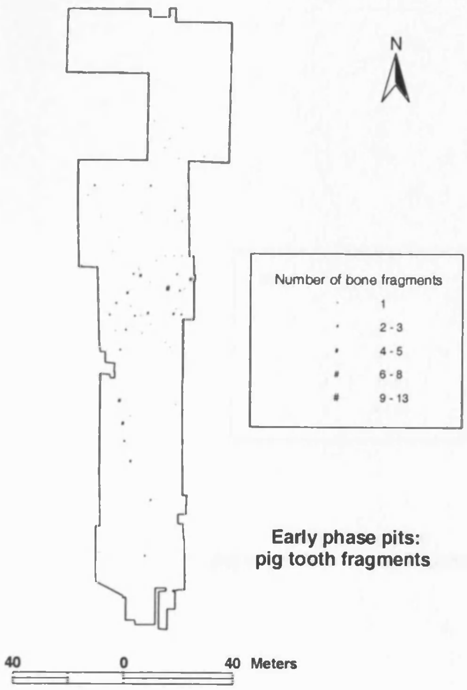

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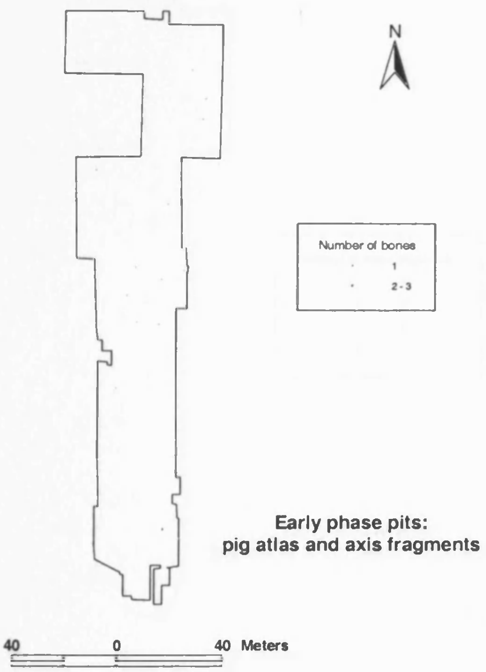

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Figure 4.2: Positions of pig bone mandible, tooth and atlas and axis fragments in pits in the early phase.

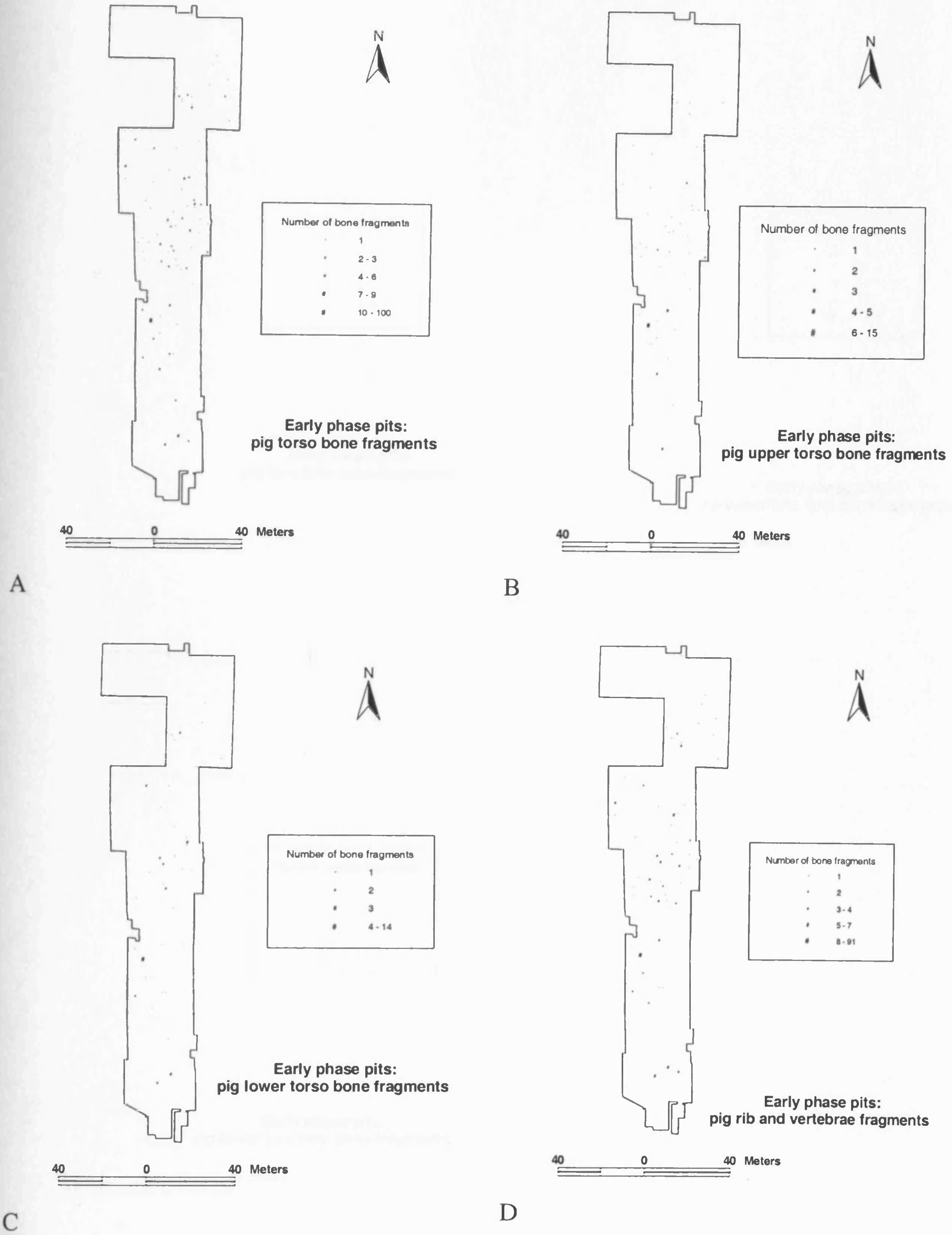
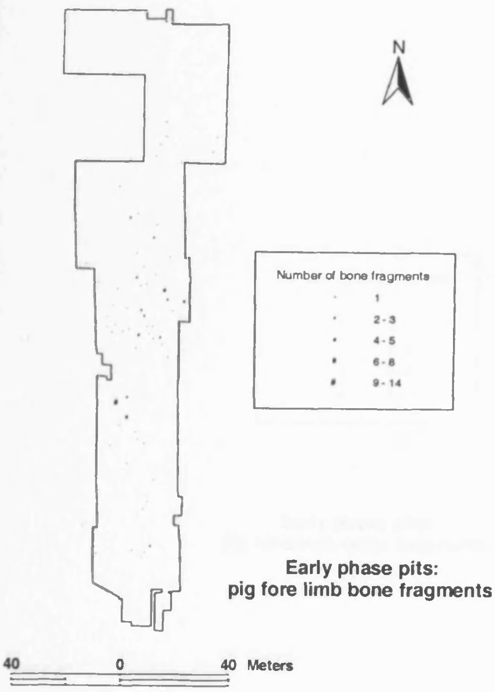


Figure 4.3: Positions of pig torso bone fragments in pits in the early phase.



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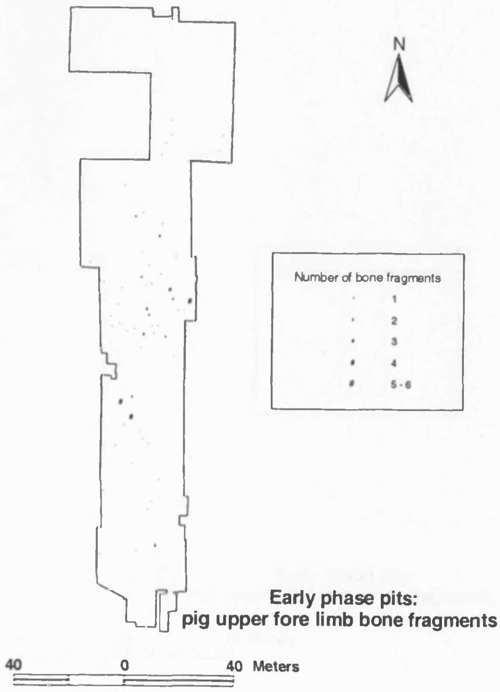

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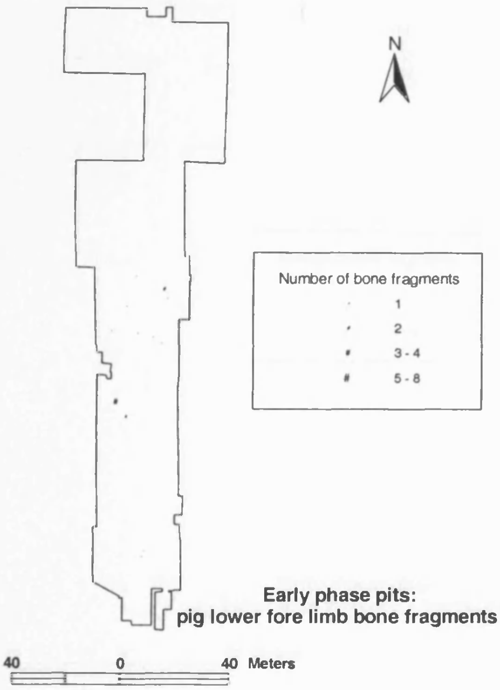

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Figure 4.4: Positions of pig forelimb bone fragments in pits in the early phase.

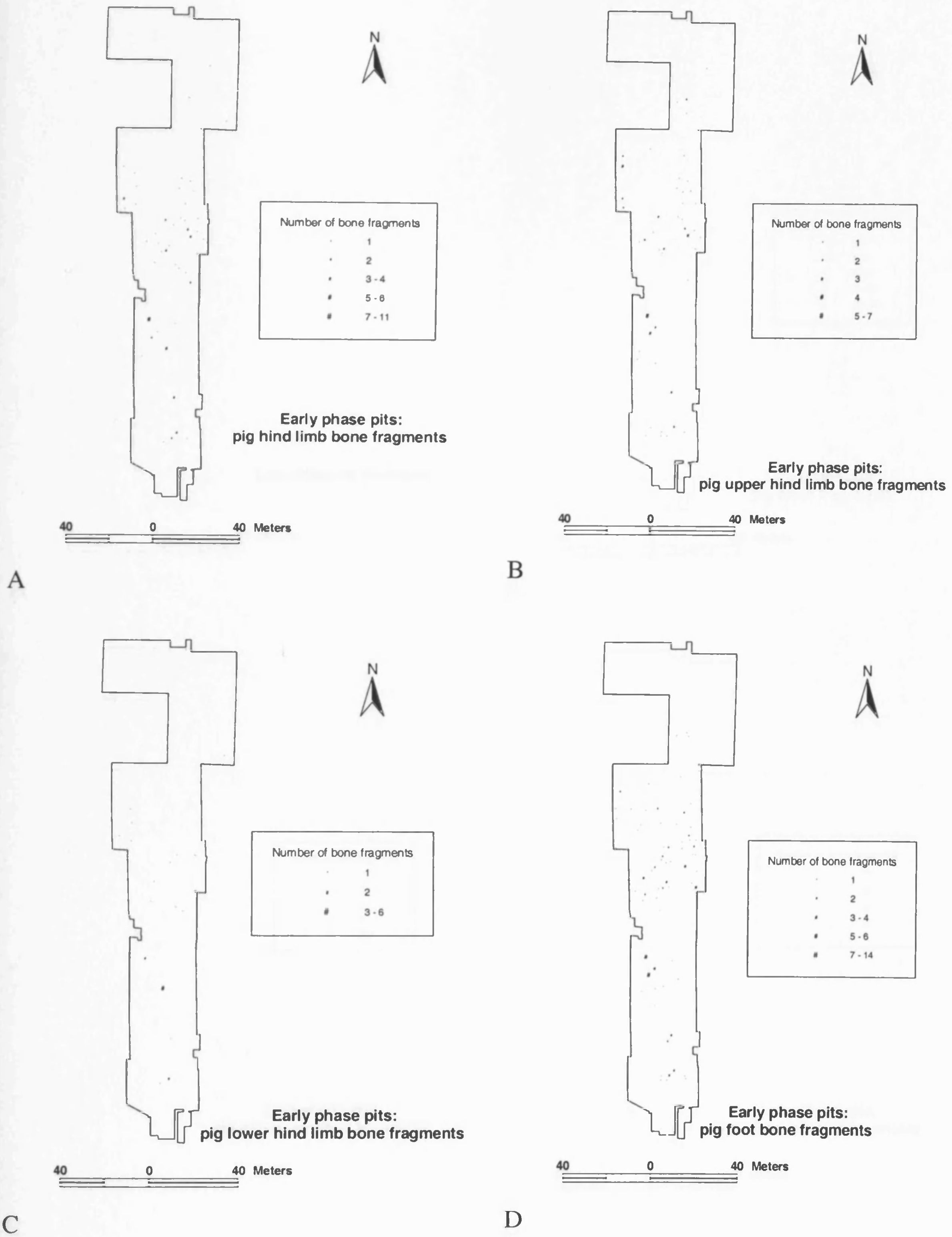


Figure 4.5: Positions of pig hindlimb bone fragments in pits in the early phase.

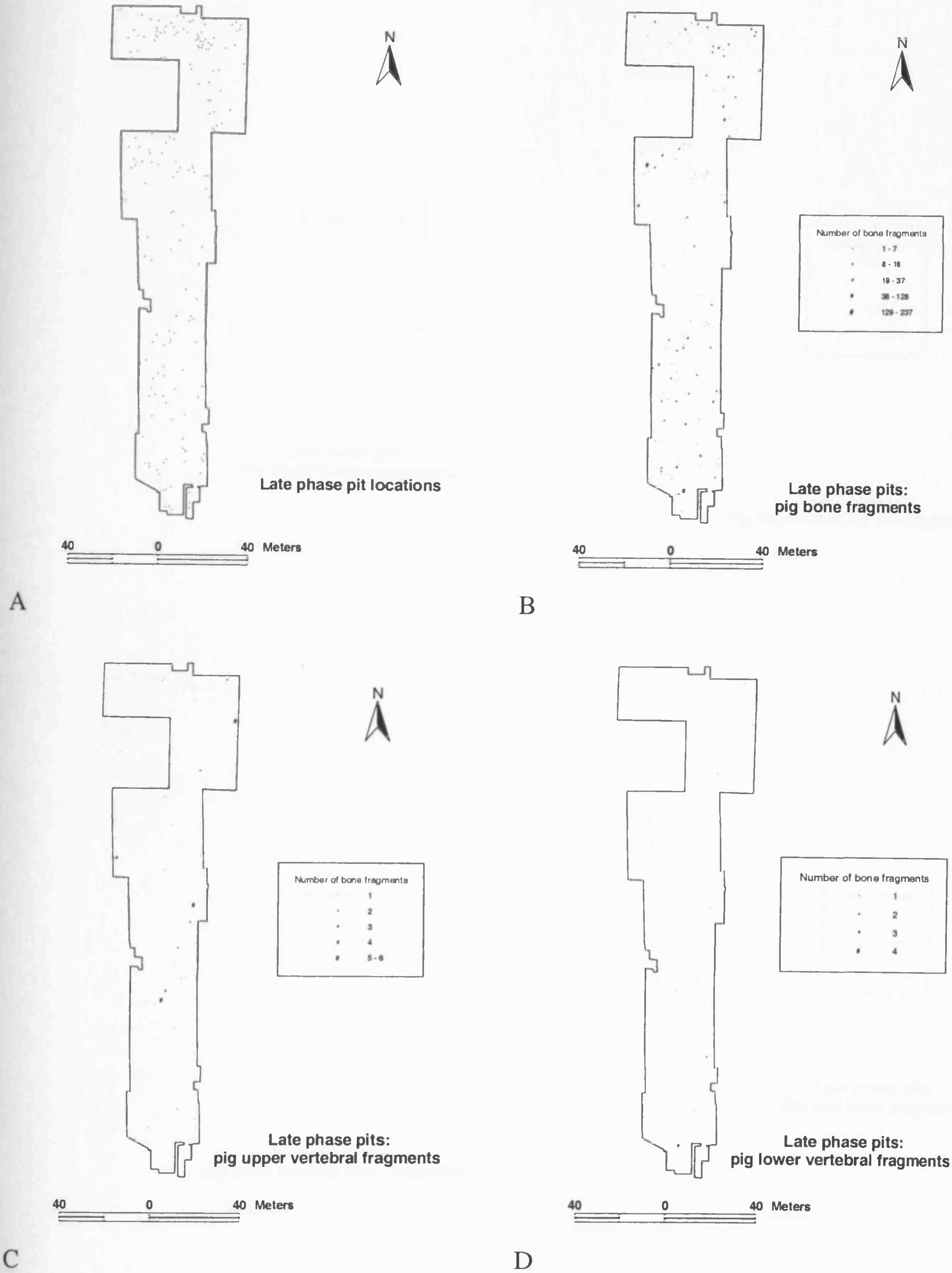


Figure 4.6: Positions of late phase pits, pig bone fragments and pig vertebral fragments.

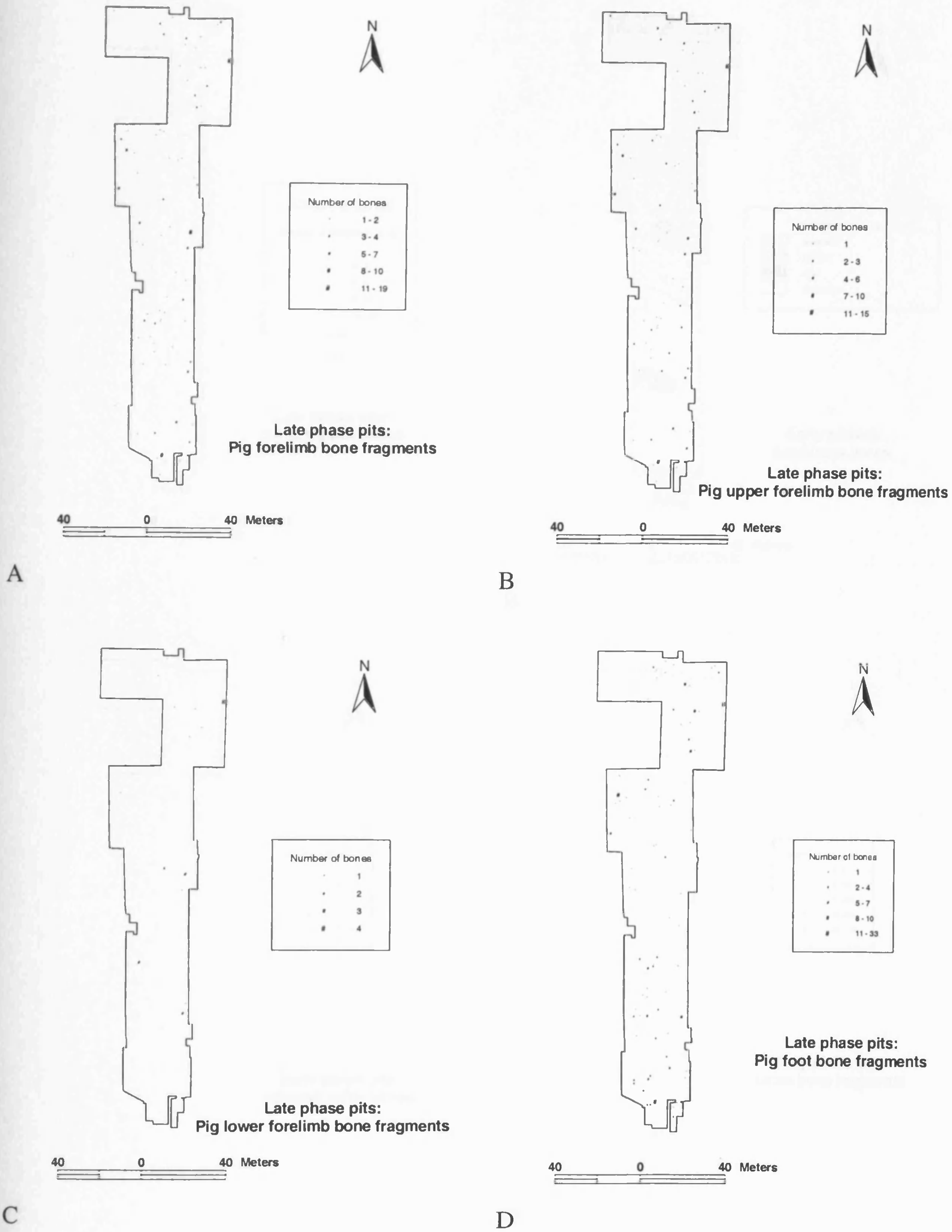


Figure 4.7: Positions of pig forelimb bone fragments in late phase pits.

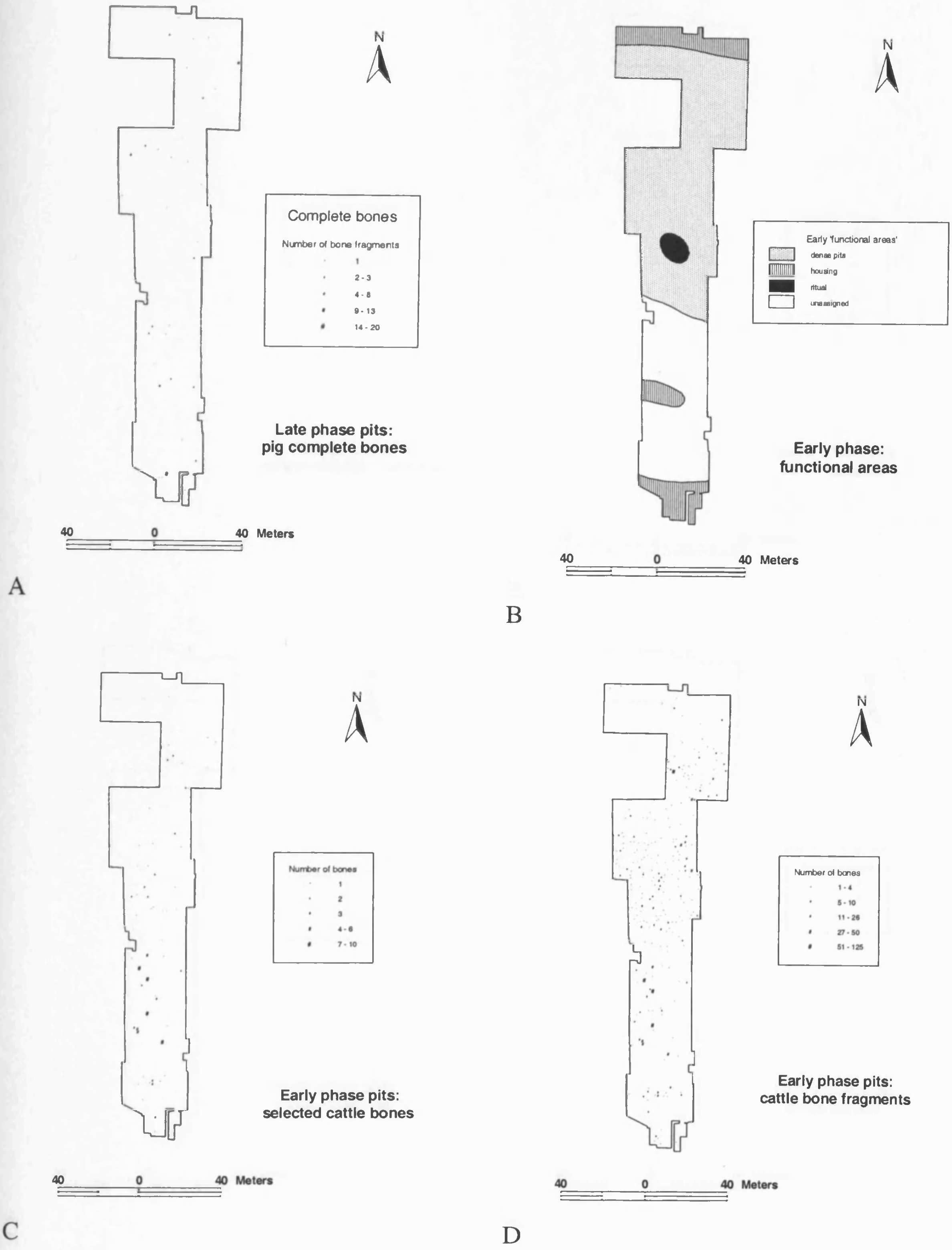


Figure 4.8: Positions of complete pig bone in late phase pits, Cunliffe's interpretation of use areas at Danebury in the early phase (Cunliffe, 1995: 42) and cattle bone fragments in early phase pits (selected bones and all fragments).

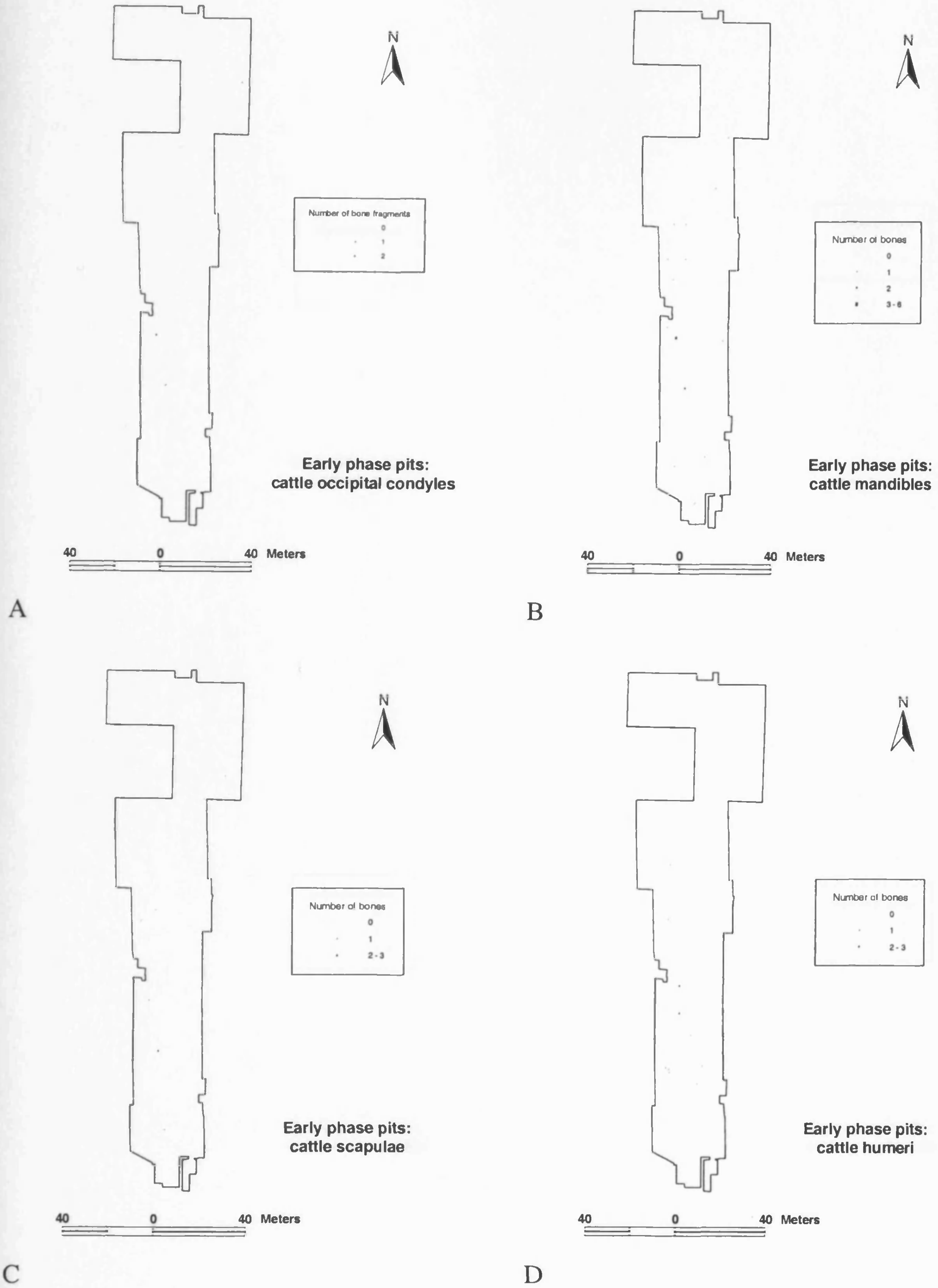


Figure 4.9: Positions of cattle occipital condyles, mandibles, distal scapula and distal humerus in pits in the early phase.

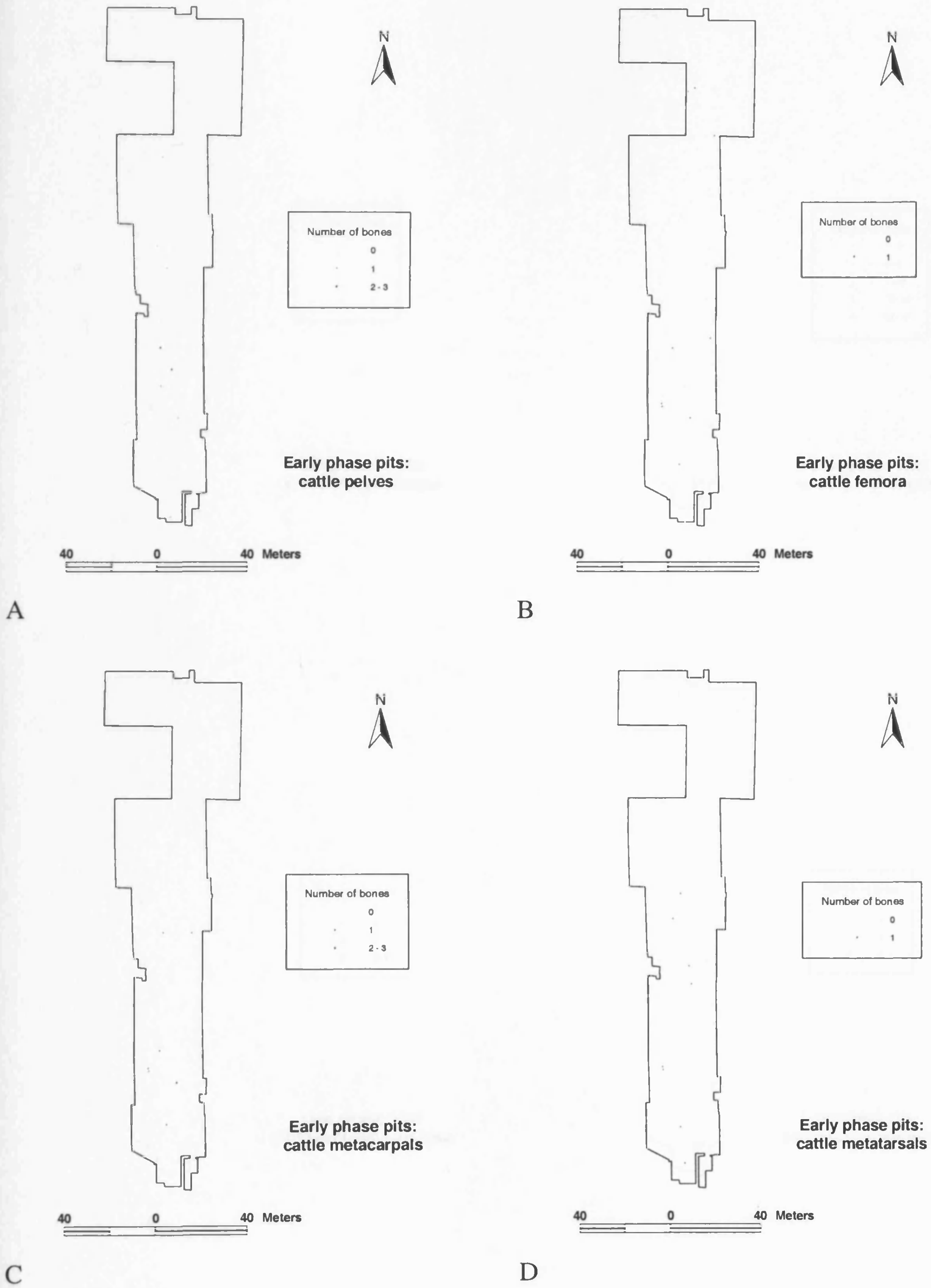


Figure 4.10: Positions of cattle distal femur, pelvic acetabulum and distal metapodials in early phase pits.

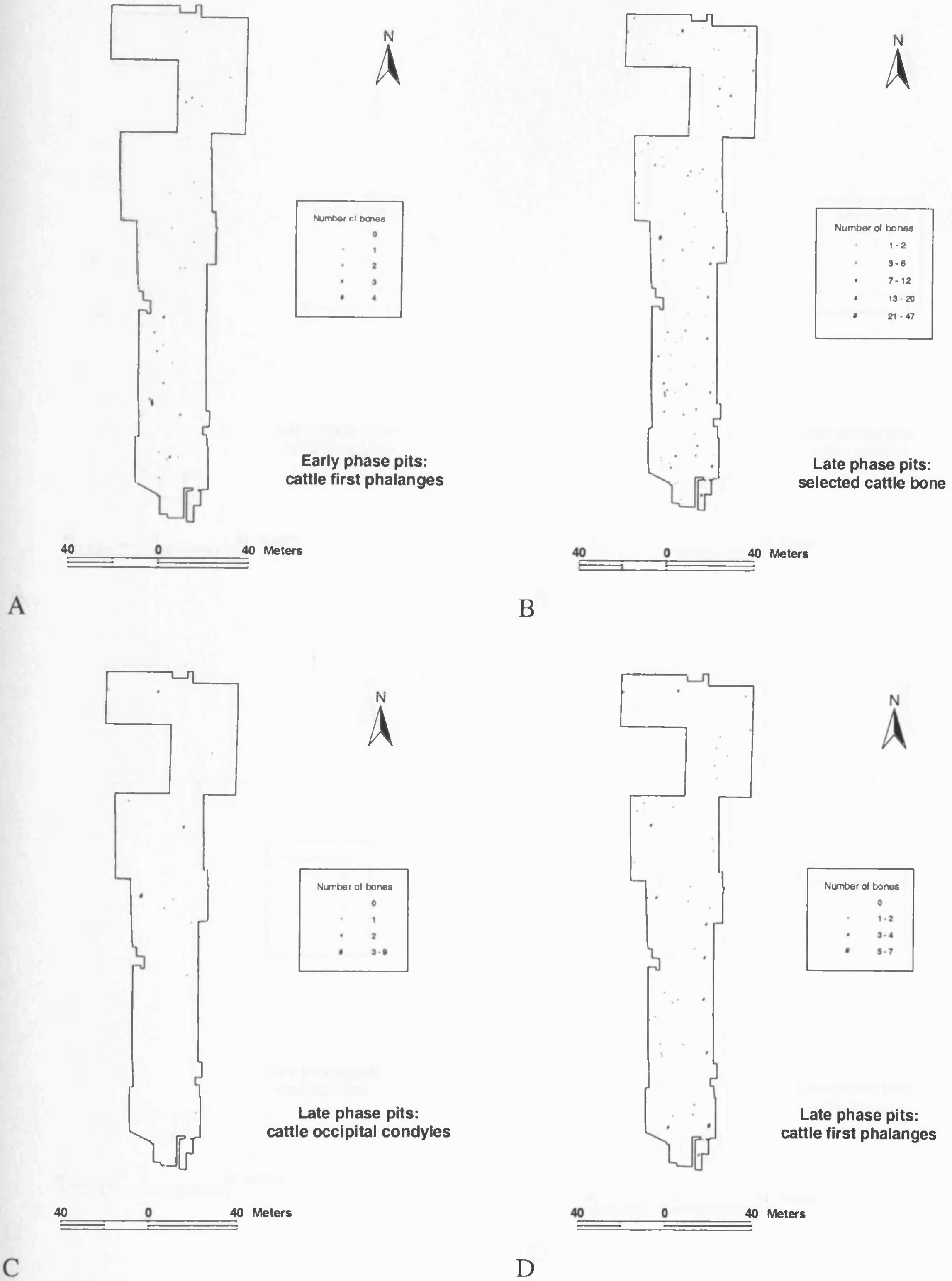


Figure 4.11: Positions of cattle first phalanges in early phase pits and cattle bone, cattle occipital condyles and first phalanges in late phase pits.

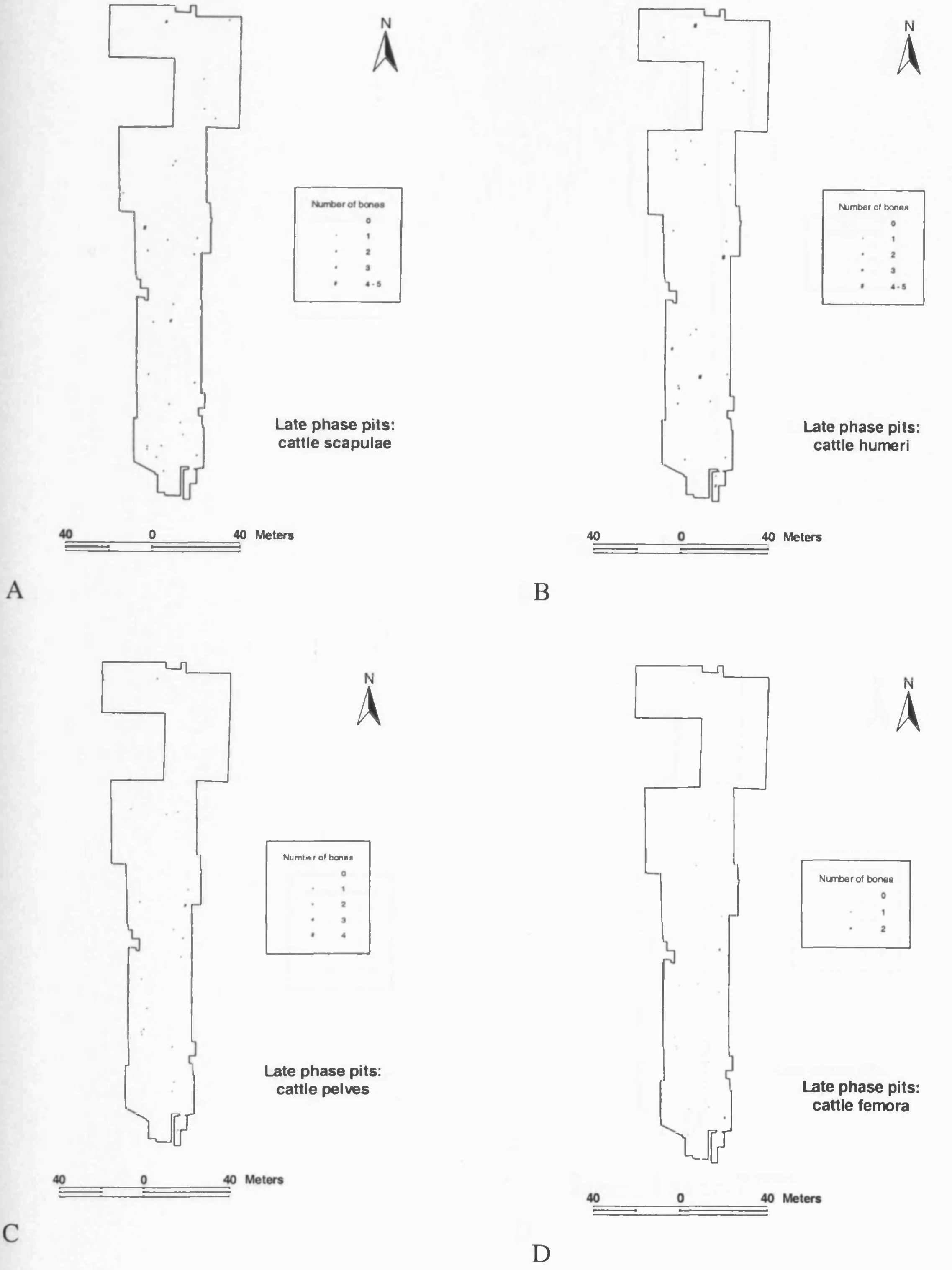


Figure 4.12: Positions of cattle distal scapulae, distal humerus, distal femur and pelvic acetabulum in the late phase.

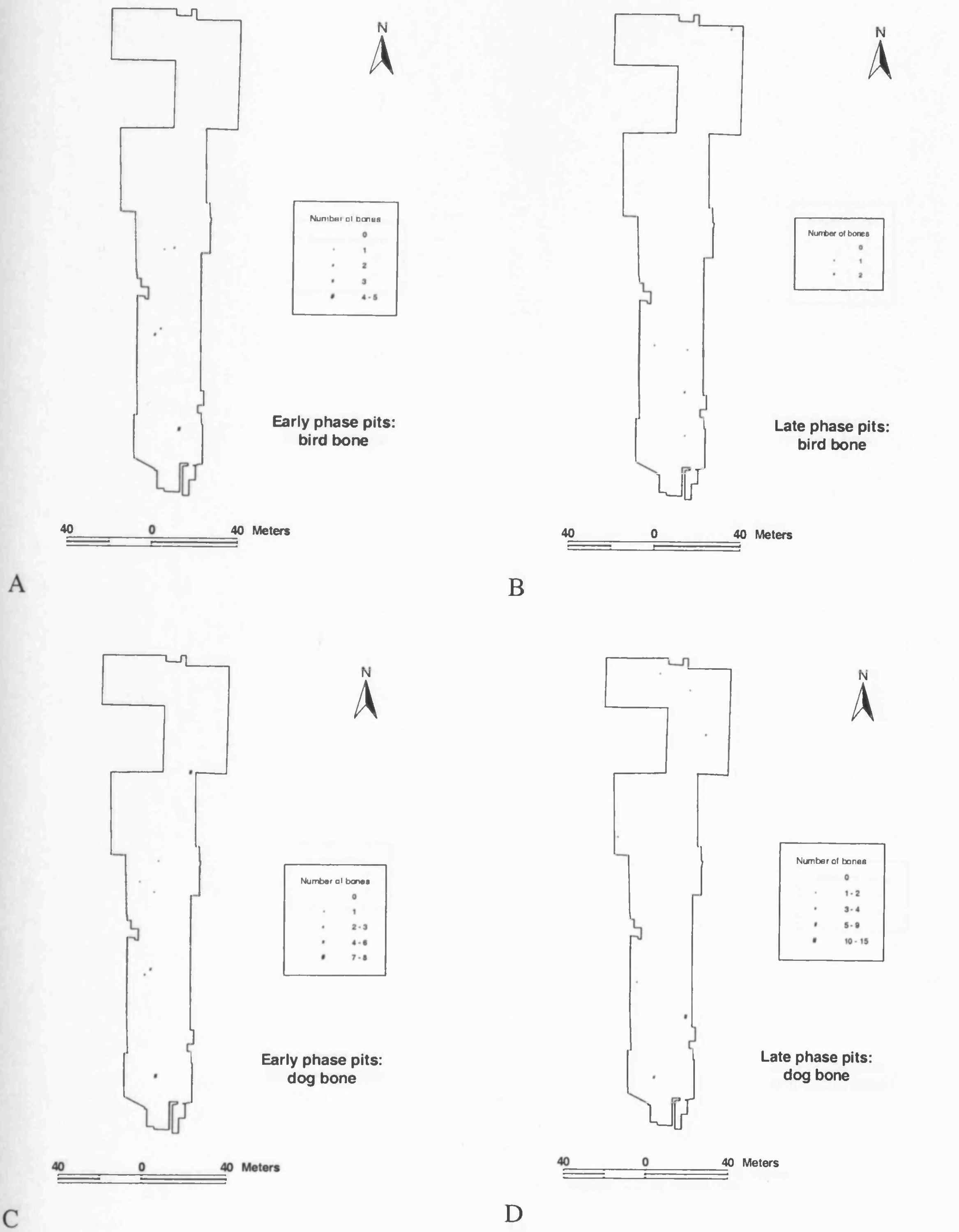


Figure 4.13: Positions of bird and dog bones in early and late phase pits.

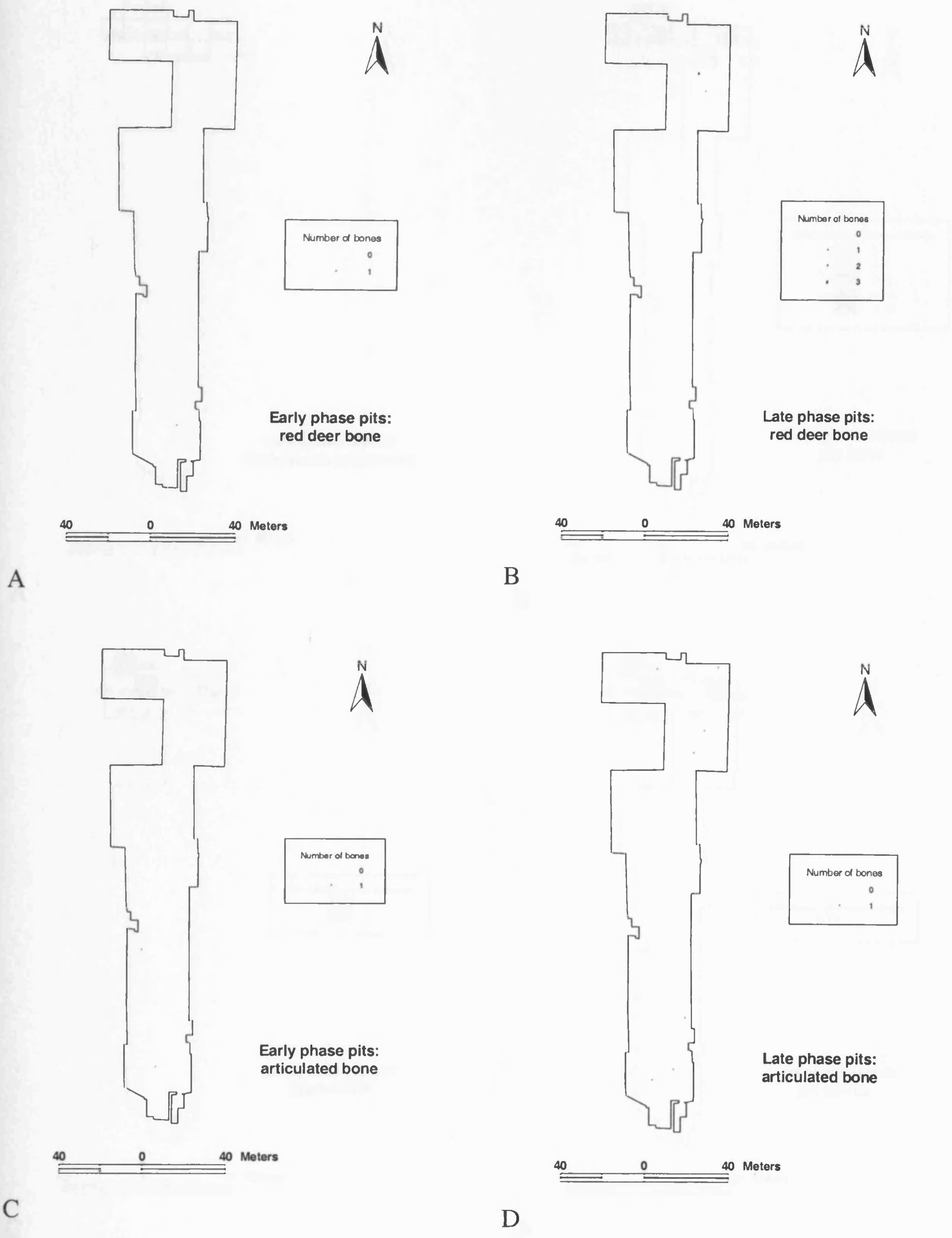


Figure 4.14: Positions of red deer and articulated bones in early and late phase pits.

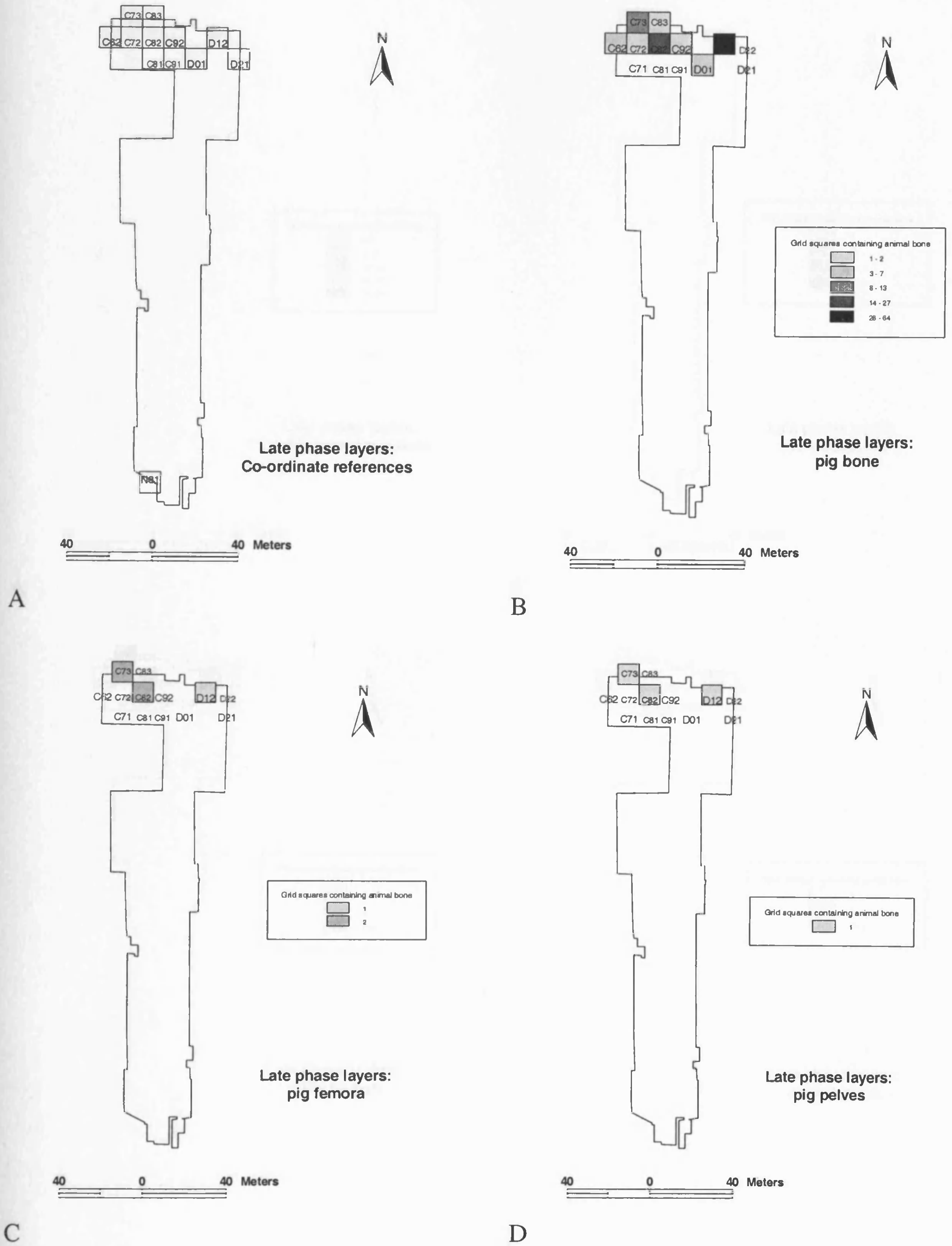


Figure 4.15: Location of co-ordinate references for layer analysis, positions of pig bone in late phase layers.

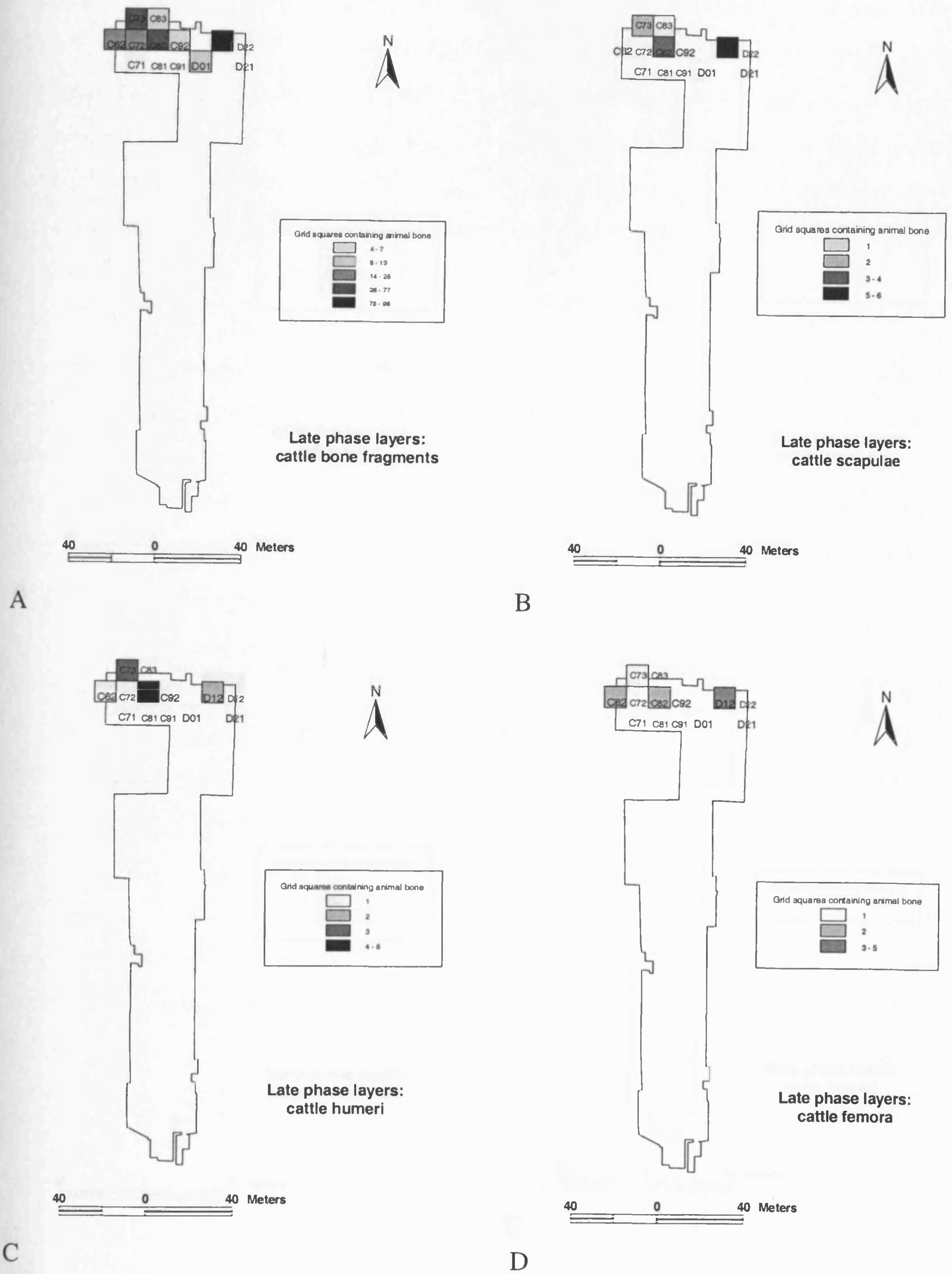


Figure 4.16: Positions of cattle bone in late phase layers.

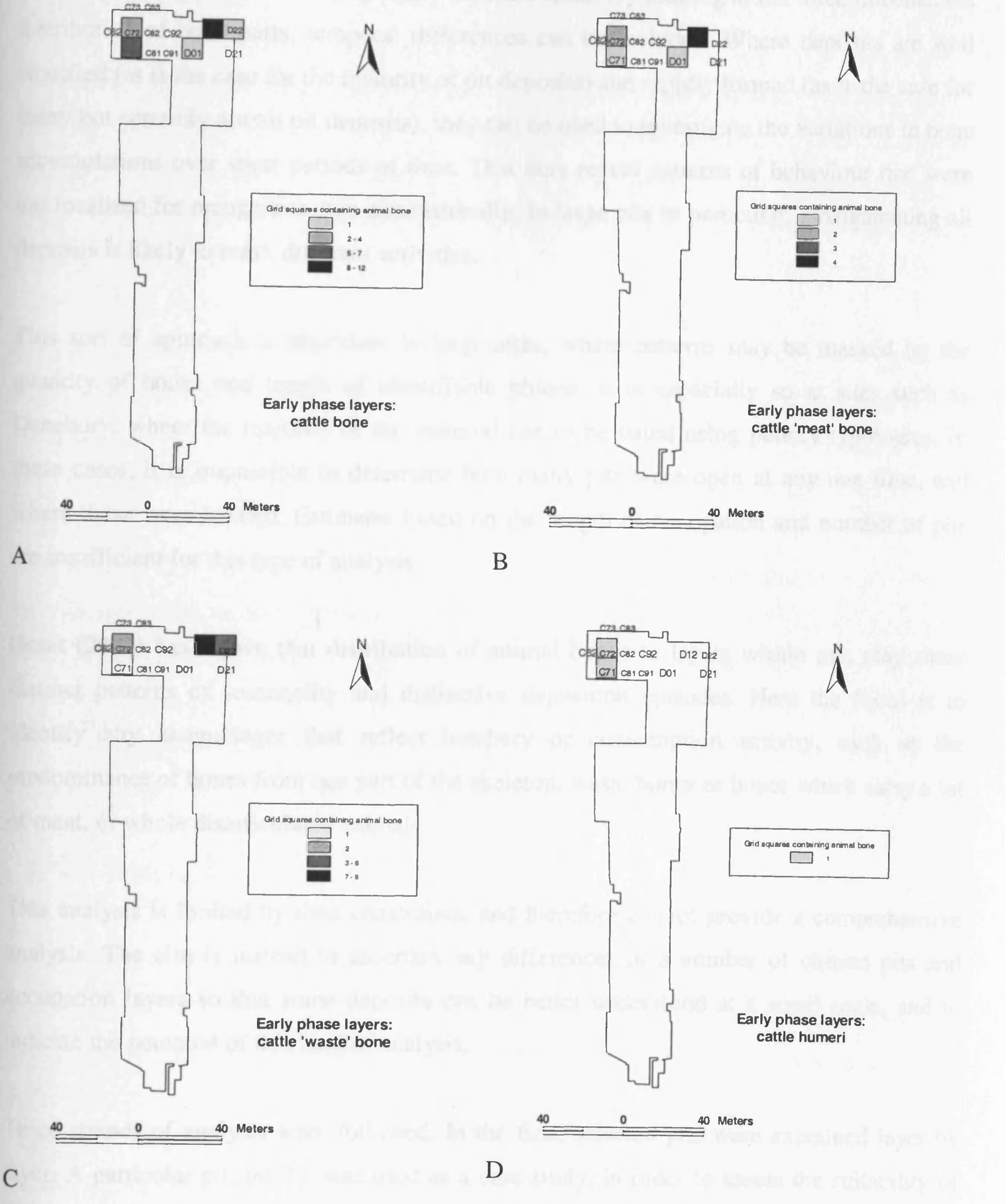


Figure 4.17: Positions of cattle bone in early phase layers.

5 SPATIAL PATTERNING: THREE DIMENSIONAL

Two-dimensional analysis of the distribution of bones produced no evidence to suggest functional distinctions between spatially separate areas. By looking at the three dimensional distribution of bone parts, temporal differences can be included. Where deposits are well stratified (as is the case for the majority of pit deposits) and rapidly formed (as is the case for many but certainly not all pit deposits), they can be used to investigate the variations in bone accumulations over short periods of time. This may reveal patterns of behaviour that were too localised for recognition two dimensionally. In large pits in particular, amalgamating all deposits is likely to mask different activities.

This sort of approach is important in large sites, where patterns may be masked by the quantity of bones and length of identifiable phases. It is especially so at sites such as Danebury, where the majority of the material has to be dated using pottery typologies. In these cases, it is impossible to determine how many pits were open at any one time, and where these were located. Estimates based on the length of occupation and number of pits are insufficient for this type of analysis.

Grant (2002) has shown that distribution of animal bones in layers within pits may show distinct patterns of seasonality and distinctive deposition episodes. Here the focus is to identify any assemblages that reflect butchery or consumption activity, such as the predominance of bones from one part of the skeleton, waste bones or bones which carry a lot of meat, or whole disarticulated animals.

This analysis is limited by time constraints, and therefore cannot provide a comprehensive analysis. The aim is instead to ascertain any differences in a number of chosen pits and occupation layers so that some deposits can be better understood at a small scale, and to indicate the potential of this kind of analysis.

Three strands of analysis were followed. In the first, selected pits were examined layer by layer. A particular pit, pit 23, was used as a case study, in order to assess the suitability of different types of qualitative and quantitative analysis. This pit contained significant numbers of pig and cattle bone in a full and varied range of deposit types (deliberate deposit, silting, special deposits). The analyses are described below (section 5.1).

Then, layers were examined using similar techniques to the pits. Layers are not always clearly defined and possibly formed over longer periods of time than pits, and so provide a good comparison. Layers are assumed to have built up gradually throughout occupation, while pit deposits are frequently demonstrated to consist of layers of rapidly formed material, presumably intentionally placed. Layers found in the same grid square were compared. These grids were often the only way of locating layers from the original records, and are large (10x10m), so include a substantial amount of bone, unlike individual structures. However layers can spread over several grids, so the precise location of many of these contexts is difficult to determine, and large layers may be present in several grid squares.

For each phase, occupation deposits were identified and where possible were compared to pits found within the confines of associated structures. If no pits were located nearby, the occupation deposits were simply compared to the pits already investigated. This method allows comparison of the surviving occupation deposits with entire deposits from pits.

Finally, some Danebury Environs pits were investigated using the same approach, in order to identify any definite distinctions between bone deposits from different layers. Pits from early, middle and late phases at Suddern Farm were used in this analysis. There were no layer deposits associated with the pits and indeed the layered deposits (from hollows) in the Iron Age contained very little bone. A smaller proportion of Suddern Farm was excavated than Danebury, resulting in fewer bones from non-pit contexts.

5.1 METHODOLOGY

The layers within pits were characterised using the following three methods, in order to compare them to each other. Only pits that had been 100% excavated were investigated, initially using the case study pit (pit 23) and then looking at other pits in conjunction with layer deposits.

The quantities and types of bone elements present in each layer are presented in diagrammatic form (figures 5.1 to 5.4 for pit 23). Drawings were made of cattle, sheep and pig skeletons, and the bone elements shaded in different densities according to their frequency. '1-2' represents one individual, '3-4' two individuals, '5-6' three individuals and '7+' four or more individuals, since there are normally two of each bone element in the body. Where there are fewer than or more than two per skeleton, for example the vertebrae, the numbers have been adjusted accordingly. For example three distal humeri would represent at least two animals so one distal humerus would be shaded using the '3-4' shade, while three lumbar vertebrae would represent one animal, so three vertebrae would be shaded as '1-2' in the diagram. Only the section of the bone that was recorded was shaded. The bone fusion stages were taken into account where possible to provide a minimum number of individuals. This analysis uses Silver's (1969) data for bone fusion sequence.

This method was used in order to enable the observer to determine rapidly whether the layer consisted of whole animals or animal parts, or whether the bone elements were scattered.

The second method involved the generation of tables, showing which layers contained meaty parts of the skeleton, which layers contained 'waste' bones, and which showed intermediate bones or a mixture of meat and waste bone. The assignation to these categories was informed by observation of butchery on cattle, pigs and sheep (chapter 3), experimental butchery (Appendix 3), and categorisation by Binford's (1978) and Metcalfe and Jones' (1988) categories. They are summarised in table 5.1, and differ slightly according to species. They do not take marrow content into account, since routine marrow extraction has not been inferred for Danebury. The cranium has been assigned to the low meat category since the brain was not necessarily eaten (there is relatively little evidence for splitting the skull).

High 'Meat Value'	Intermediate 'Meat Value'	Low 'Meat Value'
Scapula Pelvis Humerus Femur Tibia (proximal) Radius (proximal)	Mandible (pigs) Cervical vertebrae Thoracic vertebrae Lumbar vertebrae Caudal vertebrae (cattle) Ribs	Cranium Mandible (sheep and cattle) Caudal vertebrae (sheep and pigs) Metapodials Phalanges

Table 5.1: Categories of bone element determined from meat covering of bones.

This is a simplified categorisation intended to indicate whether certain layers contained bone that may have resulted from different consumption activities. A layer consisting predominantly of bones from the 'high' category would be interpreted differently to one that mostly contained bones producing low quantities of meat. In the tables, a layer that contained bones from every part of the skeleton would be recorded in the medium column, since it contains bones of high, intermediate and low value. Thus a layer that contains very many bones may be recorded as medium despite representing a large quantity of meat. This system is intended to highlight differences between deposits independent of the number of animal bones they contained (which is also recorded in the table). Thus a pit layer containing a large number of low meat value bones, a few of high meat value and a few of intermediate meat value would be recorded as a predominantly low meat value layer. This avoids obscuring the overall nature of the bone assemblage, especially in those layers with large numbers of bone, which would occur if the presence of bones from all categories were recorded. This method is intended to provide a general impression of the character of the pit deposit.

Thirdly, integration of excavation evidence, such as type of deposit (clean, mixed, quickly deposited etc), associated finds, etc. was also effected. The nature of the soil and unusual or special finds were combined with an in-depth description of the bones and species represented, in order to highlight any associations between fill type, small finds and animal bone.

It is vital that these three analyses are used together to provide a complete picture of the nature of the deposit. For example, an unmixed pit layer that had been densely filled with large quantities of meaty bone, which may have come from one large animal, might then be interpreted as possible feasting evidence. A fill that contained a mixture of bones from a mixture of animals, together with pottery from a range of vessel types, might indicate general undifferentiated refuse disposal.

5.2 LATE PHASE

5.2.1 Analysis of individual pits

5.2.1.1 Case study: pit 23

Pit 23 dates from the last phase and falls within the sample area, in the area of four and six post structures. The bone element representation is illustrated in figures 5.1 to 5.4, and is discussed below. A higher proportion of meat bearing bones was found in the middle and lower layers 4-7 (table 5.2).

The basal layer, PL8, contains only 'waste' bone, while the top three layers (PL1-3) contain bone of a low or intermediate meat value. Layers 4, 5 and 6 contain bone of mixed meat values, although in pit layers 4 and 6, sheep and cattle bones (respectively) were only of high meat value and in pit layer 6, pig bones were of a low meat value. The two top and two base layers have small numbers of bone, and accidental inclusion cannot be ruled out here, especially as these layers may have been formed through erosion (table 5.3).

Context	pig high meat	sheep high meat	cattle high meat	pig medium meat	sheep medium meat	cattle medium meat	pig low meat	sheep low meat	cattle low meat	sample size: number of fragments
PL1					x				x	14
PL2						x	x	x		9
PL3					x	x	x			110
PL4		x		x		x				120
PL6			x		x		x			48
PL5				x	x	x				178
PL7				x	x	x				38
PL8								x		3

Table 5.2: High, medium and low meat categorisation of bone from individual layers in pit 23. PL = Pit Layer.

Table 5.3 shows the recorded excavation data for pit 23, located in the archive in Winchester. Layer 5 was found in five stratigraphic layers, so is recorded in the archive as 5a-5e. Some special deposits were given separate layer numbers (3a; 4a; 5d; 7a). However, in the animal bone database, bone locations were recorded by pit, then pit layer, in numeric form, and it is not possible to ascertain which part of, for example, layer 5 any one bone was from. In the analysis carried out here, layers suffixed with 'a' are included in the layer their number corresponds to, and bone from layer 3a would therefore be merged with that from layer 3, while bone from layers 5a, 5b, 5c, 5d and 5e were amalgamated to form layer 5. Later 3a consists of pig foot bones in articulation, and this has been recorded as a special deposit in the archive. It could however simply be waste from butchery, but is not included in the bone element distribution diagrams. The human bone recorded as '4-5' was found in the interface of two layers (4 and 5), and could not be assigned to one or the other. In this pit, layer 6 was stratigraphically later than layer 5, and its relationship to layer 4 is unclear but potentially earlier, so it has been placed between layers 5 and 4 in the table.

As can be seen from table 5.3, immediately after a special deposit, there is often a layer of clean chalk, and this has been described in the archive as make-up material, deliberately placed in the pit to cover the deposit, and could explain the good state of bone preservation. Natural erosion consists of shattered chalk, assumed to have eroded from the sides of the pits. Some silting layers may have been formed from erosion, while others were full of artefacts and were interpreted as deliberately dumped 'occupation deposits' (Cunliffe 1984a: Fiche 4: B4). The initial deposits in pit 23 may have been formed from silting of occupation layers and erosion of the pit sides, and the top two deposits were probably formed after the main use of the pit, when the fills had slumped. The presence of snails and silt in the top deposit consolidates this interpretation. The other deposits, however, appear to have been formed fairly quickly, sometimes with deliberate layers of make up covering them. There was no recorded erosion on bone from this pit, and only 6 had been gnawed (0.5%)

Layer	Flint	Burnt Flint	Daub	Briquetage	Stone	Worked Bone	Iron	Other	Snails	Silt	Chalk	Occupation Deposits	Make-up	Natural Erosion
1	1			1	1				1	3	1	X		X?
2	1	1							1		2		X?	X
3a								Pig foot						
3	1		2	1	1		1	Human bone			3		X	
4a								Horse head						
4	2	2	2	1	1					3	2	X		
6		2	2			1				3	1	X		
4~5								Human Bone						
5e	1		1					} Querns		3		X		
5d								} Pot 538						
5c								} Clay Slingshot			3		X	
5b								} Coprolite		3	1	X		
5a		3						}				X		
7a								Pot						
7			1		Quern			Chalk Weight		1	3		X	X?
8	3	3				1		Slag		3		X		

Table 5.3: Summary of (non-bone) finds and excavation information from pit 23 (data from excavation archive records, held by the Hampshire County Museums Service). Shaded areas represent special deposits. Entries are coded: 1= low proportion, 3= high proportion.

The uppermost layer (1) and layer 2 contain scattered parts of sheep and cattle carcasses, with few meaty bones (figure 5.1). These two layers are nearest the top of the pit and may have been formed after the pit was initially filled: the archive records label layer 1 as a deliberate tip, possibly made to consolidate the ground surface after the pit contents consolidated and natural accumulation had formed layer 2.

Layer 3 is illustrated in figure 5.2, and contains an articulated pig foot, together with most of the elements of at least one sheep and parts of the scapula, distal humerus/proximal radius and mandible from another. When bone fusion is taken into account, it is apparent that the sheep bones originate from at least three differently aged animals (table 5.4). The cattle parts present in this layer include the lower limbs (but not phalanges), pelvis and scapula, several vertebrae and upper skull fragments. This shows a mixture of meaty bones and head/ feet bones, but the upper limb bones are absent. Ageing data suggests that the cattle bones were from at least two individuals (table 5.4). Thus, the bones in this layer are from a range of individuals of different species and ages, and a range of body areas. This is not described as an occupation layer but as 'chalk shatter' (Cunliffe 1984a: Fiche 4: B4). The bones must have become incorporated into the chalk fill as it accumulated if erosion formed the deposit as suggested in the fiche, or could have become incorporated elsewhere prior to or during make-up, as suggested by the archive. Perhaps the act of deliberate filling or capping of the pit demanded consumption activity or the integration of bone deposits.

Layer 4 is recorded as a deliberate tip in the archive notes, and contains oven daub and burnt flints as well as horse and dog bone. Grant has noted the recurring coincidence of horse and dog bone (Grant 1984c), which may be an indication of a specific type of deposit. This layer has similar proportions of the three main domestic species to layer 3, although the bone elements are slightly different. There are more meat-bearing cattle bones including the humerus, femur and vertebrae, and there are fewer fragments from the skull. The pig bones are also from more meaty areas, including skull parts in the region of the masseter muscle and a scapula. The sheep bone assemblage is similar to that of layer 3. Skull fragments are slightly more numerous and there are fewer hind feet, but again the majority of the carcass is represented. Better represented parts include the scapula, mandible, pelvis and distal humerus, and the bones came from at least three sheep.

Many of the better-represented bone elements are dense bones that survive well (see Brain 1981). However, more fragile parts such as the scapula blade are also present, and although they have been fragmented, the minimum number of elements (MNE) for the scapula blade is higher than that for the distal articulation (figure 5.2). This, and the good preservation of bone from pits, suggests that taphonomy is not the primary cause of the differences in bone element representation. It seems that animal bones deposited in this layer result from a range of butchery and consumption activities practised on a minimum of five animals (table 5.4).

In layer 6 cattle are represented by only a few bone fragments, mainly meaty parts and teeth, with no other cranial bones or foot bones (figure 5.3). Sheep bones again include elements from most parts of the skeleton including feet, skull, limb and torso parts. However the upper hind limb bones and some of the lower front limbs are infrequent, despite both being common in the previous layer. Pig bones include mandible and maxilla, mainly bones of low meat value, although the mandible does provide some meat. This layer contained a wide range of sheep bones, suggesting that low and high status cuts were not separated for sheep. The cattle bones however were mainly meat yielding, and the pig mainly 'waste' bone.

Layer 5 contained relatively fewer cattle bones, and the elements represented mainly differed to those from the previous deposit, and at least two individuals were represented (figure 5.3). There were more phalanges and metapodials but fewer bones of high meat value. Sheep bones included a significant number of 'meaty' bones from a minimum of three animals, including fore and hind limbs and scapula/ pelvis and vertebrae. Foot and head bones were not as common in this layer, maybe suggesting that consumption activity principally produced this deposit. Pig bones also show evidence of a greater proportion of meat bearing elements, including the fore and hind limbs and vertebrae. However, bones from the feet and head were also present, with bone from both meaty and 'waste' parts deposited together. This may indicate that these parts of the body were consumed at the same time; since there is a minimum number of one pig from this deposits, the bones may all be from the same individual.

Layer 7 contains a mixture of high and low meat-bearing cattle bones (figure 5.4). Pig bones are the mandible and vertebra, of intermediate meat value; there was a mixture of sheep bones. Again a mixture of bones is present, and again they are different elements to those in previous layers. The archive records this as a make-up layer, or possibly eroded pit sides; it contains little bone in comparison to the layers described above.

Layer 8 contains only parts of sheep metapodials, low meat bearing bones (figure 5.4). There may be a symbolic significance in the first deposits in pits (Cunliffe 1992), but if this were the case, the symbolism of these low meat-bearing parts is obscure.

Species / Pit layer	Sheep	Ox	Pig
1	One under 36	One over 24	
2			Birth
3	One neonate One under 28 One over 30	One between birth and 36 One over 36	One over 12
4	One under 10 One between 10 and 36 One over 36	One between birth and 42	One over 12
5	One under 8 One between 10 and 36 One over 42	One under 8 One over 13	One between birth and 42
6	One under 10 One over 13	One under 8 One over 18	One over 24
7	One neonate One over 6	One between birth and 48	

Table 5.4: Ages, in months, of the minimum numbers of individuals in pit 23, by layer.

Table 5.4 shows the distribution of animal remains by age. There is no consistency in ages represented, such as a predominance of yearlings in a layer, which might indicate deliberate culling of animals at a particular age. In fact the ages of animals are wide ranging, with both young and mature examples in most of the layers. This could substantiate the evidence discussed above, which appears to show random distributions of bone parts in most cases, rather than any deliberate selection.

5.2.1.2 Conclusions of case study analysis

Although similar proportions of cow, sheep and pig bones are found in each layer, differential treatment of species is evident. Pigs and cattle are often represented by small quantities of different bones scattered throughout layers, while the majority of sheep bone elements, possibly the remains of whole animals, is found within individual layers. This could reflect the consumption of whole or large parts of sheep, and suggests that pig and cattle meat was being eaten in smaller quantities. Grant (2002) also shows this pattern, and suggests different scales of consumption in different layers. However, she states that 'sheep were represented by much higher averages of bone per individual than cattle and pig (Grant 2002: 83). In pit 23 this is the case in the majority of the deposits, but not for pit layer 4, where there are more bones per individual for cattle than sheep (table 5.5).

Species	Sheep			Ox			Pig		
Pit layer	MNI	No. of bones	No. of bones /individual	MNI	No. of bones	No. of bones /individual	MNI	No. of bones	No. of bones /individual
1	1	4	**4**	1	6	**6**			
2	1	2	**2**	1	5	**5**	1	1	**1**
3	3	78	**26**	2	28	**14**	1	4	**4**
4	3	81	**27**	1	35	**35**	1	4	**4**
5	3	133	**44**	2	25	**13**	1	20	**20**
6	2	34	**17**	2	11	**6**	1	3	**3**
7	2	31	**16**	1	5	**5**	1	2	**2**
8	1	2	**2**						
Average per layer	2	46	**23**	1.4	16.4	**12**	1	5.7	**5.7**
All layers	4	365	**91**	3	115	**38**	2	34	**17**

Table 5.5: Numbers of bones per individual by pit layer.

Perhaps some meat from cattle and pigs was preserved on the bone and consumed at later dates, then deposited in the same area. While some whole sheep may be represented, there are also many parts that were absent from the pit, for example the neonatal bones that were present in layers 2 and 7 included only a few skeletal parts. The missing bones may be in other pits or other feature types. Other taphonomic factors may have had a particular influence on the preservation, either pre- or post-deposition, of these fragile bones.

Feasting could be interpreted from the bone in layer 4, where large quantities of meat-bearing bone from at least five individuals were found, and this layer does not contain any sub-divisions, but appears to have been deposited in one action (Cunliffe 1984a: Fiche 4: B4). However bones are not found in large quantities from one animal, so any feasting activity may either have involved the consumption of large amounts of food, not large proportions of individual animals, or the remains were deposited in more than one pit.

There appears to be no division into deposits of high and low meat value. This could be taken as an indication of lack of different status rubbish disposal (even if the parts were being consumed by different sectors of the population), or the absence of differentiation in value of meat parts.

From the bone evidence, it is possible that the cattle bones deposited in layers 3-6 could have originated from just two individuals, one under 8 months and one mature animal. Could it be possible that each pit was filled in stages from the remains of two pigs, two cows and three sheep? This would explain the incoherent groups of bones present in each individual deposit. It could also imply settled behaviour, of a group of people periodically disposing of remains into pits. If this were the case, the bones would have had to have been kept out of reach of scavengers and protected from the weather. This could have been effected by storage above ground (perhaps in the four post structures so common at Danebury), or even if semi-filled pits had been securely covered (by wooden lids, or perhaps in some cases make-up layers, e.g. pit layer 5c). The time scale for deposition in pit layers may be relatively short; Grant's case study of pit 2269 suggests this pit was filled in approximately 18 months, with five of the ten pit layers formed quickly as 'coherent' deposits, rather than over a period of months (Grant 2002: 85).

The integration of large quantities of bone in a fairly clean chalk deposit in layer 3 is interesting. There are numerous artefactual inclusions in this layer including pottery and human bone, but no silt or evidence of burning, suggesting that this deposit was not from an occupation layer. The objects that were disposed of in this layer were mingled with chalk and flint nodules. The other clean make-up layer is 7, which does not contain a large quantity of bone. The bones in layer 3 were of mixed meat value, and maybe deposition in a pit was a solution that dealt with both waste disposal and consolidation of the pit. The bone assemblage does not look like one produced from a single consumption episode, as the bones are from a wide range of parts of the skeleton. So it is unlikely that this fill was produced as a direct result of a single slaughter and consumption event. Of course it is possible that another pit may have been receiving the missing bones around the same time.

5.2.2 Comparison of late phase layers within one grid (100m²)

Grid D12 was chosen for the comparison of late phase layers, since this showed the densest concentration of bones for pig and cattle. The layers are well documented in the archive and publications (Cunliffe 1984a) and are extensive. Layers from the late phase in this grid square that contained bone are 5, 7, 9, 35 and 65. A mixture of context types is represented in this sample, including burnt chalk and flint erosion from the rampart (5), occupation layers from a hut with charcoal, daub and burning (7), light brown silt with charcoal under a hut floor (9), erosion of layer 9 (35) and a layer of silt by the hut door (65). The matrix for these is as follows:

<table>
<tr><td colspan="2" align="center">5</td></tr>
<tr><td colspan="2" align="center">7</td></tr>
<tr><td>9</td><td>65</td></tr>
<tr><td>35</td><td></td></tr>
</table>

Layer 5 provides evidence for the possible presence of joints (figure 5.5). Sheep bones include all bone elements from midshaft on the humerus to the foot, and from midshaft on the tibia to the foot. There is a pig distal humerus and proximal radius, and bones from a hind foot. The cattle bones include parts of the humeral-radial and femoral-pelvic joints. This deposit suggests that carcasses were less widely distributed in layers than pits. However, there are also isolated parts: for sheep, the shaft of a femur, distal scapula and pelvis; for cattle, mandibular, vertebral and foot bones; and for pig, vertebrae and radius/ulna.

Animals from a range of ages were present. In layer 5 there were foot bones from at least one pig under 2 years, and scapulae and a radius from a pig or pigs over 2 years. The sheep bones indicate that one individual aged over 20-28 months and one under 10 months were represented.

Layer 7 contains a similar mixture of bones from different parts of the animals. Here there is an abundance of sheep foot and head bones, but also proximal femur fragments from more than one animal. Pigs and cattle are represented by bones from all parts of the carcass, but very few adjoining bones are shown (see figure 5.7).

Layer 9 contained a few bones that could represent coherent cuts of meat (figure 5.6). These include cattle distal humerus/proximal radius and distal tibia/tarsals, and sheep upper forelimbs and neck/head bones. However, in general, the parts are relatively scattered.

In layer 35 (figure 5.6) there is also a similar scattered pattern apart from a sheep lower forelimb which appears to be complete from the radius to the hoof. However if layers 9 and 35 are combined, a logical step as 35 is the erosion of 9, the picture changes. More of the cattle hindlimb is present (from at least one mature individual), and a greater proportion of the pig head and forelimb (from a minimum of one aged around 12 months) and there are even more sheep forelimbs and cervical vertebrae. However, these bones still appear to have originated from at least two sheep (one over 36 months, one between 10 and 36 months).

Layer 65 contained far fewer bones, and once more they originate from a variety of locations in the skeleton (figure 5.7).

Context	pig high meat	sheep high meat	cattle high meat	pig medium meat	sheep medium meat	cattle medium meat	pig low meat	sheep low meat	cattle low meat	sample size: number of fragments
L5				x	x	x				296
L7				x	x	x				105
L9	x				x	x				172
L35	x				x	x				20
L65	x				x					13

Table 5.6: High, medium and low meat categorisation for late phase layers in grid D12

Table 5.6 shows that layers 9 and 35 are similar in composition when meat values are compared. This is perhaps to be expected, considering that one was eroded from the other. These two contexts are also similar to layer 65 (a silt layer from the circular structure). Layers 5 and 7 contain bone with a mixture of high and low meat values, so an overall medium deposit, and these later, large layers could represent a different activity. Overall, though, the consistency suggests that the bone material deposited in occupation layers, unlike pit layers, had a similar composition. It is, however, possible that they represent a longer time span (bone from layers is more eroded than that from pits (Grant 1984a), implying that layer assemblages may have been formed more gradually), glossing over the true differences.

The absence of deposits dominated by bones of a low meat value implies that this area was not reserved for butchery waste, but either contained the meat bearing bones, or a range of bones from the animal.

5.2.3 Comparison of deposit types: pit 507 and Circular Structure 20

These two features were chosen for investigation as they were spatially close (the pit is inside the building), and there were sufficient numbers of in-situ occupation layers to warrant investigation. The pit (figure 5.8) was open 'during the life of the structure [and] not completely filled until the building had been removed or destroyed' (Cunliffe 1984a: 79). This means that the deposits of floor layers, occupation deposits in the house, and pit deposits could be compared.

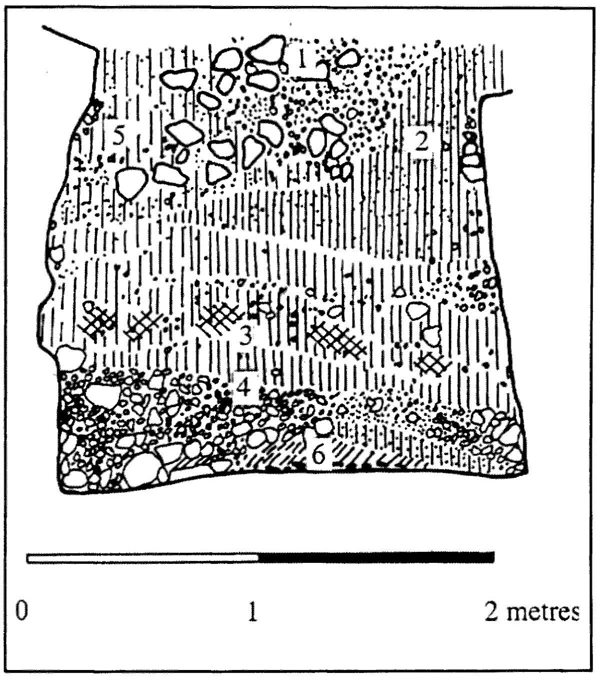


Figure 5.8: Pit 507 in section. After: Cunliffe 1984a, fiche 5.

The layer contexts consist only of cp7 deposits, two of which (layers 7 and 13) were present inside the structure, sealed by a phase 8 deposit, and one (layer 65) was from a sealed layer between the first and second consolidation of the threshold. Some of the occupation deposits could therefore be contemporary with the pit deposits.

The deposits appear to fall into three groups (table 5.7); those with high proportions of meat bearing bones, usually pig (PL1, PL5, L13 and L65), those with predominantly low value meat bones (PL2, PL4 and PL6), and those with a mixture (PL3 and L7).

Context	pig high meat	sheep high meat	cattle high meat	pig medium meat	sheep medium meat	cattle medium meat	pig low meat	sheep low meat	cattle low meat	sample size: number of fragments
PL1	x				x	x				33
PL5	x				x	x				4
PL2								x		1
PL3				x	x	x				143
PL4					x				x	9
PL6								x		1
L7				x	x	x				105
L13		x				x				14
L65	x				x					13

Table 5.7: High, medium and low meat categorisation for layers in pit 507 (prefixed by PL; in stratigraphic order) and layers in building 20 (prefixed by L).

It is noticeable that pig bones often comprise high proportions of meat-bearing bones; the low meat value parts must have been deposited elsewhere. Sheep bones, conversely, are more frequently those with low meat values, although all parts of the sheep carcass are represented. Most cattle bone fell in the medium/low categories. As the pit was completely excavated, the assemblages recovered should accurately reflect those deposited. The occupation deposits appear to be complete and undisturbed, although their edges are not as easily defined as the pit layers.

5.2.3.1 Contexts with high proportions of meat bearing bones: PL1, PL5, L65 and L13

These contexts contain a predominance of pig bones, except in layer 13 where the high meat value bones are from sheep, with medium meat value cuts from cattle and pig. Perhaps this reflects a difference in species composition between the internal (13) and threshold (65) occupation layers.

Pit deposits 1 and 5 are both positioned at the top of the pit, and their similarity in terms of meat value composition (table 5.7; figure 5.11) suggests that they could have resulted from similar activities. They are also similar to the layer material, and it is possible that the occupation layers were formed at the same time as the pit layers were deposited. Pit layer 5 is described as a deliberate tip, while the presence of snails and weathered chalk in pit layer 1 may indicate natural erosion following a special deposit of a horse mandible. The final layers in the pit may have been made up of some of the material left inside an abandoned building. A large proportion of sheep bone in the occupation layers and in pit layer 1 was from young animals, that would not have provided very large quantities of meat.

5.2.3.2 Contexts with a mixture of high, intermediate and low meat-bearing bones: pit layer 3 and layer 7

The occupation debris in layer 7 and pit layer 3 (PL3) were both densely packed with finds. They both contain a mixture of bone types. Initially it seemed that the cattle and pig bones could have originated from just one animal of each species, as the bones from the layer are not replicated in the pit context (figures 5.7 and 5.12), and it seemed possible that the two deposits may have been contemporary. However the pig represented in layer 7 is older than 12 months, so cannot be the same individual as represented in pit layer 3, which is younger than 12 months. There is also a mixture of old and young sheep in the two contexts.

These two contexts provide the largest sample of all the contexts analysed, and this may account for the mixture of all parts of the skeleton, by providing a more representative sample. One would expect to find that larger assemblages contained a more mixed deposit, which would consist of a range of high, intermediate and low meat value bones, if there had been no segregation of areas at Danebury.

5.2.3.3 Contexts with high proportions of low meat-bearing bones: PL2, PL6 and PL4

Pit layers 2 and 6 contain only one bone each, from a sheep skull in each case (figures 5.12 and 5.13). Pit layer 4 also contains a fragment of sheep skull, but also sheep metatarsal and vertebrae/ femur fragments, and cattle mandible, tail and tibial fragments. Pit layer 4 mainly contains bones of intermediate and low meat value (figure 5.13), and a human leg bone was also present in this layer. Pit layers 2 and 6 are both from lower pit layers (figures 5.12 and 5.13), and the bone in them could be from the same animal.

5.2.3.4 Conclusions

Comparing the layers from the pit and the occupation layers of building 20 shows an interesting trend: some of the bones in the pit are absent from the layers, and vice versa (compare figures 5.9 and 5.10). For example, the pig bones in the occupation layers comprise the proximal tibia, part of a humerus shaft and mandible/ skull parts. Those in the pit consist of the distal tibia, distal humerus and in the main, different skull and mandible parts, as well as vertebrae, ulna/radius, scapula and phalange. The cattle bones in occupation deposits include parts which are not represented in the pit, such as phalanges and pelvis, while both provide evidence for the mandible, vertebrae, scapula and carpals. It is more likely that these effects are due to larger sample size, since the animals are often of different ages.

Sheep bones from all parts of the animal are represented in both pits and layers, but mostly at a relatively low level. The sheep bones in the pit included a concentration of distal femora, metatarsals, horncores and maxilla/ mandibles. With the exception of mandibles and horncores, these bones were absent from the layer material (figure 5.10).

This suggests that parts of animals that were not being deposited in the pit may instead have been incorporated into the layers. Further investigation of age profiles from bone fusion showed that bones from all investigated contexts could have originated from two pigs and one ox. The sheep may also have been shared between the two types of deposit, but their bones are more numerous and it is more difficult to calculate accurate MNIs. The 'missing' bones may have been incorporated into different features or discarded elsewhere, within or outside the hillfort.

5.2.4 Conclusions

The bones in layers 9 and 35 are often from conjoining parts of the skeleton. They originated from beneath a hut floor, and may represent earlier consumption activity. The bones are not particularly eroded or gnawed (2 examples from 192 bones) which suggests quick deposition and subsequent sealing. These bones could reflect butchery and consumption activity more directly and in a more restricted area than those from pit layers, with bones being butchered, consumed and deposited without as much distribution.

5.3 EARLY PHASE

5.3.1 Analysis of individual pit layers

Pit 44 was chosen for this analysis, to provide a suitable comparison with the late pit 23. It contained a large number of bones, 89 per square metre or 387 in total, and was located centrally, in the densest area of pits. All deposits were recorded as deliberate in the database, with a special deposit of human bone in layer 3.

Layer 6, the initial deposit, consisted of a tip of chalk rubble on the base of the pit. It included some pot, one pig tibia fragment and remains of sheep head and limb bones (figure 5.16). There does not appear to be any coherent pattern to this deposit, with sheep bones from various parts of one neonate and one individual of 18-24 months of age.

In layer 5, some coherence is seen in the cattle bone, as only meat bearing bones, the scapula, femur and pelvis, are found (figure 5.16). Pig bones are more mixed, consisting of vertebrae and phalanges, and sheep bones include most forelimb parts, pelvis, vertebral and head bone. The sheep forelimb bones originate from at least two animals, one under 8 months and the other over 18 months at death. There were five divisions in this layer: mainly silty occupation deposits with some lenses of burnt material. Pig and sheep remains from this layer are mixed, although cattle remains are of high meat value.

Layer 4, the third deposit, again includes pig and cattle bone from a variety of carcass parts (figure 5.15). The sheep bone elements include a distal scapula and proximal humerus that may have been from the same animal, and a femur and metatarsal which were from an older individual.

The fourth deposit, layer 3, contains the skull of a human under 16 years of age, with some charcoal. The animal bone remains include hind foot bones and a humerus from an immature sheep, and a femur and humerus from a mature one (figure 5.15). This context also contained charcoal.

Layer 2 is the penultimate deposit and the last from this pit that was dated to the early phase. It contained a pig vertebra, immature sheep pelvis and mature sheep tibia, with fragments of skull and phalange (figure 5.14). An iron point was also found.

Context	pig high meat	sheep high meat	cattle high meat	pig medium meat	sheep medium meat	cattle medium meat	pig low meat	sheep low meat	cattle low meat	sample size: number of fragments
PL2				x	x					10
PL3				x	x					15
PL4			x	x	x					17
PL5			x	x	x					28
PL6				x	x					19

Table 5.8: High, medium and low meat categorisation for layers in pit 44.

Pit 44 then does not indicate any greater integrity of deposits than the late phase pit 23, although in two layers (4 and 5) the small quantity of cattle bones was all high meat yielding. A sheep distal scapula and proximal humerus in layer 4 may also have come from a single joint of meat. Like pit 23, the middle layers contained the most high meat bearing parts (table 5.8), although pit 507 has a different depositional pattern. However, in general the deposits in pit 44 do not appear to have any specific character, with bones from individuals of different ages, and different parts of the body.

5.3.2 Comparison of early phase layers within one grid (100m²): D12, layers 41 and 45

These layers are occupation layers from a circular structure; only two out of the three from this phase contained any animal bone.

context	pig high meat	sheep high meat	cattle high meat	pig medium meat	sheep medium meat	cattle medium meat	pig low meat	sheep low meat	cattle low meat	sample size: number of fragments
L41	x				x	x				22
L45					x	x				25

Table 5.9: High, medium and low meat categorisation for early layers 41 and 45.

Although the two layers do not contain similar bones, they both contain mainly sheep and cattle bones of medium values (table 5.9). Different cattle bone elements are found in the two layers, and could all have been from a single individual (figure 5.17). There are bones from adjacent areas in the skeleton (for instance both an atlas and axis, and radius and metacarpal). The sheep bones came from more than one individual: both fused and unfused metatarsals were found in layer 41. However a sheep humerus, radius and part of a proximal metacarpal could all have come from a single individual.

There is a possible coherence of cattle deposit, but the sheep remains again suggest scattering of animal parts, with the possible exception of a forelimb from the humerus to metacarpal.

5.3.3 Conclusions

There are no early phase houses with accompanying pits in the sample area, and indeed there were very few pits in the periphery of the area, where circular structures were located. Those that were present (98, 857, 858, 860) either did not contain any animal bone or were unexcavated, so pit and layer comparisons in the early phase were not carried out.

The analysis of pit 44 and layers in grid square D12 provides no evidence for segregation of deposits between pit or occupation layers, with the possible exception that there were more meaty deposits of cattle bone in pits than in layers in the early phase.

5.4 THREE DIMENSIONAL ANALYSIS OF BONE AT DANEBURY: CONCLUSIONS

From the small sample of pits and layers investigated here, there is no patterning of bone elements as would be expected from a site where butchery or consumption activities were segregated and waste may then have been disposed of directly into pits. There is some coherence to the pit layer compositions, to the extent that deposits do not tend to contain bones from large parts of single animals.

Bone waste may have been deposited into pits when it had accumulated to a sufficient level in protected middens. In this case it is possible that activity areas were segregated, but deposition was carried out without regard to these areas. Another possibility is that bones were deposited into pits ad hoc shortly after butchery or consumption, but that a number of pits was open at any one time, leading to dissociation of bone elements. Small-scale consumption could have led to this type of pattern, if different 'households' deposited bones into different pits after obtaining meat on the bone from one source. However, large-scale consumption could potentially produce the same patterning, whereby large animals were cooked and consumed together, but bones deposited separately.

5.5 DANEBURY ENVIRONS THREE DIMENSIONAL SPATIAL ANALYSIS

Two pits from Suddern Farm were chosen: one from the early phase (pit 87) and another from the middle phase (pit 92) (cp 3-4 and cp 5-7 respectively). In the Suddern Farm publication ceramic phases 3-6 are equated to 750-300BC and cp 7 to 270-50BC (Cunliffe & Poole 2000a: 201), the equivalent of the early and late phases at Danebury. The chosen pits each contained four or more layers and a bone count of over 100 in at least one layer.

5.5.1 Pit 87

This pit contained four layers, of which three (1, 2 and 4) contained bone from a range of skeletal elements (figures 5.18 and 5.19). Layer 3 contained deposits that appeared to be fairly coherent, including pig fore limb bones (humerus and radius) and the fragmentary remains of most bone elements in the sheep skeleton, although there is no indication that they came from a single individual. Complete fore and hind limb bones were present from at least two cattle. There was a humerus and radius from a third individual, but no ribs or vertebrae were recorded, because those that were found were not assigned to species.

Pit layer	pig high meat	sheep high meat	cattle high meat	pig medium meat	sheep medium meat	cattle medium meat	pig low meat	sheep low meat	cattle low meat
1							x		x
2			x		x		x		
3				x	x	x			
4						x		x	

Table 5.10: High, medium and low meat categorisation for layers in pit 87, Suddern Farm.

The bones in layer 3 could be the remains of either large-scale butchery or consumption activity, or the deposition of uneaten whole limbs or animals. However, the cattle bones were not articulated, and this suggests that these were butchered and eaten, not 'sacrificial' or diseased deposits of large parts of animals. The presence of the humerus-radius of at least two individuals of different species suggests that it is most likely that joints of meat had been deposited.

A mixture of meat values is represented in layer 3 (table 5.10), and figure 5.19 shows that a range of bone elements was present. It is the large quantity of bones, and the presence of elements from whole limbs that lead to the description of this layer as one containing bones from a large episode of consumption. The amalgamation of the different types of analysis is crucial to the interpretation.

5.5.2 Pit 92

Pit 92 contained eight layers, only two of which (layers 3 and 6) contained any coherent deposits (figures 5.21 and 5.22). Layer 3 did not contain much material but the cattle bones consisted of a complete scapula and humerus, possibly from one animal. Fragments of one cattle and one pig tibia were also represented. Layer 6 contained more fragments, including some parts of a pig and sheep forelimb and skull, and many cattle bones. These included a pelvis and proximal femur, tibia, tarsals and proximal metacarpal, skull, jaw and cervical vertebra, and parts of a scapula and humerus, radius, ulna and metacarpal. These could represent the remains of large-scale consumption, as the quantity of meat on these bones is considerable. A radius and metatarsal are present from another individual, suggesting that, while one animal may have been deposited in this pit almost entirely, only a small part of another was deposited in this pit.

pit layer	pig high meat	sheep high meat	cattle high meat	pig medium meat	sheep medium meat	cattle medium meat	pig low meat	sheep low meat	cattle low meat
1					x		x		x
2	x	x							x
3			x		x				
4	x					x	x		
5					x		x		
6				x	x	x			
7						x			
8					x	x	x		

Table 5.11: High, medium and low meat categorisation for layers in pit 92, Suddern Farm.

Other layers comprise very scattered parts of carcasses (figures 5.20 and 5.23), where even when two conjoining bones are present, the bones are broken and the articulating section is absent (for example layer 7 cattle bones).

There is a mixture of meat values by species in these pit layers (table 5.11). No patterns are obvious, except that the layer containing the largest number of bones (N=6) includes mainly those of medium meat value for all species. No layers have bones of exclusively high or low values.

5.5.3 Conclusions of Suddern Farm analysis

At Suddern Farm it appears that at least one deposit in each of the pits includes large quantities of bone, possibly the remains of whole animals, and that these deposits could represent the remains of butchery or feasting activity. However these pit layers usually also include bones from other individuals, and most layers contain bone from a variety of animals and skeletal areas, which suggests that the bone remains are representative of a range of activities.

5.6 CONCLUSIONS OF THREE DIMENSIONAL SPATIAL ANALYSIS

A comprehensive review of many individual pits and layers is required in order to ascertain whether the pattern presented here is representative of the site overall. This would be extremely time consuming using the method described above, and the most obvious solution would be to create a computer program which could assign bones relative values according to their meat coverage and fragmentation. Other characteristics could be brought in, such as the minimum numbers of individuals (for instance) and the deposits could then be compared. This is beyond the scope of this thesis, but the principles used here could be applied more widely. It remains essential that the full range of methods employed here are used, in order to avoid narrow interpretations.

From the limited analysis presented above, there is little evidence of firm patterning in the individual pit or layer deposits from Danebury. In certain layers more bone is found, and in some no bone was recovered, but apart from the differences in actual numbers of fragments, there does not appear to be any coherent deposition of meaty or waste bone, or any evidence of deposits where very large parts of individual animals are found in one rapidly formed layer, that might represent one episode of butchery or consumption activity. Some deposits contained a large number of meat bearing bones, and these could represent feasting activity, although as the bone came from different individuals, deposition must have been into several pits, concurring with Cunliffe's estimate of 8 pits open at any one time (Cunliffe 1992). It is also possible that these bones were a selection of those accumulated elsewhere before deposition, and that some deposits happened to contain more meat bearing elements than others. In either case, the pit or midden must have been protected from weathering and scavenger activity during accumulation.

Some pits include many parts of sheep, and often the whole carcass is represented, but the bones often originate from different animals, of different ages. Often pig bone in one deposit is from more than one individual, even where there are very few fragments recovered. This suggests that the larger pits, although they may include all bone elements of one species, do so because they contain larger numbers of bone so are more likely to contain all elements of the carcass. In some cases all cattle bone elements were found in one pit, but spread throughout the layers. This was at first thought to suggest temporal differentiation in the disposal of one animal carcass, the meat of which had been preserved on the bone where possible and eaten over the course of a year, such as recorded in 18th century England and is traditional practice in Fageça, Valencia, Spain (Malcolmson & Mastoris 1998; Wiseman 1986; Joan Segui, pers. comm.). The estimate of 18 months for a pit to be filled (Grant 2002) would fit approximately within this time scale, but analysis showed the bone to be from animals of different ages.

This pattern holds true for the pits examined from all phases and it is suggested that the pit contents are not from immediate deposition after butchery, but instead represent the remains of meat portions, which have been widely dispersed in small pieces on the bone. Small-scale consumption activity would have this effect; after butchery, cooking of these parts, perhaps the remains of individual meals, would delay deposition and disperse bones. However, the same pattern could be produced from a totally different system of consumption. Gilbert and Singer contrast ceremonial feasts in Zahau Chan (Burma) with markets in Hili-ba (eastern Chad); at the former, pigs are divided into proscribed cuts and are allocated to recipients, while in the latter, a butcher will purchase an animal, kill it and sell the parts to customers passing by. In both, the meat is distributed on the bone within a large area and the bone elements deposited at some distance from the place of slaughter and butchery (Gilbert & Singer 1982: 26). The processes and activities are very different, but the depositional pattern is the same.

Analysis of occupation layers and associated pits suggested that the bones recovered were not single joints or butchery units, but from a variety of skeletal areas. There was no evidence of specific deposits of mainly meat bearing or mainly waste bone. In one circular structure, however, occupation deposits contained possible joints from sheep (although their butchery was not assessed in this study), or at least contained bones found adjacently in the skeleton, for example the humerus and radius. This suggests that while no evidence for immediate or rapid re-deposition into pit layers exists, the assemblages from occupation layers may more closely be linked to activities such as consumption.

At Suddern Farm, deposits differ from those at Danebury. Particular layers in pits appear to contain quite coherent butchery units, such as one early pit where the fore and hind limb bones of at least three cattle were recovered from one pit layer. A similar pattern was found for early and late phase animals. Certain deposits therefore contained very high proportions of meat bearing bone, and possibly provide evidence of feasting, maybe supporting Cunliffe's idea that Suddern Farm was of high status and in fact took over power from Danebury in the late Iron Age (Cunliffe 2000).

It is possible that at Suddern Farm some deposits at least were deposited quickly and so reflect activities not seen at Danebury. However the very small numbers of pits investigated, and the limited numbers of sites upon which this investigation was based, make further testing imperative.

The apparent absence of structured patterning at Danebury is important. There was, it seems, no rapid deposition into pits directly following butchery/ consumption. It seems that, although butchery appears to have been a specialised task, the bones resulting from butchery were not deposited in a specified area. There may have been no definable butchery 'waste', if all parts of the carcass were cooked and consumed, or butchery may have occurred in several places, as required, by specialised persons. Alternatively, butchery may have been practised in a specific area, but the bones stored elsewhere prior to deposition in available pit(s), and final deposition may not have been subject to the same controlled practice as carcass division. It may be that the strictly followed butchery techniques had been formulated in response to the physiology of the animal, or the limitations of tools, rather than to social practice.

The large sizes of some cattle bone deposits in some early phase pits, observed in chapter 4, do not appear to be from individual layers in pits. Early phase pits do not contain deposits that might be regarded as the remains of feasting, at least not of whole individuals or limbs. It is however possible that they may have been deposited in several pits, and a selection of pits from the southern and central parts of the sample area could be investigated for clarification.

There is no evidence of whole cattle or pig carcasses that could suggest the consumption and deposition of entire animals in one event. Since filleting marks on the bones suggest that a large proportion of meat was removed from the bone, most deposits are more likely to reflect the activity of butchery waste deposition than consumption. In this case one would expect to find deposits of bones from adjacent parts of the skeleton together, which does not occur (at least for the cattle and pig). If the animal was slaughtered elsewhere and parts divided among the inhabitants one might expect such a diversity of bones.

Another explanation is that the meat had been preserved on the bone. The joints could then have been distributed, consumed (creating the filleting marks), and deposited when finished in the appropriate pit. This description fits the late phase at Danebury well, although it does not hold so true for Suddern Farm pits. In the early phase at Danebury different activities may have taken place, and there is a possibility that cattle were eaten in larger portions then disposed of directly following consumption.

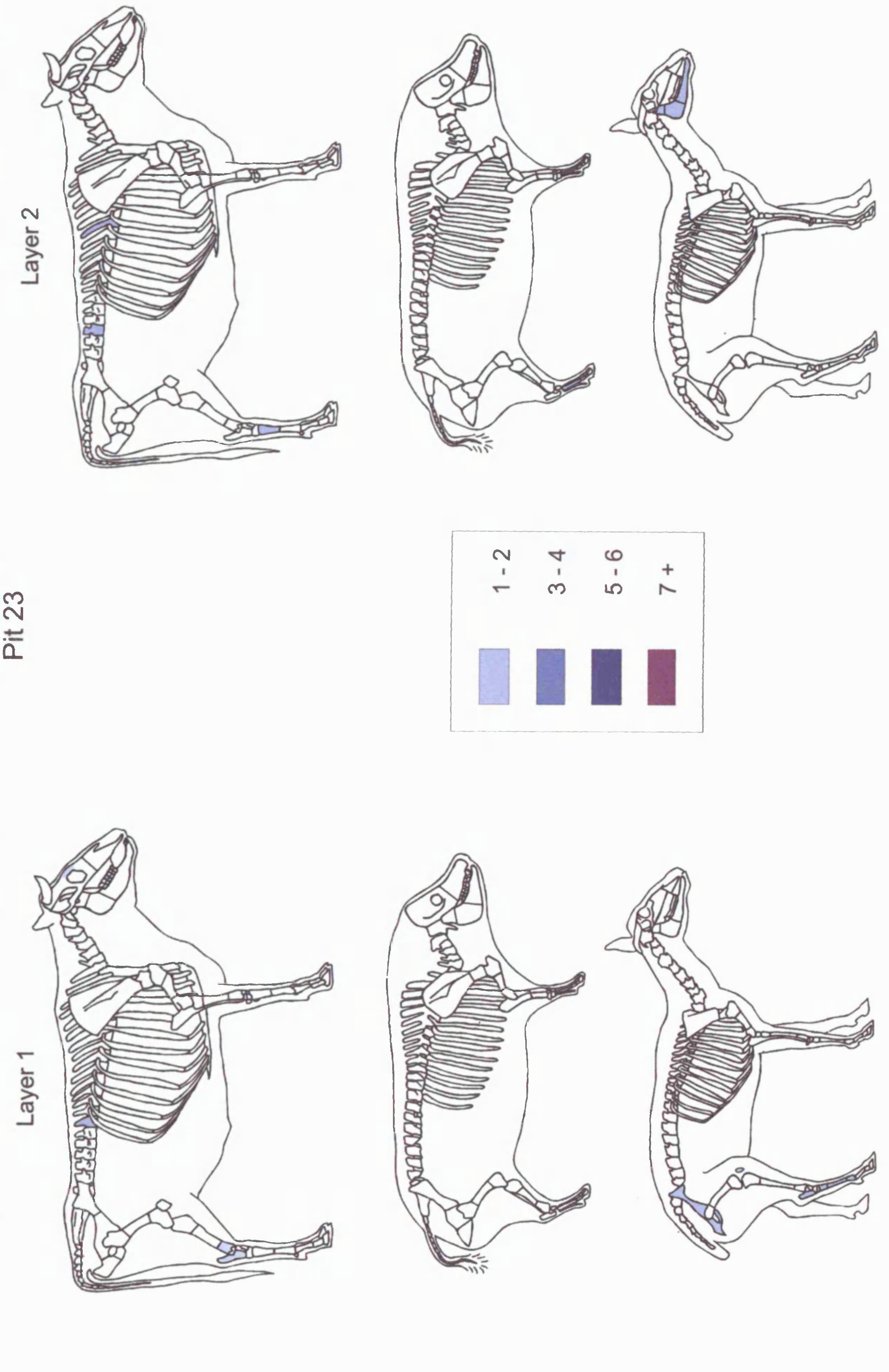


Figure 5.1: Bone elements in Pit 23, layers 1 and 2.

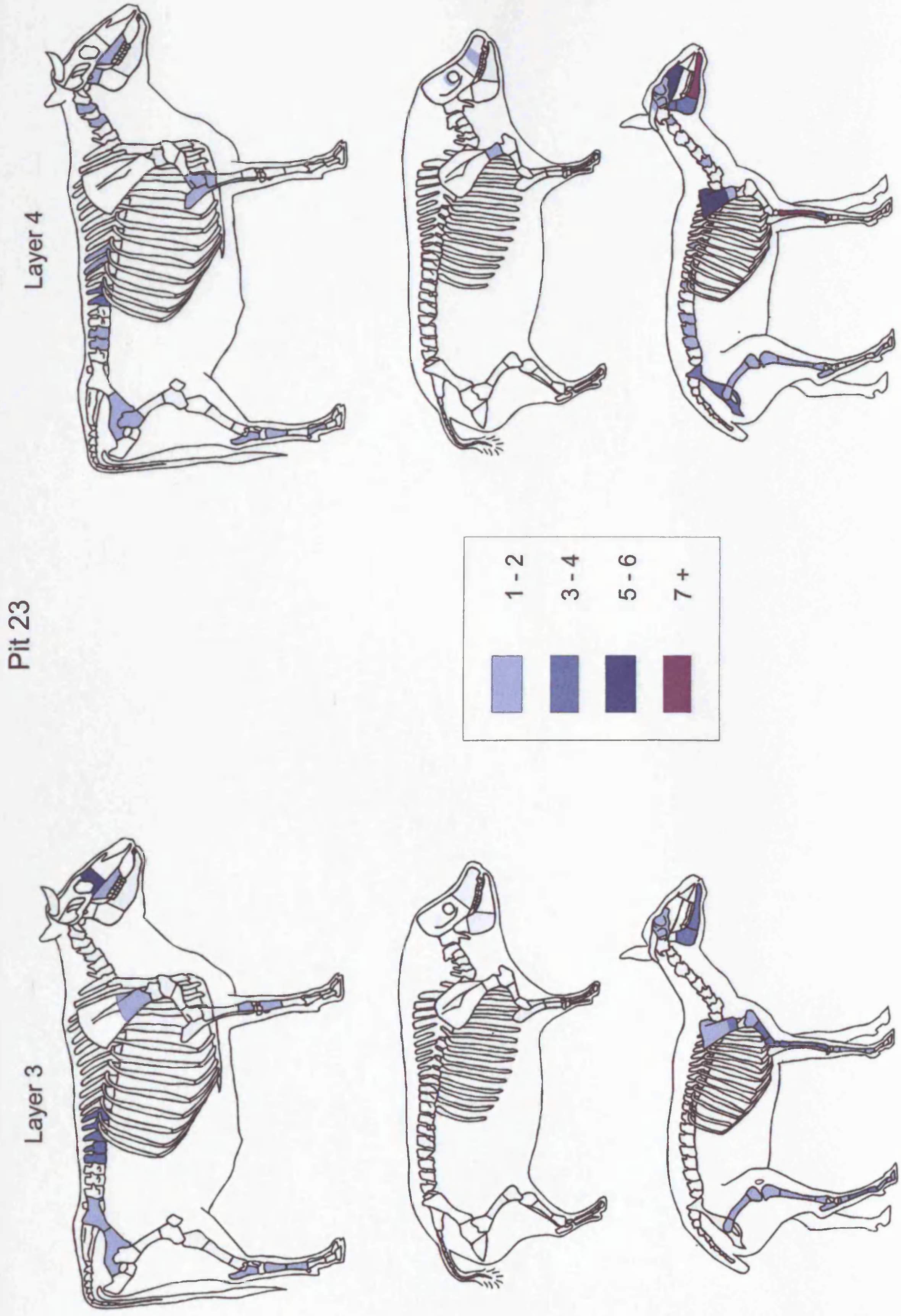


Figure 5.2: Bone elements in Pit 23, layers 3 and 4.

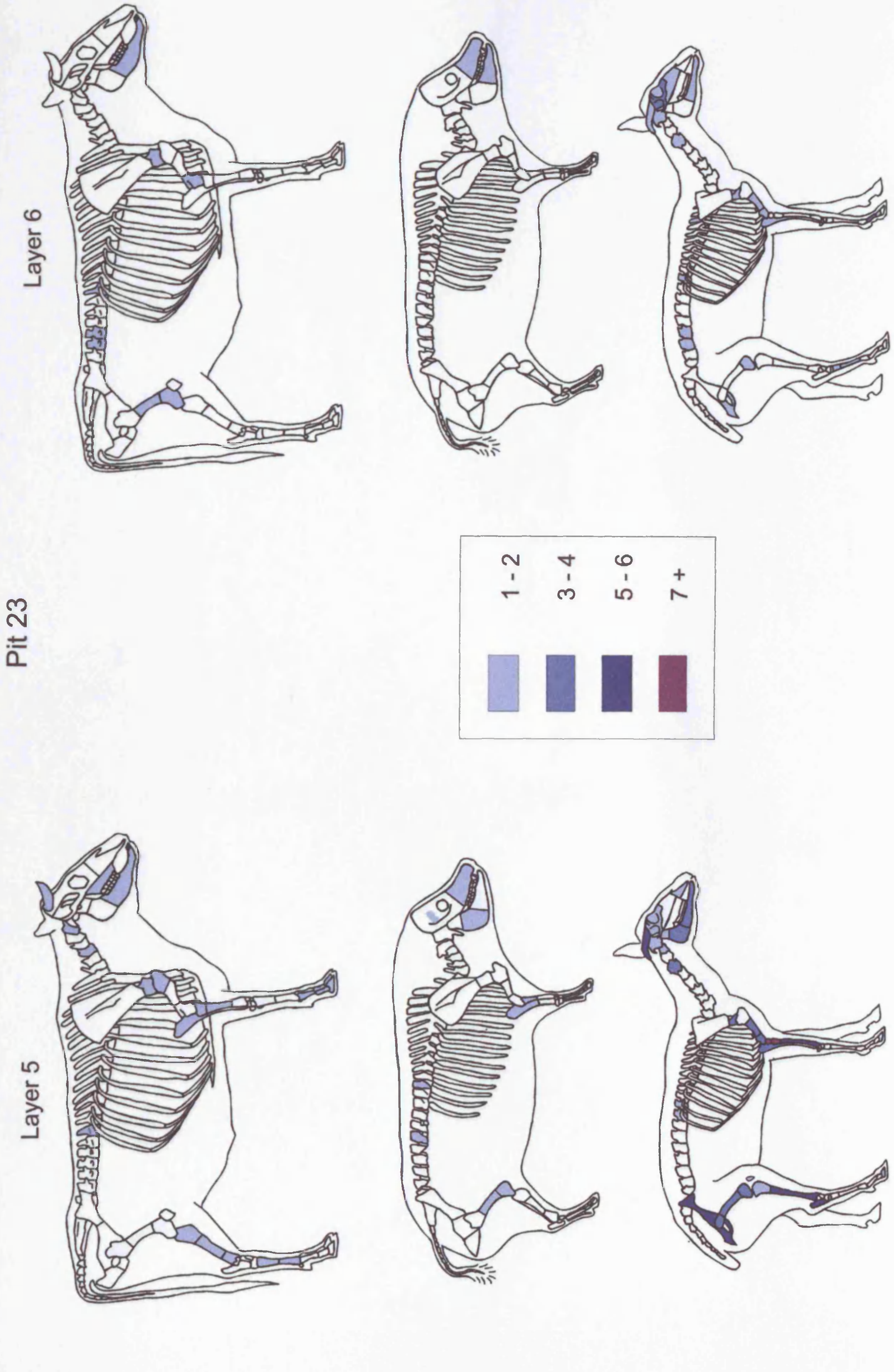


Figure 5.3: Bone elements in Pit 23, layers 5 and 6.

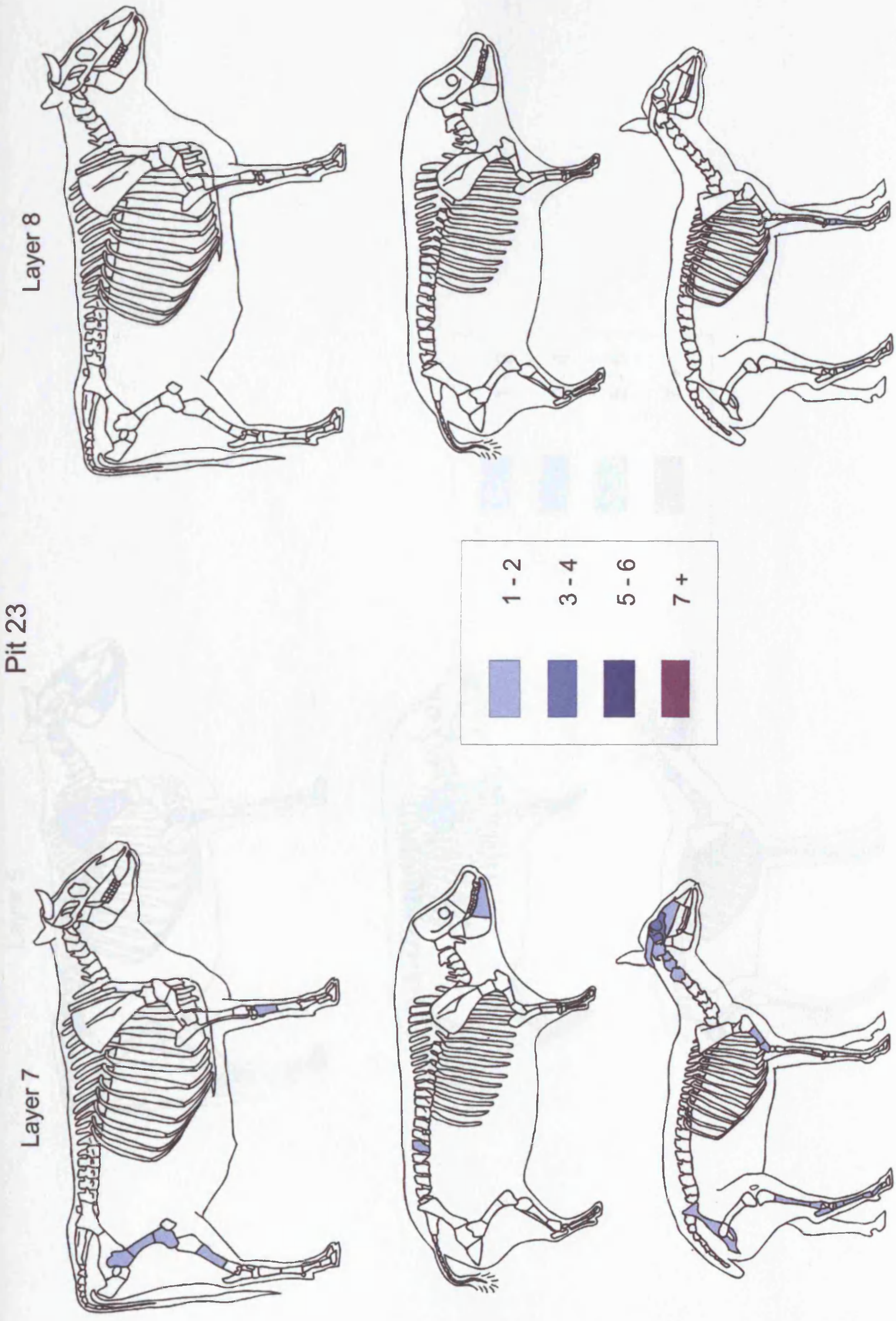


Figure 5.4: Bone elements in Pit 23, layers 7 and 8.

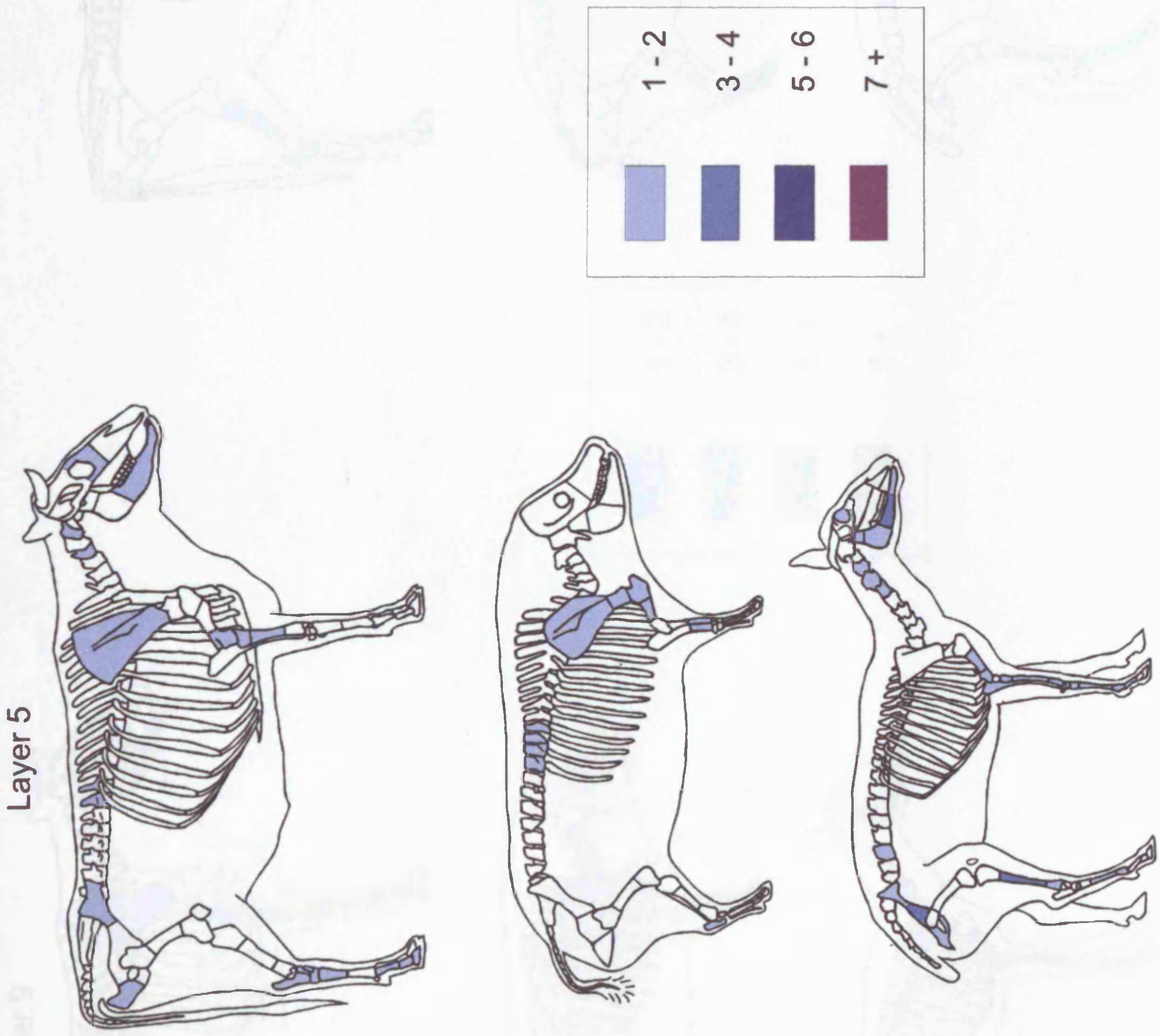


Figure 5.5: Bone elements in layer 5.

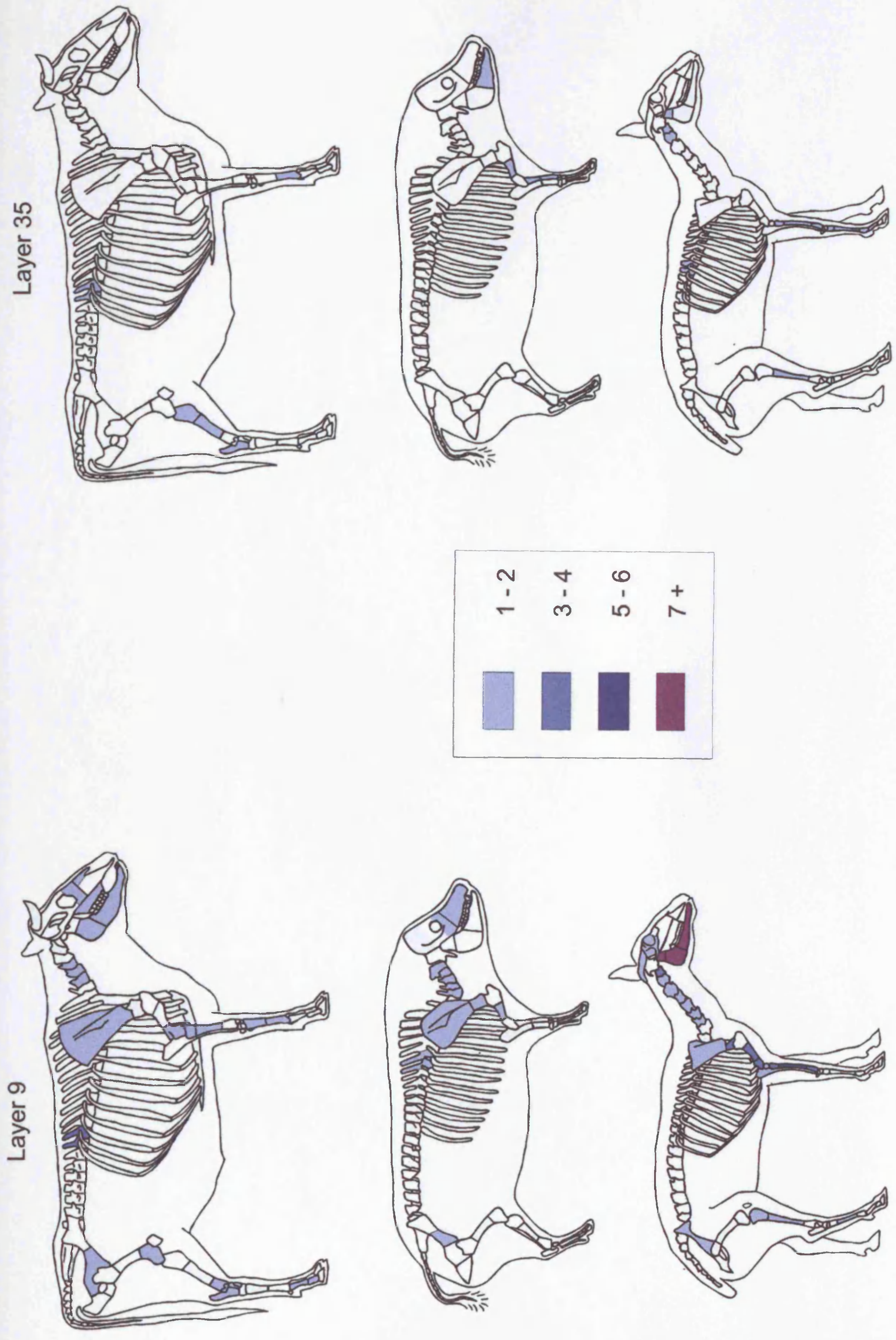


Figure 5.6: Bone elements in layers 9 and 35.

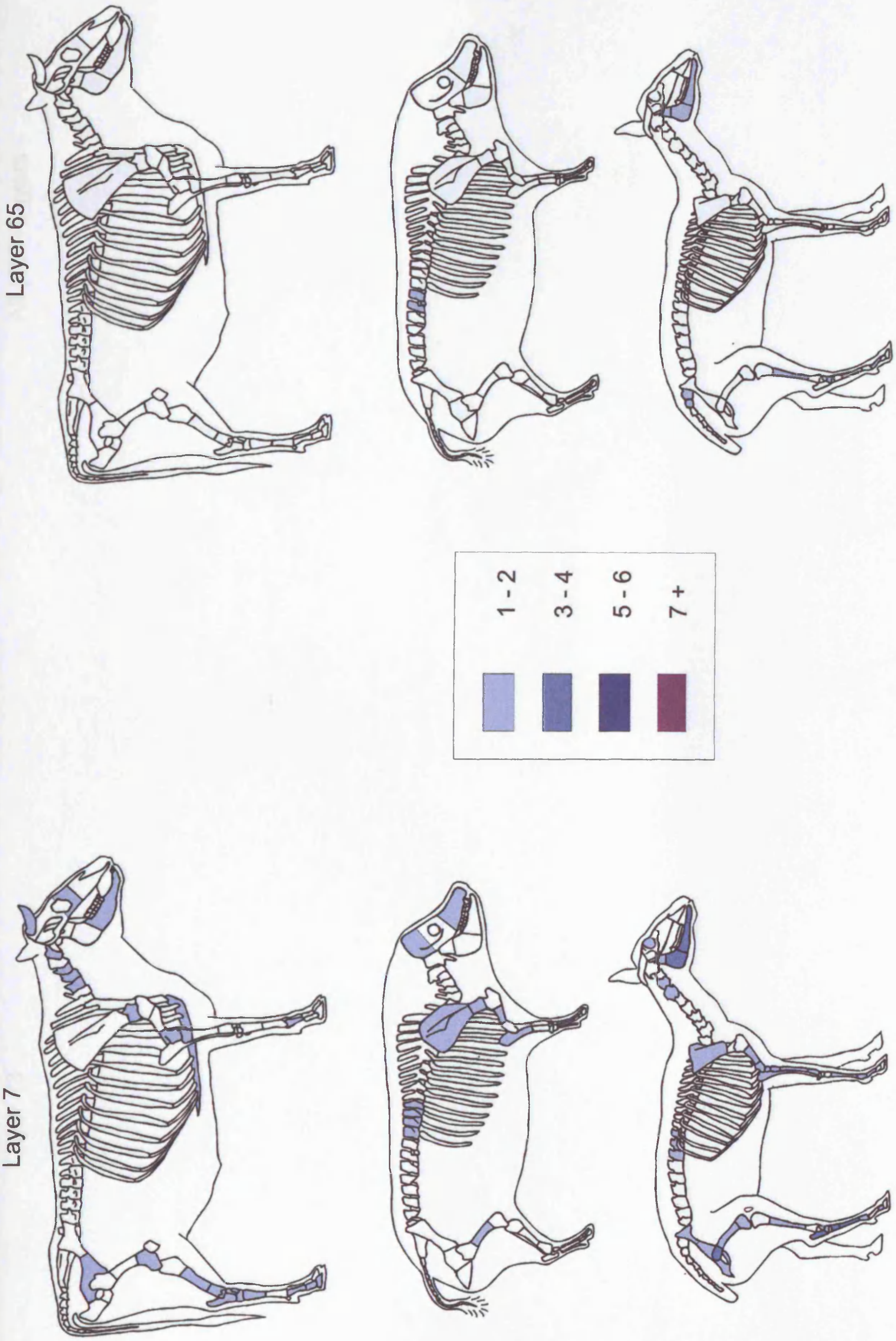


Figure 5.7: Bone elements in layers 7 and 65.

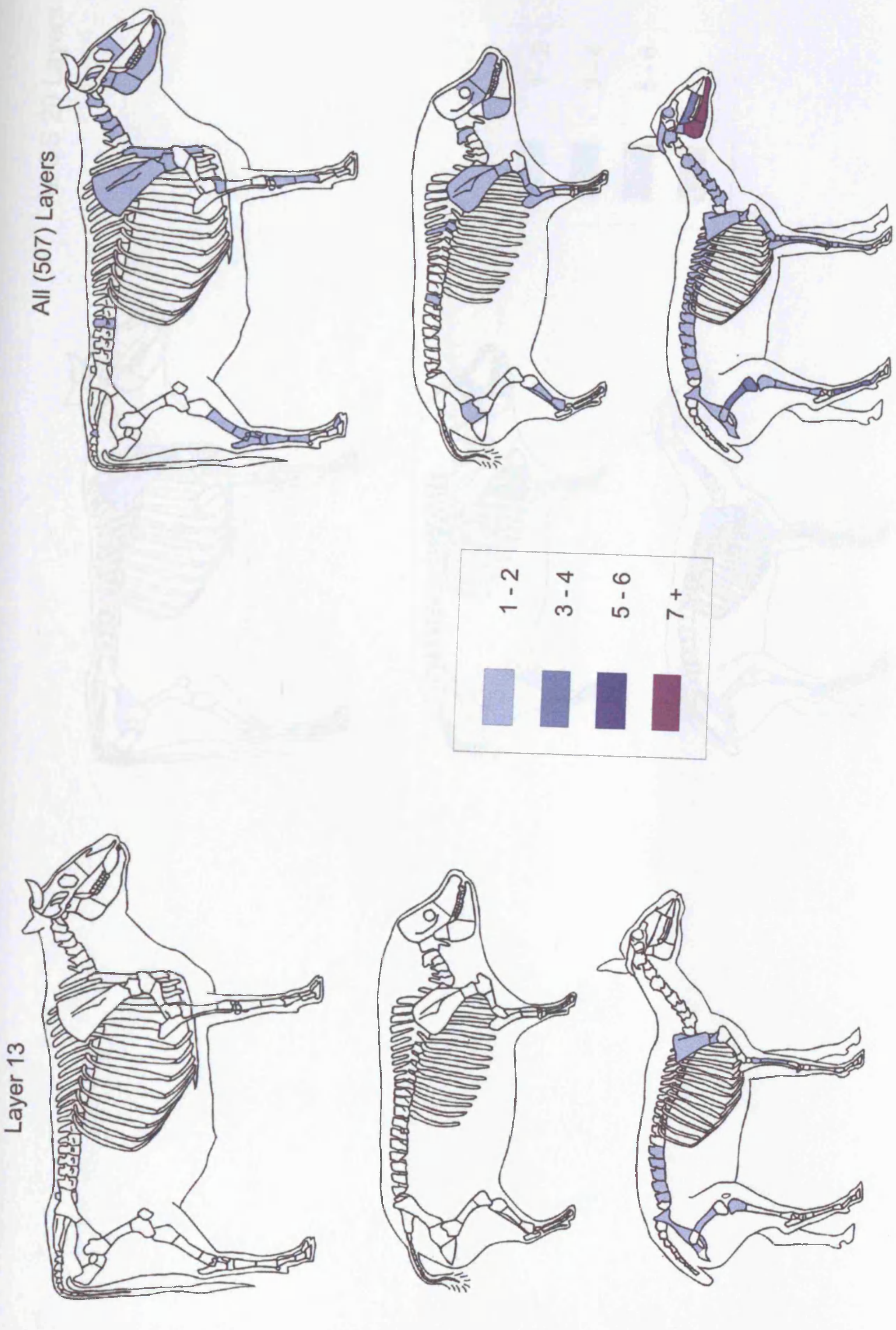


Figure 5.9: Bone elements in layer 13 and all layers of pit 507.

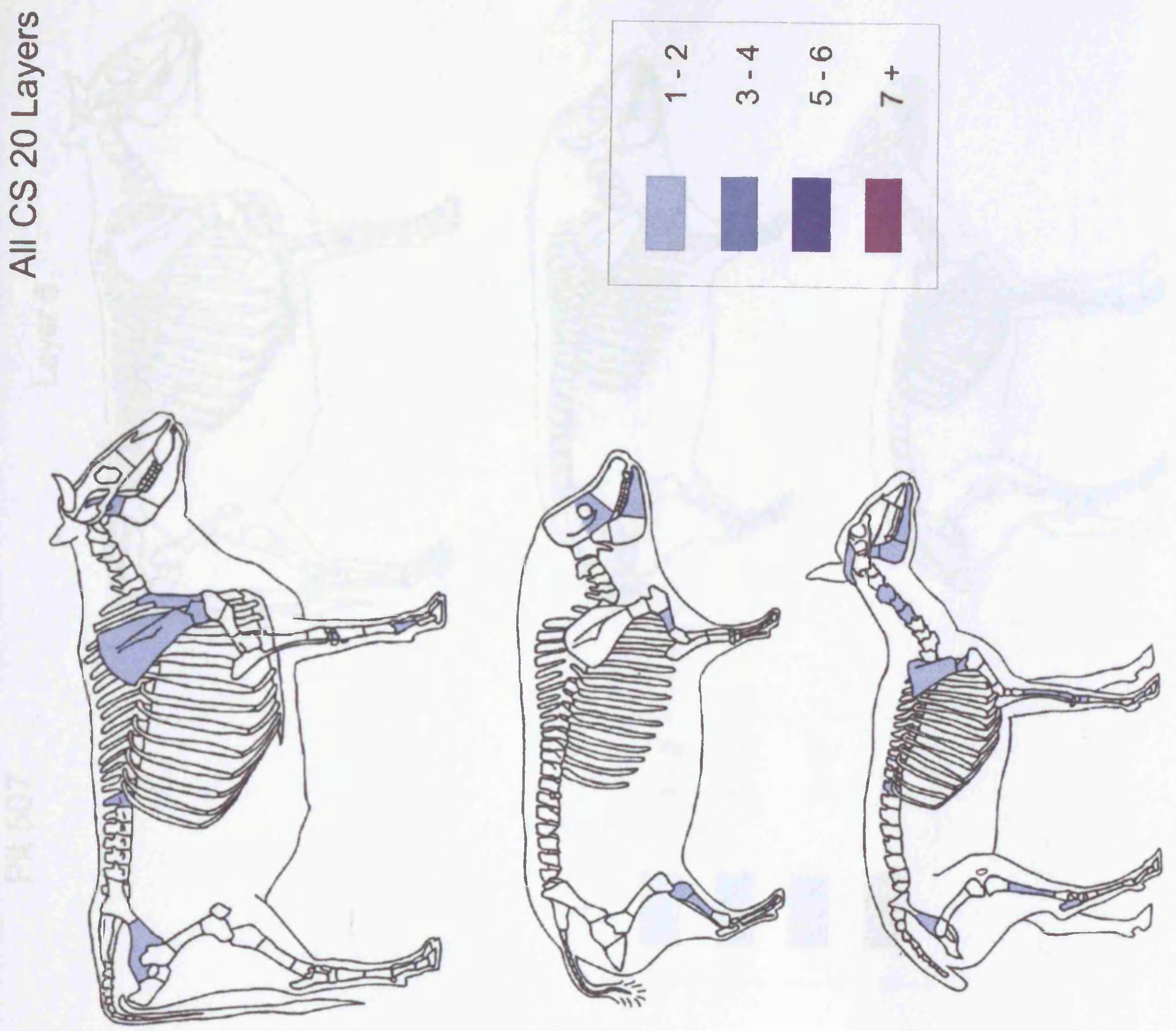


Figure 5.10: Bone elements in all layers of circular structure 20.

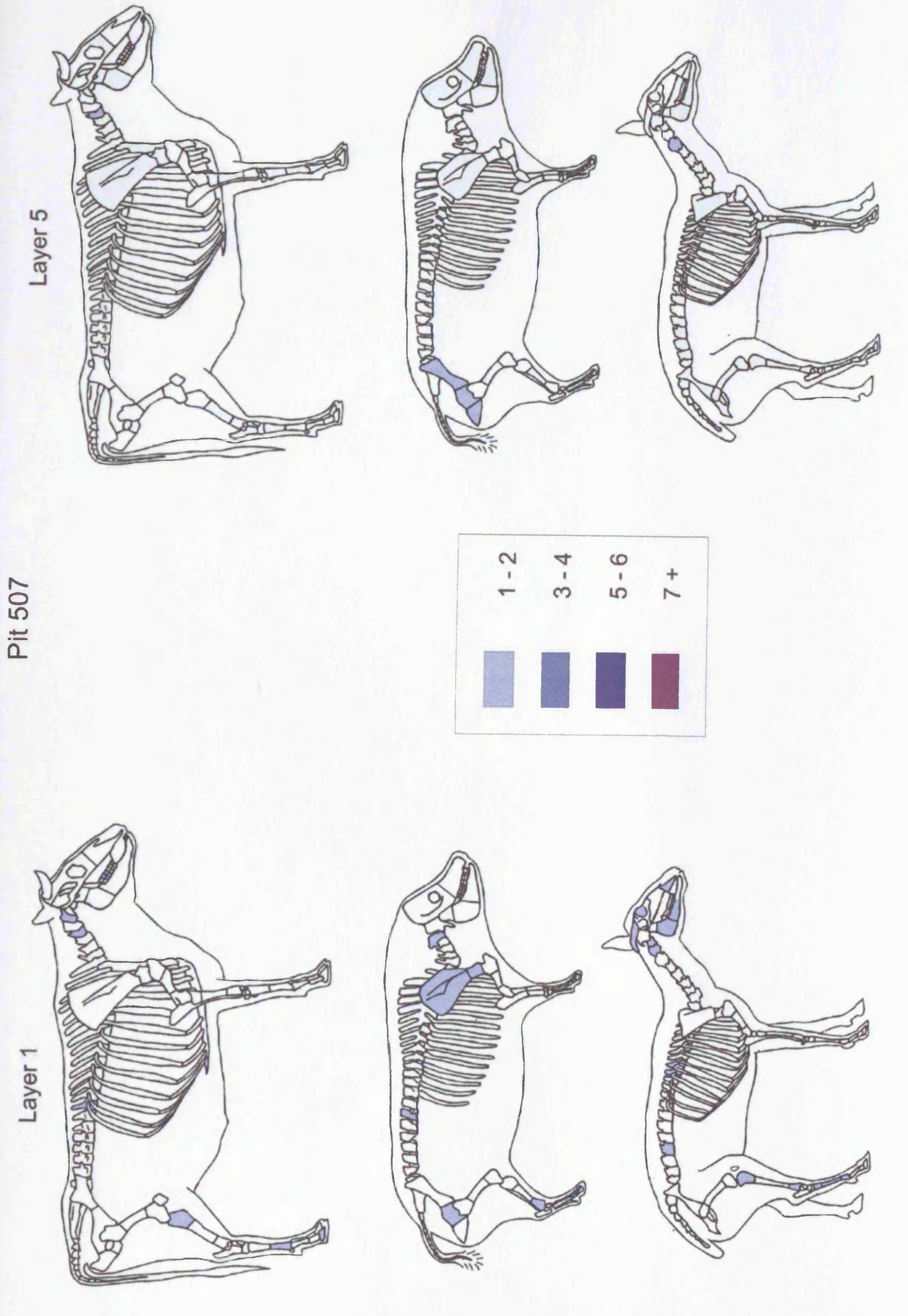


Figure 5.11: Bone elements in Pit 507, layers 1 and 5.

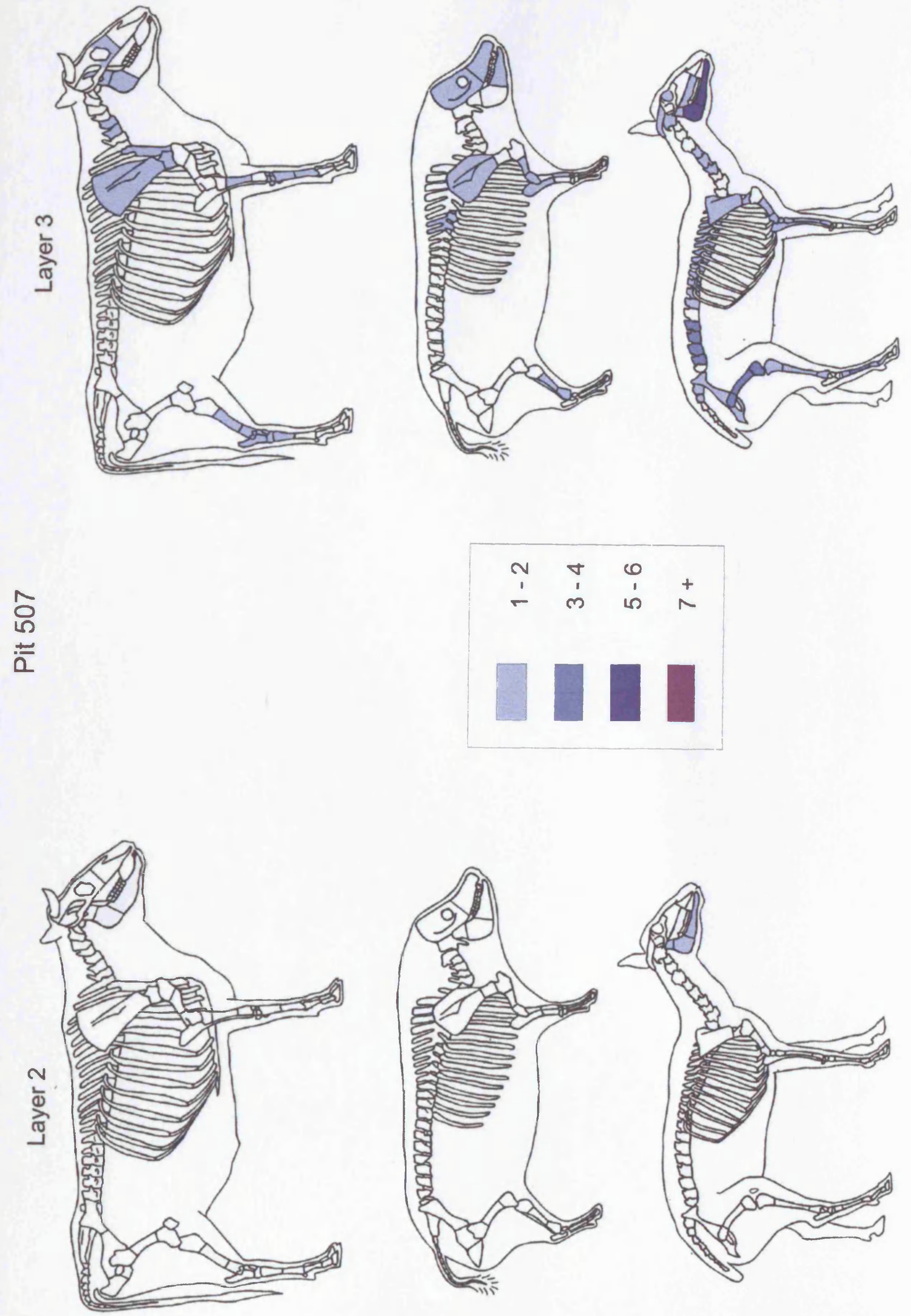


Figure 5.12: Bone elements in Pit 507, layers 2 and 3.

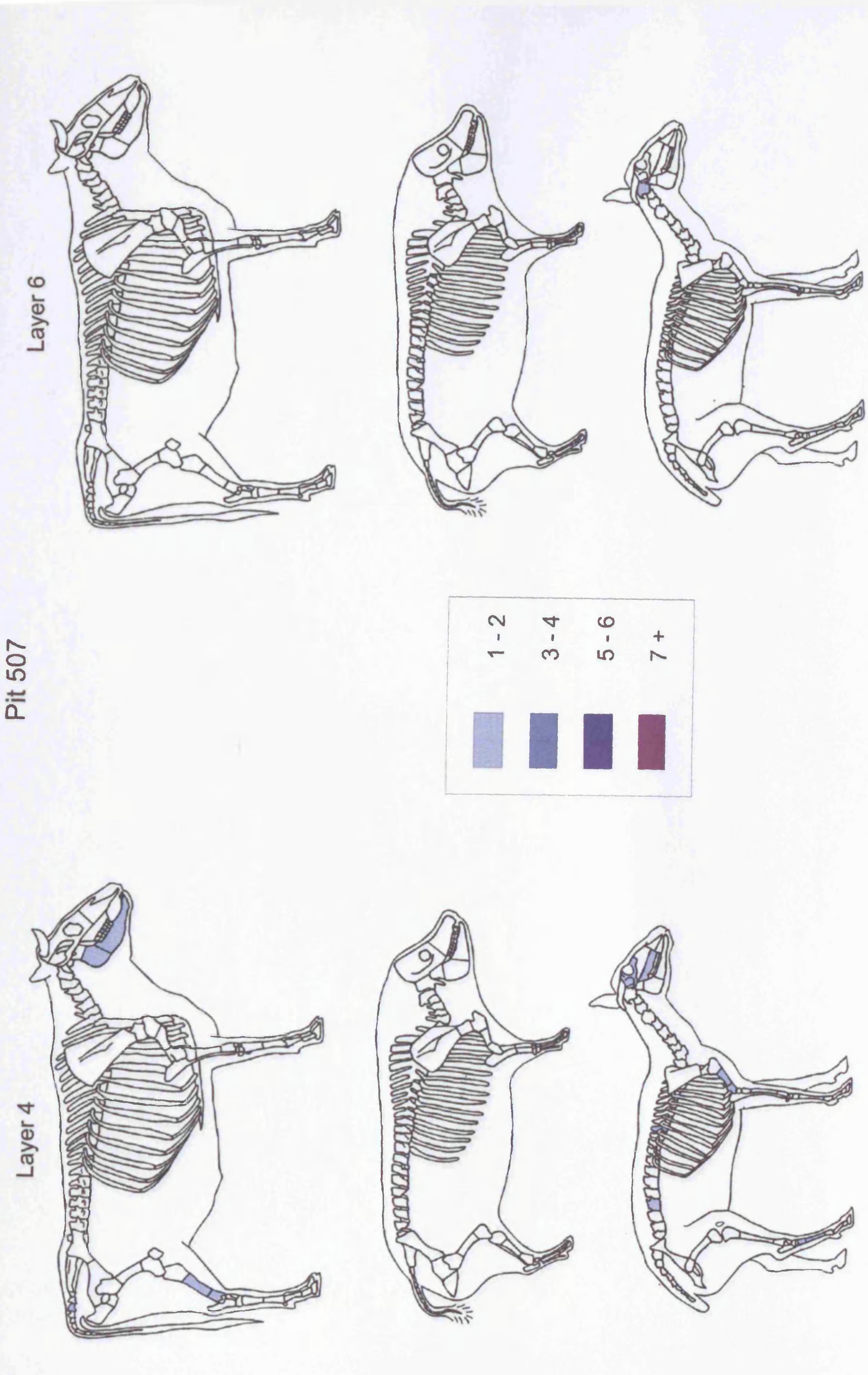


Figure 5.13: Bone elements in Pit 507, layers 4 and 6.

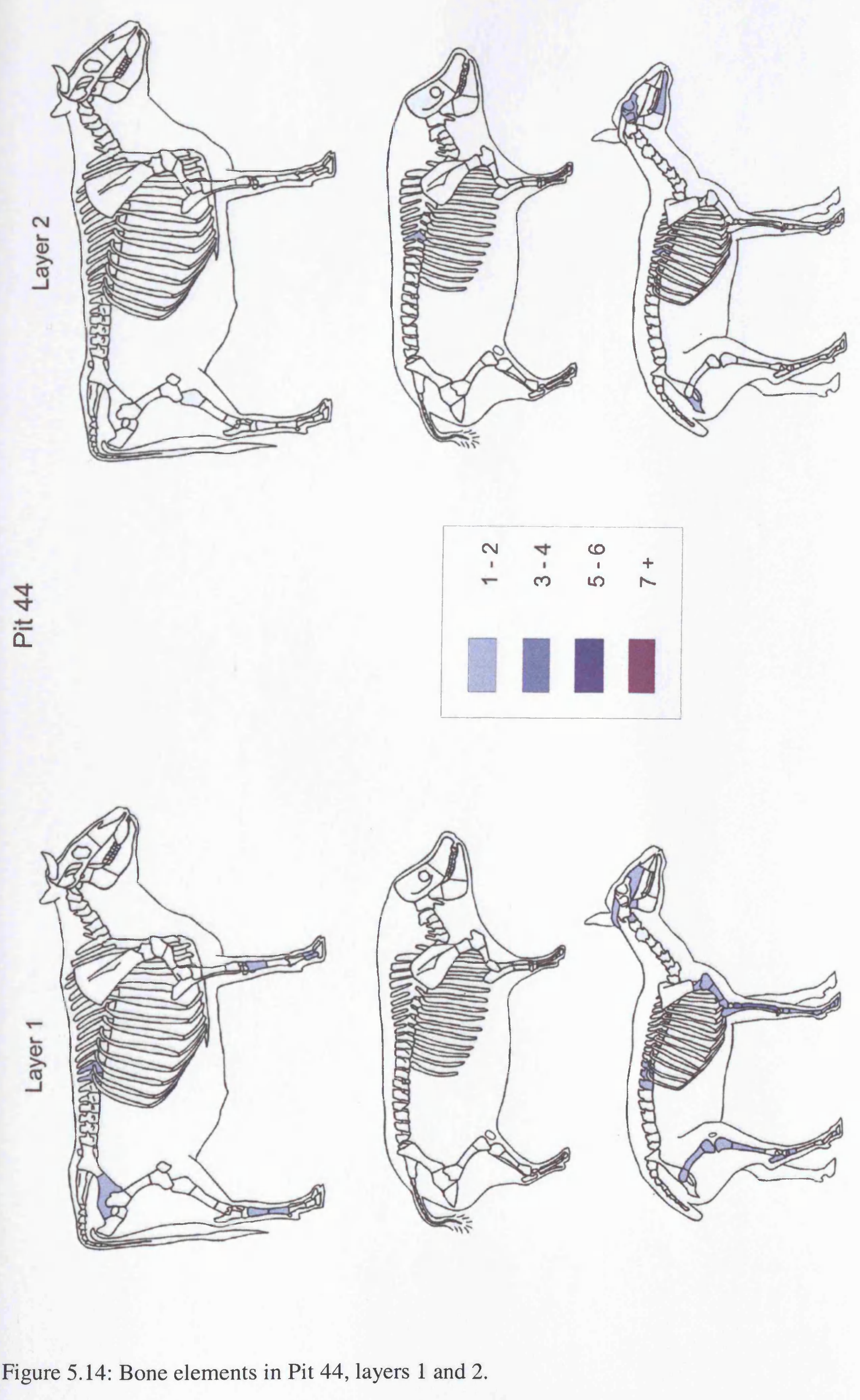


Figure 5.14: Bone elements in Pit 44, layers 1 and 2.

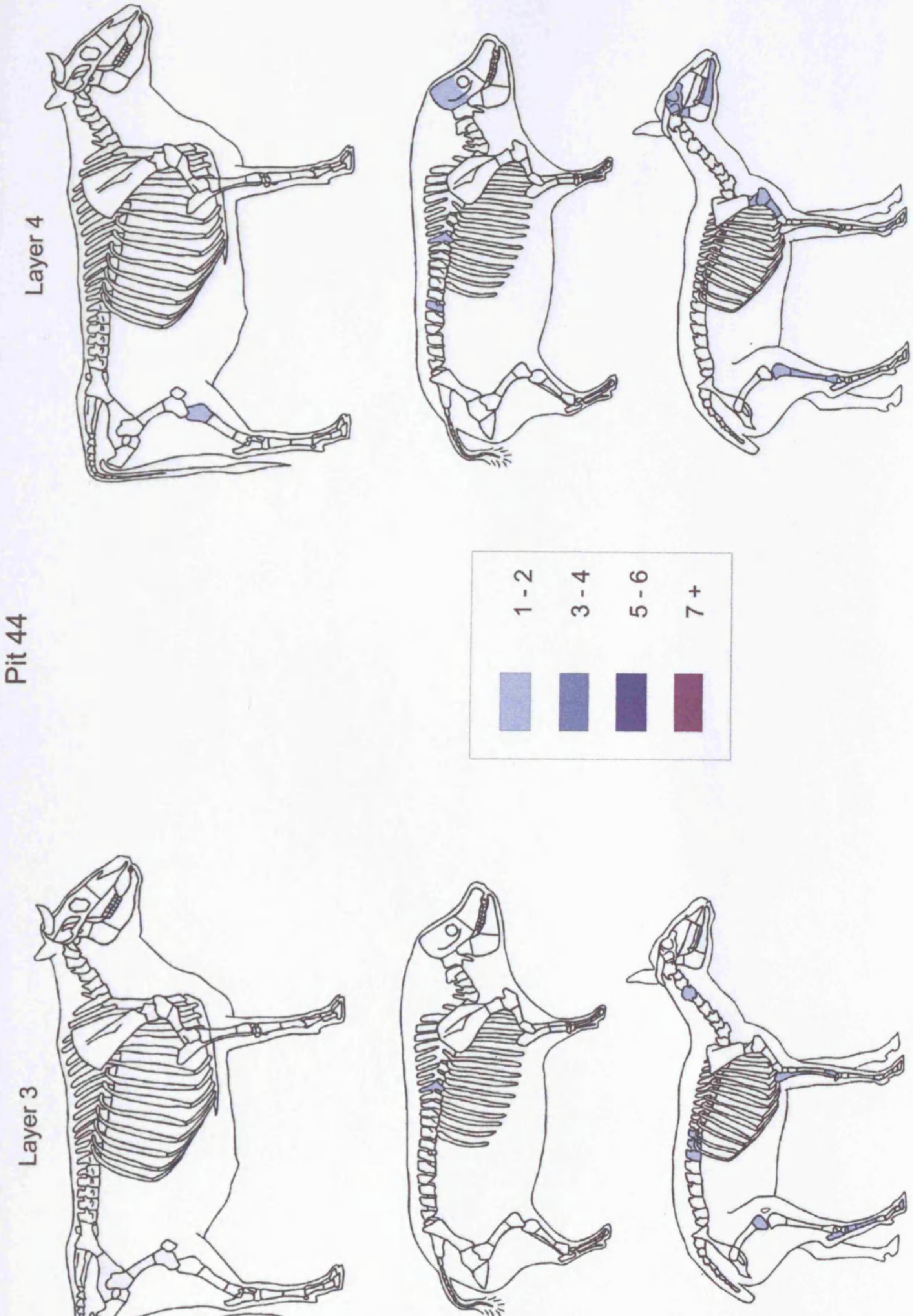


Figure 5.15: Bone elements in Pit 44, layers 3 and 4.

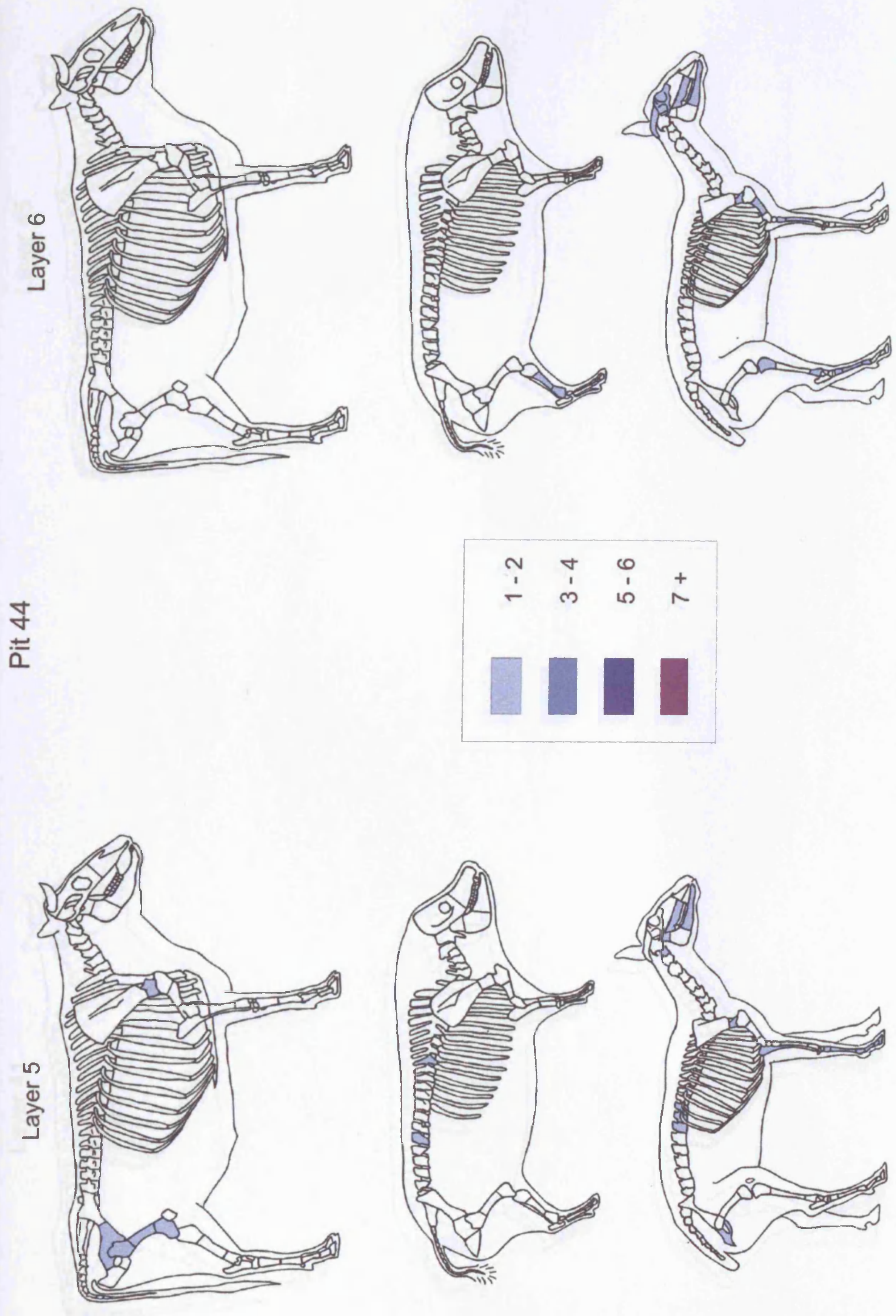


Figure 5.16: Bone elements in Pit 44, layers 5 and 6.

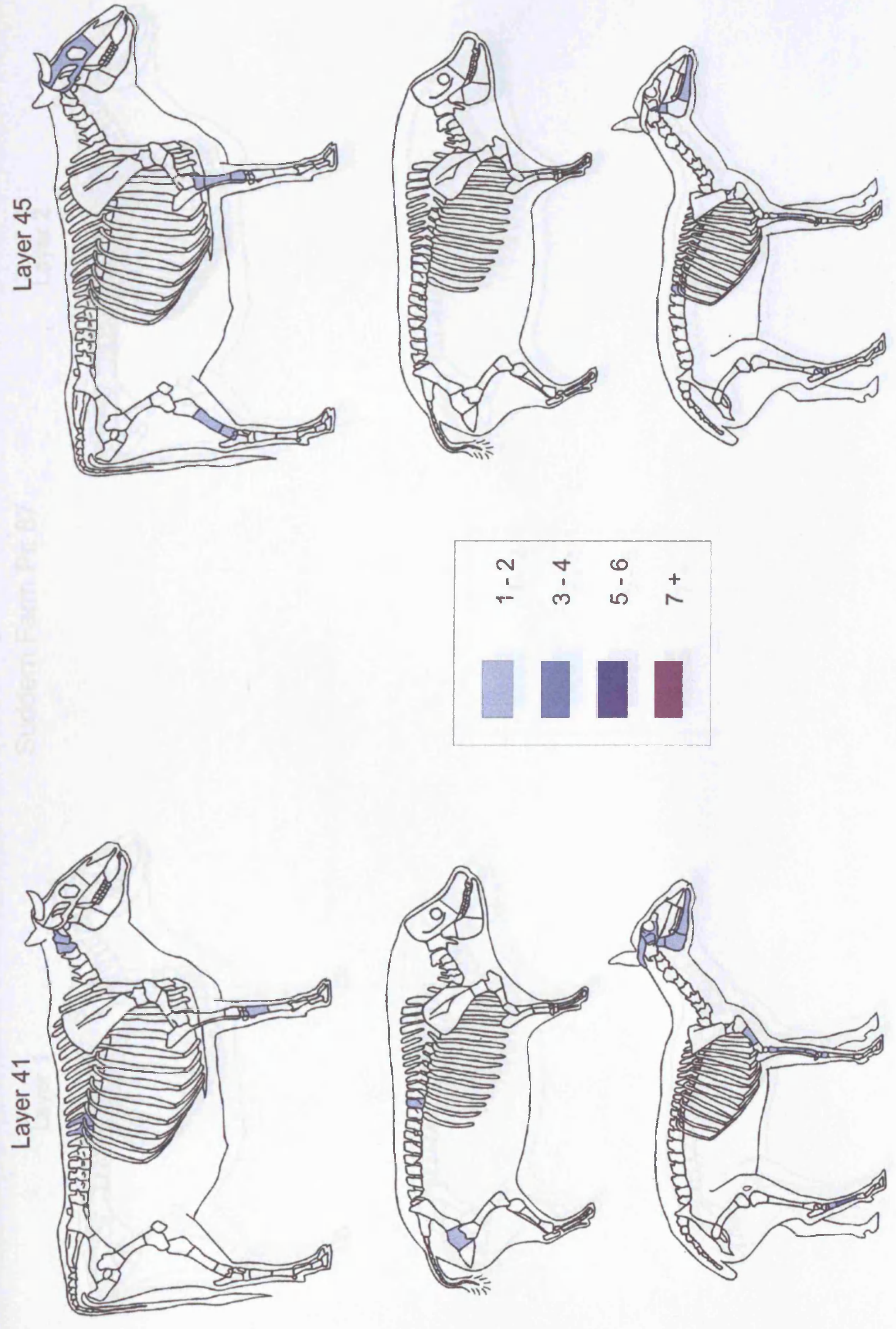


Figure 5.17: Bone elements in layers 41 and 45.

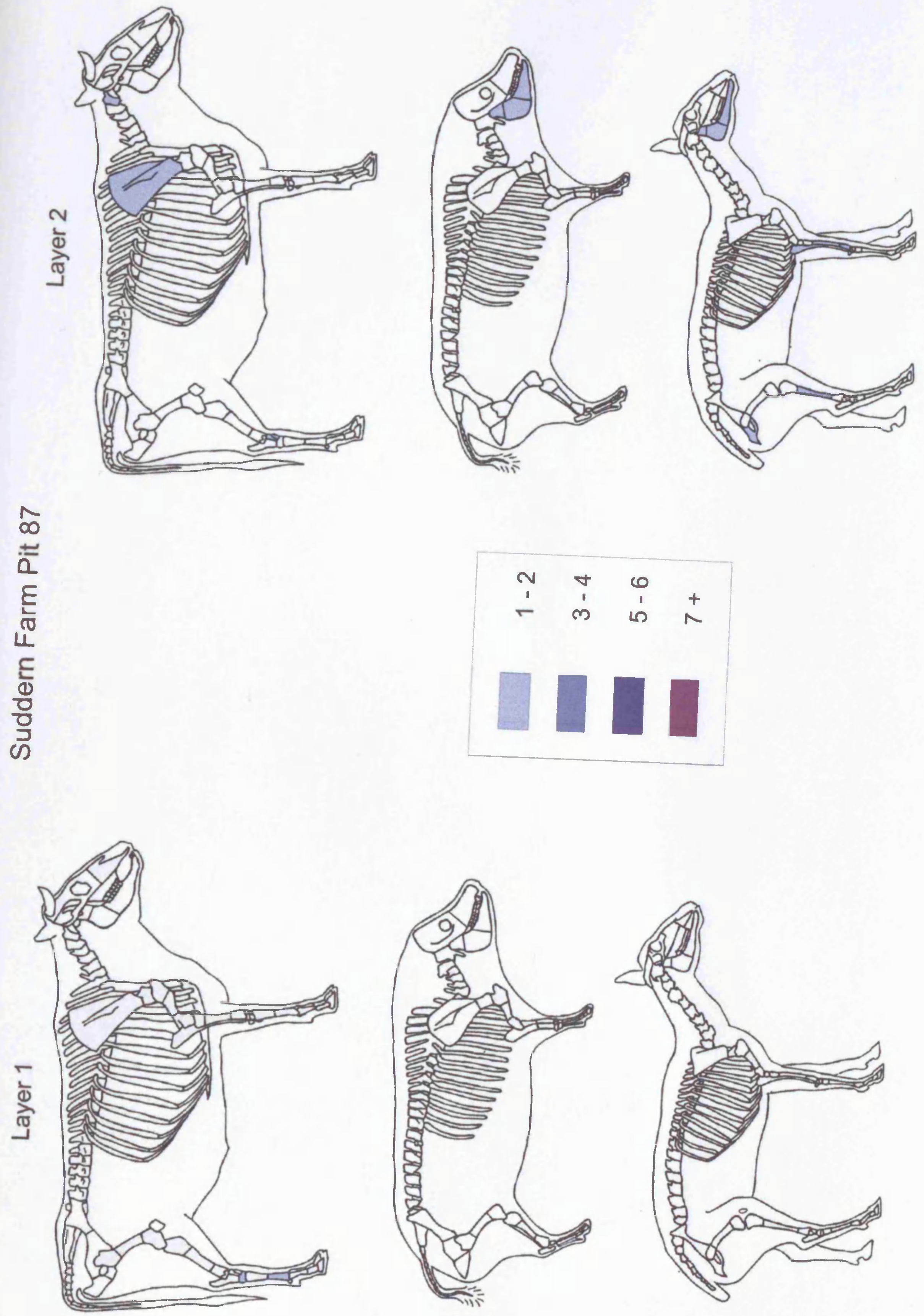


Figure 5.18: Bone elements in Suddern Farm Pit 87, layers 1 and 2.

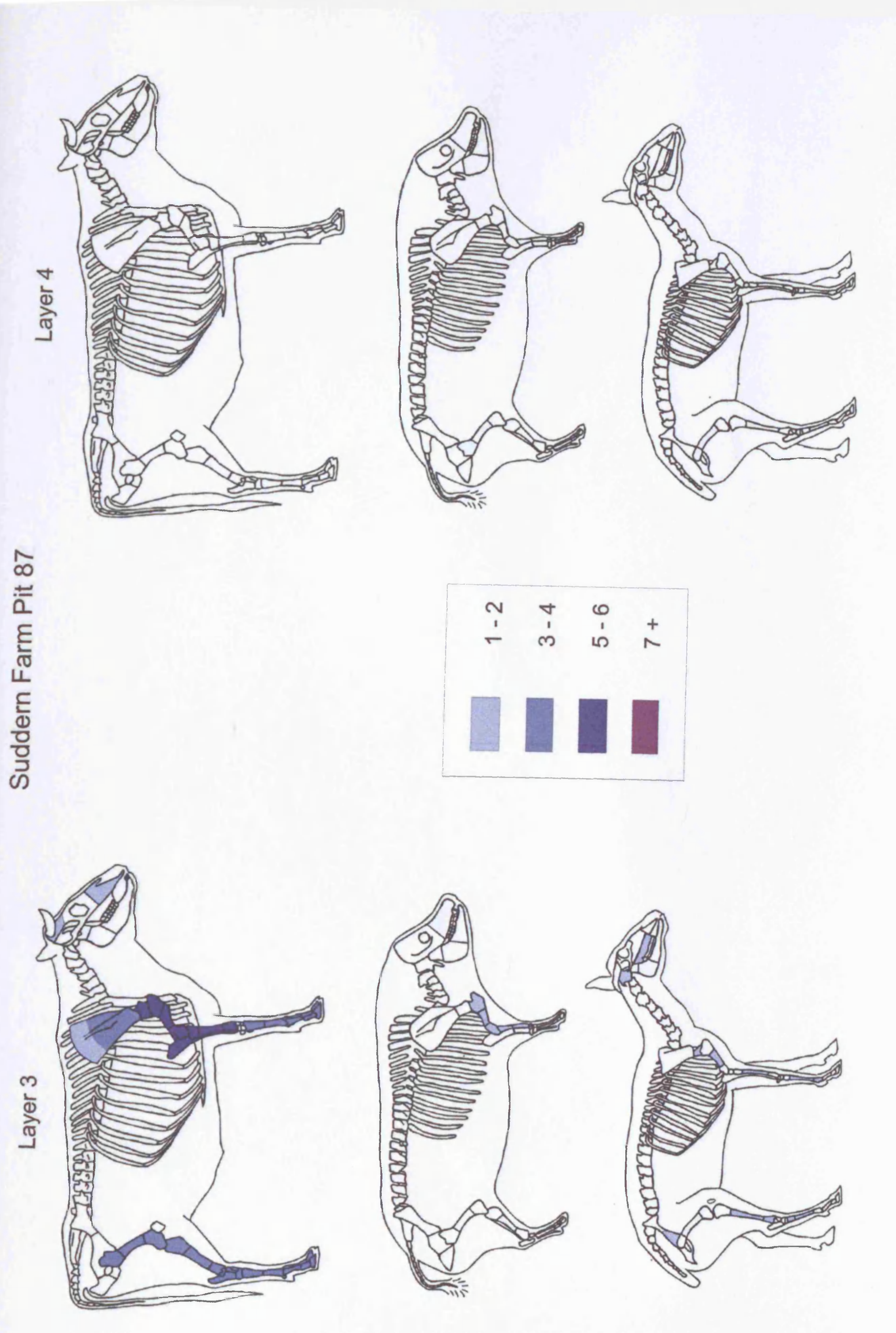


Figure 5.19: Bone elements in Suddern Farm Pit 87, layers 3 and 4.

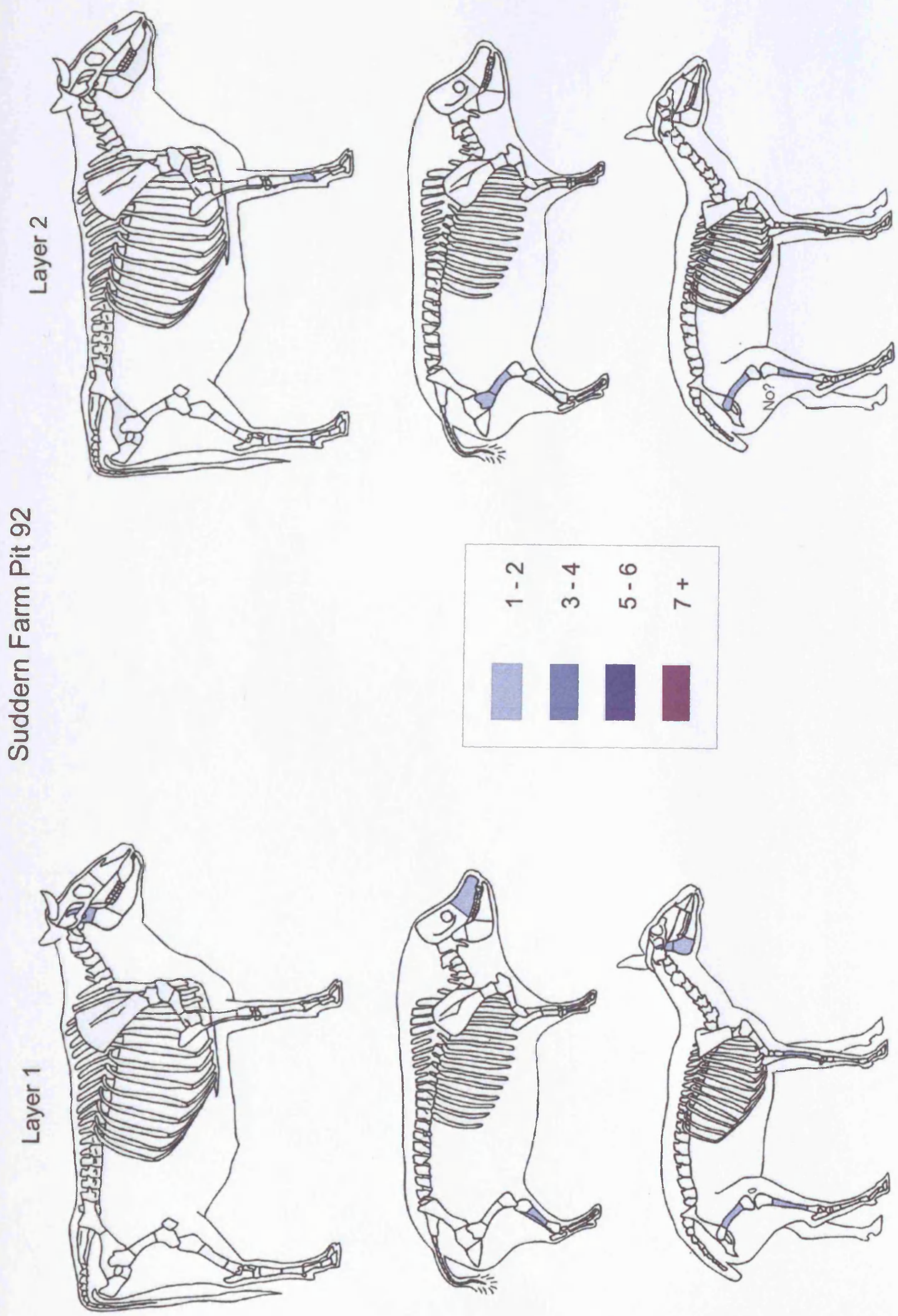


Figure 5.20: Bone elements in Suddern Farm Pit 92, layers 1 and 2.

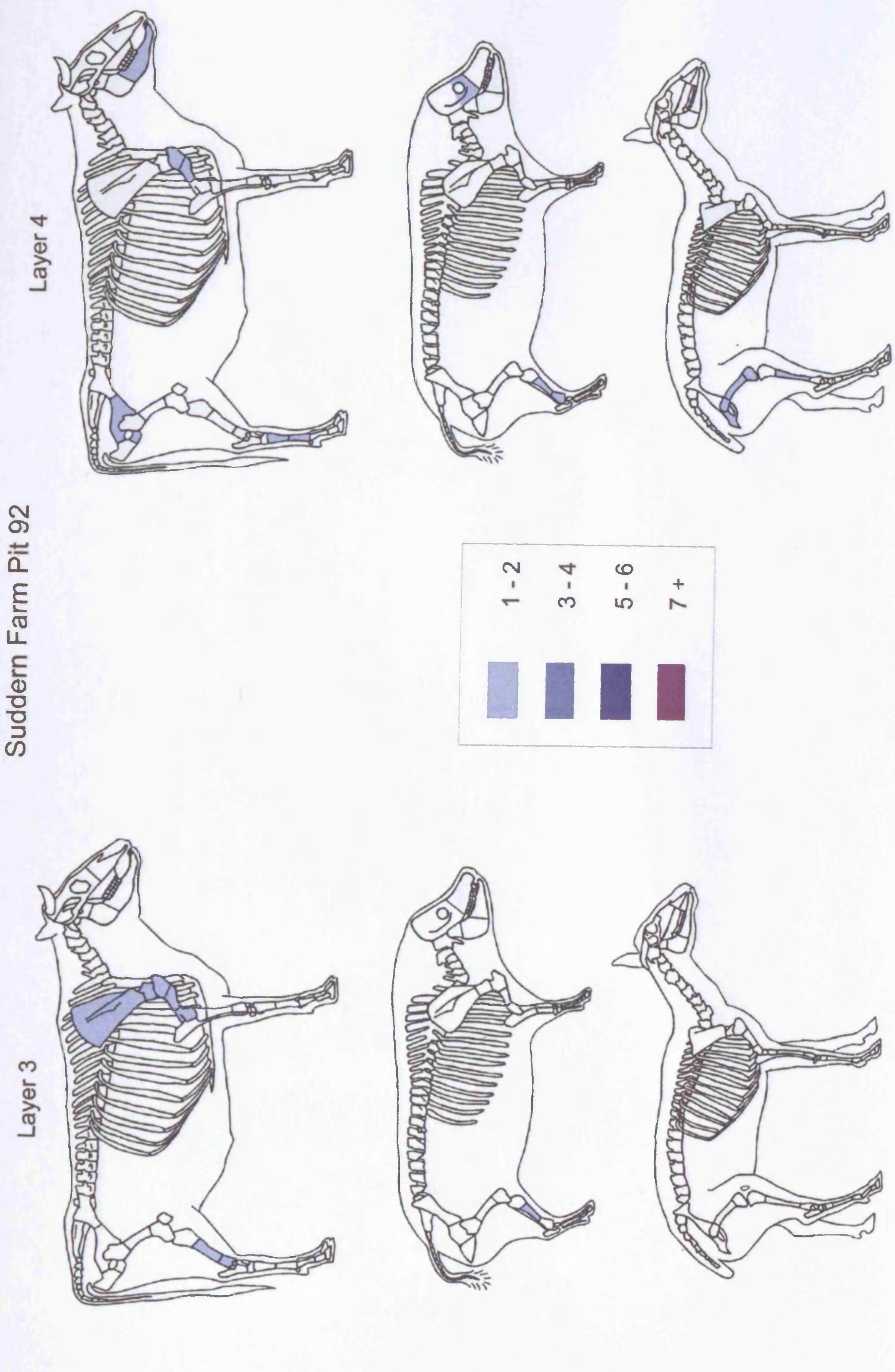


Figure 5.21: Bone elements in Suddern Farm Pit 92, layers 3 and 4.

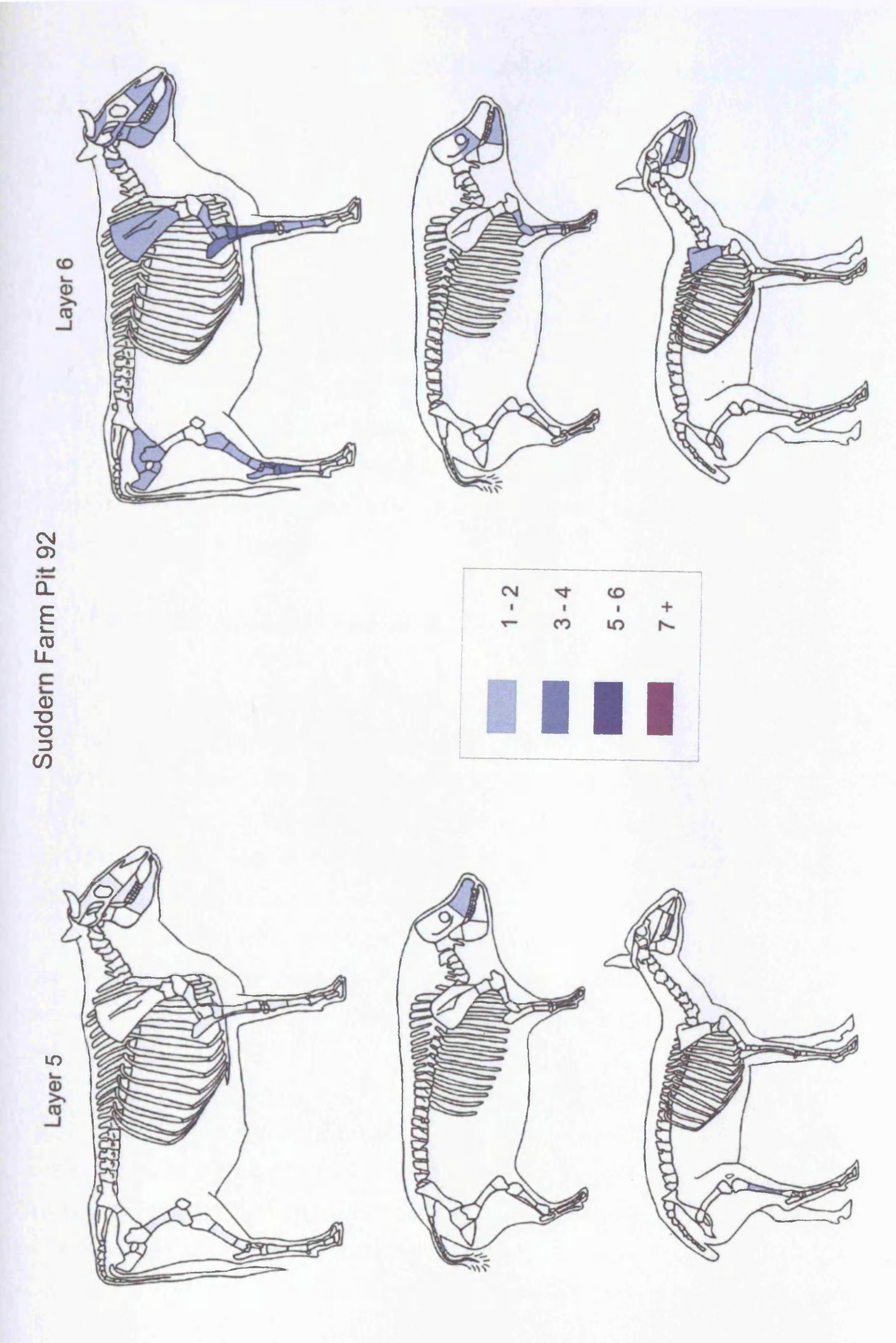


Figure 5.22: Bone elements in Suddern Farm Pit 92, layers 5 and 6.

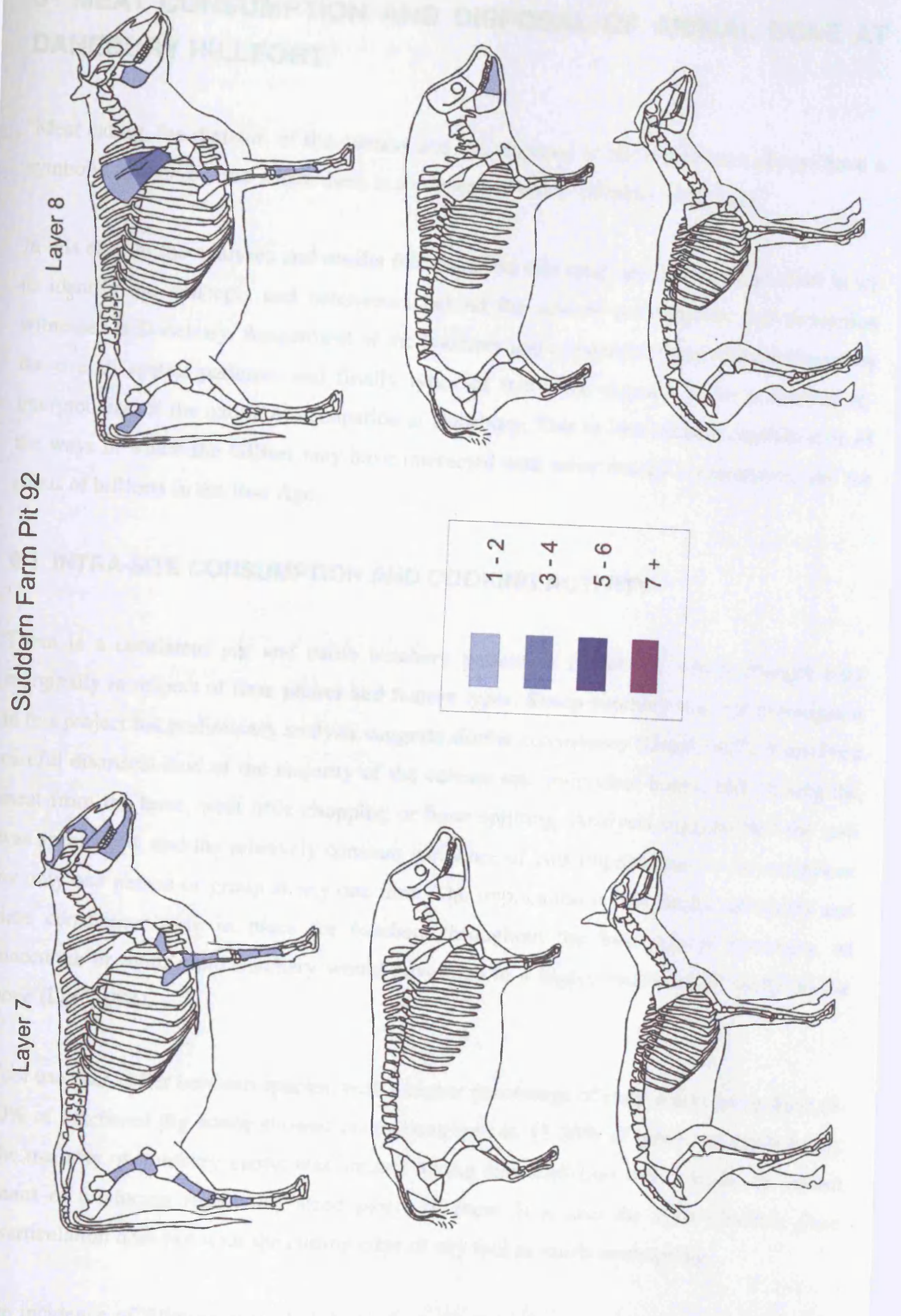


Figure 5.23: Bone elements in Suddern Farm Pit 92, layers 7 and 8.

6 MEAT CONSUMPTION AND DISPOSAL OF ANIMAL BONE AT DANEBURY HILLFORT.

'Meat eating, the division of the carcass and the dispersal of the bones must always have a symbolic context behind which there is a conceptual order' (Hodder 1982:161).

In this chapter the analyses and results that comprise this study are discussed, in order to try to identify the concepts and behaviours behind the acts of consumption and deposition witnessed at Danebury. Assessment of the butchery and consumption activities, followed by the overall spatial patterns, and finally types of individual deposit, invite a detailed re-interpretation of the nature of occupation at Danebury. This in turn leads to consideration of the ways in which the hillfort may have interacted with other nearby communities, and the status of hillforts in the Iron Age.

6.1 INTRA-SITE CONSUMPTION AND COOKING ACTIVITY

There is a consistent pig and cattle butchery pattern at Danebury, which changes only marginally in respect of time phases and feature types. Sheep butchery was not investigated in this project but preliminary analysis suggests similar consistency (Grant 1987). It involved careful disarticulation of the majority of the carcass into individual bones, and filleting the meat from the bone, with little chopping or bone splitting. Analysis suggests that the task was specialised, and the relatively constant incidence of cuts implies that it was undertaken by only one person or group at any one time. The implication is that similar efficiency and time constraints were in place for butchers throughout the Iron Age at Danebury, as inaccurate or more rapid butchery would have lead to a higher incidence of marks on the bone (Luff 1994).

Tool use does differ between species, with a higher percentage of chop marks on ox bone (8-20% of butchered pig bones showed chops compared to 17-30% of butchered cattle bone). The majority of butchery marks was created during disarticulation with a knife, the easiest means of producing reasonably sized pieces of meat. It is also the most efficient, since disarticulation does not wear the cutting edge of any tool as much as chopping.

The incidence of filleting rose slightly in the later phases, suggesting that more meat was being removed from the bone, perhaps also indicating that smaller portions were being taken from the bone and consumed. If we discount possible sample size bias from the smaller assemblages in the early phases (section 3.2.3.6), the greater number of carcass divisions noted in the late phase verifies this, since the production of more parts from each carcass implies that the portions themselves were smaller.

Differences between feature types might suggest some special treatment of bone in the pits at Danebury, in the early phases at least. Here, for pigs and cattle, crania were not filleted and it is more likely that they were deposited while still fleshed. Again this can only be a suggestion as the smaller sample may have biased the results.

6.1.1 Cooking

Butchery marks on the bone indicate disarticulation of joints and filleting of meat. This may have occurred before consumption, although it is possible that bone may have been marked during the carving of cooked meat. The low incidence of burnt bone (1.8% of identified fragments) suggests that any meat cooked on the bone was probably not grilled but boiled. Speth notes that the incidence of burning on bone roasted in a pit or oven is 'virtually nil', whereas that roasted over an open fire is 50%, if previously dismembered (Speth 2000:89). This means that roasting large parts of meat on the bone at Danebury cannot be eliminated, but it makes this method of cooking less likely than methods involving boiling. The size of bone parts is often large, with a relatively high proportion of whole or almost whole bone (pig humeri and femora 12-25% complete, and pig radii at 22-48%). This suggests that if meat was left on the bone for cooking, it would often be in large pieces. Filleting marks from pig bones at Danebury comprise 12-22% of the total butchered bone, suggesting that this process was carried out regularly, but not necessarily on all bone. Cattle bones were far more frequently filleted, almost certainly due to the larger quantities of meat they carried.

Pottery types at Danebury consist of jars, bowls, dishes and pots (Cunliffe 1984a: 231). The majority are jars (56%), followed by saucepan-pots (34%) then dishes and bowls (10%). From this it might be inferred that the main pottery forms (jars) were for storage, with those for cooking (saucepan-pots) secondary in importance and serving vessels in the minority. Brown (1995: 55) notes that both jars and saucepan pots contained residues 'consistent with activities such as cooking and boiling'. As previously stated (section 1.3.5), rim diameters of cooking pots range from 100mm to 320mm (Brown 1995: 57), the latter being a size that could accommodate most complete bone, even most bone elements of (Iron Age) cattle. The large size of many of the cooking pots could suggest that large quantities of food were being cooked for a significant number of people. It is unlikely that large quantities were prepared for very few people, as cooked meat could only be kept for a few days before becoming toxic, especially in the warmer months. The relative lack of small vessels for personal consumption might also imply that food sharing was the predominant routine. Analysis of differences in vessel type over time could identify differences in the scale of consumption activity (section 7.3.1).

6.1.2 Preservation

Many social groups preserve meat parts when the animal to be killed provides a quantity of meat larger than can be immediately consumed. In the Iron Age, available techniques for preserving meat included smoking/drying and salting. Although many of the literary sources for the Iron Age are considered unreliable, it is interesting that Strabo stated that fresh and salted pork were especially common among the Britons (Ritchie & Ritchie 1985: 17), suggesting that pig bones at least may be expected to show evidence of preservation. Preservation of meat on pig bones has been proposed for a Bronze Age dated log house at Hallstatt. The building contained rectangular pits and produced mainly humuri, femora and tibia, leading to its interpretation as a location for salting with brine pits and waste bone. The ribs, cranium and vertebrae were absent, thought to be from the methods of butchery that involve gutting and boning from the back, with the animal lying on its belly (Anon 2000). However, the bone element proportions were calculated by weight, which advantages heavier bone elements such as the humerus, femur and tibia. It would be interesting to see if other analyses give the same results.

There is no clustering of specific parts that might be indicative of similar preservation at Danebury, but the scattering of bones throughout layers and pits implies that some time had passed between butchery and deposition. Although some time is bound to have passed while the meat (and maybe bone) was cooked and consumed, such scattering might be explained by preservation, whereby parts were kept for periods of time before consumption, so would not be deposited at the same time as the remainder of the carcass. There is no modification to the bone that might indicate preservation, but modification would not necessarily have occurred (section 3.1.3.4). The evidence for production of small quantities suggests that some meat at least was not being consumed in huge chunks. This is especially so in the later periods. Preservation of parts would comply with a frugal consumption pattern that concurs with this analysis.

If we accept this interpretation, meat must have been preserved on the bone. Stokes states that it is easier to preserve meat once taken off the bone (Stokes 1996: 57), although for many meat joints, such as hams, the bone provides a useful means by which to suspend the product, avoiding spoiling due to a lack of aeration (Lawrie 1998). If meat were preserved on the bone, it would not be possible to utilise marrow, and indeed there is little evidence for marrow removal at Danebury. Filleting marks would have been made during the cutting of preserved meat from the bone in this case.

Possible evidence for preservation comes from briquetage, commonly accepted as used for transport and trade of salt, which is frequently found at Danebury. It is not found at some smaller settlements, such as Old Down Farm or Lains Farm, but is present at Winnall Down and other sites (Morris 1994: 15). There does not appear to be a difference *per se* between hillfort and settlement use of briquetage, although salting or trade may have been restricted to some sites. At both hillforts and open settlements, where briquetage is found, there appears to be an increase in later periods, perhaps suggesting more use or trade in salt. Increased salting of meat in the later periods is consistent with the evidence for the consumption of smaller parts in the later Iron Age, proposed in the following section.

6.1.3 Consumption

Distinguishing consumption waste from butchery waste is often difficult because 'all parts of the carcase [*sic*] (except the horn and horn core) may be cooked and eaten' (Serjeantson 1989: 3-4). This statement was drawn from studies of food consumption in towns, where activities may be more specialised and/or centralised than rural settlements, but the apparent specialisation of butchery as a technique at Danebury could indicate that the same applies to the Iron Age. The criteria Serjeantson advanced for distinguishing the two types of waste are: information suggesting a residential building; a majority of bones from food animals; some evidence of butchery; predominance of skeletal parts with most meat. Distinctions are confused when deposits made in one place result from more than one activity. Her third criterion does not necessarily apply, since it is the *type*, not the *presence* of butchery marks that are of importance, and since butchery marks may not necessarily be found on butchered bone. Nonetheless, at Danebury, the second and third criteria apply to the pit fills, although the first three match the (occupation) layers. The implication might be that the bone in pits is further removed from consumption activity, or more mixed up, than that in layers (see discussion of spatial patterning below).

Conversely, if Wilson's claim that the bones of small animals and joints of the larger 'are a good indicator of eating areas' (Wilson 1994: 64) is accepted, the pit deposits at Danebury would represent the residues of consumption activity. The bone elements in each deposit include many from sheep, but only a selection of parts from cattle and pig. However, the sheep bones do not tend to come from one individual, suggesting that the deposit may not directly reflect eating activity (see part 6.2.3). It is likely that deposition activity has masked any distinctions between butchery and consumption waste.

6.1.3.1 Size of meat parts

Literary sources are at variance when discussing the quantity of meat supposedly consumed in Iron Age Britain. Caesar is the only writer to directly address Britain, stating that most Britons 'do not sow corn, but live on milk and flesh and clothe themselves in skins'[1] (Caesar, *De Bello Gallico* 5. 14). In respect of the latter, butchery marks from cattle and possibly pig bones at Danebury do suggest that skinning had occurred, perhaps providing some confirmation of Caesar's statement. Grant calculated that a milk and meat economy became more important in the later phases, using projected milk, meat and offal yields and feeding costs (1991a: 469). Caesar also asserted that Iron Age Britons 'account it wrong to eat of hare, fowl and goose; but these they keep for pastime or pleasure'[2] (Caesar, *De Bello Gallico* 5. 12). However, butchery marks on domestic fowl are present at Danebury (Annie Grant pers. comm.), suggesting that at least a part of his account is flawed.

Other ancient authors wrote of the eating habits of European Celts. Athenaeus, quoting Posidonius, says that sometimes 'whole joints of meat were served'[3] (Athenaeus, *Deipnosophists* 4. 154b) while Phylarchus, also quoted by Athenaeus, states: 'many loaves of bread are broken up and served... as well as pieces of meat from the cauldrons'[4] (Athenaeus, *Deipnosophists* 4. 150d). Diodorus Siculus states that Iron Age Gauls had 'caldrons [*sic*] and spits holding whole pieces of meat. Brave warriors they reward with the choicest portions of the meat'[5] (Diodorus Siculus, 5. 4). There does not appear to be any selective deposition of different bone parts to confirm the latter at Danebury, and the low incidence of burning argues against the common use of spit roasting. Diodorus Siculus may have been exaggerating the ferocity of Celtic warriors or recording exceptional meals, the

[1] 'plerique frumenta non serunt, sed lacte et carne vivunt pellibusque sunt vestiti'
[2] 'Leporem et gallinam et anserem gustare fas non putant; haec tamen alunt animi voluptatisque causa'
[3] 'παρατεθέντων κωλήνων'
[4] 'ταῖς τραπέζαις ἄρτους πολλοὺς κατακεκλασμένους παρατίθεσθαι χύδην καὶ κρέατα ἐκ τῶν λεβήτων'
[5] 'καὶ λέβητας ἔχουσαι καὶ ὀβελοὺς πλήρεις κρεῶν ὁλομερῶν. τοὺς δ᾽ ἀγαθοὺς ἄνδρας ταῖς καλλίσταις τῶν κρεῶν μοίραις γεραίρουσι'

remains of which were rarely or never deposited at sites such as Danebury, and have not been recognised in this analysis. Consumption practice in Iron Age Britain and on the continent will have differed in some ways, and it is not possible to compare the two directly. Thus high meat content may have been atypical of everyday meals in southern Britain, despite the portrayal by Classical writers of northern European countries as lands of meat and bread.

Deitler (1996: 101) accurately states that the main problem in identifying feasting is the classification of 'single episode' deposits. At Danebury deposition in pits made such classification more possible, but the lack of indication of the length of time pit deposits took to form and the potentially significant distance in time and space between butchery and consumption remain limiting factors (see section 6.2.3).

Hill suggests that only 100 identifiable bones were deposited per year at Danebury (1995b: 2), but my calculations make the figure more like 800, when the bones are averaged per year of occupation (temporarily ignoring differences between the early and late phases, which are described more fully in section 6.5) and the number doubled to take into account the half of the site which remains unexcavated. Bone may have been deposited outside the hillfort, and even in the ditches, only a small proportion of which were excavated (Cunliffe & Poole 1991: 13). However, it is also possible that the total bone recovered represents a large proportion of the amount of meat eaten; many societies eat very little meat, although the importance they attach to it may be disproportionate (as discussed in section 1.3.4). For example, !Kung communities consume only 15% of their calories from meat, the inhabitants of medieval England spent half of the year (ostensibly) fasting from meat (Fiddes 1991: 22-29) and the Masai only kill cattle through sacrifice, and even then the meat can only be eaten by warriors (Lincoln 1981).

Small scale 'household' eating could be implied by the small size of the meat parts produced at Danebury, if direct deposition into pits after consumption is assumed (see below). This possibility is strengthened by the different patterning of sheep to ox/pig bones in pits given by other authors concerning Iron Age sites, where sheep appear to have been roasted on the bone or subject to more rapid deposition (Coy 1987), or cooked and eaten more frequently (Grant 2002). Coy's interpretation rested on the greater incidence of 'ivoried' sheep bone, the cause of which is debated and has otherwise been given as evidence for roasting and for rapid deposition. She rightly states that, whatever the precise reason for the bone becoming 'ivoried', something different had happened to the sheep bone to cause this effect (Coy

1987: 46). Thus it seems that cattle and pig may, perhaps inevitably given their larger size, have been more divided either for sharing at larger gatherings or for distribution to more people. This hypothesis is further discussed in section 6.2.4.

A mixed farming economy was practised (Cunliffe 1995), and grain could have provided a significant proportion of the diet. Meat may therefore have been infrequently consumed, and/or eaten in small parts, since the relatively small size of meat portions suggests that when meat was eaten, it was often not in large quantities.

6.1.3.2 Intensity of use

The high proportion of complete long bones at Danebury suggests that marrow extraction was not a common practice. However, the bones that were fragmentary constitute a significant number, and further analysis of fracture patterns and fragment sizes would clarify the extent of pre- and post-depositional breakage (Vehik 1977; White 1992; Outram 2001). Unfortunately there was not time to perform such analyses on any scale for this project, though it would form a useful focus for further work. The very low proportion of bones that were recognised as being chopped suggests that deliberate peri-mortem bone fracture was relatively rare.

The types of tool used could have exerted a strong influence on the types of butchery marks made. Chopping blunts iron knives and cleavers more quickly than modern steel ones, and if flint tools had been used in the early phases, these are more difficult to use in chopping activities, requiring a hammerstone (appendix 3). However, there is no evidence of a higher proportion of marks resulting from chopping in the late phase, which suggests that tool types did not alter. Both flint and iron tools performed the range of butchery tasks that were thought to have been performed at Danebury, suggesting that the influence of technology on the majority of the butchery techniques practised at Danebury was probably limited. No butchery at Danebury appears to have been performed with a saw - the main difference between modern and Iron Age butchery methods - and this most likely has a technological basis, since iron saws would blunt very quickly. Sawing marks were found on some worked bone though (Cunliffe & Poole 1991: 368), suggesting that bone working tools differed from butchery tools, possibly again indicating specialisation of craft activities.

Carcass divisions in the early phase produce larger joints of meat than in later phases. The incidence of butchered bone is constant through phases, but the variety of marks is greater in the later phase, with more cuts to separate bone into smaller parts, and more evidence of chopping to split the bone. If we assume that sample size biases have not overly biased the results (an admittedly large assumption), it may be that in the earlier Iron Age meat was cooked in larger parts. This must remain an extremely tentative conclusion at this stage, which could be addressed with further work on cooking techniques and pottery sizes (section 7.3.1).

In summary, it is likely that meat was cooked by boiling in relatively small parts, and that preservation activity increased in the later Iron Age, although breakage of bone for marrow was still relatively uncommon. Consumption of large quantities of meat was probably not common, although it may have occurred more frequently in the earlier phases.

6.2 INTRA-SITE DEPOSITIONAL ACTIVITY

Pivotal to the understanding of any site using animal bone remains are issues of taphonomy. Here it has been argued (chapter 2) that there is little in the way of bias from the processes of gnawing, erosion and inter-site trading. In addition, Maltby concluded that although there is some evidence that preservation differs between features and by burial depth, this does not result in an overall bias in Iron Age assemblages in Wessex (Maltby 1996: 19). Hill cites Balksbury and Winnall Down as two sites where bone elements of more robust nature are found in the top layers of pits (Hill 1995a). This is not so at Danebury, where, for example, the top two layers of pit 23 contained, together with six robust bone elements, three cattle vertebrae and a whole sheep pelvis, bones that are not especially robust. Thus it would be expected that bones were deposited quickly after use, or were safeguarded from scavengers and weathering by storage or protection.

The analysis of bone elements in individual layers at Danebury showed that in each layer, bones originated from individuals of differing species and ages, and that the bones did not come originally from particular parts of the skeleton. Other pit layers may differ; Grant (2002) has shown that in pit 2269 five of ten layer deposits were coherent, often containing the remains of single animals. Further analysis is required to determine the extent of coherent deposits, but for the Danebury pits investigated in this thesis, and some of the layers in pit 2269, the scattered nature of bone elements suggests that parts of the carcass were moved around between butchery, consumption and deposition, Schiffer's 'secondary refuse' (Schiffer 1972). 'Primary refuse', defined as that discarded at its location of use, may apply to special deposits. Most special deposits appear to have been carefully placed on the base of pits or covered by a capping of clean material (Grant 1984a; this study, part 5.2.1.1). If we regard special deposits as offerings (Cunliffe 1992), their area of use was the pit, and therefore they could be described as primary deposits. They will therefore represent different processes from the remainder of the bone, which is often found with special deposits, but is more likely to be secondary refuse.

6.2.1 Identifying ritual deposits

There are many difficulties associated with identifying the differences between 'special' and 'mundane' deposits. Feature type could be regarded as an indicator, with special deposits found in pits (Hill 1996b). Any material in postholes could be from natural accumulation as the post rotted, and material in gullies from silting or after disuse. Hill raised the possibility that all pit deposits were in a way special, by virtue of their survival (see section 1.3.4).

Building upon Wait's (1985) idea that the absence of enclosure ditches (common in earlier prehistoric periods and some Iron Age sites) led to the deposition of humans (and other special items) in pits, Fitzpatrick suggests that whilst special deposits were found in pits, feasting remains were deposited elsewhere (Fitzpatrick 1997). He backs this interpretation up by noting the unabraded nature of pottery sherds in pits, indicating that they were primary deposits that had not been disturbed. Sillar (1996) describes a similar activity in the Andes, where storage pits, once relieved of their produce, are used as receptacles for dead bodies, in this case to 'preserve' the spirit, although the same cannot necessarily be said of the Iron Age deposits. The storage/ preservation of sustenance and human remains is proposed for both places. However, the remains of butchered animal bones within the pits at Danebury suggest that these remains were certainly eaten, although they may of course represent activities other than 'everyday' consumption.

However, the nature of the deposits from pits and layers at Danebury suggests that there was not a considerable difference between the contents or methods of bone deposition in pits and occupation layers, especially in the later phases. Thus Bradley's (1985) suggestion that we 'rank' deposits on a ritual scale, depending on whether the components are found in domestic rubbish, is flawed. There is no means of identifying where exactly domestic rubbish is to be found, nor indeed what domestic rubbish is, or even whether any rubbish is purely domestic. There is also the question of re-use and recycling, which would, for animal bone, result in the obliteration of bone remains when fully exploited for marrow, grease and raw material for working. This obviously had not happened to a large number of bones at

Danebury, indicating that bone had not been fully exploited, and again no difference was recognised in bone fragmentation between pits and layers. This suggests that, whatever the cause of the apparent absence of full exploitation of the bone at Danebury (taste, time constraints or ritualised activities such as conspicuous consumption), the pits and layers were largely equal.

Unusual sites that have an undisputedly different function might be interpreted as of a ritual nature. For example, the 'temple' on Hayling Island contains 'unusual' species proportions, in this case many pig and sheep bones, and no cattle (Downey *et al.* 1979: 7). At most sites dating to the Iron Age, cattle are the second best represented species by fragment count (Maltby 1981; Grant 1984b). The absence of ox bones was interpreted by the excavators of the Hayling Island site as evidence for prohibition on ox sacrifice. There is no obvious evidence of the avoidance of cattle bones in particular areas or deposits at Danebury, even special deposits. However, Hayling Island is geographically separate from the Wessex Iron Age settlement sites, and differences could be regional (see section 1.3.1.2). It is also a different structure type to the majority of buildings at Danebury, which were roundhouses, and is more similar to the central 'shrine' at Danebury. However, no bones were recovered from the latter. It could be that different activities took place in different buildings, without them necessarily having a distinct ritual nature.

Particular deposits in features, in addition to features themselves and whole sites, have been regarded as ritual in origin. Some debate has taken place over what constitutes such a 'special' deposit, especially those found with so-called ordinary refuse (see section 1.3.4), and how they were created. Maltby (1985) has suggested that articulated skeletons are the remains of diseased animals that were deposited whole into pits, but other authors have convincingly argued that this is unlikely, since species representation of special deposits is different to that of the site(s) as a whole (for example, Hambledon 1998: 59).

However, the burial of a cow that had died whilst birthing at Gussage all Saints (Harcourt 1979), suggests that some at least of the animals that make up the special deposits may have died during unusual situations, which made them perceived as unsuitable for eating; Fiddes (1991: 84) has noted a widespread taboo on eating animals not deliberately slaughtered. Jones (1977: 58) provides an alternative view, suggesting that the pits at Winklebury acted as 'unintentional traps for animals'. However, a photograph of pit 616 indicates that the pit deposits at Winklebury also contained a range of other bone elements, like Danebury; this particular pit was extremely densely filled, and contained apparently complete animal bones with a high proportion of mandibles. Jones' explanation is not consistent with the evidence for Danebury, where if pits had been left open so that animals could fall in, the bone would not have been in such good condition. Feasting activity was suggested for parts that were articulated but carry butchery marks from filleting (Harcourt 1979: 150), which is possible, since even bones without cut marks may have been carefully butchered. Armour-Chelu (1991) also suggests that articulated animal bones at Maiden Castle were the remains of celebratory event or special meals. This explanation is entirely feasible, but does not explain some of the more unusual juxtapositions of articulated bone with other skeletons and artefacts, described by Grant (1984c).

As discussed in section 1.3.4, Wait sees all special deposits as animals that had been exploited in an unusual manner (Wait 1985: 151), stating that depositing articulated (and, he assumes, fleshed) bones is uneconomic, and that it is hard to imagine these were not religious/ritual in nature. We have already discussed the possibility that the meat had been removed from the bone, and that the breakage of bone for marrow extraction appears to have been limited in extent for both articulated and disarticulated bones. He goes on to say that ritual is spatially segregated (Wait 1985: 242). However, at Danebury there is no spatial segregation of special deposits, which occur across the site in roughly equal proportions to those of the pits. Human bones, conversely, are not found in the areas of densest pit concentration in the early phase, instead being concentrated at the peripheries (see section 1.3.3). In other phases they have a roughly equal distribution. So it may be that human bone deposition was focussed in certain places in the early period, and human bones and special animal deposits were not normally deposited, or regarded, in similar ways.

Obvious 'special' deposits are those animal bones and artefacts found as grave goods. Individual graves in Iron Age cemeteries in East Yorkshire often contain the remains of animal parts (Stead 1991). It is uncertain whether these parts could represent habitual meat 'cuts', or a specific funerary rite either as a sacrifice or a funerary meal. The parts include whole pig forelimbs and so do not correlate with the butchery patterns from Danebury, which show disarticulation at all joints on the leg. Whole forelimbs have, however, been found as special deposits, which could represent a particular ritual activity rather than mirroring animal disarticulation for consumption. However, Hampshire and East Yorkshire were spatially and culturally separate in the Iron Age, so any direct comparison is difficult to sustain.

Poole (2000: 7) questions why individual bones are seen as less 'special' than articulated parts or head deposits. Her premise, like that of Hill (1995a), is that the bones in the pits are unusual in the fact of their survival, and that they should be compared to structured or articulated deposits. She also puts forward the possibility that single bones could represent other parts of the animal, 'a long bone for a leg, a skull for the whole animal' (Poole 2000: 8). Other authors have stressed the symbolic aspects of meat eating, which could have some influence on the manner in which bones were treated. The killing involved in procuring meat makes it a symbolically loaded occupation: 'in some societies, all slaughter is sacrifice, and can only take place within the context of the sacred' (Sherratt 1991: 62). Thus the remains of this activity are 'dangerous', and need to be safely disposed of, which may preclude dumping the remains on the fields. If one bone was regarded as representative of one animal, the scattering of the other parts of the carcass in individual pit layers requires less explanation; one bone (one animal) had been safely disposed of, so the remainder of the carcass becomes impotent.

It is also possible that a single bone or bone part may be representative of a butchery unit, for example a distal humerus may represent a shoulder of meat, and this might explain the scattered parts of the carcass found in pit layers, for example in pit 507, layer 3. Here, despite a relatively large number of bone fragments recovered, there are no conjoining parts. Thus while a whole animal may have been consumed, only part of the carcass was deposited as representative of the rest, and the missing parts may have been discarded in other symbolically insignificant locations.

This other consumption waste may have been mixed into the soil in fields as fertiliser, although there has been no fieldwalking done in the area around Danebury so it is impossible to tell from the pottery recovery if this was the case. Bone element representation does not support this interpretation, as there are no bone parts that are conspicuously absent from the hillfort assemblages (see Grant 1984: 462). However, the deposition of bone elements in fields may have been random. Bones not quickly deposited in pits may have been burned for fuel or destroyed by dogs, although the good condition of bone from occupation layers suggests much of the bone was deposited in a relatively protected environment.

By comparing types of deposit it may be possible to rank deposits according to certain criteria, for example the integrity of deposit or associations with other finds. This could then denote degrees of ritual (see Brück 1999), rather than pigeonholing deposits as ritual or secular, the separation of which is in any case irrelevant for most societies. When individual layer assemblages in pits were investigated, there did not appear to be any particularly unusual deposits that could be denoted as of a different ritual status. The only positive distinction was that some layers (for example the middle layers in pit 23) contained a particularly large quantity of animal bone, and this was also where the special deposits of human bones and pottery were found. However, these large deposits also contained large quantities of other categories of find, and may simply denote a bigger deposition episode.

In summary, there is no evidence to suggest that at Danebury the layer deposits were any less 'special' than the majority of pit deposits, nor that there was strict structuring of pit deposits which could represent different degrees of ritual within pits. Pits or individual deposits do not seem to be restricted to certain species that could indicate ritual activity, while 'special deposits' within pit layers are not segregated to certain parts of the site. Bone elements believed to have been ritual in nature when used as grave goods are not directly comparable to deposits at Danebury, which originate from a demonstrably different culture. Symbolic interpretation of the scattered nature of bone deposits in pits includes metonymic explanations, whereby a single bone is representative of an animal or meat part. Such explanations, although tempting given the body of evidence that suggests that some deposits in the Iron Age were symbolically meaningful (section 1.3.4), are tenuous. If the deposits did hold meanings, they are not visible in this analysis, and do not appear to differ between feature type or, in most cases, between sites.

6.2.2 Zoning of areas

Many writers have stressed the tendency of human societies to segregate space (e.g. Lefebvre (1992: 89), Hodder (1982) and Parker-Pearson (1996)). Parker-Pearson has highlighted the possibility that activities were explicitly zoned within Iron Age buildings. Unfortunately the circular structures at Danebury rarely have surviving occupation deposits with which to test this theory. Those that did exist and could be investigated consisted of only a few deposits (section 5.2.3) and did not show substantially different bone assemblages.

Other forms of segregated space are 'functional' or 'use' areas. The identification of these is dependent on the activity being performed in the same location, resulting in characteristic patterns of deposition. Many authors have contemplated whether use and discard areas are likely to coincide, with the majority rejecting the hypothesis. Indeed, 'the potentially great inconsistency between butchering locality and locus of consumption' is noted by Gilbert &

Singer (1982: 26), while Grantham (1995) concludes that for an agricultural village community, even when consumption of certain foods occurs separately, disposal of is likely to merge the remains. Other writers consider site formation processes to be the main force influencing the spatial distribution of animal bone (Dooney 1997; Wilson 1996). The scattered nature of the bone deposits at Danebury does suggest that some time had elapsed between butchery and the disposal of bone, during which time the bone was distributed by human agency (chapter 5). Taphonomic processes appear to be less important (see below).

6.2.3 Evidence of area segregation at Danebury

Cunliffe's functional areas, illustrated in figure 2.1, are based mainly on the sub-surface features that could be recognised. Therefore the area of housing on the periphery is informed purely by the survival in these areas of gullies and postholes indicative of buildings. Differential preservation may well have a part to play in this patterning, as the houses in the periphery were cut into or covered by stratified layers beneath or behind the ramparts. It is likely that more circular structures existed in the centre of the site but that their remains have been truncated (Cunliffe 1984a: 43). Area differentiation is based, to an extent, on pit distribution and surviving structures, as well as roads and computer identified four-post structures. This means that Cunliffe's divisions may at least in part reflect the survival of features. The distribution of animal bone parts does not differ according to proposed functional area; in fact the distributions of cattle and pig bones do not appear to show any segregation of activities at all. Primary, secondary and tertiary butchery waste is found across the site in direct proportion to the density of pits, confirming Cunliffe's statement that there was no 'positive patterning' across the site (Cunliffe 1995: 42). There is also a lack of evidence for distribution patterns based on species or age, with the exception of a number of pits in the early phase that contained large quantities of disarticulated cattle bone. These were found outside the main area of pits, in similar areas to those where bird bones were found (but separate to those containing human part-skeletons (Walker 1984: 458). These might represent the remains of special events where large numbers of cattle were consumed, or at least deposited.

Wilson's (1996) analysis and interpretation of spatial distribution of species on Iron Age sites was outlined in section 1.3.3. The three main factors he stated as contributing to movement of bone across site are reiterated here:

a) Canine activity and dispersal, which transports bigger, meatier bones a greater distance from their origin, leaving smaller bones at the place of deposition;
b) Butchery practice, which will leave bone from small animals (assumed to be cooked on the bone) at the place of cooking, at the focus of habitation of the site, and that from (defleshed) larger animals at the periphery of activity;
c) Rubbish disposal strategies, which involve the movement of larger pieces of bone (and thus bone from larger animals) from the centre to the periphery of occupation, as areas are cleaned of hazardous or odious waste. Smaller pieces (under 9cm) are left behind.

As previously stated, the relevance of many of these considerations to this investigation is tenuous. The theory was developed from data from Mingies Ditch, Oxfordshire, where material from ditches and gullies was analysed, not occupation layers and pits like at Danebury. The occupation area is of a very different layout, and Wilson unconvincingly used later historic periods in his analysis.

The basic premise, that bones from the butchery of larger animals were deposited (or dragged by scavengers) outside the main area of use, does not explain the bone distribution at Danebury. The presence of more cattle and horse bones at the periphery of settlements does not fit with the large deposits of cattle bones in the southern half of the sample area at Danebury in the early phase. In the early Iron Age, this area provided more evidence for housing, and therefore presumably consumption and other activity (Cunliffe 1995: 25); it is not the periphery of the settlement area. The ditch deposits, which were not extensively excavated, may contain a greater proportion of cattle and horse bones, but only further excavation can clarify this point. Evidence at Danebury for canine destruction of bone, another agency in Wilson's model, is also very limited.

It is possible that a few pits in the southern sector of the site in the early period contained the remains of activities involving the consumption of large quantities of meat. Although this area contained relatively few pits, it does contain substantial quantities of cattle bones in some pits, potentially indicating that this area was dedicated for butchery and/or feasting activities, as well as housing.

There is no evidence for differential status between areas of the hillfort as might have been revealed by the separation of 'waste' and 'meat' bones in certain places, or of particular bones, for example the cranium, in certain places - perhaps around the central ('ritual') structure. Instead the bone elements appear to have been deposited extremely evenly. When individual pits were examined in more detail there did not appear to be any difference in particular deposits within the pits that might have suggested that families or households of different status were depositing separately into pits. Cunliffe's hierarchical society, should it have existed, is not evident from the deposits. Several options are available to explain this: the hillfort may only have been occupied by a single layer of a hierarchical society; the social divisions occurring in the population had little or no impact on eating habits; food was not an indicator of status. Ethnographic and historical data suggest that this is unlikely, but it would comply with Sharples' (1991) theory of a hillfort building elite that controlled people but made an outward show of egalitarianism; this is explored more fully below. It is also possible that status divisions were reflected in food consumption, but these were obliterated by common disposal in the same places.

Chaff, grain and weed were found in similar proportions throughout pit layers at Danebury, which suggested that a range of activities was carried out across the hillfort site (Jones 1984: 489). No distinctions in individual features were identified that might have indicated the disposal of remains from different activities. Although Grant's (2002) analysis identified some coherent deposits within a pit at Danebury, the analysis of pits for this project led to similar conclusions as those made by Jones. The only difference that could be identified between individual deposits was the density of bone parts. This could represent different scales of consumption prior to deposition, but the difficulty of ascertaining the length of time represented by a particular layer in a pit makes it very hard to draw meaningful conclusions from bone densities. The number of bone fragments per cubic metre of each layer would provide a simplified means by which to compare fills, a methodology used successfully by Rob Sayer (pers. comm.). This would assume an even weathering of the pit, and is also beyond the scope of this thesis.

When bone from a small sample of layers and pits was compared, a greater number of potentially conjoining bone fragments was found in occupation deposits than in pit layers (section 5.2.4). Deposits from house make-up layers may therefore be more directly formed, the activities of butchery, consumption and deposition occurring in closer proximity to each other. Butchery may even have been performed in the circular structures. However, this analysis was extremely limited in scale, and these results cannot be seen as conclusive.

The mixture in pit layers of a range of bones from different species and of individuals of different ages, suggests that in both pits and layers the bones had been widely distributed rather than become mingled prior to or during deposition, or that meals consisted of a variety of meat from a number of different animals. The bones that were not in a given context must have been taken off site, destroyed, or deposited in a different pit or layer. The gathering of many people or groups, each contributing some food, is a tempting explanation for the scattered nature of animal bone, and would result in some very large deposits. However, the same evidence could also be used to argue a more familiar situation, where individual animals were divided up between different people or groups, or perhaps small parts bought or traded from suppliers, prior to cooking and consumption.

Alternatively, curation of parts would have isolated the bones for a length of time before deposition, suitably long for the other bones in the skeleton to have been deposited, or for them to have been middened or deposited in a separate place, explaining the scattered nature of bone parts. The good overall preservation of animal bone suggests they had not been left in the open or on floor surfaces for any length of time. However, Walker suggests that the small size of human cranial fragments implies some attrition prior to disposal (Walker 1984: 454), in which case, some disturbance of the bone, or secondary deposition is inferred, although not necessarily for animal bone. The low proportion of eroded or gnawed bone could be explained by protecting middens from scavengers and weather conditions. However, if this were the case one would expect the pit to be filled at once, with a homogenous deposit, rather than in a series of episodes. If several pits were open at any one time, the bones may have been spread between the pits. In this case, the whole site might consist of 'structured' acts of deposition. Put simply, there might be no 'ordinary' deposits.

6.2.4 Possible deposition scenarios

'Plausible results may be expected only from reconstructing the history of individual features and their fills as fully as possible' (Jerem 1998: 331).

Developing the possible interpretations presented above, three possible scenarios for bone deposition are presented here. They aim to explain the scattered nature of cattle, pig and sheep bone elements in pits: even when the bones deposited appear to have been the waste from consumption of a large quantity of meat, they have often been shown to have come from several individuals of different ages. Rapid deposition of many parts in a short space of time, immediate deposition of bone into pits after consumption, and curation are the three most compelling explanations.

a) Rapid, periodic deposition

At Danebury, half of the excavated pits had been filled 'rapidly or deliberately' (Cunliffe & Poole 2000a: 30). The proportion was considerably higher at some of the Danebury Environs sites: 61% at Nettlebank Copse and 87% at Suddern Farm (Cunliffe & Poole 2000b: 24; Cunliffe & Poole 2000a: 30).

Hill concluded that rapid periods of intense depositional activity was the most likely way that Iron Age pit deposits formed. However, he did not look in detail at individual bone elements, or ageing; these have shown that the majority of the deposits was incoherent. He also did not consider Danebury in detail, and notes that Winklebury and Danebury had a higher proportion of natural silting episodes in pit deposits than other Iron Age sites such as Winnall Down (Hill 1995a: 49). This suggests that hillfort sites had more sporadic filling episodes than other settlements, and possibly less dense occupation. Grant has shown that a sample pit from Danebury was probably filled in 18 months (Grant 2002); it is possible that pits at Danebury were filled more slowly than at other sites.

If pit deposits were made periodically, but contained remains from the consumption of large quantities of meat, one possibility is that the mode of consumption may have been feasting. The scattered nature of pit deposits suggests that whole animals were not being cooked and eaten at once, or if they were, not deposited into a single pit. Instead, feasting may have involved each participant accepting (or bringing) a meat part, perhaps related to their status. Alternatively, it may have been that individual meat parts had no particular status, and that the parts simply reflect what was available. The deposits that included only small amounts of bone therefore must represent erosion or deliberate make-up layers, where bone became mixed in accidentally. The contextual information for layers in pit 23 does not contradict this explanation (section 5.2.1.1), but the bone elements in the smaller assemblages (layers 1, 2 and 8) are not eroded or gnawed. Therefore it is unlikely that small bone deposits were accidentally caught up in fill deposits.

The 'missing' bone elements from particular layers may have been deposited in other pits. At Danebury, many pits may have been open at once, seemingly with more pits filled per year of occupation in the early phases than the late. At Winnall Down and Winklebury, Hill (1995a: 3) calculated that only one pit per year was open, although since none of these sites were fully excavated the exact numbers are not known. At Suddern Farm, only 1.3 pits was filled per year, an estimate based on the proportion of the site excavated (a conservative estimate of 10%) and multiplied by the number of pits in this area (78), then dividing by the number of years the site was in use (580, if the middle abandonment phases are excluded). This suggests that at Suddern Farm far fewer pits would have been open than in the early Danebury phases, but similar numbers to those of the late phase at Danebury. In the early period at Danebury, therefore, bones from one animal may mainly have been deposited in several pits, but at other sites with a smaller proportion of open pits, deposition cannot have followed this pattern, and absent bones must have been deposited elsewhere.

This scenario assumes that the bones represent the total quantity of meat eaten at the hillfort, which of course may not be the case. As Poole (2000) says, each bone might represent an animal, from the hillfort or from outside settlements. In this eventuality, where are the other remains? They might be at other sites or have been differently disposed of. The less dense bones and elements that were used in bone working are less frequent overall at Danebury (Grant 1991a: 453), and this may also partly account for the apparent scattered nature of bone elements in individual deposits. While this may be the case for some deposits (pit 23, layer 5 for instance, illustrated in figure 5.3), many other deposits show a mixture of fragile and robust elements (for example pit 23, layer 4 shown in figure 5.2), suggesting that taphonomy is not the only factor to take into consideration.

If all bones in pits were 'special', as proposed by Hill (1995a) and Poole (2000), this would mean that pits and layers, which showed few differences in bone element composition, would both have had this special status, and therefore that all consumption at Danebury was special in nature. Some differences are apparent between Danebury and Suddern Farm, but a similar pattern of scattered bone elements is evident in most of the investigated pit layers at Suddern Farm. If Danebury was special, then so was Suddern Farm. It is perhaps more likely that, instead of being 'special' in the now accepted sense, the bone that survived did originate from a different type of activity to everyday consumption. It is perfectly plausible that all sites in Wessex in the Iron Age had a similar consumption pattern, and that all meat eating took place in the context of feasting or, at least, communal eating.

b) Small-scale eating and depositional actions

If meat consumption was small scale, over a period of time deposits would be made directly into pits as bones were stripped of meat. The extremely good condition of the bone suggests that pits must have been covered and quickly filled to explain the absence of gnawing and weathering effects. Rain and freezing temperatures may still have affected the condition of the uppermost bones, although if layers were regularly 'capped' with make-up layers and/or special deposits, these effects would be limited. This manner of deposition could reflect periods of relative abundance and scarcity that might be expected during the changing seasons, explaining why some layers contained a large quantity of bones and why in others they were rare.

In this scenario, many pits must have been open at any one time, and deposition not restricted to one pit. However, in the later periods at Danebury and at the smaller sites where fewer pits were found, there may not have been more than one pit open at any one time. The missing bones therefore might be in layers or destroyed, although again this raises the question of why some bones entered pit deposits and others did not. The unusual nature of some of the pit deposits at Danebury (Grant 1984c) suggests that it is likely that other pit deposits may have also had some meaning. However, evidence from the layers, which have not been found to contain special deposits, suggests that there was little difference between most pit layers and occupation layers.

A large centralised market or redistribution centre, where meat could be obtained on the bone would explain the apparently random range of bone elements present. A scenario can be envisaged whereby consumers would have purchased or traded for different meat joints depending on the occasion, and deposits would include a range of remains from different events. Unfortunately, this type of activity can be hard to distinguish from feasting activity, where participants take away with them the meat share they have been awarded (Gilbert & Singer 1982: 26-28).

c) Curation

If all bone was first deposited in a protected environment, this means that the bone present (excepting the more fragile parts and elements used for bone working) is the total that was consumed, and would suggest that small quantities were eaten. This scenario fits the bone element representation evidence for the site as a whole, which suggests there was no trade of particular meat parts off site, but that the pattern of bone representation was explained by taphonomic factors. As mentioned before, the stratigraphic layers in pits suggest sporadic fill patterns, not a periodic massive dumping of waste. It is possible that middened bone and pottery fragments were used to form make up layers between special deposits, possibly at particular times of the year, rather than using midden material as a means by which to fill a pit as quickly as possible. It is also possible that midden material had been specially reserved for deposition, if perhaps it held some symbolic value (as suggested by Sherratt 1991 and Hill 1995a), and therefore represented only a small part of the meat actually consumed. However, there does not appear to be any patterning of species or bone elements that might indicate any difference to 'ordinary' bone from consumption.

Stopp, in her (1999) investigation of pit fills at late Iron Age Basel-Gasfabrik (Switzerland), suggested that there was no difference between dark earth (occupation) deposits and other fill types, except that bone was more weathered in the occupation deposits. She suggests curation of these bones from the low numbers of matchable fragments, and protected deposition areas from the low incidence of gnawing, although she does not indicate where bone may have been protected.

It is also possible that different groups filled pits in different areas, so only one pit may have been available for filling for each of these sub-communities. The relevant community might have formed each deliberate layer by importing curated bone (perhaps one from each animal killed since the last deposit). A different bone would have had to have been chosen each time in order to create the scattering seen in deposits, which seems unlikely. The different provenances of grain suggests that crop processing waste from more than one site was represented at Danebury (Jones 1995), and this fits well with Hill and Sharples' suggestions that hillforts were communal areas, where different communities gathered, and to which they brought provisions.

Conclusions

For each of these three possible scenarios, the special deposits of articulated remains or skulls might have been deposited on different occasions to the rest of the fills. The bones found *with* special deposits are dissimilar to those *from* special deposits in two basic respects. They are seldom found with their conjoining elements and they sometimes have chop and filleting marks. There are seldom assemblages that contain all the bone elements that might be found in a special deposit, such as an articulated limb, or a single individual, and it is perhaps more likely that they had been stripped of meat, although this cannot be proven. It seems that special deposits have very little in common with the remainder of the animal bone, and were probably a part of a very different activity to the majority of the bone deposits.

The bones found with special deposits are not noticeably different to those in other pit layers (bearing in mind that any organic special deposits might since have vanished), although in pit 23, layer 4, which was in proximity to a human bone, contained more 'meaty' bone. Both Hill (1995b) and Hambledon (1998) mention a possible association with human bone; both concluded that deposits containing human remains were different to those without. Human bone might be accompanied by remains from ceremonial consumption.

The human skeletal evidence represents only a small percentage of the population that is proposed to have lived there (Walker 1984: 472), and much of it shows pathologies and evidence of violence. Hooper (1984) suggests sword cuts were common, possibly indicating that these bodies were of those who had died an unusual or violent death, further adding to the impression that pit deposits were not mundane in origin. Sherratt argues that the remains from some ritual activities require careful disposal (Sherratt 1991: 50), possibly by fire, although burial would also be a possible means. In some societies specific associations between human individuals and animal species are made (Ingold 1988). However, there is a possibility that the association with human bones is not as symbolically loaded as we might expect; Ingold (1988) and Tapper (1988) both describe other societies where the distinction between animals and humans is blurred. Such assumptions have some validity in the context of monumental enclosures of the Neolithic, such as Windmill Hill (Pollard 1995).

The simplest and most familiar scenario is that of small-scale consumption, a model closest to our own consumption patterns. It is certainly plausible, and accounts neatly for the differences in bone density between deposits. However, it seems unlikely that each time a bone was discarded the pit covering was removed, the bone was thrown in and the pit re-covered, without bones suffering any obvious attrition. Experimental work on the effects of exposure on bone could clarify the possibility that this occurred. Nicholson (1998) has addressed the issue, but the bones she studied had been buried, not left on the ground surface. This model would, however, account for the apparently coherent deposits identified in one pit by Grant (2002), as remains of discrete episodes of meat eating and/or deposition. More unlikely is large-scale curation of bones, which would have been stored safely before disposal, in relatively small quantities, into pits. The process of redeposition would have fragmented the assemblage, accounting for the scattered nature of bone elements in deposits, but the same issue applies as to the previous explanation – why is there so little evidence of attrition? And where would the bones have been stored?

A more likely scenario than curation of parts, in my opinion, is that the deposits were created by many different groups, possibly including some from outside the hillfort, whose food remains became mingled and deposited in pits. This would explain the scattered nature of bone elements, the very dense nature of some deposits and the presence of plant remains from many different areas outside Danebury. Consumption could have been communal, providing an opportunity for communities to come together for other (ritual?) activities, such as the placement of special deposits or human bone. However, it is difficult to justify the presence of bones with little meat value, such as phalanges and metapodials, which are found throughout the deposits, as belonging to food portions brought for events. The large numbers of bone in some deposits are as easily explained by periodic large-scale meat consumption in a society that normally ate small portions (scenario b). Therefore, small-scale consumption and depositional practice is presented here as the most likely model for meat eating and bone disposal at Danebury.

6.3 INTER-SITE CONSUMPTION ACTIVITY

For many of the sites used here as comparisons, detailed butchery records have not been published, and so some comments must be taken at face value for the sites not investigated at first hand by the present author. Thus where writers have noted that certain types of butchery are rare, it is not possible to know how their definition of rare matches my own. Other discrepancies may arise from a different researcher's interpretation of marks, or perception of similarities or regular sizes. For this reason the discussions of the butchery at Old Down Farm (Davies 1994), Lain's Farm (Coy 1991) and Maiden Castle (Armour-Chelu 1991) must be treated with caution.

The general similarities in butchery techniques in the Iron Age have been well documented, with the noted predominance of disarticulation and the use of knives (Maltby 1996; Wilson 1978: 120). Animal husbandry methods for Iron Age chalk land sites are also often similar (section 1.3.2). This discussion attempts to isolate the differences between sites that are only revealed during detailed analysis of butchery and deposition methods. The scale of meat consumption can be assessed using various means. The size of the animal, size that it was cut into and extent of filleting of meat from the carcass are used to provide an idea of the relative scale of meat consumption at a selection of sites in Wessex. The intensity of use of animals can also be investigated by assessing how much of the carcass was utilised, including the parts where relatively little sustenance can be found, such as the head and feet, and the breakage of bones for marrow extraction. It may be that sites where there is evidence of more intensive use of the carcass, such as splitting of bones, were of lower status, and could not afford to ignore this food resource. The reasons why marrow was discarded instead of used could include dislike of marrow, a lack of knowledge or ability to extract it efficiently, or a taboo on its consumption.

Maltby (1995) provides information on a large range of Iron Age sites in southern England. He states that Owslebury unusually provides evidence for culling of cattle at immature age, mainly for meat, and culling of sheep at their optimum meat age (Maltby 1995: 22). This suggests that the deposits at Owslebury, like those at Danebury, contain bone from animals that were mainly kept for meat, and that these two sites had a greater emphasis on meat production than smaller settlements. Grant's analysis of sheep mandibular wear stage (MWS) patterns at Danebury showed a peak at MWS 10, animals around one year old (Grant 1984b: 107). She suggested that this represented the culling of weak or surplus males, in order to strengthen the flock (analysis of the sex of the animal bones did not provide enough examples to support this hypothesis). However, in some societies young animals are desirable food (Fiddes 1991), so it is possible that the remains of very young animals, that died before they reached their optimum meat weight, suggest a high status.

The size that carcasses were cut into also provides a crude measurement of the size of parts eaten, especially when coupled with analysis of the proportion of filleting marks, which could indicate how big the meat portions were. In this thesis, it has been proposed that cattle at Balksbury had been more intensively butchered than those at Danebury, perhaps because they provided food for more people, but more likely because of different butchers at these sites. Late phase Balksbury in fact has more in common with middle phases at Danebury, where disarticulation was by far the most common butchery mark. Nettlebank Copse had an intensive butchery pattern, with relatively small bone parts, which might indicate that less meat was eaten per inhabitant at these two sites. Old Down Farm in Hampshire, is described as having similar faunal remains as Balksbury (Davies 1994), although it is not possible to say without further analysis how similar the butchery patterns were.

Some butchery descriptions simply state that meat was divided into 'regular size', sometimes without a detailed description of how this interpretation was made. This is the case for Lain's Farm, a possible banjo enclosure in Hampshire. This site dates to the 5th-1st centuries BC, comparable with Danebury ceramic phases 3-7, but too little was excavated to draw conclusions about differences by phase (Bellamy 1992: 73). One deposit at Lain's Farm included a length of articulated spine, which could be a special deposit or a butchery unit (or indeed both) (Coy 1992). A length of spine with the meat still on would provide a similar amount of meat to some of the joints proposed for Danebury, such as the radius or tibia of a pig. Filleting at this site was described as rare, as is deliberate breakage of bone, so it can be suggested that disarticulation, which did occur, produced joints of meat that were roughly the same size as the bone element they were attached to. It may be that some of these butchery units were larger than Danebury, where filleting marks were relatively common, forming between a third and a fifth of the observed butchery marks. However, differences in recovery and recording approach may also account for apparent contrasts.

At Maiden Castle, Dorset, cattle parts were of regular size (Armour-Chelu 1991: 150). They are argued to have been chopped up to extract marrow and to fit into pottery vessels. Pig limb bones were under-represented, and it is suggested that there was 'more thorough processing of pig compared with other species' (Armour-Chelu 1991: 146). Neither of these patterns fit with that at Danebury, and the meat parts at Maiden Castle may have been smaller. However, occasionally large portions of meat may have been available; there were filleting marks on sheep and dog special deposits, and it was proposed that partial skeletons were the remains of celebratory special meals (Armour-Chelu 1991: 151). This compares well with Ashville but not Danebury.

Analysis in this thesis has suggested that there may have been specific deposits at Suddern Farm that resulted directly from feasting, or at least large-scale meat production, and other sites have also produced similar results. At Winnall Down, Hampshire, one early Iron Age pit contained most of the meat bearing bone elements of three oxen and two horses, with a large concentration of other bones. Bones with little meat value, including phalanges and tarsals, were not recovered from this pit. Maltby (1985: 101) suggested this pit contained the remnants of a large consumption or preservation episode. Large accumulations of meat bearing bones were also recovered at Ashville in Oxfordshire, where meat appeared to have been stripped from entire articulated limbs (Wilson 1978: 125-137), as filleting marks and gnawing were found on articulated horse and cattle limbs. This implies activities here that were distinct from those at Danebury, where articulated animal bones showed no evidence of filleting. However it may be that some butchery marks on the Danebury bones were missed (section 2.3.4). An entire horse or ox limb would provide a large quantity of meat, enough for several dozen people, and feasting activity could thus be implied, although the bones might represent butchery waste. It is likely that meat was removed prior to cooking, since cooked bone joints often disarticulate spontaneously (Boulton pers. comm.). Unfortunately the pig butchery is not as fully described by Wilson (1978: 122), so comparisons are limited.

Meat on cattle heads at Ashville was filleted in a similar manner to those in layer deposits at Danebury, suggesting that at least in some features, the use of the carcass was fairly intensive. The majority of the bone at Ashville was recovered from ditch deposits (62%), suggesting that differences in butchery between the two sites may in fact stem from the feature type; Wilson did not describe butchery from pits and ditches separately.

At a few sites, for example Winnall Down and ditch deposits at Owslebury (Maltby 1985), bones show evidence of having been split to enable marrow extraction, although there is no indication of how frequently this may have occurred. Generally, bones did not show evidence of routine marrow extraction (Maltby 1995; Coy 1992), and even where raw meat had been filleted from the bone at Maiden Castle and Winnall Down, marrow was not extracted. This suggests that at these sites, it was not an inability to extract marrow (such as would be caused by preserving meat on the bone), but a choice not to.

As a result it could be suggested that sites such as Owslebury, Ashville and Nettlebank Copse, and Winnall Down and Maiden Castle (in some deposits of disarticulated bone), were using carcasses more intensively. However, the butchery at these sites is often not described by phase, so it is difficult to say whether the intensive use of the carcass occurred in a particular time period; at Danebury deposits seem to indicate less intensive use in the early phase. Suddern Farm and Balksbury have higher proportions of butchered cattle bone, perhaps suggesting that these cattle were butchered by a different, possibly a less experienced person than the butcher(s) at Danebury, or that there was more intensive use of the carcass. However, pig bones do not show the same pattern, and some deposits at Suddern Farm suggest that feasting could have been taking place. The large amounts of cattle bones in single deposits at Suddern Farm and Winnall Down suggest that either butchery was undertaken in one place (although the largest deposit at Winnall Down does not contain phalanges or tarsals, while other, smaller, deposits do), or, more likely, that some episodes of consumption were very large. In these deposits large parts of several animals are represented, suggesting that deposition of the bones occurred relatively quickly and perhaps in the same area as slaughter.

The smaller size of many of the assemblages from other sites discussed here often did not allow for division into phases or feature types. Thus comparison with Danebury is often limited; only general conclusions are possible. However it can be stated with some confidence that the overall patterns are similar, with some deposits containing bones representative of large volumes of meat, and some containing the remains of relatively small parts and of fully exploited bone resources (Ashville, Maiden Castle and Winnall Down). Certain sites show evidence of larger carcass divisions, such as Suddern Farm and perhaps Lain's Farm, although this may be offset, at least at Suddern Farm, by a greater incidence of filleting of meat from the bone. Intensity of use appears to be greater at some of the smaller sites (Nettlebank Copse for instance), although it is difficult to ascertain the extent by incidence of butchery, which depends to a degree on the skill of the butcher.

6.4 INTER-SITE DEPOSITIONAL ACTIVITY

The purpose of this section is to explore the nature of deposition at other sites in the Danebury region in the Iron Age, in order to compare the scale of deposits, the extent of distribution of carcass parts and possible evidence for differential use of space that could indicate area specialisation. Various aspects of spatial patterning are discussed, including evidence for zoning of activities, coherence of deposit and scattering of bone elements. Different site types with similar patterns of distribution are also examined.

Relatively few sites have been explored with regards to spatial patterning of both animal bone and other artefacts. At Winklebury hillfort in Hampshire, animal bone and pottery types were investigated spatially. No evidence of waste/ meat, nor coarse/ fineware segregation was found, and there was no association of waste or meat bone with particular pottery types as might be expected if certain meat parts and material goods held different status (Fisher 1985: 175). However, meat and waste bone definitions are not provided. Animal bone was found to be as common near four-post structures as circular buildings, and there did not appear to be a restriction of crafts (or at least artefacts associated with various crafts) to certain areas. No spatial segregation (of deposition) is therefore proposed for this site.

At Winnall Down in the middle Iron Age some spatial patterning was identified. Animal bone was found in less dense quantities the further away it was from hut groups (Maltby 1985). This suggests that deposition at this site was in some way related to the people using or living in the structures. Bones from larger animals were found on the periphery of the site, in ditch deposits. Unfortunately very few ditch deposits at Danebury have been excavated, and the nearest comparable deposits, those in quarry hollows, fell outside the area of the sample analysed for this thesis. A similar pattern of deposition to that at Winnall Down had already been suggested for Ashville in Oxfordshire, for which a functional explanation was proposed, whereby cattle bones had been stripped of meat and deposited in bulk at the periphery of the settlement (Wilson 1978).

This type of patterning does not appear to be characteristic of deposits at Danebury, where species proportions were similar in pits and layers (Grant 1991a: 449). However, some differences are apparent in the early phase, when slight differences in butchery of cattle and pig crania in pits and layers were recognised, and fewer bird, dog and horse but more cattle bones were recovered from layers. This suggests that the size of the animal was not as important (in terms of deposition location) as the species, since cattle and horse are both large animals and their spatial distribution differs slightly. The location of the Danebury pits – in the centre or periphery - also seemed to have little impact on the bones deposited in them. Cattle and pig bones were found in direct proportion to the density of pits, with the exception of a few pits in the southern half of the site in the early phase that contained large quantities of cattle bone. However these pits were near a concentration of housing, not at the periphery, so it is suggested that in general, and admittedly without comparative data from the ditches at Danebury, larger animal bones were not deposited at the periphery.

Differences in deposition at Winnall Down were noted between deposits in the north and south areas. The highest density of material is found in the southern half, as is the case for cattle bones in the early period at Danebury. The southern area at Winnall Down was also the location of deposition for many small finds and human remains, but this is not the case at Danebury. Some deposition or activity might thus have been influenced by orientation, but the evidence is not strong. At Winnall Down, human skeletons were found outside the former enclosure, while the bodies of infants, partial skeletons and individual human bones were found inside, suggesting a degree of depositional segregation between internal and external areas (Hill 1995a: 88). There is no obvious dividing line at Danebury, except perhaps for the roads, but there is no evidence for any segregation of deposits occurring here in respect of animal bone remains.

Different types of deposits were located in different features at late Iron Age Wendens Ambo (Halstead *et al.* 1978). What was interpreted as 'table' refuse (bones of smaller animals) was infrequently found in pits, but was common in gullies and postholes, with many parts of the sheep skeleton represented in single features. This suggests that butchery and consumption of sheep occurred in the same location, and that sheep were consumed in one event. However, there is no indication as to how many bones per individual were recovered, nor of the ages of individuals, so again this site cannot be directly compared to Danebury. The larger numbers of sheep bones recovered from the site overall probably contributed to the composition of individual deposits containing many parts of sheep skeletal elements.

Different deposit types at Wendens Ambo contained remains predominantly from bones of different meat value; 'kitchen' waste was found in the enclosure and 'table' waste in the hearths (Halstead *et al.* 1978) (see section 1.3.3), a pattern not found at Danebury. This might be because occupation deposits in the circular structures at Danebury were relatively rare, either due to the clearing of waste in the Iron Age, or to a later truncation of deposits. It is also possible that deposits at Danebury simply became more mixed after consumption, obscuring any differentiation, as suggested by the plant remains. While a mixture of chaff, grain and weeds were found in each deposit in the early phase at Danebury (Jones 1984: 489), at Winnall Down (as outlined above) and Suddern Farm (Campbell 2000: 52) the different pit layers contained the remains of different crop processing activities. Thus the plant remains at Danebury may have been subjected to a greater degree of mingling of material prior to or at deposition. The mixing may also have occurred in the pits if deposits resulting from a range of activities were discarded in fairly rapid succession.

At Ashville, Wilson notes the association of ox atlas and skull fragments (Wilson 1985: 119). Such association is not found at Danebury, and the difference is not due to different butchery practices at the two sites (decapitation took place on the anterior condyles of the atlas at both). This again suggests that deposits at Danebury were subject to more mixing than at other sites. Again this interpretation depends on feature type; the atlas and skull fragments may have come from layer deposits, which at Danebury seem to provide more evidence of conjoining bone elements. In addition, Wilson identified some associated lumbar ox vertebrae, also found at Danebury and interpreted as possible portions of meat (section 4.2.3).

Close investigation of individual deposits is important when attempting to ascertain the relationship between use/ activity and deposit. Some single deposits at Danebury contain many bones from sheep, although often from a range of individuals rather than almost complete animals. This might indicate small-scale consumption. The greater numbers of bone in some deposits suggest that these were periods of more intensive consumption or deposition activity. A few layers (see, for example, figure 5.3) contained many bones, from a relatively small minimum number of individuals. In such cases there are more bones per individual, perhaps indicating episodes of disposal more directly linked to butchery or consumption activities in the vicinity. Such deposits were found at Suddern Farm, where significant numbers of cattle limb bones from relatively few individuals were found. Here episodes that could be construed as feasting are more common than at Danebury, and are larger in scale.

One pit at Lain's Farm in the early Iron Age was filled with the remains of more than seven sheep, but only a few bones from other species, suggesting that here, as at Danebury, larger parts of sheep than cattle and pig may have been consumed and/or deposited in one event (Coy 1992). Underrepresented bones in this pit show that these sheep were by no means complete, with relatively few scapulae, humeri, radii, femora and tibiae. These bones may have been destroyed by breakage to extract marrow, although Coy notes that this practice was infrequent, or they may have been deposited elsewhere. The missing bones are all those that carry a large quantity of meat, and they might have been intended for a different event to that resulting in the remains in the pit. They may even have been preserved with the meat, and deposited later. It is unlikely that the pit contained only butchery waste, as other meat bearing bone elements (e.g. the pelvis and vertebrae) were well represented, although meat may have been filleted from these parts (without marking the bone). Such obvious patterning, involving the under-representation of meat bearing bones, was not recognised at Danebury. Coy notes that the bottom fills of this pit contained only one ox mandible. Though very restricted in scale, this evidence mirrors that at Danebury where the basal layers of pits often contained few bones, mainly of low meat value.

Hill (1995a: 71) suggests that some pits at Winnall Down contain the remains from the killing and/or consumption of many animals: in one there are bones from more than 12 individuals of four species; cattle, horse, pig and dog. However, it is unclear how much of each of these animals was present; if his figures were obtained from a minimum number of individuals count, the bone elements may comprise a range from various parts of the skeleton, much like in the Danebury pits, rather than the remains of most of 12 individuals. This deposit does not necessarily represent one episode of activity apart from that of deposition, so no conclusions can be drawn from direct comparisons of the Danebury deposits investigated here.

Generally similar deposition practices (deposition in pits, the inclusion of articulated or 'special' deposits, a mixture of bone, pottery and other artefacts) are found in Iron Age hillforts, open settlements and enclosures throughout Wessex. However, some similarities are also present in the pit deposits at Danebury and other site types, for example the midden site at East Chisenbury, Wiltshire (McOmish 1996) has an extremely large, well preserved faunal assemblage from the late Bronze Age-early Iron Age. The assemblage consists mainly of sheep bones, in common with most other Iron Age sites in southern England, but like Danebury, has a disproportionately large number of neonate and foetal lambs. There are even some articulated joints, but more commonly 'individual segments, some displaying cutmarks from butchery' (Brown *et al.* 1994: 48). Unusual, seemingly 'special' deposits include a fragment of human skull placed in the midden with pot sherds from one vessel and a fragment of sarsen placed around it (McOmish 1996: 73). The midden is not homogenous but includes prepared and compacted chalk floors and platforms without artefacts, much like the make-up layers in pit fills from Danebury.

In other respects, this assemblage is very different to the Danebury assemblages. Bagust (1996: 44) states that this huge accumulation, which is thought to have formed in under 100 years, was subject to heavy gnawing. Heavy chops into bone were recorded, suggesting marrow extraction and indicating a more intensive use of the bone, and greater exposure to the elements, than was usual at Danebury. Bagust suggests that the remains were of animals from neighbouring hillforts/ farms, and that the site possibly acted as a meeting point for feasting. The size of animals by species was varied, leading her to conclude that many different flocks, and therefore communities were represented. However the individual lenses of deposition were extremely large, and bone element analysis for each layer was not carried out. The difference in preservation and butchery at this site when compared to hillfort pit deposits, suggests that what is represented at Danebury is a different activity entirely.

It is important to note that the material at East Chisenbury is not necessarily simply waste; Parker-Pearson, quoting Collis, states that in modern Germany, farmers measured their wealth by the size of the midden in their courtyard (1996: 127). A midden the size of East Chisenbury makes a bold statement about the scale of consumption made by a community. The midden was regarded by McOmish (1996) as the remains of feasting, and he proposes that bone waste was not routinely scattered on fields, but deliberately accumulated. I would agree that, at least in the early Iron Age, Danebury deposits may not simply represent the convenient disposal of remains of everyday meals (if meat was an everyday ingredient), but could also have been a deliberate symbol of meat eating activity. However, deposition in pits renders such activity invisible, so any symbolic message must have depended on personal knowledge, as was presumably the case for any significance held by special deposits. In the late Iron Age, when it is likely that meat eating became less communal, any symbolism attached to meat consumption probably declined.

To summarise, Danebury shares many superficial aspects of its deposition pattern with a variety of sites. However, more in-depth analysis has shown that the deposits at Danebury may have been more mixed than those from smaller sites such as Suddern Farm, Wendens Ambo, Winnall Down and Ashville. Another hillfort, Winklebury, has shown an absence of zoning similar to that at Danebury; it is possible that activity patterning here and at Danebury may have been obscured by deposition practices, especially in the late phases (see section 6.5).

6.5 CHANGE OVER TIME

Cunliffe (1995: 25) proposed a change between the northern and southern halves of the site midway through the Iron Age. The area he named as the 'occupation' zone moved from the south to the north, and the area considered as 'storage', from the north to the south. Some differences in deposition of cattle bones in the early period may reflect these changes and divisions, but no evidence has been isolated from this project that suggests a segregation of areas in the late Iron Age.

As mentioned in section 6.4, some differences between species proportions and butchery patterns were evident between the early and late phases. Grant (1991a: 449) noted generally similar species proportions in layers and pits, but bird, dog and horse bones were less frequently recovered from layer deposits, and in the early phase, there was proportionately more cattle bone in layers. This is unlikely to be explained by Wilson's (1996) view that butchery of larger animals occurred on the periphery of sites, the location of most of the layers at Danebury, since large deposits of cattle bone were also found in some pits in the area of housing. Some other differences between feature type are apparent in the early phase; butchery of pig and cattle crania between pits and layers seems to differ in the early phase but not the late (section 3.2.6). Marks resulting from the filleting of meat from the head were found only in layer deposits, perhaps suggesting more intensive use of the carcass in the latter. It is therefore suggested that the material deposited in layers in the early phase was the result of less careful and/or more intensive butchery, and of smaller scale consumption than that found in pits.

Although the butchery marks are very similar overall, suggesting that the techniques of butchery did not alter significantly, this analysis has suggested that smaller carcass/meat parts were produced in the late Iron Age. The implication is that carcass processing became more intensive, with some bones possibly being split for marrow extraction. This concurs with other analyses that document the deposition of increasing volumes of all finds, interpreted as evidence for intensification (Cunliffe 1995: 71). Grant (1991a: 450) also calculated that there were more animal bones per pit, and a higher minimum number of animals deposited per 10 years of occupation in the late than early phase (Grant 1991a: 482).

Salter and Ehrenrich (1984: 151) state that in late Iron Age central southern Britain, there was an increase in iron tool use, or at least, deposition. Butchery tool types might have altered, with metal tools perhaps replacing flint tools that may have been used in the early Iron Age for certain tasks (Young & Humphrey 1999, discussed in appendix 3). One explanation could be that in the late Iron Age, butchery had become a more high status task, but it is more likely that iron had become more commonly available. An increased number of finds of briquetage in the late Iron Age (Morris 1994) could indicate that preservation of meat by salting had become more prevalent. No direct evidence for salting meat (described in section 3.1.3) has been identified at Danebury, but meat may be salted without any impact on the bone. Meat eating, or eating large quantities of meat, may have become less frequent. This could have been due to increasing pressure on resources, suggested by Cunliffe (1991), using in part the increased proportion of sheep periodontal disease in the Iron Age recorded by Grant (1984a).

As has been already been noted (section 6.4), differences in plant remains show that in the early phase there may have been less segregation of grain processing activities; grain, chaff and weeds were similarly dispersed with a concentration in the middle-south area. In the late phase, spatial organisation of crop processing activities is suggested by the absence of charred weeds in areas of densest crop processing (Jones & Nye 1991; Jones 1995: 46).

The re-fortification of Danebury in cp6 (310-270 BC) provides a convenient dividing point for the differences that have been identified: butchery and deposition from cp1-3 have been shown to differ (albeit slightly) from those in cp7-8 - the middle phases do not provide a coherent enough pattern to identify specific differences. By the time of re-fortification, the suggested practice of eating large meat parts communally had probably reduced in scale (section 6.1.3). Differences between material deposited in pits and layers had ended, and the practice of depositing more unusual items (birds, special deposits) in the southern part of the site had ceased too. Segregation of areas for processing of crops may have been introduced, and (using the evidence from briquetage) preservation of meat may have become more widespread.

Other sites show similar patterns. At Winnall Down, bone evidence suggested that remains of larger parts of meat were deposited in the early rather than late Iron Age (Fasham 1985). Sharples (1991) provided evidence of a considerable change in occupation type from earlier periods for late Iron Age Maiden Castle, with rampart rebuilding, more organised and dense occupation and a change in material culture at the end of the second century BC. An increase in the range and form of vessels, their degree of decoration and quality of production was noted and used as evidence for regionalised styles and territories. In the late Iron Age, metalworking was apparently confined to an area near the east entrance, and a cemetery was created. This was seen as evidence for the increasing segregation of roles and activities (Shaples 1991: 263).

This sort of segregation is not apparent from the animal bone distributions at Danebury, although butchery and meat eating may have been less segregated than some other activities. The declining proportions of cattle and pigs over time at Maiden Castle (Armour-Chelu 1991: 151) might have resulted from less meat eating, as is suggested here to have happened at Danebury. Sharples interpreted the differences at Maiden Castle as originating from the increased importance of individuals: grave goods and coinage were more common; associated field systems indicated, according to Sharples, evidence for personal appropriation of previously communally owned land; and the segregation of certain areas resulted from individual control of specialist industries (see section 1.3.1). Danebury provides little of this sort of evidence, although the smaller size of meat portions is probably related to smaller groups eating together, possibly indicating fewer communal activities.

Hill also states that in the middle Iron Age all activities took place in the same locations in settlements, while by the late Iron Age, divisions occurred leading to the performance of some activities (burials, shrines, hoards and special deposits) in different locations (Hill 1995a: 125). He agrees with Sharples that the individual became more important, with the introduction of 'sets' of ceramic eating equipment and drinking vessels (Hill 1995a: 121). Other authors also state that public and private activities became more separate in the late Iron Age, for example, Giles and Parker-Pearson used artefact scatters from roundhouses to suggest that public consumption occurred at a distance from private housing (Giles & Parker-Pearson 1999).

It was not possible to investigate the butchery from the very latest phase at Danebury, cp 8, separately, due to the small sample of butchery marks that could be securely dated to that period. This is unfortunate, as Cunliffe (1995: 53) noted a significant change in animal husbandry and an increase in artefact deposition in this period, and it is possible that butchery practice or meat consumption also altered. Roman influences on pottery were noted from this period (Brown 1995: 55), and it is possible that butchery and other activities also altered at this time.

In conclusion, many of the strands of this analysis provided seemingly scant evidence for specific differences over time at Danebury. However, when they are amalgamated, it is apparent that consumption and deposition practice at Danebury had changed during the Iron Age. The differences between feature type became less apparent, suggesting a greater homogenisation of activities or deposition. However, deposits from crop processing activity appear to have become more spatially structured in the late Iron Age. The southern part of the site may have held a different status to the northern in the early phase, with some very large deposits of disarticulated cattle bone, and a greater proportion of less common species in the former. Circumstantial evidence from briquetage, together with the possible decrease in the scale of meat consumption in the late phase could suggest that meat preservation became more common. The increasingly small size of meat parts and segregation of deposits is also attested at other sites in the Iron Age (for example Maiden Castle and Winnall Down).

6.6 A SPECIAL STATUS FOR DANEBURY?

'The only difference between communities, that could indicate a hierarchy during this period, is that some communities are surrounded by large defences and some are not' (Sharples 1991: 260).

The nature of differences within Danebury itself in comparison to other settlements has been explored in this chapter. As stated previously, the most informative methods of investigation are not based upon the study of single sites, but focus instead on the patterns that emerge when several sites can be compared. This allows analysis of how other sites are different to Danebury; defining the nature of difference is crucial.

Compared to Balksbury and Nettlebank Copse, Danebury does appear to be 'special', with larger meat portions and an absence of butchery on cattle and pig crania, possibly related to 'special' deposition. However, the deposits at Lain's Farm, Winnall Down and Suddern Farm are very similar to those at Danebury, with the possible exceptions of larger episodes of consumption in the late phase at Suddern Farm. Cunliffe's (2000) deduction that Suddern

Farm was high status is perhaps confirmed by this outcome. Danebury appears to be less structured spatially than Maiden Castle in the late Iron Age, possibly implying that there was less specialisation at Danebury. However, chapters 4 and 5 have shown that deposition at Danebury was spatially and probably temporally separated from the activities of butchery and consumption. It may be that inter site differences fall mainly in the realm of depositional practice.

There has been very little that has emerged from the research undertaken for this thesis that shows Danebury to be out of the ordinary. The large bone deposits in the early period suggest that Danebury may have been a centre of some sort, but the evidence does not suggest different status from other sites, except in the scale of rampart building. It may be that communal activities were simply more common in the early Iron Age. By the late Iron Age, the consumption of meat at the hillfort appears to have been scaled down, with smaller parts being deposited with less variation between areas and feature types. This contrasts with some other sites, such as Suddern Farm, where deposits remain of a similar size through to the late Iron Age, and sites such as Maiden Castle where specialisation occurs. Apart from crop processing, perhaps Danebury failed to diversify and specialise adequately, leading to its eventual abandonment, while other sites continued to function into the Roman period.

7 CONCLUSIONS

The intention of this work was to identify butchery techniques in order to explore the spatial patterning of butchery units at the hillfort. Although originally intended to act as a prelude to the spatial analysis, the interpretation of butchery patterns proved to be extremely productive in its own right, yielding observations about butchery practice at Danebury that could be compared to modern butchery and to other Iron Age sites. Spatial analysis was begun using pig bones in order to assess the best means of analysis, and to begin with, bone elements were investigated separately. The methodology was refined for cattle bone when the distributions of pig bones showed no differences between young and old or whole and fragmented bone. Cattle bone distribution was investigated using one dense and usually well-preserved zone of each butchery unit, giving similar results to that of the pig. It soon became clear that the dataset at Danebury was far too complex for simple two-dimensional spatial investigation. In limiting study to two dimensions there is the danger that many temporal differences in deposition that are present in Iron Age pit deposits may be obscured (Hill 1995a: 53). A lack of stratigraphic relationships between pits made comparisons difficult since it is impossible to ascertain which pits were open at the same time. In order to address this issue, individual deposits in pits and layers were investigated. The importance of comparative data from the Danebury Environs project and other nearby sites became clear as the relative lack of patterning at Danebury prompted comparative analysis of other sites using the same methodology.

7.1 DANEBURY IN THE IRON AGE

'No amount of attempting to account for the distortion will get us closer to the unbiased behavioural system... in accounting for the biases, you actually lose the very object of your study- society itself' (Hambledon 1998: 125).

As outlined in the previous chapter, the analysis undertaken in this thesis has provided no clear evidence for social status differentiation among the inhabitants of Danebury, or for discrete use areas within the hillfort. If activities were specialised, as suggested by butchery techniques, they were either not spatially segregated or segregation was obscured by the methods of deposition that followed. The different scales of deposition noted in some pit layers are the main indicators of differences between deposits as far as animal bones are concerned. Even these are unreliable without an indication of the density of bone per layer (which can be sometimes estimated from the pit section drawings but only with large margins of error).

The carcasses were divided up into joints based on disarticulated bone elements, with additional evidence of filleting, suggesting that small portions of meat were produced. In the late phase, cuts were produced on more parts of the skeleton, possibly suggesting that either the butchery technique had diversified or, more likely in the author's view when the scattered nature of bone deposits is remembered, that more joints were being produced. The consistency of the butchery technique could imply that one person or group took responsibility for the procedure, and the similarity of butchery marks throughout Iron Age sites in southern England leads to the possibility that butchery practice was proscribed by certain rules or only practised by a few people. However, the considerably lower incidence of butchery on cattle bone at Danebury when compared to Suddern Farm, Nettlebank Copse and Balksbury suggests some differences in practice. The similarity of the techniques used on pig and cattle at Danebury and other sites suggest that it is not due to a fundamentally different method, but that maybe butchers at Danebury were more careful or more practised, an interpretation that also explains the absence of butchery marks on the crania of cattle, at least in the early phase.

On the basis of both butchery and deposition evidence, the size of meat portions at Suddern Farm appear to have been larger than those at Danebury, at least in the late phase. Those at Nettlebank Copse appeared to be similar in size, although no spatial investigation was undertaken at this site. If meat portion size equated with status, it seems that Suddern Farm may have been of a higher status than Danebury. However, alternative explanations could be argued. For example, filleting marks suggest that meat was taken off the bone at Suddern Farm, and it may be that the bone was deposited in pits and the meat preserved or sent off site (but there is no direct evidence for this type of activity). The most important difference is that bone deposits appear to reflect the activity of butchery and/or consumption more directly at Suddern Farm (though not to the same extent as other sites such as Wendens Ambo), while at Danebury these activities were separated in space or perhaps in time. There is no evidence that the inhabitants of Danebury were eating more lavishly or in larger quantities than other sites, suggesting that, in terms of meat consumption, it was not more privileged than nearby non-hillfort sites. The lack of evidence for intensification of carcass use at Balksbury up to cp 7 suggests that either Balksbury was not subject to the same pressure that Danebury was in the late Iron Age, or that consumption at Danebury did not start to intensify until the very last period (cp 8-9, equivalent to 50 BC-AD 50)

The mixture of deposits at Danebury suggests a lack of any particularly strong structuring based on bone element or meat value. While the deposition of particular bones might represent that of a whole animal or limb, for example, it is probable that these mixed deposits simply reflect the process of deposition at a spatial or temporal distance from acts of cooking or consumption. Rubbish curation, markets, centralised distribution and feasts where meat parts become distributed among inhabitants can all explain this type of scattering of bone at deposition. The very good state of preservation of bone remains indicates that the bone had not been exposed, and thus if deposits were being made periodically the pits or deposits must have been covered in the intervening period. Preliminary deposition in a midden is only likely if carried out in a protected environment. The midden site at East Chisenbury is said to contain an assemblage with a large proportion of gnawed bone (Bagust 1996), suggesting that deposition at these two sites differed (see below).

The mixing of bone deposits could be explained as the results of many people coming together, each bringing a portion of meat, but the variety of meat parts makes this difficult to justify: why would some communities or participants choose to bring trotters, for example, unless there was no differentiation in value attached to different carcass parts? There is no means by which to ascertain the status of different parts of the carcass in the Iron Age, so this possibility is still an interesting one, especially in view of the range of crop provenances that suggests the activity of different communities were somehow represented in the pit deposits. However, for the bone elements represented in each deposit to range so much, different parts must have been selected each time or by each group, and at present there is no evidence that this was the case. The most likely scenario at this stage is that bones were deposited in small numbers as their use was exhausted, by members of the hillfort community, producing variably sized deposits according to supply. Further analysis of pottery and bone degradation (section 7.3) can help to determine whether this is the most plausible interpretation.

Over time, the meat pieces seem to have become smaller. I have proposed that this implied smaller amounts of meat were eaten in the later Iron Age, and noted that this correlated well with Cunliffe's (1991) interpretation of greater pressure on resources at this time. It may be that preservation of meat became more common in the later period, as the greater numbers of briquetage might suggest, with smaller meat parts easier to preserve and lasting longer. It is possible that meat simply formed a very small proportion of the diet. However, it also has a resonance with Sharples' (1991) view that the individual became more important, and with the views of Giles and Parker-Pearson (1999), who suggest that public consumption (large meat parts) gave way to private consumption (smaller, 'household' sized parts) in the late Iron Age. Analysis of cooking techniques would be a means of corroborating this suggestion (section 7.3.1).

Similar types of deposition to that at Danebury were found at other Iron Age sites including relatively small open settlements, and at the East Chisenbury midden (McOmish 1996). The presence of articulated, 'special' deposits, apparent waste and layers of 'make up' at a variety of site types indicates that similar processes were occurring at both middens and settlements. This suggests that some aspects of deposition practice in the Iron Age were common to many areas and site types, although, as has already been noted, bone was exposed to carnivore action and weathering at East Chisenbury. However, deposits themselves were similarly structured, indicating that a simple 'reflection' of everyday activities may not be attainable on the majority of sites. Instead, deposition is best regarded as an activity in itself (see Hill 1994).

'Special deposits' bear little resemblance to the rest of the bone assemblage; there are relatively few deposits where the components of a whole limb from a single individual are represented, for example. Therefore they may indeed have held some special status. The difference in butchery on crania between pits and layers disappears in the late phase, perhaps implying that the two types of deposition no longer performed dual roles. The disappearance of this butchery distinction perhaps indicated that pits had lost some of the 'special' status they once had.

Schiffer (1972) has argued that with increasing site population or size, and increasing intensity of occupation, there is a decreasing correspondence between the use and discard locations of artefacts. The evidence presented here, suggesting that deposits at Danebury are removed from the butchery and consumption activities that we know to have taken place, suggests that occupation or use at Danebury was indeed complex, perhaps more so than at some other sites. However, in terms of consumption activity, it does not appear to be 'special'.

7.2 APPRAISAL OF METHODOLOGIES USED

7.2.1 Butchery

The method devised to code the butchery marks (see appendices 1 and 2) was felt necessary to record the butchery marks in an accessible form for future reference and accessibility. No existing coding system incorporated a means of recording the purpose of the individual marks. In practice it has to be admitted that the development of yet another coding scheme has not helped with regards to the wider project of the standardisation of recording systems in archaeozoology. This is badly needed, and if I were to repeat the analysis, rather than devise a wholly new system I would elaborate an existing scheme (described in section 3.1.3), perhaps adding an 'interpretation' field of my own. It is extremely difficult to interpret from any code exactly where the butchery mark fell, and what its purpose was, and in fact the best means of recording the marks for interpretation and display, remains the drawing. Luff (1994) and Wilson (1978) provide good examples of this method, and indeed the initial recoding of butchery by Grant was by sketching. However, even with drawings it is difficult to identify the direction and depth of the cuts, information which is needed to work out the precise purpose, speed or level of experience of the butcher. Interpretation by the recording specialist remains the best means by which to ensure that all possible information is obtained.

The smaller sample numbers in the earlier phases, together with the probability of most butchery not impacting on the bone surface, has limited the identification of any clear differences or similarities over time. The large time span covered by the late phase might, for cattle at least, also have obscured any changes during this period. However, the similarities between the butchery of pigs and cattle in the early phase, where crania of neither animal in the pit material show butchery marks, indicate that some aspects of butchery have been directly reflected in the bone record. It would be interesting to see if the same techniques were used for sheep.

The butchery analysis, together with the spatial investigation, has allowed some conclusions to be drawn about butchery techniques at Danebury. These have been discussed in previous chapters, but it is worth summarising here the main interpretative results. Some bones were very frequently marked, and it is no surprise that these are those that either lie close to the skin (tarsals), or which are difficult to disarticulate (distal humerus). The size of meat parts could be roughly ascertained, although sample size differences introduced some uncertainty in this particular aspect. The butchery divisions were, as expected, different from those followed by traditional butchers today, with no sawing through bone, and an apparent disregard for the modern butchery methods, that divide the animal into parts of different retail value, determined by the suitability of meat for roasting.

The integration of other artefactual evidence and the spatial distributions of bone added further to the understanding of butchery. Specific meat 'portions' could be interpreted from the patterning of deposits, for example, thoracic vertebrae were probably butchered in chunks, not split into separate bones, since they are more frequently found in groups in pits than lumbar vertebrae. By looking at the pottery evidence it would be possible to estimate the size of meat parts that could be cooked in ceramic vessels. By comparing pot size with the size that bones were chopped into, the likelihood of boiling as a method of cooking meat, and the scale of filleting activity, can be assessed. Recording of rim size by vessel type was carried out for the Danebury pottery assemblage (Brown 1995), but no study of differences by phase was undertaken. Such analysis was not carried out in detail for this project, due to time constraints and the large size of the pottery assemblage from Danebury, but a thorough investigation of the pottery sizes through time would be a profitable avenue for future study. The importance of integration of different types of evidence is therefore stressed.

The different sizes of pigs in layers to those in pits, interpreted from the differing age structures, suggests that the older (larger) pigs were not subject to a greater degree of butchery than younger (smaller) animals, and nor did cattle bones have a higher proportion of butchery marks than pigs. Size does not appear to have affected the butchery pattern at Danebury, but this does not *necessarily* imply that portions of cattle and pig meat were larger than those from sheep, since the parts could have been further divided after removal from the bone.

7.2.2 Deposition

'It could be that within a large and highly mixed data-set actual patterns which are the result of human behaviour are so subtle that they are no more obvious than patterns which occur randomly' (Lock 1989: 5).

7.2.2.1 Geographic Information Systems

Using a GIS system allowed extremely rapid and effective display of the distribution of bone types. In this analysis, the time taken to input the material into the GIS (approximately two weeks) was justified by the excellent quality of the output and by the number of analyses undertaken (analyses were replicated for different species, phases and feature types). It would be easy, with a smaller sample, to spend longer on the input of the information than would be justified by the result, although GIS have an intrinsic advantage in that the spatial databases created are highly flexible and can be modified and elaborated in future investigations.

However, GIS are severely limited when temporal differences are introduced- a major drawback for archaeological analyses. In this case, differences between stratigraphic layers could not be easily displayed, and alternative analyses had to be devised.

7.2.2.2 Three-dimensional analysis

The three dimensional analyses of pits and layers was extremely time consuming. Only a very small number of features could be investigated manually. Many different aspects such as age, bone element, meat value, etc, need to be included if a complete picture is to be built up of the nature of each deposit. It is important to use all methods and include full context information in order to avoid reaching the wrong conclusion from incomplete data.

Layers within pits can be of very different composition, therefore there is little point in just considering pits as single entities. The larger the deposit, however, the more likely it was to contain elements of a range of meat values. This suggests that sample size may have influenced the characterisation of deposits as of predominantly high or low meat value, and emphasises the necessity of using a range of analyses to define different fills.

7.3 FURTHER WORK

As this thesis progressed, more avenues opened up for investigation, only a small proportion of which I had time to follow. Those areas that are worthy of further sustained study are outlined here.

7.3.1 Consumption activity

Full integration of pottery sizes and bone fragmentation is required in order to ascertain the degree to which the boiling and boning out of meat was practised. Meat may be roasted in huge portions, while boiling meat depends on the size of the receptacle used. The scale of consumption could thus be investigated, enabling the verification of certain interpretations, such as a larger size of meat parts in the early Iron Age. Surface features (polished or ivoried bone) together with microscopic analysis of bone (Turner-Walker *et al.* forthcoming), should provide some additional information on the means of cooking (if any) of the bones. This type of analysis would also shed light on whether any special deposits had been cooked, or were more likely to reflect 'sacrificial' (i.e. uncooked) deposition. Residue analysis has been carried out on the cooking pots, but with limited success; pots were shown to have had water boiled in them (Brown 1995: 55).

7.3.2 Butchery

It was not possible here to examine the butchery of sheep, horse and dog due to time constraints. I had hoped to include sheep, since they provide the largest sample size and have carcasses significantly smaller than cattle and pigs (figure 2.2), which therefore may have provided evidence of a different butchery technique. The unusual nature of horse and dog deposition, where horse and dog bones were usually found together and formed a high proportion of special deposits, would suggest that these two species were treated differently, and it would be interesting to see if their butchery reflected this.

If time had allowed, analysis of fracture patterns (Outram 2001) for at least a sample of the site would have been informative. A high proportion of bones broken when fresh would have indicated breakage for marrow extraction, and this evidence could have been integrated with the butchery analyses. Analysis of bone fragment size would also have been useful, perhaps in conjunction with analysis of the areas of the bones most frequently snapped (see Wilson 1978), to elucidate further the patterns of breakage during disarticulation.

Microscopic analysis using an SEM could have assisted in identifying the different morphologies of cut marks made with iron and/or flint knives. A number of authors have looked at this topic, and concluded that there are recognisable differences (for example, Shipman 1981; Shipman & Rose 1983). However, these analyses often compared dissimilar materials - in one instance comparing steel and flint axes - since their focus was on early hominid butchery. 'Control' marks could have been compared to the Danebury material, or at least a selection of it, and conclusions drawn about the tools types used, and possibly, the status of butchers. For example, the use of iron tools in the early Iron Age might have conferred high status upon a craftsperson.

Another analysis that could be carried out is the difference in butchery between sites that ended in the Iron Age and those that continued unto the Romano-British period. Suddern Farm, for example, continued to be occupied into the Roman period, while Danebury was abandoned. The difference between these two sites might be elucidated by investigation of the nature of later activity at Suddern Farm, i.e. the site may have undergone a deliberate process of Romanisation during the latest years of the Iron Age, perhaps accounting for some of the difference in deposits when compared to Danebury.

7.3.3 Spatial distribution

GIS analysis of intra-site distribution of bones was limited as it was unable to take into account temporal differences between pits, especially when those pits contain different numbers of layers. The continuous sample of the site from north to south showed no evidence of any segregation, suggesting that investigation of the remainder of the interior would probably not produce any further patterns. It is possible that different activities were occurring at parts of the site not included in this thesis, such as the entrances (as at Maiden Castle), but the investigation of the sample area provides no suggestion that spatial analysis of the entire excavated area would be fruitful.

Computerised analysis of individual layers and pit layers would allow far quicker comparison of the individual deposits. It could be expanded to include more details, such as the extent of fragmentation in each layer (to better define the amount of meat represented by the bone) and the number of bones by volume in each layer (to provide some idea of the density of the deposit, and therefore the intensity of activity).

7.3.4 Inter site studies

Analysis of complete layers and the spatial dispersal of parts from similar extensively excavated sites, such as Winnall Down or perhaps other hillforts (dependent on ease of access) would clarify whether or not Danebury's apparent lack of any internal organisation as far as bone deposits are concerned was typical of settlements in general. Evidence from Maiden Castle suggests that spatial segregation may have become more common in later Iron Age Wessex.

Also rewarding would be a study of the potential differences in sites from other areas of Britain, where deposits within house structures are more common. Using occupation deposits in housing, which are so far free of any identified special deposits, would allow comparison of depositional practice and possible activity areas within houses (Giles & Parker-Pearson 1999: 225). At Danebury this was not possible due to the lack of occupation deposits in circular structures, but if areas in houses were dedicated to 'task zones', the bone deposits may reflect these (Halstead *et al.* 1978). Analysis of the composition of middens too would aid our understanding of deposition activity; for instance, comparison of the bone element patterning in deposits at East Chisenbury and Danebury could help us to understand if bone had been deposited on middens at Danebury prior to deposition in pits or layers.

Different site types would also be worth investigating; they potentially contain deposits which are related more closely to activities, and might tell us more directly about the actual parts and amounts eaten. Oppida provide ideal data sets, with a wider range of possible functions than hillforts, although given that they are also generally late in date they may not be entirely comparable (Collis 1976: 10). Possible oppida in Britain include: Oram's Arbour, of which Whinney (1994: 88) states: 'parts of the enclosure were reserved for specific activities'; Dragonby, where coins were manufactured (May 1996: 630), described by Cunliffe (1976: 42) as a possible oppidum; and Silchester, which is unusual due to the high numbers of pig bone (Grant 2000). Outside of Britain, an ideal site for comparison would be Manching, which appears to have been highly structured. Roads and buildings seem to follow a pattern, but more importantly, tools and industrial debris (from textile and metal industries) are located in specific areas (Collis 1997: 150). Collis (1984) sees this as evidence of craft guilds, with centralised production. Addressing butchery deposition could help to indicate whether butchery at that time was also centrally controlled or became a separate craft later, or whether at such an apparently highly structured site, deposition was still mixed, obscuring evidence for any segregation that existed.

7.4 CONCLUDING REMARKS

In conclusion then, the analysis of butchery has been shown to be more than simply a means by which to understand the particular issues of the scale of meat eating, although it is undisputedly valuable in that respect. Apart from its potential to identify obvious divisions, such as butchery waste areas, or deposits of industrial waste, it also enables better understanding of the ways in which animal bone elements were distributed and so assists in the interpretation of depositional activity. The analysis of individual deposits, including evaluation of the coherence of deposits, is impossible without first identifying the carcass divisions made by butchery practice; taphonomic issues too are imperfectly understood if not tempered with some analysis of the preceding deliberate separation of bone parts by human agency. Butchery must not be assumed to have been absent or rare at a site simply due to an absence of marks, as this thesis has shown that the majority of butchered bone, or indeed all of it, may show no cut marks at all if knife disarticulation and filleting was the normal means of butchery. Analysis of butchery techniques needs to become an integral component of every site report in order for deposition, as well as consumption activity, to be fully understood.

APPENDIX 1 The range of possible codes for butchery marks.

	Slaughter	Primary Butchery								Preparation And Portioning	
	Poleaxing	Decapitation			Foot Removal				skinning	organ removal	
Major body part (A)	1	1	2	1	3 4 5	3 4 5	3 4 5	3 4 5	3 4	x	1
Minor body part (B)	1	1	1	2	2	2	2	2	1	x	1
Bone (C)	9	9	7 8	1	1	4	4	5 6 7	2 3	x	9
Bone area (D)	1	7	3	1 2 3	1 2 3	1 3	1 2 3	1 2 3	3	x	1
Position (E)	1	2	4 5 6	1 2 4	x	x	x	x	1 2 3 4	x	5
Type (F)	1	2 1	12	1 2	x	1 2	1	1 2	2	x	1 2
Purpose (G)	4	2	2	2	2 4	2 4	4	2 4	1	5	4
Number of marks (H)	x	x	x	x	x	x	x	x	x	x	x
Reliability (I)*	1	1	1	2	2	2	2	2	1	2	2

	Preparation And Portioning																						
	Chops Through							Disarticulation							Filleting								
Major body part (A)	3 4 5	1	1	1	2	2	2	2	3	4	2	2	2	2	1	1	1	1	3	4	2	2	2
Minor body part (B)	1	1	2	1 2 5	1 2 5	4	1	2	1	1	1	2	1	2	1	2	2	1	1	1	1 2 5	1	2
Bone (C)	1 2 3	9	9	2 3 4 5 9	2 3 4 5 9	9	1	6	1 2 3	1 2 3	1	6	1	6	9	9	9	9	1 2 3	1 2 3	2 3 4 5 9	1	6
Bone area (D)	2 3	1	4	2	3	1 2	2	1 3 4	1 4	1 5	1 2	2 5	3 4 5 6	1 2 3 4	3	1	2 3	3 4 5 6	2 3	1 2 3	1	3 4 5 6	1 2 3 4
Position (E)	1 2 3 4	5 6	5 6	5 6	3 4 5 6	x	1 2 3 4	x	x	x	1 3 4 5 6	x	x	x	2 4	3 4	4	4 5	1 2 3 4	3 4	1 2 4	x	x
Type (F)	1 2	1 2	1	1 2	2	1 2	1	1	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2
Purpose (G)	4	4	4	4	4	4	4	4	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3
Number of marks (H)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Reliability (I)*	1/2	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	1	1	2	2	2

* Reliability (I): 1 = reliable interpretation; 2 = probably correct but could be confused with other activities. An x in any column = any value is possible.

APPENDIX 2 Butchery marks

2.1 Coded butchery marks from pig bones in pits

Ceramic Phase	Bone ID	Body Area (A)	Body area (B)	Bone Element (C)	Bone Area (D)	Position (E)	Cut Type (F)	Cut Purpose (G)	Number of Marks (H)
0	82671	1	1	9	7	2	2	2	9
0	22280	2	1	7	3	6	1	4	1
0	25593	2	1	1	9	9	2	9	9
0	106563	2	2	6	4	3	2	2	7
0	106562	3	1	1	5	4	2	2	2
0	68157	3	2	2	9	9	2	9	9
0	68158	3	2	3	9	9	2	9	9
0	106321	4	1	1	2	3	2	2	1
0	106321	4	1	1	2	9	2	2	1
0	68160	4	2	2	9	9	2	9	9
0	100064	5	2	5	2	2	2	1	1
4	108688	1	1	9	2	4	2	5	1
4	110103	2	1	7	3	1	1	2	1
4	21799	2	1	1	1	2	2	2	1
4	21799	2	1	1	3	6	2	2	1
4	21799	2	1	1	5	2	2	2	2
4	21799	2	1	1	3	2	2	2	4
4	77153	2	1	0	3	2	2	2	2
4	103433	2	2	4	2	6	2	4	9
4	2122	2	2	6	3	9	2	3	1
4	2122	2	2	6	1	2	2	3	9
4	3111	2	2	6	2	3	2	2	1
4	4616	2	2	6	2	3	2	2	1
4	4663	2	2	6	1	1	2	2	1
4	23974	2	2	4	9	9	2	9	9
4	4687	3	1	3	1	1	2	2	2
4	4689	3	1	2	1	3	2	2	2
4	91987	3	1	3	1	1	2	2	2
4	91987	3	1	3	2	1	2	2	4
4	13925	4	2	2	1	2	2	2	9
4	13925	4	2	2	1	1	2	2	9
5	25356	1	2	9	1	3	2	2	8
5	12948	1	2	4	9	9	2	9	9
5	14271	2	1	1	1	1	2	2	1
5	25354	2	1	7	9	9	2	9	9
5	12993	3	1	1	4	2	2	2	2
5	25857	3	1	2	9	9	9	9	9
5	25398	3	1	1	9	9	2	9	9
5	25859	4	1	2	9	9	9	9	9
5	25151	4	2	2	3	1	2	2	2
5	25395	4	2	4	1	1	2	1	1
6	18602	1	1	9	3	4	9	9	9
6	21579	1	2	9	2	3	1	2	2
6	21579	1	2	9	2	3	2	3	4
6	95777	2	1	7	9	3	2	2	9
6	98158	2	1	1	2	3	2	2	9
6	18051	2	1	7	3	5	1	4	2

6	30323	2	1	7	3	6	2	4	8
6	30323	2	1	7	2	6	2	2	4
6	111131	2	1	7	9	9	2	9	9
6	82899	2	2	4	9	9	9	9	9
6	108965	3	1	3	3	9	2	1	99
6	108966	3	1	2	3	1	2	1	99
6	82511	3	1	1	9	9	2	9	9
6	30759	3	2	1	1	4	2	2	3
6	82890	4	1	1	9	9	9	9	9
6	13724	4	1	1	4	3	2	3	1
6	13724	4	1	1	3	1	2	3	2
6	82882	4	1	2	9	9	2	9	9
6	94235	4	2	1	9	9	9	9	9
6	536	4	2	7	9	9	2	9	9
6	7438	4	2	2	1	1	2	2	3
6	89720	4	2	1	9	9	2	9	9
6	89721	4	2	1	9	9	2	9	9
6	93007	4	2	1	9	9	2	9	9
6	94208	4	2	1	9	9	2	9	9
6	94626	4	2	1	9	9	2	9	9
6	30261	5	2	6	9	9	9	9	9
13	22332	1	2	9	4	1	1	4	1
13	25062	1	2	9	2	4	2	3	1
13	114803	1	2	9	9	9	2	9	9
13	25051	2	1	1	1	1	2	2	1
13	25051	2	1	1	2	1	2	2	1
13	27017	2	1	1	2	2	2	2	3
13	27017	2	1	1	2	6	2	2	4
13	27017	2	1	1	3	2	2	3	10
13	22235	2	1	1	4	1	2	4	1
13	98762	2	1	1	4	3	2	2	6
13	82850	2	1	1	5	1	2	2	2
13	82850	2	1	1	5	2	2	2	2
13	97775	2	1	1	9	9	9	9	9
13	25063	2	1	1	9	9	2	9	9
13	98761	2	1	3	3	5	2	4	1
13	111043	2	1	7	3	5	2	2	1
13	111043	2	1	7	3	6	2	2	2
13	114445	2	1	7	9	9	1	2	2
13	114032	2	1	7	9	9	2	9	9
13	114671	2	1	7	9	9	2	9	9
13	80	2	1	7	9	9	1	9	9
13	8064	2	1	8	3	5	2	3	1
13	97969	2	1	8	3	6	2	2	3
13	91655	2	2	4	2	5	2	4	9
13	112076	2	2	4	3	6	2	4	1
13	861	2	2	4	3	6	1	4	3
13	861	2	2	4	3	6	2	2	1
13	96247	2	2	4	9	9	2	9	9
13	112306	2	2	4	9	9	2	9	9
13	107532	2	2	4	9	9	2	9	9
13	111073	2	2	6	1	3	2	3	4
13	111102	2	2	6	1	3	2	3	9
13	91654	2	2	6	2	3	2	2	10
13	102412	2	2	6	2	3	1	4	1

13	1376	2	2	6	2	3	2	2	1
13	111102	2	2	6	3	3	2	2	3
13	25052	3	1	1	3	2	4	2	3
13	111079	3	1	1	4	2	2	2	7
13	4922	3	1	1	4	2	1	2	1
13	4922	3	1	1	4	2	2	2	1
13	4922	3	1	1	4	3	2	2	5
13	79161	3	1	1	9	9	9	9	9
13	25064	3	1	1	9	9	2	9	9
13	27018	3	1	1	9	9	2	9	9
13	1861	3	1	2	1	4	2	2	3
13	98178	3	1	2	2	2	2	3	99
13	111417	3	1	3	2	1	2	2	2
13	74146	3	1	3	1	1	2	2	9
13	74146	3	1	3	2	9	2	2	9
13	4959	3	2	4	3	6	2	2	2
13	25068	4	1	1	5	4	2	2	4
13	24864	4	1	1	9	9	2	9	9
13	92890	4	2	2	4	1	2	2	1
13	111001	4	2	2	2	2	2	2	1
13	1875	4	2	2	2	4	1	2	3
13	1875	4	2	2	2	3	1	2	5
13	25038	4	2	1	3	3	2	2	4
13	100220	4	2	1	9	9	2	9	9
13	105337	4	2	1	9	9	2	9	9
13	112724	4	2	1	9	9	2	9	9
13	835	4	2	1	9	9	2	9	9
13	1363	4	2	1	9	9	2	9	9
13	1876	4	2	1	9	9	2	9	9
13	110670	4	2	1	9	9	2	9	9
13	75260	5	2	4	9	9	9	9	9
13	1857	5	2	5	2	1	2	1	7
34	108131	2	1	1	2	9	2	2	9
34	108131	2	1	1	1	9	2	2	9
67	87789	2	2	6	9	9	2	9	9
78	7219	1	1	9	1	5	2	4	1
78	109794	1	1	9	2	2	2	2	99
78	75940	1	1	9	3	4	2	3	99
78	104341	1	1	9	3	4	2	3	99
78	20923	1	1	9	3	4	2	3	3
78	30387	1	1	9	3	4	2	3	4
78	75941	1	1	9	7	2	2	2	99
78	27832	1	2	9	4	9	9	9	9
78	28365	1	2	9	9	9	9	9	9
78	87867	1	2	9	9	9	2	9	9
78	106844	2	1	1	1	3	2	2	99
78	104922	2	1	1	1	9	2	2	1
78	106844	2	1	1	2	3	2	2	99
78	112650	2	1	1	2	3	2	2	8
78	2193	2	1	1	2	3	2	2	99
78	111230	2	1	1	2	4	2	2	1
78	2193	2	1	1	2	4	2	2	99
78	17260	2	1	1	2	6	1	2	1
78	99682	2	1	1	4	4	2	2	1
78	29408	2	1	1	5	3	2	3	3

78	80464	2	1	1	9	9	9	9	9
78	26232	2	1	1	9	9	9	9	9
78	28072	2	1	1	9	9	2	9	9
78	97064	2	1	2	9	9	1	9	9
78	75972	2	1	3	1	4	2	3	99
78	4262	2	1	3	3	6	1	4	1
78	28280	2	1	3	9	9	9	9	9
78	30571	2	1	7	3	1	1	2	1
78	92599	2	1	7	3	6	1	4	99
78	8861	2	1	7	3	6	2	4	3
78	30571	2	1	7	3	6	1	3	3
78	87682	2	1	7	9	9	9	9	9
78	111623	2	1	7	9	9	2	9	9
78	27839	2	1	7	9	9	1	9	9
78	107246	2	1	8	3	1	2	2	99
78	107246	2	1	8	3	5	2	2	99
78	105078	2	1	3	9	9	2	9	9
78	115834	2	1	1	1	1	2	2	2
78	115835	2	1	1	1	1	2	2	4
78	115833	2	1	1	1	2	2	2	3
78	115832	2	1	1	2	1	2	2	2
78	115832	2	1	1	3	1	2	3	2
78	115833	2	1	1	4	1	2	2	5
78	17274	2	2	4	1	4	2	4	99
78	4292	2	2	4	2	6	2	4	99
78	109787	2	2	4	3	4	2	4	99
78	17274	2	2	4	3	4	2	4	99
78	104923	2	2	4	9	9	2	9	9
78	28193	2	2	6	1	1	2	3	15
78	338	2	2	6	1	2	2	3	16
78	2219	2	2	6	1	9	1	4	99
78	107023	2	2	6	3	3	2	2	1
78	2219	2	2	6	3	3	2	2	4
78	19456	2	2	6	3	3	2	2	2
78	109674	2	2	6	3	9	2	2	1
78	108035	2	2	6	4	3	2	3	3
78	109792	2	2	6	4	3	2	3	3
78	109793	2	2	6	4	3	2	3	3
78	20452	2	2	6	4	6	2	3	1
78	3156	2	2	6	5	3	2	2	1
78	87461	2	2	6	9	9	9	9	9
78	88893	2	2	6	9	9	2	9	9
78	123	2	2	6	9	9	2	9	9
78	29574	2	2	6	9	9	2	9	9
78	116363	2	2	6	1	4	2	3	6
78	116342	2	4	9	1	1	1	4	5
78	116234	2	4	9	1	3	2	2	5
78	3939	2	5	9	2	6	2	4	99
78	15164	3	1	1	1	9	1	2	3
78	93741	3	1	1	2	4	2	2	99
78	11615	3	1	1	3	1	2	2	1
78	28340	3	1	1	3	3	2	2	3
78	28340	3	1	1	3	3	2	3	3
78	111634	3	1	1	4	2	2	2	2
78	93741	3	1	1	4	3	2	2	6

78	105954	3	1	1	4	3	2	2	99
78	7155	3	1	1	4	3	2	2	1
78	16622	3	1	1	4	3	2	2	6
78	31253	3	1	1	4	3	2	2	4
78	105954	3	1	1	4	6	2	2	1
78	82262	3	1	1	9	9	9	9	9
78	82286	3	1	1	9	9	9	9	9
78	16916	3	1	1	9	9	9	9	9
78	21387	3	1	1	9	9	9	9	9
78	79685	3	1	1	9	9	2	9	9
78	92522	3	1	1	9	9	2	9	9
78	29239	3	1	1	9	9	2	9	9
78	91787	3	1	2	1	3	2	2	99
78	114647	3	1	2	1	5	2	2	3
78	2227	3	1	2	2	2	2	2	99
78	91787	3	1	2	2	3	2	3	99
78	111201	3	1	2	9	9	9	9	9
78	69380	3	1	3	1	1	2	2	1
78	94134	3	1	3	1	1	2	2	99
78	21182	3	1	3	1	1	2	2	5
78	107228	3	1	3	1	2	2	2	99
78	21180	3	1	3	2	1	2	2	7
78	18158	3	1	3	3	9	2	1	99
78	116362	3	1	1	3	2	2	2	4
78	116362	3	1	1	3	4	2	3	5
78	116058	3	1	1	4	1	2	2	2
78	116138	3	2	3	2	4	2	2	2
78	116348	3	2	3	2	4	2	2	2
78	29400	4	1	1	2	3	2	2	1
78	112590	4	1	1	4	1	1	2	99
78	5351	4	1	1	4	4	2	2	99
78	6769	4	1	1	5	6	2	2	8
78	3752	4	1	1	9	9	9	9	9
78	89472	4	1	1	9	9	2	9	9
78	28134	4	1	1	9	9	2	9	9
78	30165	4	1	2	1	3	2	2	5
78	11748	4	1	2	3	2	2	4	2
78	86969	4	1	2	9	9	2	9	9
78	1500	4	1	3	4	9	2	2	1
78	81334	4	1	3	9	9	2	9	9
78	72193	4	2	1	9	9	2	9	9
78	87684	4	2	1	9	9	2	9	9
78	94058	4	2	1	9	9	2	9	9
78	104624	4	2	1	9	9	2	9	9
78	105695	4	2	1	9	9	2	9	9
78	109606	4	2	1	9	9	2	9	9
78	18322	4	2	1	9	9	2	9	9
78	27811	4	2	1	9	9	2	9	9
78	92126	4	2	2	1	3	2	2	3
78	19710	4	2	2	2	1	2	2	8
78	19710	4	2	2	3	1	2	2	2
78	20459	4	2	4	3	6	2	2	3
78	88018	5	2	4	9	9	2	9	9

2.2 Coded butchery marks from pig bones in layers

Ceramic Phase	Bone ID	Body Area (A)	Body area (B)	Bone Element (C)	Bone Area (D)	Position (E)	Cut Type (F)	Cut Purpose (G)	Number of Marks (H)
0	43231	3	1	1	9	9	2	9	9
4	62855	1	2	9	2	9	2	9	9
5	52196	2	2	6	3	3	2	2	3
5	66772	3	1	1	3	3	2	2	11
5	66772	3	1	1	4	3	2	2	3
5	66772	3	1	1	3	4	2	2	3
5	67733	3	1	1	3	2	2	2	5
5	49700	4	2	1	1	5	2	2	2
5	51009	4	2	1	9	9	2	9	9
6	51934	1	1	9	5	4	9	9	9
6	51946	1	1	9	5	4	9	9	9
6	46156	2	1	1	2	1	2	2	4
6	66559	2	1	8	2	6	1	4	1
6	47256	2	1	1	9	9	2	9	9
6	50968	2	1	7	9	9	2	9	9
6	60858	2	1	3	9	9	2	9	9
6	66895	2	2	6	3	3	2	2	99
6	67045	2	2	6	3	3	1	4	2
6	68076	2	2	6	5	3	2	2	3
6	52281	2	2	6	5	3	2	2	1
6	46130	3	1	1	1	3	2	2	4
6	52277	3	1	1	2	1	2	3	3
6	61084	4	1	1	5	2	2	2	99
6	66191	4	1	1	2	9	2	3	99
6	67934	4	1	1	1	3	2	2	2
6	46383	4	2	1	9	9	2	9	9
6	67922	4	2	2	9	9	2	9	9
13	51739	1	1	9	3	4	2	3	5
13	51814	1	1	9	3	4	2	3	3
13	51847	1	1	9	8	6	2	2	1
13	41480	2	1	7	9	9	9	9	9
13	67594	2	1	7	3	1	1	2	1
13	54681	2	1	1	2	1	2	2	1
13	54681	2	1	1	3	1	2	2	1
13	51822	2	2	4	1	6	2	4	3
13	51822	2	2	4	3	6	2	2	2
13	67639	2	2	4	9	9	2	9	9
13	66133	3	1	1	9	9	9	9	9
13	60604	4	2	1	9	9	2	9	9
13	37030	5	2	6	1	2	2	1	1
13	37030	5	2	6	3	2	2	1	1
78	37616	1	1	9	3	4	2	3	4
78	38673	1	1	9	7	2	2	2	4
78	39638	1	1	9	3	4	9	9	9
78	43217	1	1	9	1	5	2	4	2
78	54438	1	1	9	3	4	2	3	3
78	65627	1	1	9	1	5	2	4	1
78	40281	1	1	9	3	9	9	9	9
78	40749	1	1	9	3	9	9	9	9
78	65628	1	1	9	3	9	9	9	9
78	37102	1	2	9	1	3	2	2	4
78	37244	2	1	1	1	3	2	2	3

78	37244	2	1	1	3	4	2	3	3
78	39368	2	1	9	2	4	2	3	1
78	39456	2	1	7	3	1	2	3	4
78	43314	2	1	1	9	9	9	9	9
78	43359	2	1	1	9	9	9	9	9
78	43735	2	1	7	3	5	1	2	4
78	43735	2	1	7	3	1	2	2	1
78	43735	2	1	7	3	2	1	4	2
78	43735	2	1	7	3	2	2	2	10
78	43735	2	1	7	3	6	2	2	4
78	43735	2	1	7	3	6	1	4	1
78	63983	2	1	1	2	9	2	2	9
78	64759	2	1	1	9	9	9	9	9
78	64937	2	1	3	3	6	1	4	1
78	65071	2	1	1	2	3	2	2	2
78	45418	2	1	1	9	9	9	9	9
78	49797	2	1	1	9	9	9	9	9
78	49819	2	1	4	9	9	9	9	9
78	39379	2	2	6	5	3	2	2	3
78	39434	2	2	6	9	9	9	9	9
78	39441	2	2	6	9	9	9	9	9
78	41097	2	2	6	3	3	2	4	3
78	42925	2	2	6	9	9	9	9	9
78	50890	2	2	6	3	3	2	4	1
78	52964	2	2	4	3	6	1	4	1
78	65789	2	2	4	3	6	1	4	1
78	67554	2	2	6	3	3	2	3	4
78	43895	2	6	6	9	9	9	9	9
78	37203	3	1	1	3	3	2	2	3
78	38763	3	1	3	1	1	2	2	3
78	39212	3	1	2	9	9	9	9	9
78	39389	3	1	1	3	2	1	2	5
78	39977	3	1	1	9	9	9	9	9
78	40578	3	1	2	9	9	9	9	9
78	45331	3	1	3	1	1	2	2	2
78	48311	3	1	3	2	3	2	2	7
78	48745	3	1	1	9	9	9	9	9
78	54242	3	1	1	1	3	2	2	3
78	63955	3	1	3	9	9	9	9	9
78	64474	3	1	2	3	1	2	1	99
78	64680	3	1	3	2	1	2	2	2
78	66819	3	1	3	2	1	2	2	2
78	38597	3	1	1	9	9	9	9	9
78	40079	3	1	1	9	9	9	9	9
78	45165	3	1	1	9	9	9	9	9
78	45302	3	1	1	9	9	9	9	9
78	37521	4	1	1	1	3	2	2	1
78	38359	4	1	1	5	3	2	2	10
78	39425	4	1	1	3	9	2	3	5
78	43777	4	1	1	9	9	9	9	9
78	48599	4	1	1	1	1	2	2	4
78	54179	4	1	1	4	2	2	2	1
78	47189	4	1	1	9	9	9	9	9
78	46963	4	2	2	9	9	9	9	9
78	63966	4	2	1	9	9	9	9	9

2.3 Coded butchery marks from cattle bones in pits

Ceramic Phase	Feature Number	Body Area (A)	Body area (B)	Bone Element (C)	Bone Area (D)	Position (E)	Cut Type (F)	Cut Purpose (G)	Number of Marks (H)
3	p1050/2	3	1	3	3	2	2	3	4
3	p1135/4	2	1	7	3	4	2	2	9
3	p1135/4	2	2	6	3	9	2	3	1
3	p1135/4	4	2	2	3	2	1	4	2
3	p1135/4	5	2	5	2	4	2	1	6
3	p1135/4	5	2	5	2	4	2	1	7
3	p1135/4	5	2	5	2	4	2	1	8
3	p1135/4	5	2	5	2	4	2	1	9
3	p1135/4	5	2	5	2	4	2	1	10
3	p1135/4	5	2	5	2	4	2	1	11
3	p1135/4	5	2	5	2	4	2	1	12
3	p1136/3	1	1	1	1	9	1	6?	1
3	p1150/4	1	1	9	7	2	2	2	9
3	p1150/5	1	1	9	7	6	2	2	9
3	p1275/1	2	2	6	4	2	1	4	3
3	p1305/1	2	1	3	3	6	1	4	1
3	p1312/1	4	1	1	5	1	2	2	1
3	p1346/5	2	1	1	1	1	1	4	4
3	p1346/5	2	1	2	3	1	4	4	9
3	p1461/1	3	1	1	4	2	2	2	11
3	p154	4	2	1	2	1	2	2	10
3	p1542/1	4	1	1	1	4	2	2	4
3	p1542/1	4	1	1	4	3	2	2	1
3	p2045/2	2	2	6	4	4	2	3	3
3	p2503/3	1	2	1	2	4	2	2?3	7
3	p2509/2	4	1	1	5	4	2	2	6
3	p54/10	3	2	4	1	5	1	5	1
3	p587/1	2	1	1	2	9	2	2	9
3	p587/5	1	2	9	1	3	1	2	9
3	p587/5	3	2	3	1	4	2	2	9
3	p655/2	2	2	4	2	6	2	3	9
3	p655/2	2	2	4	2	6	2	3	9
3	p658/4	4	1	1	1	9	1	2	1
3	p674/4	4	2	2	3	4	2	2	2
3	p717/1	1	1	1	1	9	1	6?	1
3	p783/3	3	1	1	4	9	1	4	1
3	p84/2	1	1	1	2	4	1	6?	9
3	p84/2	2	2	6	3	3	1	4	3
3	p862/2	1	2	9	3	4	2	1?	2
3	p862/3	1	2	9	3	4	2	1?	9
3	p871/2	4	1	1	5	9	2	2	9
3	p889/4	2	1	1	1,2	1,3,4	1	2	5
3	p906/1	2	2	6	4	6	2	2	9
3	p906/1	2	2	6	3	9	2	3	9
3	p906/4	3	1	1	1	9	2	2	9
3	p906/4	4	1	1	4	9	2	3	9
3	p906/4	4	1	2	1	9	2	2	9

3	p908/3	2	1	3	3	4	1	4	1
3	p945/3	2	2	6	4	9	1	4	9
3	p987/3	5	2	6	9	4	2	1	9
4	p117/3	4	1	1	4	9	2	3	9
4	p117/5	3	1	1	4	3	2	2	9
4	p1545/3	2	1	1	3	4	1	3	1
4	p1545/3	3	1	1	4	2	2	2	5
4	p1545/3	3	1	2	1	1	1	2	1
4	p1545/3	4	1	2	5	9	2	2	4
4	p1545/4	2	2	4	2	6	2	3	2
4	p1545/5	2	2	6	3	6	2	2	1
4	p575/3	2	3	0	2	9	1?2	4	9
4	p599/1	2	2	4	3	4	1	4	1
4	p677/4	2	1	1	1	4	2	2	3
4	p972/1	5	2	5	2	1	2	1	10
5	p2199/3	2	1	3	3	4	1	2	1
5	p2199/4	3	1	1	4	4	2	2	1
5	p2219/4	3	1	1	1	2	2	2	1
5	p2219/4	5	2	5	3	1	2	1	9
5	p2219/4	5	2	5	3	1	2	1	9
5	p2464/1	4	1	2	3	1	2	3	7
5	p2518/6	3	2	4	2	9	2	1?	8
5	p2530/4	3	1	1	2	1	2	3	5
5	p38/1	2	1	7	3	4	2	2	9
5	p583/1	2	1	2	3	9	2	2	9
5	p583/4	2	2	4	2	9	7	4?	1
5	p583/4	2	2	4	2	9	7	4?	1
5	p583/4	2	2	4	2	9	7	4?	1
6	p1005/1	4	2	2	1	1	2	2	4
6	p1055/4	2	1	3	3	4	2	4	1
6	p1064/3	2	1	2	3	5	2	3	9
6	p1116/6	2	1	3	3	5	2	4	1
6	p1822/1	2	2	4	3	4	2	3	2
6	p1983/4	1	2	9	1	5	2	2	3
6	p2030/4	2	1	1	4	1	2	4	4
6	p2183/6	2	2	6	1	6	2	2	3
6	p2184/3	2	2	6	3	1	2	2	3
6	p2363/6	3	1	3	3	4	2	3	17
6	p2363/6	3	2	4	3	2	2	2	3
6	p2578/3	2	1	1	1	3	2	2	2
6	p2583/4	3	1	2	1	3	2	2	4
6	p2583/4	3	1	3	3	3	2	3	1
6	p2583/4	3	1	3	2	4	2	2	2
6	p639/1	2	1	1	2	9	1	4	1
6	p639/3	1	2	9	1	2	2	2	9
6	p639/3	2	1	1	1	4	2	2	1
6	p639/4	2	1	2	3	4	1	4	9
6	p639/4	2	2	4	2	9	1	4	9
6	p639/4	2	2	6	4	4	1	4	2
6	p664/4	3	1	1	4	1	1	4	1
6	p665/8	3	1	2	4	9	2	2	5
6	p665/8	4	1	2	5	1	2	2	9

6	p821/3	3	1	3	2	1	2	2	9
6	p912/2	1	1	1	2	9	1	6?	1
6	p919/3	3	1	1	4	4	2	2	12
7	p1000/3	2	2	4	2	9	2	3	9
7	p110/3	4	1	2	3	9	2	3	1
7	p1113/2	3	1	1	2	9	2	3	9
7	p1114/1	3	1	1	1	9	2	2	8
7	p1114/2	4	2	4	3	1	1	2	6
7	p1153/1	2	1	3	3	4	1	4	1
7	p1153/1	2	2	4	3	4	1	4	4
7	p1161/1	2	1	3	3	4	2	2	2
7	p1161/10	2	1	1	1	4	2	2	1
7	p1161/10	2	2	6	5	1	2	2	9
7	p1161/8	2	1	3	3	1	1	4	1
7	p1161/8	2	1	3	1	1	2	2	1
7	p1161/8	5	2	5	2	1	2	1	9
7	p1161/9	2	1	3	1	4	1	3	4
7	p1161/9	2	2	4	3	1	1	4	3
7	p1224/5	2	2	6	3	6	1	4	4
7	p1224/5	3	1	1	1	9	2	2	1
7	p1285/1	4	2	1	2	4	2	2	6
7	p1285/6	2	1	1	6	4	2	3	1
7	p1285/6	2	2	6	1	6	2	3	2
7	p1285/6	3	1	2	1	4	2	2	4
7	p1285/6	3	1	2	3	1	2	3	7
7	p1333/11	1	1	1	4	9	1	6?	9
7	p1333/9	2	1	1	2	4	2	2	9
7	p1343/1	2	1	7	3	5	1	4	9
7	p1350/5	3	1	1	4	2	2	2	10
7	p1350/8	3	1	1	1	3	2	2	8
7	p1452/9	3	2	4	1	2	2	2	1
7	p1455/1	1	1	1	1	9	2	6?	1
7	p1455/3	2	1	3	3	???	???	???	9
7	p1456/1	3	1	2	2	3	2	2	4
7	p1456/4	3	2	3	1	4	2	2	9
7	p1481/1	2	2	6	3	6	1	2	1
7	p1481/1	3	1	2	4	3	2	2	1
7	p1481/1	3	2	3	1	4	2	2	9
7	p1481/7	3	1	1	2	4	2	3	9
7	p1789/6	3	2	3	1	4	2	2	1
7	p1790/1	2	2	6	3	6	1	2	2
7	p1793/3	2	1	1	1	4	2	2	1
7	p1820/2	1	1	9	5	1	2	1	5
7	p1986/1	2	1	1	1	3	2	2	3
7	p1988/4	2	2	6	3	6	2	3	6
7	p1991/4	2	1	1	2	3,4	2	2	9
7	p1991/5	2	1	3	3	4	2	2?3	1
7	p1991/5	2	2	4	3	6	1	2	1
7	p1992/4	1	1	1	4	1	1	6?	1
7	p1992/4	2	1	3	3	9	1	2	1
7	p1992/4	4	2	2	1	4	2	2	1
7	p2090/3	1	1	9	5	6	2	1?	1

7	p2106/2	2	2	6	3	6	2	2	4
7	p2106/2	2	2	6	4	6	2	3	1
7	p2115/2	4	2	2	1	2	2	2	3
7	p2115/4	2	1	1	5	4	2	3	2
7	p2115/4	2	2	4	2	1	2	3	9
7	p2115/4	3	1	2	1	2	2	2	8
7	p2115/5	4	1	1	1	5	2	2	2
7	p2121/4	2	2	6	4	9	2	3	1
7	p2145/2	1	1	1	1	9	2	6?	9
7	p2145/2	5	2	6	3	4	2	2	1
7	p2158/2	2	1	1	2,5	4	2	3	36
7	p2163/4	2	5	9	1	4	2	3?2	3
7	p2163/4	4	1	2	1	5	2	2	1
7	p2178/4	2	1	1	2	9	2	2	9
7	p2178/4	2	1	1	2	9	2	2	1
7	p2223/3	3	1	1	4	9	2	2	13
7	p2242/2	1	1	9	8	2	2	2	9
7	p2254/8	3	1	2	4	1	2	2	2
7	p2256/10	1	1	1	4	3	1	6?	2
7	p2256/10	4	2	2	1	1	2	2	9
7	p2258/6	4	1	1	1	9	2	2	9
7	p2259/2	4	2	2	2	1	2	2	1
7	p2269/4	2	1	1	2	4	2	3	9
7	p2269/8	2	2	4	3	4	1	4	1
7	p2270/3	2	2	4	3	5	1	3	4
7	p2273/4	5	2	6	2	2	2	3	3
7	p23/1	4	2	2	9	4	2	2	9
7	p23/3	3	1	2	4	1	2	2	9
7	p23/4	4	2	4	3	2	2	2	9
7	p23/5	2	1	1	2	4	2	2	9
7	p23/5	3	1	1	4	4	2	2	9
7	p23/5	3	1	2	4	3	2	2	9
7	p23/5	4	2	4	1	5	1	5	1
7	p23/6	2	1	1	1	9	1	2	9
7	p23/6	3	1	1	4	9	1	4	9
7	p2347/10	2	1	1	2	1	2	4	4
7	p2347/8	2	1	1	1	4	2	2	5
7	p2349/8	3	1	1	2	9	2	3	5
7	p2353/5	1	2	9	1	2	1	2	3
7	p2353/5	2	1	1	2	4	2	3	4
7	p2353/5	2	1	2	3	5	1	4	1
7	p2353/8	1	2	1	2	4	2	2?3	7
7	p2361/1	1	1	9	3	4	2	3	5
7	p2361/2	3	1	2	2	3	2	3	1
7	p2362/2	2	1	1	1	2	2	2	3
7	p2362/3	4	1	2	1	9	2	2	6
7	p2362/4	5	2	5	1	1	2	2	3
7	p2362/6	2	2	6	1	5	2	3	2
7	p2362/6	3	1	1	1	3	2	2	9
7	p2371/1	4	2	4	3	1	2	2	6
7	p2426/10	2	1	1	1	4	2	2	1
7	p2426/18	2	1	3	3	5	1	4	1

7	p2426/18	2	1	3	3	4	2	2	3
7	p2426/18	2	1	3	1	4	2	3	11
7	p2426/18	2	2	4	3	1	1	4	1
7	p2426/18	2	2	4	2	2	2	4	1
7	p2426/18	2	2	4	3	5	1	4	2
7	p2426/18	2	2	4	2	6	2	3	5
7	p2426/18	2	2	4	2	6	2	3	3
7	p2426/18	2	2	5	3	1	2	4	1
7	p2426/18	2	2	6	1	4	2	3	5
7	p2426/18	2	2	6	5	3	2	2	2
7	p2426/18	2	2	6	4	4	2	3	1
7	p2426/18	2	2	6	4	4	2	3	3
7	p2426/18	2	2	6	1	4	1	4	3
7	p2426/18	2	2	6	4	6	2	3	1
7	p2426/18	2	3	0	2	3	2	3	2
7	p2426/18	2	3	0	2	3	2	3	1
7	p2426/18	2	3	0	2	3	2	4	3
7	p2426/18	2	3	0	2	4	2	4	2
7	p2426/18	2	3	0	2	3	2	4	2
7	p2426/18	2	3	0	3	3	2	3	1
7	p2426/18	2	3	0	2	3	1	4	1
7	p2426/18	2	3	0	1	4	1	2	1
7	p2426/18	2	3	0	2	3	2	3	4
7	p2426/18	2	3	0	2	3	2	3	1
7	p2426/18	2	3	9	2	4	2	3?4	7
7	p2426/18	2	3	9	2	4		3?4	3
7	p2426/18	2	5	9	4	2	1	4	1
7	p2426/18	2	5	9	3	4	1	4	1
7	p2426/18	3	1	1	4	3	1	2	1
7	p2426/18	3	1	1	4	4	2	2	5
7	p2426/18	3	1	2	4	1	1	4	1
7	p2426/18	3	2	3	1	4	2	2	4
7	p2426/18	4	1	1	1	1	2	2	2
7	p2426/18	4	1	1	5	4	2	2	3
7	p2426/18	4	1	1	5	3	2	2	1
7	p2426/18	4	1	2	3	3	2	3	11
7	p2426/18	4	1	2	5	3	2	2	3
7	p2426/18	4	2	1	3	3	2	2	2
7	p2426/18	4	2	1	2	4	2	2	2
7	p2426/18	4	2	3	1	4	2	2	1
7	p2426/18	5	2	5	3	4	2	2	2
7	p2426/18	5	2	5	3	4	2	2	1
7	p2426/18	5	2	5	3	4	2	2	2
7	p2426/18	5	2	5	3	4	2	2	1
7	p2426/18	5	2	5	3	3	2	2	1
7	p2426/18	5	2	5	3	4	2	2	4
7	p2426/18	5	2	6	1	1	2	2	1
7	p2426/18	5	2	6	1	1	2	2	3
7	p2426/18	5	2	6	1	1	2	2	1
7	p2426/18	5	2	6	1	1	2	2	5
7	p2426/18	5	2	6	1	1	2	2	1
7	p2426/4	1	2	9	2	3	2	2	6

7	p2434/2	3	2	4	2	1	2	1	4
7	p2534/12	2	2	6	4	6	1	2	3
7	p2544/2	2	1	1	2	4	2	2	3
7	p2544/2	2	1	1	2	3	1	4	1
7	p2545/3	1	2	9	1	4	2	2	4
7	p25456/7	1	2	9	1	3	2	2	4
7	p2548/10	4	2	8	2	1	2	2	6
7	p2549/4	4	2	1	2	4	2	2	8
7	p2549/4	4	2	4	2	2	2	1	4
7	p2550/2	4	1	1	5	2	2	2	8
7	p2550/2	4	1	1	4	3	2	3	4
7	p2557/1	1	2	9	1	3	2	2	1
7	p2562/2	3	1	3	2	1	2	2	4
7	p2563/7	2	1	1	1	2	2	2	5
7	p2564/1	1	2	9	1	3?4	2	2	10
7	p2564/1	2	2	5	2	5	2	3	2
7	p2570/4	2	1	1	5	1	2	3	2
7	p2572/6	2	1	2	1	5	2	2	7
7	p2572/6	2	1	2	3	4	1	3	1
7	p2574/5	2	3	0	2	1	2	3	6
7	p2575/3	1	2	1	2	4	2	2?3	9
7	p2575/3	2	2	6	5	4	2	2	4
7	p2575/4	3	1	2	2	1	2	2	14
7	p2575/5	1	1	1	1	6	2	6	3
7	p2575/5	3	1	1	4	4	2	2	12
7	p2575/7	3	1	2	4	2	2	2	4
7	p2575/8	2	1	3	3	5	2	4	1
7	p2575/8	2	1	3	3	5	2	4	3
7	p2575/8	2	1	3	3	5	2	4	2
7	p2575/8	4	1	1	1	2	2	2	2
7	p2577/1	3	1	1	4	2	2	2	3
7	p2577/1	3	1	3	2	1	1	2	1
7	p2579/4	1	1	9	5	1	2	1?	11
7	p2579/4	2	2	6	4	3	2	3	3
7	p2579/4	2	3	0	2	4	2	3	6
7	p2579/4	3	1	1	4	4	3	3	7
7	p2580	3	1	2	1	2	1	5	2
7	p2580/1	1	1	9	1	5	2	1?	8
7	p2580/6	1	2	9	2	3	2	2?3	5
7	p2590/3	2	2	6	5	6	2	2	4
7	p27/1	2	2	6	1	1	2	2	6
7	p27/10	2	1	1	1	1	1	2	2
7	p27/10	4	1	2	1	9	1	2	9
7	p27/4	4	2	4	1	5	1	5	1
7	p27/5	5	2	5	7	9	1	5	1
7	p27/6	2	1	1	1	2	1	2	1
7	p27/6	3	1	1	1	9	2	2	9
7	p29/2	5	2	5	7	9	1	5	1
7	p29/2	5	2	6	7	5	1	5	1
7	p29/4	5	2	5	7	6	1	5	1
7	p29/4	5	2	6	2	6	1	4	1
7	p507/3	2	1	3	3	4	2	4	9

7	p58/2	3	2	4	3	6	1	5	2
7	p58/3	3	1	1	4	6	1	4	1
7	p580/6	2	1	7	3	1	2	2	9
7	p582/1	2	3	0	1	9	2	3	1
7	p582/4	1	2	9	1	4	2	2	7
7	p582/6	3	2	3	1	1	2	2	9
7	p584/2	2	1	1	1	4	2	2	9
7	p584/3	3	1	2	2	1	2	3	9
7	p584/3	5	2	5	2	1	2	1	9
7	p584/4	2	1	7	3	2	1	4	9
7	p598/1	4	2	1	2	9	1	2	1
7	p598/3	4	1	1	2	4	2	3	9
7	p612/1	3	1	1	4	9	1	4	1
7	p612/2	2	1	8	3	6	2	3	7
7	p612/2	2	2	5	1	5	1	4	1
7	p612/2	4	1	2	1	1	2	2	9
7	p624/1	2	1	3	3	5	1	4	9
7	p624/1	3	2	3	1	1	2	2	9
7	p624/1	3	2	3	1	1	2	2	9
7	p624/2	2	1	7	3	5	2	2	9
7	p624/3	2	2	4	3	4	2	2	1
7	p624/3	5	2	5	1	2	2	2	1
7	p627/1	3	1	2	2	1	2	3	9
7	p630/1	2	1	3	3	5	1	4	9
7	p630/1	3	1	2	2	3	2	3	1
7	p630/1	3	1	3	2	1	2	2	3
7	p630/1	3	1	3	1	4	2	2	4
7	p636/2	3	1	3	2	6	2	2	3
7	p636/7	2	1	3	3	4	1	4	9
7	p636/7	2	1	3	3	4	1	4	9
7	p636/9	2	1	2	3	1	2	4	1
7	p638/2	3	1	1	4	3	2	2	9
7	p682/4	1	2	9	1	4	1	2	9
7	p682/4	3	1	1	4	4	2	2	8
7	p753/3	5	2	6	1	1	2	2	1
7	p766/4	3	1	1	4	1	2	2	9
7	p806/2	4	2	4	3	1	2	2	9
7	p813/8	2	2	6	4	6	2	2	9
7	p815/3	1	2	9	1	3	1	2	9
7	p815/3	3	1	2	1	4	2	2	9
7	p823/4	1	1	9	3	4	2	3	3
7	p827/3	4	1	1	4	9	2	3	9
7	p827/3	4	1	2	3	9	2	3	9
7	p891/4	4	2	4	1	1	2	2	5
7	p891/8	3	1	2	2	3,4	2	5	4
7	p911/1	2	1	1	2	3	2	2	9
7	p911/6	2	1	8	3	6	1	4	9
7	p92/3	3	2	4	9	9	1	5	9
7	p92/5	3	1	2	9	9	2	3	9
7	p92/5	4	1	2	3	9	2	3	9
7	p923/7	2	1	2	3	4	1	4	9
7	p925/6	3	1	1	4	4	2	2	4

7	p935/2	2	1	7	3	1	2	2	9
7	p935/3	3	1	1	4	9	2	2	9
7	p953/5	3	2	4	3	6	2	2	3
7	p955/2	2	1	7	3	6	1	4	1
7	p955/2	3	1	3	2	2	2	3	9
7	p955/2	3	2	4	3	2	2	3	9
7	p994/1	2	1	7	3	5	2	2	9
7	p995/3	3	2	4	3	6	1	5	2
8	p1577/3	2	1	1	2	2	2	2	4
8	p1577/6	1	2	9	1	5	1	2	2
8	p1727/6	3	1	3	1	4	2	3?2	3
8	p2577/1	3	1	3	2	4	2	2	7
8	p636/1	3	1	3	2	1	2	2	3
8	p702/6	1	2	9	1	5	1	2	9
8	p702/6	3	1	2	1	3	2	2	2
8	p702/6	3	1	2	2	3	2	3	4
13	p1063/5	3	2	4	3	1	2	2	2
13	p1149/6	2	1	1	2	9	2	3	9
13	p181/2	2	1	2	3	1	1	4	1
13	p1953/1	1	1	9	7	2	2	2	4
13	p1953/1	2	2	6	3	6	1	2	1
13	p2228/2	2	2	6	5	2	2	2	1
13	p2251/2	2	1	1	2	2	2	2,3	8
13	p707/2	1	1	1	1	9	1	6?	9
13	p740/3	1	2	9	2	4	2	3	6
13	p740/3	2	1	3	1,3	5	1	4	1
13	p756/1	2	2	6	3	9	2	3	9
13	p867/3	2	1	1	4	9	1	4	9
36	p2388/1	2	1	1	2	1	2	2?3	11
45	p1913/4	1	1	9	7	2	2	2	9
45	p634/2	5	2	5	3	1	2	2	6
57	p32/5	2	2	5	3	1	1	4	1
67	p1115/4	4	1	2	1	1	1	2	9
67	p2056/2	2	5	9	2	1	2	3	1
67	p2383/1	4	2	4	3	2	2	2	2
67	p2384/3	4	1	2	3	9	2	3	3
68	p606/4	1	1	9	3	4	2	3	9
68	p699/1	1	1	9	3	4	2	3	1
78	p1078/7	4	2	4	2	1	2	1	9
78	p1078/7	5	2	5	2	1	2	1	11
78	p1089/1	3	1	1	4	1	2	2	3
78	p1089/2	2	1	1	4	6	1	4	9
78	p1089/2	2	1	8	3	6	2	3	9
78	p1089/2	3	1	3	2	2	2	3	1
78	p1530/1	3	1	1	3	4	2	3	9
78	p1530/2	2	2	4	3	4	2	3	1
78	p1530/5	3	2	3	1	2	2	2	1
78	p1530/5	4	1	2	4	9	2	3	2
78	p1530/5	4	2	4	3	6	2	2	4
78	p1579/+	1	1	1	1	9	1	6?	9
78	p1579/1	1	1	9	1	5	2	1?	4
78	p1579/12	1	1	9	3	4	2	3	4

78	p1579/14	2	1	1	2	4	2	2	5
78	p1579/14	4	1	1	1	2	2	2	7
78	p1579/3	2	1	1	5	4	2	3	2
78	p1579/4	3	1	1	4	9	2	2	15
78	p1579/7	4	2	2	1	1	2	3?2	4
78	p1687/3	3	1	2	1	3	2	2	5
78	p1900/1	1	2	9	1	2	1	2	2
78	p1900/1	2	1	1	2	1	2	3	2
78	p1900/1	3	1	1	4	1	2	2	10
78	p1900/1	3	2	4	1	1	1	4	1
78	p1900/1	4	1	2	4	9	2	3	1
78	p1900/2	3	1	1	4	1	2	2	3
78	p2110/3	2	1	1	2	3	2	2?3	8
78	p2346/2	1	1	1	1	9	1	6?	1
78	p2346/2	1	2	9	2	4	2	3	7
78	p2346/7	2	2	6	5	2	2	2	2
78	p2346/7	2	2	6	1	6	2	3	1
78	p2426/11	1	2	1	1	4	2	2?	6
78	p2426/18	4	2	8	2	2	2	2	2
78	p802/2	4	1	1	1	9	2	2	9
3,8	p2122/1	5	2	5	2	1	2	3?	6
4,5	p72/8	3	1	1	2	9	2	3	9
4,5	p72/8	3	1	1	2	9	2	3	9
5,7	p63/2	2	1	2	3	1	1	4	1
5,8	p1815/4	4	2	8	2	1	2	2	2
6,8	p606/6	2	2	4	3	4	2	2?3	9
6,8	p606/6	3	1	1	4	1	2	2	8
6,8	p606/6	3	1	1	4	4	2	2	9
6,8	p699/1	3	1	2	1	3	2	2	9
6,8	p699/1	4	1	2	5	1	2	2	9
unphased	p1445/1	4	1	1	3	1	2	3	9
unphased	p2266/1	2	1	2	2	1	2	2	1
unphased	p920	2	5	9	3	4	2	3	9
unphased	ph3631/1	2	2	6	3	6	2	4	1
unphased	ph5282/1	2	2	4	3	4	2	2	3
unphased	ph8093	2	2	6	5	4	2	2	4
unphased	ph9923/2	3	1	3	1	1	2	2	2
unphased	ph9923/2	3	1	3	1	1	2	2	2

2.4 Coded butchery marks from cattle bones in layers

Ceramic Phase	Feature Number	Body Area (A)	Body area (B)	Bone Element (C)	Bone Area (D)	Position (E)	Cut Type (F)	Cut Purpose (G)	Number of Marks (H)
3	l1743	1	2	9	2	3	2	2?3	4
3	l465	1	1	1	1	9	1	6?	9
3	l730	1	2	9	1	4	2	2	3
3	l730	1	2	9	1	2	2	3	2
3	l731	1	2	9	1	2	2	2	5
3	l730	2	1	1	2	4	2	2	7
3	l994	2	1	1	2	4	2	2	2
3	l705	2	2	6	3	6	2	2	1
3	l481	4	1	2	5	9	2	2	1
3	l730	4	1	1	1	2	2	2	3
3	l496	4	2	1	1	1	1	4	1
3	l2054	5	2	5	2	5	2	1	5
3	l2054	5	2	5	2	5	2	1	10
3	l2054	5	2	5	2	5	2	1	6
3	l2054	5	2	5	2	5	2	1	3
3	l2054	5	2	5	2	5	2	1	6
3	l359	5	2	5	2	1	2	1	9
3	l730	5	2	5	2	1	2	1	4
4	l1997	1	1	9	1	1	2	1	7
4	l497	2	1	3	1	4	1	4	1
4	l1997	3	1	1	3	2	2	3	5
4	l1997	3	1	1	4	3	2	2	11
4	l1997	4	1	2	4	9	2	3	5
5	l506	3	1	1	4	6	2	2	3
6	l1053	1	1	9	3	4	2	3	2
6	l551	1	1	1	9	4	1	6?	1
6	l1742	1	2	9	1	3?4	2	2	2
6	l1910	2	1	1	1	4	2	2	6
6	l1910	2	1	1	4	3	2	3	3
6	l1910	2	1	1	5	3	2	3	6
6	l511	2	1	2	3	9	1	4	1
6	l743	2	1	1	1	4	2	2	1
6	l406	2	2	6	1	9	1	4	9
6	l44	2	2	6	5	9	1	2	1
6	l473	2	2	4	3	9	1	4	9
6	l473	2	2	6	3	9	2	2?3	9
6	l1063	3	1	2	2	4	2	3	3
6	l458	3	1	1	4	3	2	2	2
6	l870	3	1	1	4	4	2	2	3
6	l897	3	1	1	4	2	2	2	3
6	l1734	4	1	2	5	9	2	2	10
6	l547	4	1	2	4	1	2	3	1
6	l1160	4	2	4	2	3	2	1	1
6	l1734	5	2	5	2	4	2	1	4
6	l1742	5	2	5	2	3	2	2	1
7	l1545	1	1	9	5	1	2	1?	2
7	l415	1	1	9	3	4	2	3	1
7	l838	1	2	9	1	4	1	2	7

7	I954	1	2	9	1	5	2	2	2
7	I1000	2	1	2	3	5	2	3	2
7	I1000	2	1	2	3	5	2	3	9
7	I1153	2	1	1	1	3	2	2	2
7	I1153	2	1	1	1	4,3	2	2	5
7	I1188	2	1	3	3	6	2	3	1
7	I1195	2	1	1	2	1	2	2	7
7	I1206	2	1	1	1	2	2	2	3
7	I1289	2	1	7	3	5	2	2	1
7	I1521	2	1	7	3	6	2	2	3
7	I1678	2	1	2	3	1	2	2	9
7	I1680	2	1	1	1	1	2	2	3
7	I1963	2	1	8	3	1	1	4	3
7	I361	2	1	2	2	9	1	4	1
7	I367	2	1	1	6	3	1	4	9
7	I393	2	1	1	2	4	1	4	9
7	I393	2	1	3	3	4	1	4	1
7	I6	2	1	1	4	1	1	4	1
7	I851	2	1	1	1	4	2	2	1
7	I1026	2	2	5	3	6	2	3	2
7	I1153	2	2	6	1	5	1	2	1
7	I1188	2	2	6	4	9	1	2?3	3
7	I1521	2	2	6	1	3	1	2	1
7	I1545	2	2	4	2	4	2	4	3
7	I1545	2	2	4	3	4	2	2	2
7	I1856	2	2	6	1	6	2	3	4
7	I1912	2	2	5	3	6	2	3	6
7	I393	2	2	5	3	9	2	2?3	9
7	I859	2	2	5	2	4	1	1?3	1
7	I914	2	2	6	3	6	2	2	1
7	I916	2	2	6	5	2	2	2	1
7	I988	2	2	6	3	6	2	4	6
7	I988	2	2	6	5	5	2	3	1
7	I1545	2	9	9	3	2	1	4	5
7	I1153	3	1	1	4	3	2	2	3
7	I1188	3	1	1	4	4	2	2	5
7	I1191	3	1	1	4	2	2	2	4
7	I1289	3	1	3	2	1	2	2	3
7	I1538	3	1	1	4	3	2	2	8
7	I230	3	1	2	4	1	1	4	4
7	I230	3	1	2	4	1	1	2	9
7	I367	3	1	2	2	2	2	3	9
7	I371	3	1	1	4	2	2	2	1
7	I389	3	1	1	4	1	2	2	5
7	I393	3	1	3	2	1	2	2	5
7	I414	3	1	2	2	3	2	2?	4
7	I429	3	1	1	4	3	1	2	1
7	I525	3	1	1	4	3	1	2	3
7	I750	3	1	3	1	1	2	2	2
7	I838	3	1	2	2	1	2	2	2
7	I888	3	1	1	4	4	2	2	7
7	I888	3	1	1	4	3	2	2	7

7	I1157	3	2	4	3	1	2	2	1
7	I1153	4	1	1	5	2	2	2	2
7	I1189	4	1	1	1	9	2	2	5
7	I1512	4	1	2	2	2	2	3	4
7	I361	4	1	1	2	1	2	3	9
7	I456	4	1	1	5	9	1	4	1
7	I718	4	1	1	4	2	2	2	4
7	I1153	4	2	1	3	1	2	2	4
7	I1521	4	2	1	3	1	2	2	3
7	I1521	4	2	4	2	1	1	4	5
7	I1521	4	2	4	2	1	2	1	11
7	I1529	4	2	2	2	1	2	2	2
7	I1545	4	2	1	3	1	2	2	6
7	I1690	4	2	2	2	4	2	2	2
7	I1856	4	2	1	3	3	2	2	5
7	I1863	4	2	2	2	4	2	1?2	3
7	I367	4	2	2	1	1	2	2	9
7	I715	4	2	2	1	9	1	2	3
7	I930	4	2	2	1	4	2	2	1
7	I988	4	2	1	2	1	2	2	5
7	I456	5	2	5	3	4	2	2	2
8	I4	5	2	5	3	1	1	4	1
13	I730	3	1	2	1	4,3	2	2	9
78	I722	1	1	9	7	2	2	2	4
unphased	I323	2	2	6	1	6	1	4	9

APPENDIX 3 Butchery Experiment

A3.1 INTRODUCTION

The overall aims of the experiment were to provide a fuller understanding of butchery methods to aid interpretation of butchery marks on bone, and to compare the use of flint and iron tools in boar butchery. This interpretation could then potentially shed some light on the status of butchers/ butchery at Danebury, since iron has been regarded as having a higher status than flint in this period (Young and Humphrey, 1999). The validity of the author's interpretation of marks on the Danebury material which underpins this thesis could also be tested. The objectives of the experiment fell into five main areas, outlined below.

The first objective was to assess the relative merits of three hardnesses of iron knives and several types of flint tool (scrapers, blades) when performing different tasks including disarticulation and filleting of meat from the bone. Butchery marks on pig bone suggest that these tasks were performed at Danebury, although it is not certain which tools were used for these tasks. Both iron knives and flints[1] have been found in Iron Age contexts from Danebury, and recently Young and Humphrey (1999) have suggested that flint may have been used in Iron Age domestic tasks. Butchery could be just such a task, and one for which the use of 'expensive' iron objects was not suitable. Comparisons between the replica tools and modern steel knives did not form a prime objective although differences have implications for the speed and accuracy of the butcher's work. Saws were found at Danebury, but saw marks for butchery were not identified on the domestic animal bone.

The second objective was to gain important empirical insights from a skilled professional butcher in order to verify the author's interpretations of Iron Age butchery, including the proposed order of dismemberment and the coincidence of cutmarks on the modern carcass and those observed on the bones from Danebury.

[1] No Iron Age flints were illustrated in the site report, but flint pieces in the forms identified by Young and Humphrey (1999) are present in the archive. Humphrey's preliminary analysis identified pieces deemed typical of Iron Age flint; these were used as prototypes for the experimental flints and two are described below:
a). DA72, P291/2, Find No. 890: Fresh broken flake- bifacially worked on one edge for cutting knife. Cortex on opposite side.
b). DA85, P2424/1, Bulk Find: Fresh very large flake from core, bifacially worked on distal edge to form cutting. Chopping edge. Tool.

The third objective was to record matters of importance to the study of meat consumption in the past, including correlations between live, dead, dressed and bone weight. These are secondary to the main emphasis of the experiment, but nonetheless have the potential to show differences between the efficiency of the two tool materials.

The fourth objective was to identify use wear on each of the knives and flint, including detailed microscopic analysis. The number of sharpenings and weight loss during use was recorded, together with which tasks the tools were used for and how many times. Again this is peripheral to the main focus of the study and of limited relevance, but may help when considering the appropriateness of different materials for butchery.

The final objective was to investigate the morphology of cuts into the bone, in order to compare these to the butchery marks at Danebury, in an attempt to identify which tools may have been in use for butchery tasks in the Iron Age.

A3.2 BACKGROUND[2]

The original intention of the butchery experiment was to disarticulate and fillet an entire boar with iron and flint cutting tools, in a similar manner to the butchery process interpreted from the Danebury assemblage, and to see if and how the marks on the carcass corresponded to those in the archaeological record. Iron knives had been found at Danebury, and a colleague (Jodie Humphrey) was investigating the potential for the use of flint in domestic contexts in the Iron Age.

A boar was chosen as its bones and musculature were thought to more accurately represent the 'unimproved' pig of the prehistoric period which contained less fat than modern examples, and was heavily bristled (Lawrie 1998; Malcolmson & Mastoris 1998). The boar was from a free range farm in Cornwall, and it was thought that the exercise that free range animals enjoyed would produce individuals of more similar musculature to those in the Iron Age than those kept in confined spaces on pig farms. It was expected that the bone density of a boar might be higher than that of modern breeds which are bred to mature fast for a quick turnover of meat. Denser bone was expected to be more resistant to marking with cutting tools.

[2] The idea for the experiment came about during a seminar discussion between the author, Jodie Humphrey, Dr Rob Young and Dr Annie Grant.

Knives were made for the experiment by Peter Crew, the archaeology officer of the Snowdonia National Park Study Centre, in conjunction with a blacksmith, Hector Cole, using iron smelted with what are thought to be Iron Age techniques (see Crew 1991). The forms of the knives were based on those recovered from Danebury, and the most suitable for butchery were chosen in consultation with the butcher. Three knives were made of differing carbon and phosphorous content, shape and size (see figures A3.1 and A3.2).

These may have been smaller than those at Danebury if the Iron Age knives had been sharpened many times prior to deposition and their edge worn away. Flint scrapers, flakes and knives in various sizes (see figure A3.3), were produced by Linden Cooper, project officer at the University of Leicester Archaeological Services and Jodie Humphrey, based on her analysis of flints thought to be of Iron Age date from Danebury (figure A3.4).

The experiment was organised for September 2000, and Mr Wood, a traditional butcher, had kindly made himself available for a full Sunday to perform the butchery, in accordance with the methods hypothesised from the author's interpretation of the butchery marks. The week before the experiment saw the instigation of major fuel protests across the UK, with hauliers, farmers and taxi drivers blockading major depots. As fuel supplies slowly ran out across the country, a crisis developed for emergency services, and the farmer who was to have supplied our boar was unable to do so.

The experiment was rescheduled for November 2000. However the butcher developed glandular fever and was unable to work at all, and the experiment was again rescheduled, this time for March-April 2001 when the butcher was feeling well enough to do work additional to his main employment. The outbreak of foot and mouth in Britain was first recognised in early February 2001. The farmer who was to provide the boar had his animals condemned on Tuesday 27th March, four days before the experiment was due to take place.

Time constraints did not allow for another rescheduling of the experiment, and instead a smaller scale one was undertaken. The butcher simply kept two heads and hocks of pigs he received for butchery and resale, and each of these was subject to disarticulation (of the jaw) and filleting of the meat from hocks, mandible and skull. Trotters had been removed from the carcasses to reduce risk of foot and mouth contamination, so these were not available for investigation. The carcasses were those of two females aged between 6 and 8 months[3].

The modified experiment limited the potential for testing assumptions about butchery in the Iron Age, especially since the bone was from modern breeds and likely to be easily marked. The meat very probably had a higher fat content than Iron Age meat, and the skin almost certainly softer to cut through, which could affect the cutting edge of the blades. However the experiment still had the potential to address questions concerning the impact of tools upon bone, the potential for the use of flint in butchery as an alternative to iron knives, and the correlation of the positions of butchery marks with particular activities.

A3.3 METHODOLOGY

The butcher was asked to skin, disarticulate and fillet the bones if possible, and to split the skull and mandible longitudinally. The meat weights from each bone were recorded as they were removed, and retained for further investigation. Following completion of the experiment the bones were boiled for roughly an hour and the majority of the soft tissue picked off. Knives were not used as this could have created further marks. The bones were then soaked in a solution of pepsin at 35 degrees Celsius, in order to break down the remaining soft tissue adhering to the bone. The bones were left for 5 days, then boiled and scrubbed. The process was repeated as not much of the tissue was dislodged on the first attempt. The bones were then bleached by Tony Gouldwell, left to dry and the positions of cuts noted, measured and photographed (figure A3.5).

Cutmarks were examined by eye to identify if different types can be distinguished in non-microscopic identification of animal bone, and then examined under a microscope at x30 magnification.

[3] Grant's 1982 system of aging was used to calculate a mandible wear stage for the two animals. Differences in the relationship between age and tooth wear are expected since modern animals were probably fed very differently to the Iron Age animals, possibly on softer, less abrasive items. The improvement of breeds in the 17-18th centuries led to faster growing animals, which may result in modern individuals having earlier tooth eruption times than their Iron Age counterparts (Wiseman 1986).

Pig and side	M1	score	M2	score	M3	score	MWS
Pig 1, right	c	8	C	1	N	0	9
Pig 1, left	c	8	C	1	N	0	9
Pig 2, right	b	7	C	1	N	0	8
Pig 2, left	b	7	C	1	N	0	8

Table A3.1: Mandibular Wear Stages of the two pigs used in the butchery experiment.
On both animals the first molars were in wear but the second had not yet erupted. Silver (1969) gives an age of 4-6 months for the eruption of the first molar in modern animals, and of 7-13 months for the second molar. The butcher's age of 6-8 months is consistent with Silver's figures for modern animals.

Some butchery had been undertaken prior to the experiment during disarticulation from the main carcass. Using stainless steel blades, the butcher had separated the hocks from the upper leg at the proximal radius and ulna, and sharp knife cuts were visible on the cleaned bone. The separation of the skull from the rest of the carcass created similar cuts on the occipital condyles. Circular saws had been used in the abattoir to remove the feet and also to split the entire carcass in half lengthways cutting straight through the midshaft of the radius and ulna, and into the back of the skull, where the bone is thickest. The latter did not cut along the suture of the skull but was off centre, so the cuts made by the experimental tools did not run along the middle of the skull. This probably made the process of splitting the skull using the experimental tools more difficult and as a result the morphology of the cuts created may have been affected.

A3.4 RESULTS

A3.4.1 Comparison of knife and flint

Process: Filleting out the meat from the upper radius/ ulna.

The flint knives were good at cutting through skin and flesh, and the butcher found it easy to remove most meat from the bone. Skinning was also undertaken, but the result was uneven and he attributed this to his lack of practice with the tool rather than the tool itself. The functioning of the iron knives varied according to their softness, but the butcher said that they were much easier to use than the flint, partly because he was used to them and partly because they were easier to guide. The softest was not sharp enough to cut easily through the skin.

Process: the skull was split longitudinally, the mandible was disarticulated from the skull, and the meat on the sides of the jaw and head and the tongue removed.

The flint was used as a wedge, with a hammerstone to split the skull. This was achieved with some force and chips of flint shattered some distance. The iron knife was also hit with the hammerstone; this tool was more easy to direct (figure A3.6). The tongue was removed and the mandible split easily with both types of tool. The mandible was then removed from the skull, using a sawing action with many cuts to the medial condyle area (figure A3.7). Physical force was used to separate the jaw and skull, which resulted in parts of the mandible snapping off. The rest of the meat was then removed from the bone.

A3.4.2 Comparison of the experimental cuts and those observed at Danebury

a). Position of cuts

Physical evidence of the butchery using flint tools showed only along the length of the skull (figure A3.8), where it had been split, and on the mandible. Cuts to the mandible were found on the lateral and medial side across the angle (figure A3.9), where the meat was filleted out, and into the articulation on the posterior edge, from disarticulation. Both sides had suffered loss of the coronoid process where the bone had been snapped off during disarticulation. The splitting of the mandible and the skull did not follow the suture, but was asymmetric, falling to one side and leaving the fore part of the mandible almost intact.

The marks made with flint tools therefore reflect some of the marks seen on bone from Danebury, especially those interpreted as resulting from the filleting of meat from the mandible, and the separation of the mandible. However marks resulting from the splitting of the skull and mandible are not mirrored at Danebury: it is likely that at Danebury the mandible was not broken during disarticulation, but that more cuts would have been made to the upper parts to remove the lower jaw.

Cuts to the skull made with iron knives were visible under the orbit and along the frontal bone, as well as on the mandible (figure A3.11). Those used to split the skull were also visible (figure A3.10). This may imply that knives leave more traces of cuts on the bone, although it is possible that the butcher simply used this tool with more force as it was more familiar to him.

Cuts to the mandible were found beneath the toothrow on the lateral side, and these were created during filleting. Many disarticulation marks were found on the medial side, cutting up and into the condyle, with some cutting across the medial and into the anterior part of the angle. Again parts of the mandible had been completely broken off: the entire articulation had been snapped from one side. Cuts to split the skull and mandible laterally were again off-centre, as the butcher followed the mechanically made cut.

Filleting cuts were found on the skull below the orbit (in exactly the same position as those at Danebury). One cut along the frontal part looked as if it had been made by 'shaving' off the flesh, and occurred during removal of the skin from the skull. The marks that resulted from skinning the experimental skull did not occur at Danebury. Skinning of the animal would normally have occurred before disarticulation, to remove large parts of skin, so it cannot be expected to produce similar marks when performed after disarticulation.

Cuts made with knives are consistent with some of the activities hypothesised for Danebury. Cuts to remove meat below the toothrow were not found on pig bones at Danebury but were found on cattle bones. Cuts below the orbit were mirrored on the Danebury pigs. The cuts across the medial side of the angle are similar to cattle bone butchery marks from Danebury. The heavy cuts into the articulation for disarticulation are not mirrored at Danebury and this could be due to the bluntness of the knife, or excessive force used in disarticulation in the experimental procedure.

The most important differences result from the splitting of the skull and the disarticulation of the mandible. It is likely that at Danebury the mandible was disarticulated using dextrous cuts into the articulation, evidenced by cuts to the condyle of the mandible and beneath the orbit. Since the majority of the Danebury pigs were generally older and of a different conformation to modern animals, it is less likely that the mandible could easily be snapped off, especially as the bone from unimproved species is denser. The cuts to split the skull did not follow the suture, and this may be misleading, but it is not likely that a hammerstone was used to split the skull, due to cut morphology (see below).

b). Frequency of cuts

Cuts made with flint and iron tools were observed on the head, but only one was found on the radius (apart from those created from the initial disarticulation of the hocks from the trotters and humerus) from an iron knife. All parts were stripped of meat, and it is notable that these lower limb parts were mainly unmarked even though the process was performed by a person unfamiliar with the tools. This could suggest that the majority of cuts made did not mark the bone and may explain why only 2% of the Danebury pig bones have cutmarks on them. While it is possible that these 2% may be unrepresentative of the general methods of butchery, it is perhaps more likely that they were made by inexperienced or careless butchers and are in fact representative of the techniques used in the Iron Age.

The experimental procedure left many flint and iron knife cuts on the skulls. Rather than suggesting a contrast between the experimental and Iron Age butchery methods, it is possible that the relative bluntness of the iron knives, and unfamiliarity of the tools caused the butcher to have less control over the cuts he made, causing deeper and more frequent cuts to the experimental skulls. Stanford and colleagues have suggested that flint cuts easily through flesh but does not readily sever the myelin sheaths around muscles (Stanford *et al* 1981). This does not accord with the comment that Mr Woods made about the proficiency of flint tools at cutting through both skin and flesh, although it is possible that no unbroken myelin sheaths were encountered in this experiment.

c). Nature of cuts

The cuts made to split the skull using flint tools were extensive: such cuts have not been found on the Danebury material. On the top of the skull the blows with the hammerstone had caused the bone to come off in discs, leaving scooped out fractures (figure A3.8). The use if iron knives resulted in similar fracturing of the bone but on a much smaller scale, and the cuts were more even. The flints had caused an uneven scooped cut, while iron tools had left something more recognised in the Danebury material, a slightly ridged appearance (figure A3.12). These ridges were in evidence in cuts to split the skull, remove the eye and where bone had been scraped off the frontal part.

Flint cuts for disarticulation of the jaw were deep and v-shaped, those made with iron knives were v-shaped (\/) and blunted v-shapes (_/). The latter probably reflects the relative softness of the iron knives, which were not highly sharpened, although adequate for the butchery tasks performed. Such a cut in the Danebury material would have been interpreted as a 'chop'. In fact the modern cut was made by using the knife in a sawing motion, and resulted in very deep cuts (up to 5mm).

Cuts for filleting using flints were v-shaped, although one was very faint. More of the iron knife cuts were blunted v-shaped cuts and one cut was more of a right-angled scoop.

Walker and Long (1977) performed an experiment using different tools to create butchery marks; the profile of the marks from their work corresponds with those produced in this experiment. The more blunted _/-shaped cuts are distinctive of knife cuts while sharp \/-shaped cuts are typically made by flint tools (Walker & Long, 1977: 609). The boundaries between the two types may be blurred depending on the force, angle and motion (sawing, chopping etc) of the cut. The cuts made by Walker and Long were shallower, probably a result of a coarser cutting edge which was produced by bifacial flaking. Since the pattern which appears in Walker and Long's work is also that presented here, the relative bluntness of the iron tools compared to steel in this experiment may not have biased the results.

It is difficult to make unequivocal suggestions about tool use at Danebury: the iron knife cuts appear to mirror the splitting and scraping cuts from Danebury, and the flint cuts the disarticulation and filleting marks. It is of course possible that both were used perhaps at different stages of the butchery, or that the iron knife marks made in this experiment were made by unrepresentatively blunt tools.

A3.4.3 Meat and bone weights from the head and hock

The meat and bone from each individual was weighed to compare the ratio of meat to bone weight.

FLINT TOOLS	Bone weight before cleaning (g)	Meat weight (g)	% Meat	Dry bone weight (g)	Dry bone as % of uncleaned bone	Dry bone as % of recovered meat
Radius and Ulna	205	455	**69**	70	**34**	15
Skull	2160	880	**29**	440	**20**	50
Mandible (inc tongue)	705	1385	**66**	230	**33**	17
Head (total)	2865	2265	**44**	670	**23**	30
IRON TOOLS	**Bone weight before cleaning (g)**	**Meat weight (g)**	**% Meat**	**Dry bone weight (g)**	**Dry bone as % of uncleaned bone**	**Dry bone as % of recovered meat**
Radius and Ulna	185	400	**68**	65	**35**	16
Skull	1700	745	**30**	330	**19**	44
Mandible (inc tongue)	435	1455	**77**	150	**34**	10
Head (total)	2135	2200	**51**	480	**22**	22

Table A3.2: Meat and bone weights from the butchery experiment, to 5 grams.

The pig butchered with iron knives appears to have had a greater percentage of meat removed from its mandible, although table A3.2 shows that there is very little difference in the percentages of meat removed from the hock and skull.

The initial impression was that there was slightly more meat left on the mandible when using flint. This could be related to the bluntness of the iron knives, although if this were the case one would expect the pattern to be similar for the other bones. An alternative explanation is that the shape of the mandible meant the smaller flints were more efficient at removing meat from awkward parts.

When the dry bone was weighed, it was noticeable that there is very little difference between the two pigs in the proportion of dry to uncleaned bone. This suggests that both tools had removed a similar amount of meat from the skull. When the dry bone was compared to the amount of meat removed, it is clear that the pig butchered with iron knives in fact carried less meat on its head, with a similar amount on its hock. This could have been due to differences in the position of the cut to remove the head, although it is more likely that the conformation of these pigs was slightly different, possibly due to the gap in their ages. The pig butchered with iron knives was younger by 2 months. There is no difference between the two pigs in the proportions of meat on the hock, although this part carries less meat so differences would be less pronounced.

This analysis suggests that it is unlikely that the iron knives were less efficient at filleting meat from the mandible than the flint.

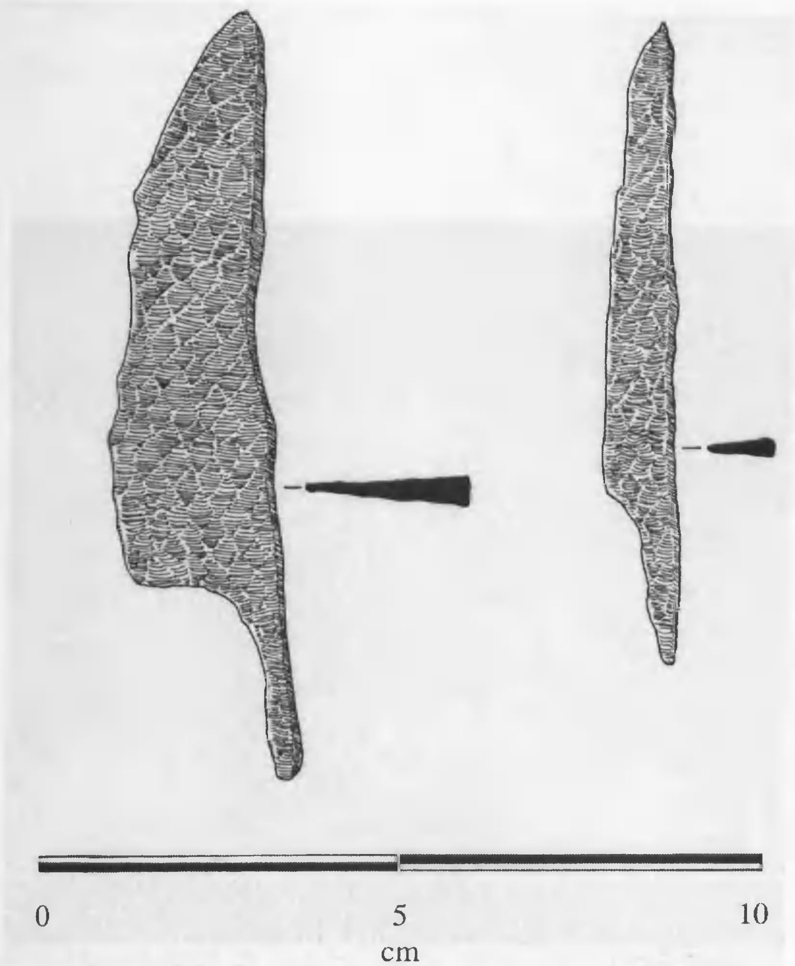
A3.5 CONCLUSIONS

From the limited evidence available, it seems that in the Iron Age the skull was probably not split using flints; nor is the use of iron knives for this task definitely established. It is possible an iron cleaver may have performed the task at Danebury. However, the pig skulls in this experiment were not split along the suture as those from Danebury were; a far easier and neater task. Both materials performed filleting and disarticulation tasks well, and either may have been in use at Danebury. The cuts found from filleting activities coincide with marks on pig bones found at Danebury, and they are also often mirrored by the marks found on cattle at Danebury. Modern pigs are closer to the size of prehistoric cattle. The position of cuts for disarticulation sometimes correspond in both tool types, but those from Danebury are less deep, probably suggesting greater familiarity with the tool type in the past.

The morphology of the cuts at Danebury is more similar in profile to cuts made by flint than iron knives, but the sharpness of the iron knives may be a crucial factor. It could be concluded that blunt iron knives were not in use for butchery at Danebury, although sharp ones may have been. The knives used in this experiment were perfectly adequate for the butchery tasks that were required, and it seems unlikely that a butcher would sharpen tools unnecessarily unless butchery were regarded as a specialised, artisan craft, or one in which time was an important factor. It may be that at Danebury butchery was a specialised craft for which sharp knives were used. It was certainly a craft which was performed carefully, as is shown by the meticulous disarticulation of the mandible, rather than breaking it (although it may have been more difficult to snap this part off a boar).

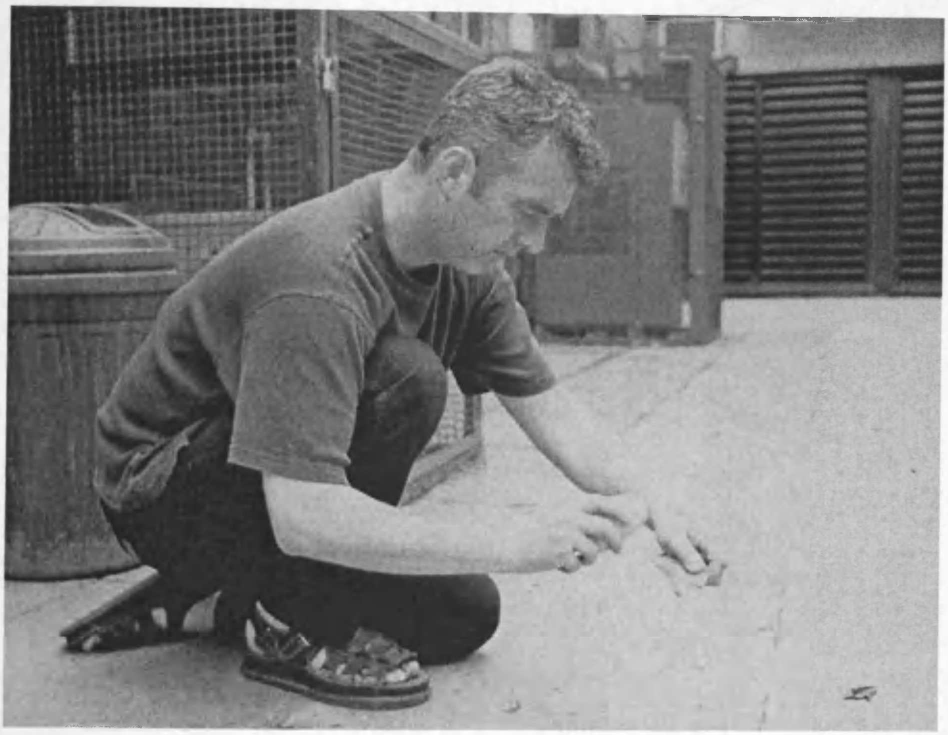
Most crucial to this study is the observation that the frequency of cuts to the skull in the experiment was more common than has been observed for Danebury. This was perhaps because pig heads at the hillfort were not skinned, although the unfamiliarity of the experimental tools may also be an important factor. The lack of cuts to the hock of the experimental animals suggests that in the past butchery may not have resulted in bone being visibly marked, a phenomenon noted by several authors including Peck (1986) and Guilday et al (1962). This means that although only 2% of the Danebury pig bone was marked, we should not conclude that the remaining 98% had not been subject to the similar butchery processes. The absence of butchery marks should not therefore lead us to assume that the animals were, for example, roasted whole.

This limited experiment has not provided conclusive evidence for the tool types used at Danebury for butchery. The sharpness of the tools is a crucial factor and further experimentation using sharper knives may add additional insights. However, there is some evidence to suggest that different types of tools were used for the most appropriate tasks and were not necessarily used exclusively.

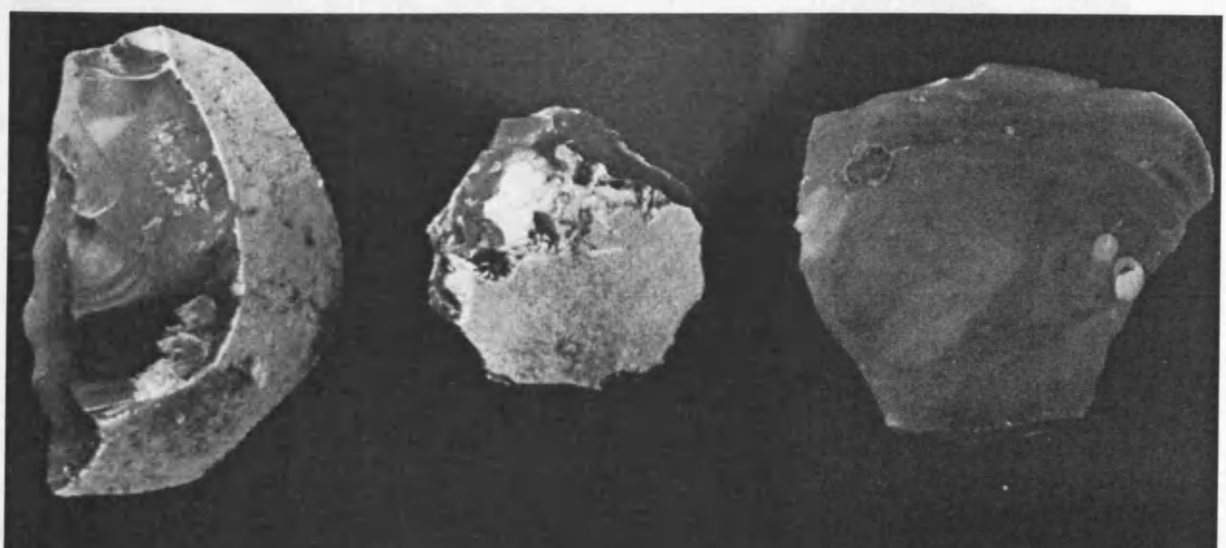


A3.1: Iron knives 2.13 and 2.28, recovered from Danebury used as prototypes for the experimental tools. Source: Cunliffe, 1984: 350.

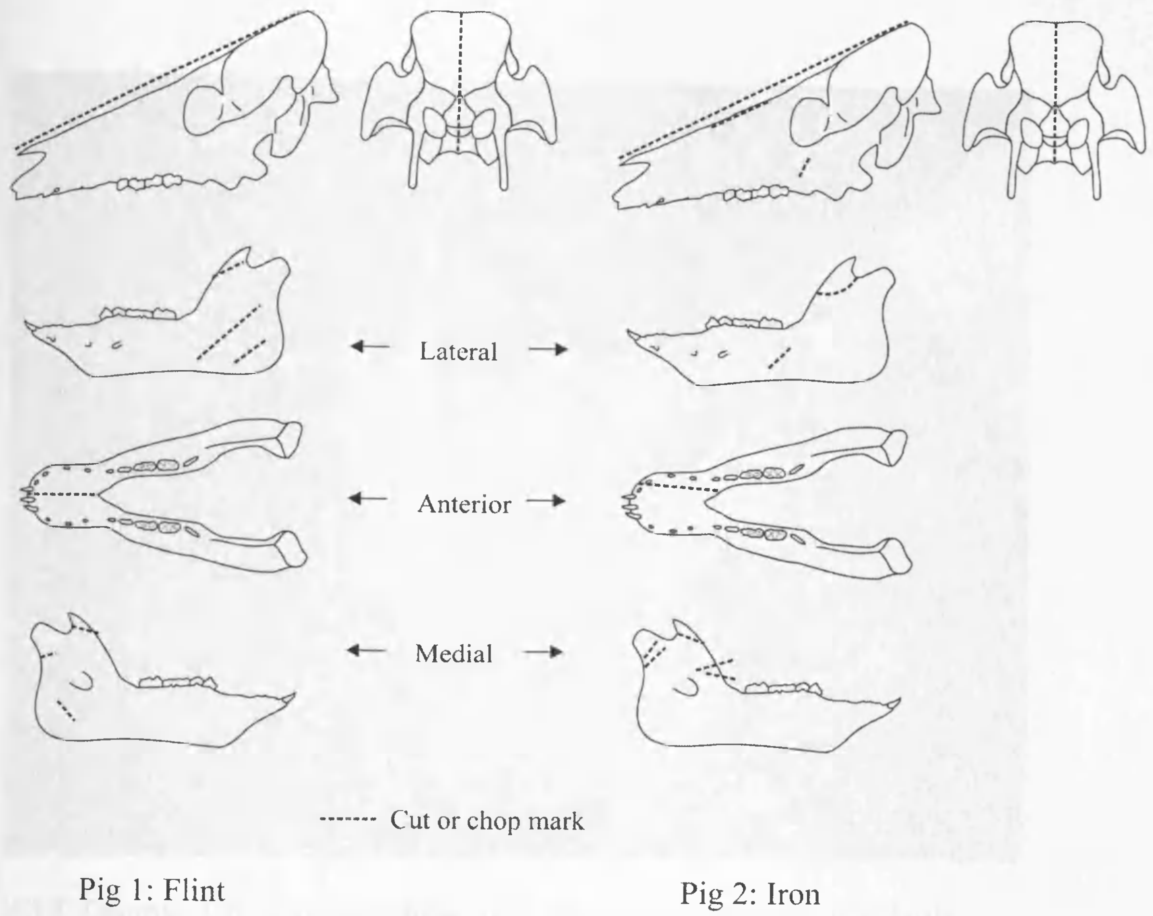
A3.2: Iron knives produced for the experiment. Scale in cm.



A3.3: Flint tools being knapped by Linden Cooper.

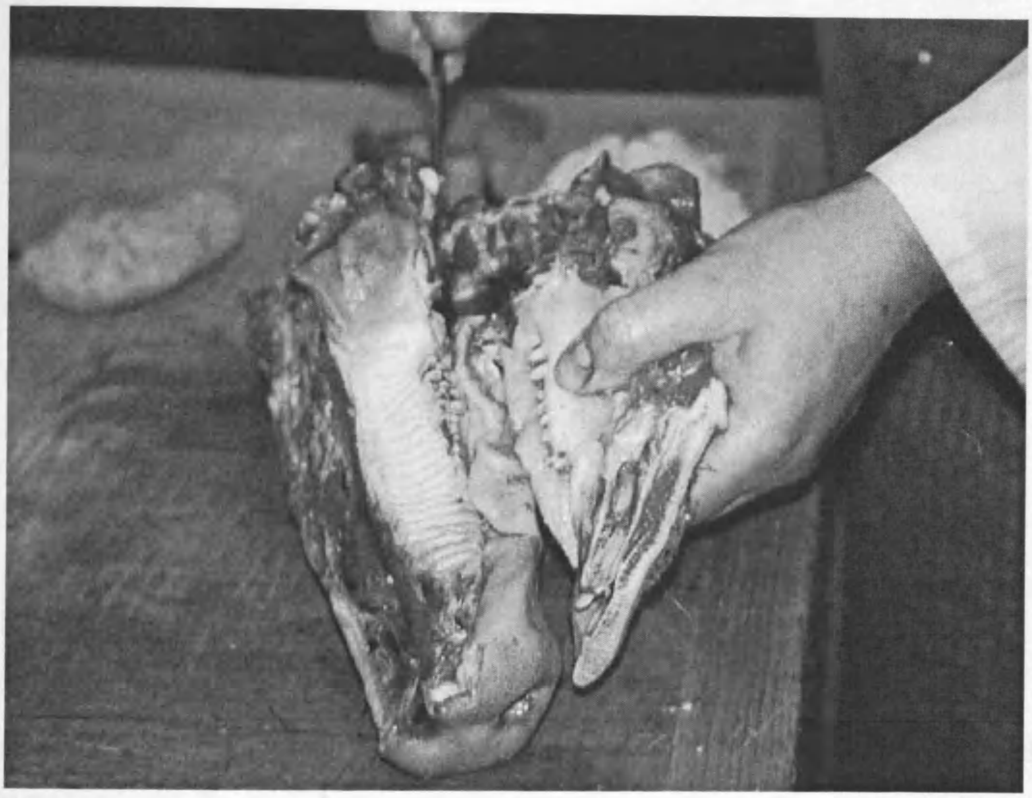


A3.4: Three of the flint tools used in the experiment. Scale in cm.

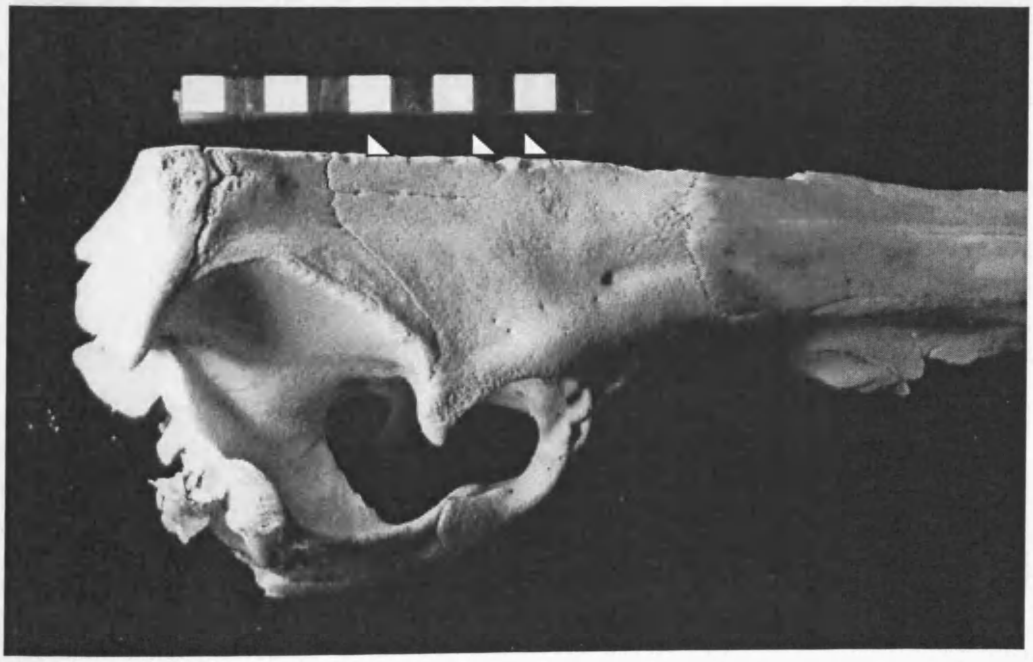


A3.5: Cut marks observed on the bones of the experimental pig heads.

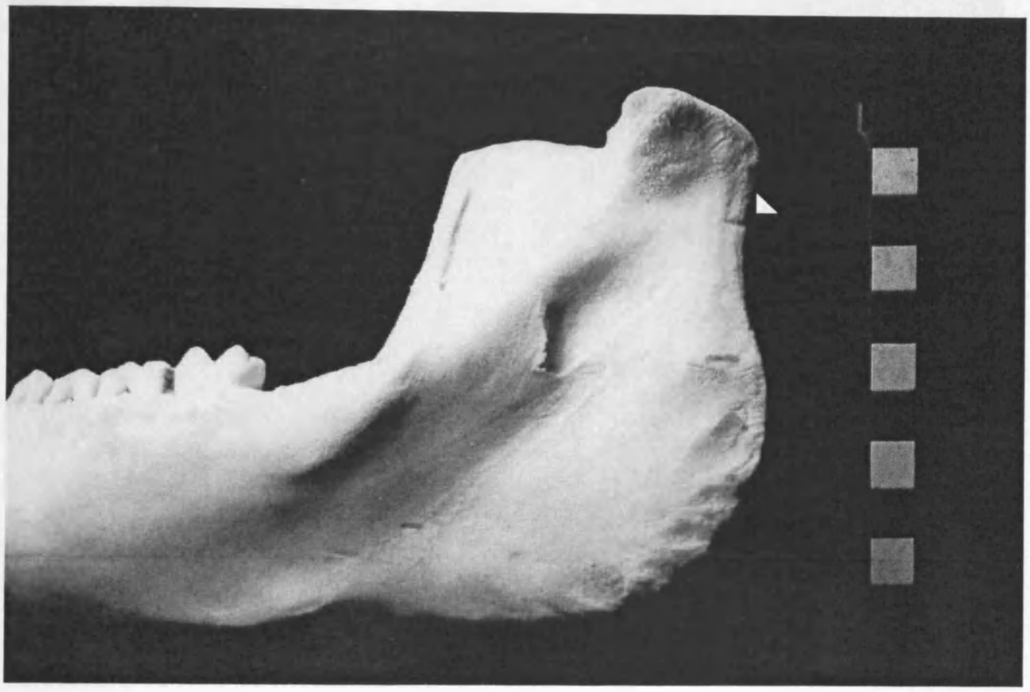
A3.6: Splitting the skull with an iron knife and hammerstone.



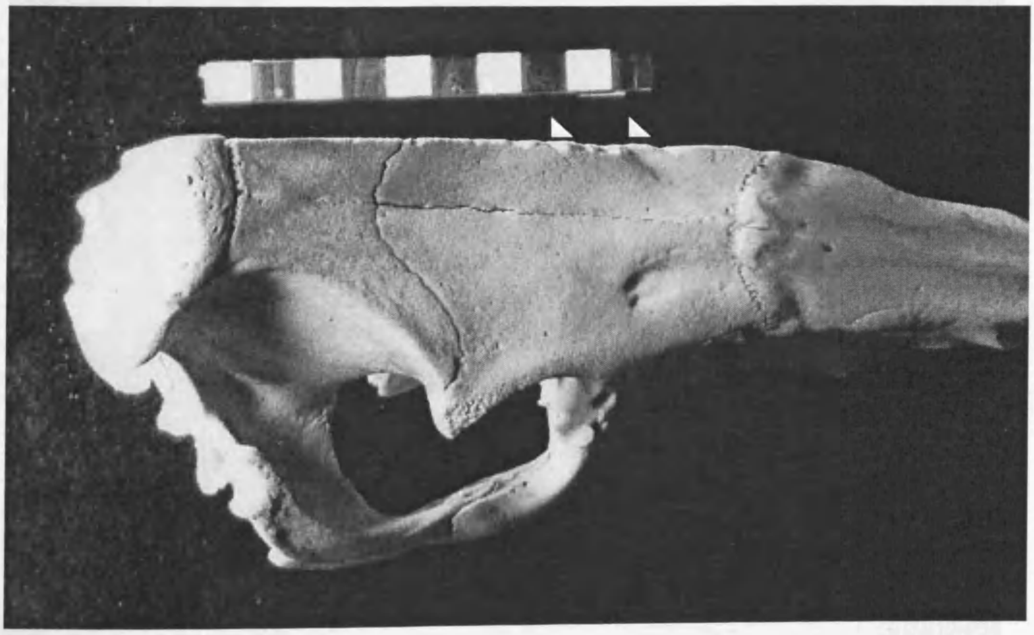
A3.7: Disarticulating the mandible from the cranium using an iron knife.



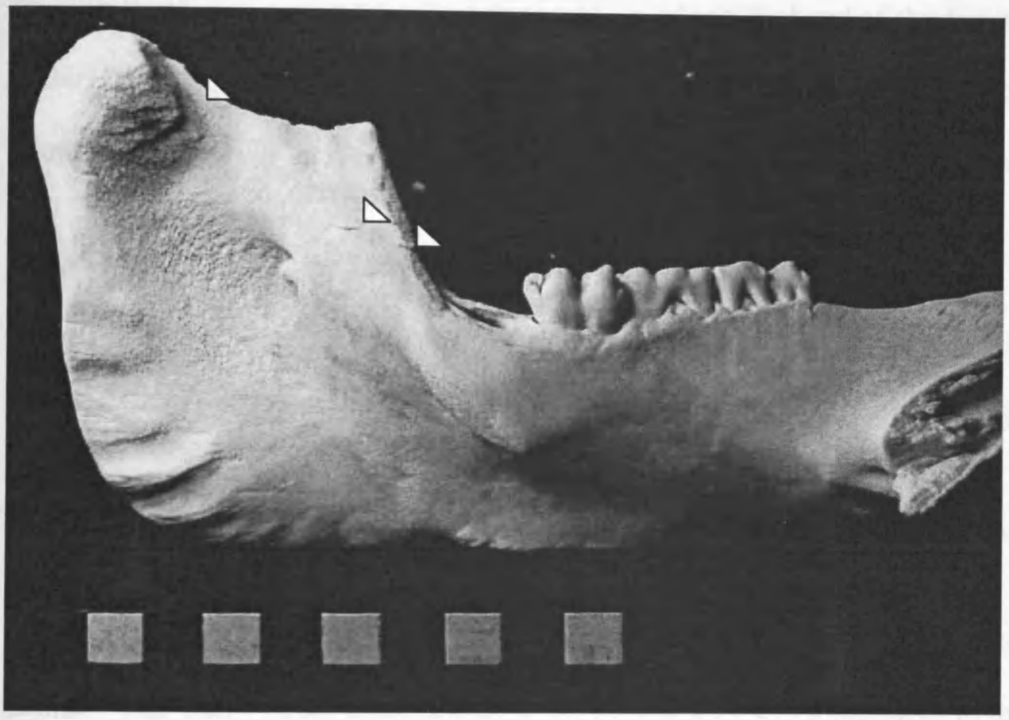
A3.8: Marks made on the skull of pig number 1 with a flint tool and hammerstone while splitting the skull in half. Scale in cm.



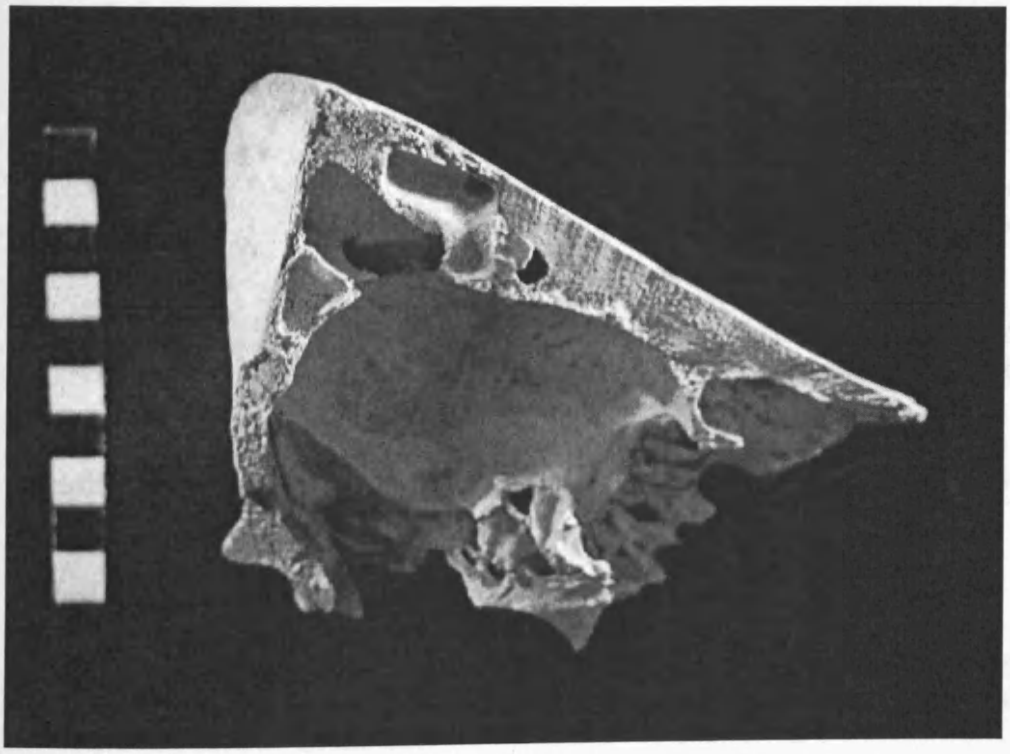
A3.9: Marks made on the mandible of pig number 1 with a flint tool during disarticulation from the cranium. Scale in cm.



A3.10: Marks made on the cranium of pig number 2 with an iron knife and hammerstone while splitting the skull in half. Scale in cm.



A3.11: Marks made on the mandible of pig number 2 with an iron knife during disarticulation from the cranium. Scale in cm.



A3.12: A split skull at Danebury from a late phase pit. Scale in cm.

APPENDIX 4 Glossary

Acetabulum: the pelvic socket joint, in which the head of the femur turns.

Anterior: the foremost part of the bone, towards the head of the animal.

Condyle: a rounded process in the mandible where it articulates with the cranium.

Distal: the lower end of the bone: towards the hoof.

Dorsal: the upperside of the bone: towards the back of the animal.

Epiphysis: the termination of each bone. It fuses to the bone shaft at a certain stage in the life of the animal, when the shaft is fully formed.

Filleting: a term used in butchery to describe the removal of meat from the bone. 'Boning out' is an alternative phrase.

Glenoid cavity: the scapula socket joint, in which the head of the humerus turns.

Ilium the cranial end of the pelvis, projecting forwards to the head

Ischium the caudal end of the pelvis, projecting behind the hind limb

Lateral: the outermost side of the bone, towards the side of the animal.

Masseter: cheek muscle used for closing the jaw.

Maxilla: the upper part of the jaw.

Medial: the innermost side of the bone, towards the centre of the animal.

MNE: the Minimum Number of Elements present in a certain deposit or site, calculated using ageing data, side of the animal the bone was from and the size of the bone.

MNI: the Minimum Number of Individuals present in a certain deposit or site, calculated using ageing data, side of the animal the bone was from and the size of the bone.

Occipital condyle: the bone processes at the back base of the skull, which articulate with the atlas

Periosteum: the membrane which covers the bone surface

Portioning: term used in butchery to describe the process of chopping through bone to create smaller 'portions' of meat, usually with bone incluuded in the cut.

Posterior: the hindmost side of the bone, towards the tail of the animal.

Proximal: the upper end of the bone.

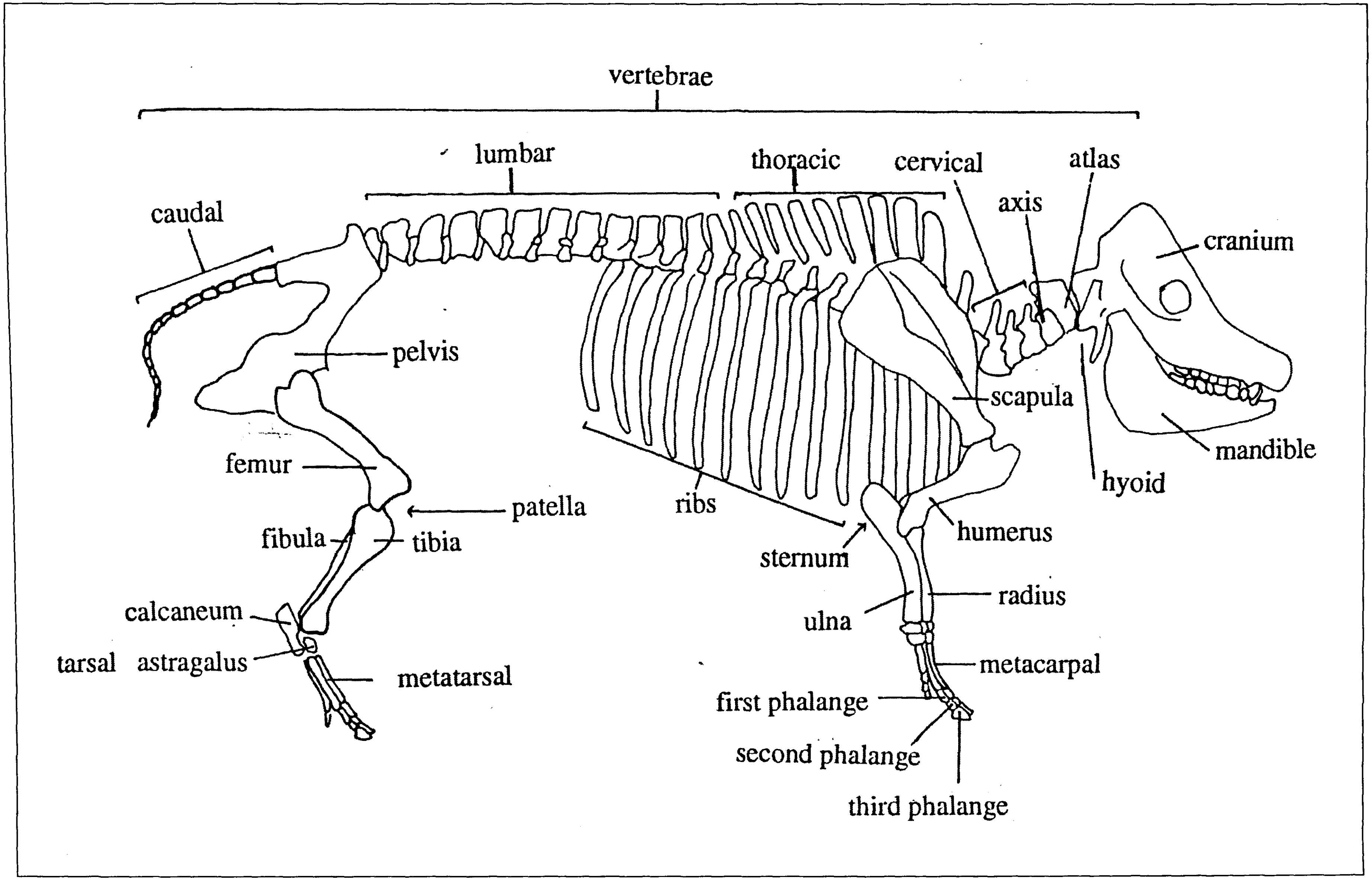
Ramus: the vertical part of the mandible posterior to the toothrow.

Taphonomy: the study of the processes by which animal and plant remains become preserved as fossils.

Theme: 'a user-defined perspective on a coverage...or image geographic data set' (defined by ESRI, http://www.esri.com/library/glossary/t_z.html).

Transverse process: the bone protrusions lateral to the vertebral body, serving as attachments for muscles.

Ventral: the underside of the bone: towards the abdomen of the animal.


vertebrae
lumbar
thoracic
cervical
atlas
axis
caudal
cranium
pelvis
scapula
mandible
femur
hyoid
patella
ribs
fibula
tibia
humerus
sternum
calcaneum
radius
ulna
tarsal
astragalus
metacarpal
metatarsal
first phalange
second phalange
third phalange

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