CHAPTER 3
PASTORAL FARMING
By Martyn Allen

INTRODUCTION
Since the 1970s numerous zooarchaeological studies have contributed much to our understanding of pastoralism in late Iron Age and Roman Britain (Grant 1989; 2004; King 1978; 1984; 1991; 1999a; Maltby 1981; 1984; 2010; 2015). The impact of Roman rule on farming practices has been much debated but it is widely considered that significant developments in animal husbandry occurred after the conquest (Van der Veen and O'Connor 1998; Dobney 2001; Albarella 2007; Albarella et al. 2008; Hesse 2011). These include, but are not limited to, increases in the size and stature of livestock, particularly cattle, in southern and eastern England (Maltby 1981; Noddle 1984; Albarella et al. 2008); an increasingly developed market exchange system and systems of military procurement, in which livestock were moved around more frequently and possibly over long distances (Stallibrass 2009; Minniti et al. 2014); the appearance of full-time specialist butchers in towns and on military sites (Maltby 1989; 2007; Seetah 2006); and more widespread husbandry of chickens, a previously rare animal that was imported to Britain in the later Iron Age (Maltby 1997; Allen and Sykes 2011). However, these changes were not universal nor did they occur simultaneously. In the late Iron Age, husbandry practices varied regionally (Hambleton 1999). Differences in local traditions, the availability of land and environmental conditions all probably contributed to mixed responses to Roman rule.

Despite the advances made by zooarchaeologists over the past 30 years, our understanding of the livestock economy is fairly biased towards evidence from towns. This is partly due to the larger quantities of animal bone that derive from urban excavations. There have also been recent syntheses of data from towns, which draw upon a wide range of zooarchaeological data (Maltby 2010; 2015). However, the rural dataset is now so extensive that it is difficult to examine in a single study. King’s broad surveys have covered much of England and Wales (King 1978; 1984; 1999a). His research, however, is largely restricted to the analysis of relative frequencies of cattle, sheep, and pigs, and does not venture too far into subjects such as slaughter patterns or size change. In contrast, other studies have been more wide ranging, but have chosen to examine rural evidence on a more manageable, regional scale (e.g. Albarella et al. 2008; Hesse 2011).

This chapter represents an opportunity to redress this imbalance. Cattle, sheep, and pigs continue to take centre stage, as these were undoubtedly the three most important animals in the Romano-British economy. The analysis, however, has been extended to cover aspects of livestock abundance, size and stature, mortality profiles, and carcass processing, as well as considering the exploitation of horses and chickens. Discussion of animal products, such as worked bone, horn and hides, features in Chapter 5 of this volume, while an examination of dogs, cats and wild mammals and birds is presented in Volume 3 in relation to pet-keeping and hunting.

RELATIVE ABUNDANCE OF CATTLE, SHEEP, AND PIGS: A REGIONAL OVERVIEW
It has often been stated that the Roman period witnessed a widespread shift from sheep farming to cattle farming (King 1991; Grant 2004; Albarella 2007; Maltby 2016). The establishment of urban centres and military sites represents an expansion in the number of people who were not primarily engaged in food production. Cattle would have provided more meat per head of livestock and an abundance of raw materials – horn, skin, and bone – for the expanding craft industries. King has suggested that high proportions of cattle bones in towns and forts in the early Roman period reflect immigrants coming from Gaul and Germany, where beef consumption was common (King 1984; 1999a). Maltby has more recently argued that the evidence for livestock in towns is far more varied, and that the general pattern is heavily biased by massive accumulations of butchered cattle bones found predominantly at the outskirts of several urban settlements (Maltby 2010, 265). Other authors have claimed that increasing numbers of cattle were, in fact, a by-product of the expansion of arable agriculture across lowland Britain. The use of cattle for ploughing became more important in the Roman period, particularly where arable farming expanded...
into marginal areas (e.g. on heavy clays) (Van der Veen and O’Connor 1998). Of course, recovery bias on some sites may favour bones from larger animals, and this is a factor that must always be considered when examining animal bones and zooarchaeological data (Maltby 1985a). As will be shown below, however, a general trend towards higher frequencies of cattle bones on rural settlements is true for most areas of Britain, although there is considerable variation. It is important to understand the complexities of livestock exploitation within regional contexts. Economic variations, environmental factors, and cultural influences all played a part.

Maltby (1994a, 86) has pointed out that geographic variations can be masked when data from across the province are considered as a whole. Regional differences in the mean percentages of the major livestock were clearly shown in Volume 1 (Smith and Fulford 2016, 399, fig. 12.13). Rippon has argued that geology played an important role in defining distinctive farming regions, or pays, in the Roman and succeeding medieval periods (Rippon 2012, 263–86; Rippon et al. 2015). Similarly, Hesse has shown that environmental change in the Upper Thames Valley between the late Iron Age and the late Roman period impacted upon the area of pasture available for livestock. Contrasting with the views of King, Hesse stated that ‘the presence of sheep at some sites correlates more strongly with changes in the environment than with a ‘native’ versus ‘military’ diet’ (Hesse 2011, 233). Undoubtedly, the local environment would have influenced the choice of livestock and styles of animal husbandry.

It must also be remembered that farm animals can be moved around, potentially over long distances. Livestock remains recovered from archaeological sites were not necessarily from animals that were farmed at the settlement. This is one of the more poorly understood areas of zooarchaeology, though recent results from strontium isotope analyses are beginning to suggest that livestock were increasingly transported in the Roman period (Minniti et al. 2014).

Bearing these issues in mind, a regional approach is adopted here. Unfortunately, animal bone assemblages are very unevenly distributed across the country. Much of this results from differences in soil acidity, and the heavily biased

**FIG. 3.1.** Distribution of rural sites with zooarchaeological assemblages
distribution of excavated Roman rural sites towards eastern and southern England. In terms of the project regions used to investigate settlement patterns in Volume 1 (Smith et al. 2016), the bulk of the zooarchaeological data are located in the Central Belt and the South, with fewer assemblages in the East and North-East, and far less in the Central West, North, Upland Wales and the Marches, and the South-West. While our understanding of livestock exploitation in the latter four regions is severely limited, the quality and quantity of data in the former allow for more detailed analyses. In this chapter, the animal bone data are organised into five sub-regional groups (Fig. 3.1). The division of the assemblages is partly led by the distribution and concentration of sites with zooarchaeological assemblages, but also by topographic and geological factors, characterised by the Natural England Landscape Zones that were also used in Volume 1 (Fulford and Brindle 2016, 15–16). The regions used here are:

- The Central South region
- The Thames Estuary and London Basin region
- The Upper Thames, Cotswolds and Severn Estuary region
- The Fens region
- The North-East region

Broadly speaking, the Central South and the Thames Estuary and London Basin regions correlate with Volume 1’s South region (Allen 2016a), the Fens (which includes areas surrounding the Fenlands) and the Upper Thames, Cotswolds and Severn Estuary regions correlate with the Central Belt (Smith 2016a), and the North-East region is approximately the area covered by its name-sake (Allen 2016b). There are other sites with animal bone assemblages that are located outside of these regions. These are too sparsely distributed to be considered as a single group. However, there are some very important assemblages and evidence from these sites will be drawn upon where it is relevant in the chapter. For chronological analyses, the phasing of this dataset follows the structure outlined in Chapter 1.

THE CENTRAL SOUTH REGION

Broadly, sheep and cattle are equally represented in livestock assemblages in the Central South region, apart from in the late Iron Age/early Roman phase when the mean percentage of sheep is 10 per cent higher than cattle (Figs 3.2–3.3). Here, the proportion of sheep is generally higher than in other regions. This is undoubtedly due to the chalk downland that characterises much of the landscape, which favours sheep husbandry owing to its elevated topography and relatively dry ground conditions. Sheep bones are also commonly recovered from early and middle Iron Age sites in this region, which suggests that animal husbandry regimes were largely maintained from before the Roman conquest (Albarella 2007, 394; Hambleton 1999). The recovery of sheep bones is also helped by the alkaline soils on the chalk, which aid the preservation of bones from smaller and more gracile animals. However, the percentages of sheep bones in late Iron Age and Roman assemblages in this region vary considerably (Fig. 3.3). Cattle bones, by contrast, more commonly represent between 30 and 40 per cent of most assemblages, and there is some evidence that they become more frequent on sites dating to the late Roman period (Fig. 3.2).

Part of this variation is caused by differences between assemblages in different areas of the region. For example, higher percentages of cattle are typically found at rural settlements in the hinterlands of Chichester and Silchester (Fig. 3.4). In contrast, sites close to Dorchester and Winchester tend to produce higher proportions of sheep bones. In the hinterland of Dorchester in Dorset sheep bones are more common than those of cattle at every known rural site. Those with particularly high proportions of sheep include Flagstones and Fordington Bottom on the A37 Western Link Road (Bullock and Allen 1997), Whitcombe (Buckland-Wright 1990), Alington Avenue (Maltby 2002), and the suburban, ‘village’ settlement at Poundbury (Buckland-Wright 1987). The concentration of these sites around Dorchester may be partly influenced by demand from the town. In comparison to other Roman towns, excavations at Dorchester have tended to produce higher proportions of sheep (Maltby 1993). As Rippon and Maltby have both pointed out, this may reflect local conditions that were favourable for sheep husbandry (Maltby 1994a, 94–7; Rippon 2012, 267–8).

However, even though cattle are poorly represented on rural sites around Dorchester, some sites show an increase in cattle over time. At Poundbury, cattle remains increased from 22 per cent in the early Roman phase to 42 per cent in the late Roman phase (Buckland-Wright 1987). At Fordington Bottom, cattle increased from 24 per cent in the early Roman phase to 39 per cent in the late Roman phase (Rielly 1997). In contrast to these sites, cattle reduced in frequency between the late Iron Age and the Roman period at Bucknowle villa (Light and Ellis 2009). In the hinterland around Winchester in Hampshire there is very little evidence for an increase in the importance of cattle over time. At Owslebury, the percentage of cattle bone remained between 37 and 39 per cent in the late Iron Age, early Roman and late Roman phases (Maltby 1987).
At Houghton Down, the proportion of cattle bone reduced from 38 per cent in the late Iron Age to 22 per cent in the late Roman (villa) phase (Hammon 2008a). This example goes against the general trend of villa sites producing higher frequencies of cattle bone (e.g. King 1991).

The marked variation in domestic livestock frequencies from villas is shown in Fig. 3.5. In addition to Houghton Down, high proportions of sheep are also present at Fullerton, Tarrant Hinton, Dunkirt Barn and Grateley South, all of which were located on the Hampshire and Wessex Downs (Peck and Maltby 2006; Hammon 2008b–c; Worley 2008). In contrast, notably high frequencies of cattle bone have been recovered from villas in the hinterland of Chichester in West Sussex; at Batten Hanger, Watergate Hanger (Hunter n.d.), Chilgrove 1, Chilgrove 2 (Outen 1979) and Bignor (Armitage et al. 1995). These patterns suggest that villa assemblages tend to mirror local patterns of livestock exploitation, rather than their site type.

FIG. 3.2. Percentages of cattle bones by phase in the Central South case study area

FIG. 3.3. Percentages of sheep bones by phase in the Central South case study area

FIG. 3.4. Average and standard deviation of cattle percentages (NISP) from rural sites in the hinterlands of the four major towns in the Central South case study area (n.b. includes sites within 20 km of the town)
Pig bones rarely contribute more than 10–15 per cent in most assemblages (Fig. 3.6). The late Iron Age oppidum at Silchester in Hampshire produced a high proportion of pig bones (Grant 2000), while high pig proportions are also known from Fishbourne in West Sussex, particularly in the earliest phases (Allen 2011; Grant 1971; Sykes 2005). Pigs may have been important at settlements involved in long-distance trade and exchange, possibly reflecting a continental preference for pork (Maltby 2016, 5). Clear evidence for the consumption of pork has been identified at the Roman temple on Hayling Island, Hampshire. Here, the selection and disposal of specific body parts suggests that joints of pork may have been brought to the temple for feasts and religious events (King 2005). There are also cultural links between the Hayling Island temple and the villa/palace at Fishbourne, which may partly explain the preference for pork at these sites in the late Iron Age and early Roman periods. The recent excavation of Liss Roman villa in Hampshire has produced an exceptionally high proportion of pig bones, which the faunal specialist suggested were associated with feasting waste (Hamilton-Dyer 2008).

Elsewhere, high proportions of pig have been identified at Ower and Norden, Corfe Castle, on the Dorset coast (Coy 1987). Maltby has previously identified a link between pig-processing and salt production at these sites, possibly representing the curing of bacon and ham (Maltby 2006; see Meat production and preservation below). Relatively high frequencies of pig bones have also been recovered from some farmsteads, such as Balksbury Camp and Owslebury in Hampshire (Maltby 1987; 1995). Pig bones were particularly prevalent in late Iron Age and early Roman deposits at both of these sites, which may reflect a local emphasis on pig husbandry.

**THE THAMES ESTUARY AND LONDON BASIN REGION**

Compared to the Central South region, assemblages in the Thames Estuary and London Basin region show a much clearer shift towards higher cattle frequencies in the later Roman period (Fig. 3.7). In the majority of assemblages dating to the late Iron Age/early Roman period, cattle formed
between 30 and 50 per cent of the identified specimens. By the late Roman period, cattle bones contributed more than 40 per cent of the remains in the majority of assemblages. In fact, cattle bones formed over 70 per cent of the material in nearly 25 per cent of late Roman assemblages. These changes correspond with a reduction in the number of assemblages with high relative proportions of sheep and pigs (Figs 3.8–3.9).

Many assemblages with higher proportions of cattle bones in the mid- and late Roman phases have been recovered at either roadside settlements or villas. Cattle were clearly of major economic importance at the nucleated settlement at Heybridge, Essex, representing 61 per cent and 65 per cent of the four main domesticates in the late Iron Age and early Roman phases of the Elms Farm excavations, rising to 81 per cent in the mid- and late Roman phases (Johnstone and Albarella 2015). Equally, excavations at the roadside settlements of Shadwell in Greater London, Braintree in Essex, Hacheston in Suffolk and Staines in Surrey, have all produced large cattle assemblages (e.g. Douglas et al. 2011; King 2004; McKinley 2004). Demand for beef, horn and leather at the urban markets in London and Colchester could have been partly responsible for this pattern, encouraging farmers to raise cattle...
over other livestock. The surrounding landscape would also have favoured cattle husbandry. The low-lying river gravels of the lower and middle Thames provided lush seasonal pasture, suitable for extensive cattle-grazing. A number of wide late Roman droveways with enclosure systems have also been recently excavated, as at Heathrow Terminal 5 (Lewis et al. 2010) and Imperial College Sports Ground, Harlington to the west of London (Crockett and Nowall 1998). It is possible that these were involved with the management and movement of potentially large cattle herds in this region, or that larger, nucleated settlements were generating demand for beef (cf. Allen 2016a, 133).

As in the Central South region, the relative frequencies of the main domesticates vary considerably at villas. In this region, however, cattle clearly dominate, once more reflecting local rather than site type patterns (fig. 3.10). Only in the early Roman phase at Thurnham in Kent are sheep bones better represented than cattle. An increasing abundance of cattle occurs at a number of sites that develop into villas. At Beddington, Surrey, the frequency of cattle bones increases from 26 per cent in the late Iron Age phase to 37 per cent in the early Roman phase, but only become more common than sheep in the late Roman villa phase, where they represent 51 per cent of the assemblage (Locke 2005).

While sheep tend to be poorly represented in the region, relatively high proportions are found at sites on the Isle of Thanet in eastern Kent, as at the two enclosed farmsteads excavated on the East Kent Access Road (Zones 13 and 14) (Strid 2015). At the nearby village of Monkton, sheep bones represented over 60 per cent of the assemblage. This material dated to the second-third century A.D. and was mostly excavated from a series of cellared buildings (Bendrey 2008).

These animals may have been grazed on the low-lying salt-marshes around the Wantsum Channel during this period.

Pig bones were well represented at a number of late Iron Age and early Roman sites. Various excavations at the late Iron Age oppidum at Brauxing in Hertfordshire have produced large quantities of pig bones, commonly representing over 30 per cent of the major livestock assemblages (Ashdown and Evans 1977; 1981; Fifield 1988). Their representation on villa sites varies, though at Gorhambury in Hertfordshire, Lullingstone and Plaxtol in Kent, and Latmer in Buckinghamshire, pig bones were more common than sheep (fig. 3.10). Several farmsteads have produced high frequencies of pig bone, with a notably large assemblage at Stansted, ACS site in Essex (Hutton 2004). An exceptional number of pig bones recovered from a well at Nazeingbury, Essex, probably represents intensive carcass processing (Huggins 1978; see Meat production and preservation, p. 119). It is also worth noting that assemblages from London and Colchester also include relatively high proportions of pig compared to other major towns in Britain (Maltby 2010, 269). Whether these pigs were imported from local rural sites or reared in pig-sties within the towns is not known.

THE UPPER THAMES, COTSWOLDS, AND SEVERN ESTUARY REGION

Combined proportions of cattle and sheep vary considerably between the three major landscape zones in this region: the Upper Thames Valley, the Cotswolds, and the Severn Estuary. Cattle are markedly better represented on sites in the Upper Thames and the Severn/Avon valleys, compared to the higher ground of the Cotswolds where sheep are more common (fig. 3.11; see also Hesse
2011, 229–30). The use of floodplains for cattle husbandry would have been important throughout the late Iron Age and Roman periods. This appears to follow patterns observed on sites dating between the late Bronze Age and the middle Iron Age, which suggests a degree of continuity in the use of these landscapes (Hambleton 2008, 58). Cattle dominated the later Iron Age/early Roman assemblage at Thornhill Farm, Gloucestershire (60.5 per cent), where groups of conjoined rectilinear enclosures laid out on the first gravel terrace of the Upper Thames appear to have been constructed for intensive livestock management (Jennings et al. 2004). Seasonal exploitation of open wetlands on the Gwent and Somerset Levels may also have been important during the Roman period. At Nash, Glamorgan-Gwent, burials of juvenile cattle were found in an area that was intensively drained, presumably to allow livestock onto the pasture for longer periods (Meddens 2001).

FIGURE 3.12 shows the increased proportion of late Roman assemblages with high frequencies of cattle bone. In contrast, both sheep and pig are poorly represented in the mid- and late Roman phases (FIGS 3.13–3.14). Hesse has previously highlighted the potential impact of environmental change on sites near the River Thames where cattle became more important in the late Roman period (Hesse 2011, 225–7). Molluscan and pollen evidence from a number of sites suggests that there was an increasing emphasis on the management of pastures and hay meadows on the Upper Thames floodplain (Booth et al. 2007, 26–8). The recovery of dung beetles from waterlogged deposits also demonstrates the presence of grazing livestock (ibid.). The low-lying landscape would have been less suitable for raising sheep, which are far more susceptible to parasites such as liver fluke.

Evidence for large-scale livestock management has recently been identified at Gill Mill, Oxfordshire, where a large complex of roads and enclosures has been excavated (Booth and Simmonds forthcoming). Despite a stringent sieving programme, this low-lying site produced an assemblage heavily dominated by cattle with a high proportion of horse bones (Strid forthcoming). The site showed very little evidence for arable farming or industrial activity, and it may have
been used on a seasonal basis for cattle herds to exploit the lush grazing in the summer.

The importance of cattle in the late Roman period is also reflected at a number of villas. In large assemblages from Shakenoak and Barton Court Farm in Oxfordshire, Frocester Court in Gloucestershire and Bays Meadow villa, Droitwich, in Worcestershire, cattle bones constituted between 53 and 64 per cent of the livestock remains (fig. 3.15). In contrast to this pattern, high proportions of sheep bones were identified in large assemblages from Ironmongers Piece and Barnsley Park villas. Both of these sites are located in the Cotswolds and probably reflect the local emphasis on sheep-raising.

Similar to the pattern in the Thames Estuary and London Basin region, sites with higher percentages of pigs tend to be late Iron Age or early Roman in date. Pig bones constituted over 20 per cent of the livestock assemblages at the late Iron Age farmsteads at Middle Duntisbourne and Duntisbourne Grove in the Cotswolds (Mudd et al. 1999). Here, pig bones were more frequent than sheep, and it is notable that the pottery evidence from these sites also hints at a receptiveness to Roman material culture and consumption practices (see Timby, Ch. 7). Given the greater carcass weights of pigs, pork would have been far more abundant than mutton at these sites. It may not be a coincidence that pig bones were also relatively frequent at the nearby, first-century A.D. villa at The Ditches, North Cerney (18 per cent). Each of these sites was probably associated with the oppidum at Bagendon, which may explain the abundance of pig, a pattern found at oppida in other areas. Late Roman assemblages with high proportions of pig are rare, though exceptions can be found at the villas at Yarford in Somerset and Shakenoak in Oxfordshire (Allen 2006; Cram 2005).

A number of defended small towns have produced sizeable faunal assemblages, including Alcester, Worcester, Alchester, Dorchester-on-Thames, and Bath. However, the relative abundances of different livestock vary considerably between different sites within these settlements. At the Explosion Site in Alcester, just south of the walled town, cattle bones contributed over 60 per cent of the domestic mammal remains from both early and late Roman deposits, while pig bones increased from 5 to 11 per cent over the same period (Maltby 2001). In contrast, cattle and sheep bones were more equally represented in mid- and late Roman deposits at Gas House Lane, within the defences in the south-eastern part of the town (Hamilton 1998). Cattle dominate most of the faunal assemblages from Worcester, while pig bones are very well represented from the site at

![Fig. 3.13. Percentages of sheep bones by phase in the Upper Thames, Cotswolds and Severn Estuary case study area.](image)

![Fig. 3.14. Percentages of pig bones by phase in the Upper Thames, Cotswolds and Severn Estuary case study area.](image)
Deansway, particularly in mid- and late Roman deposits where they were as common as sheep (Nicholson and Scott 2004).

THE FENS REGION

Faunal assemblages in the Fens region typically contain high proportions of cattle bone. They represent 40–50 per cent of the majority of assemblages from late Iron Age and early Roman sites (FIG. 3.16). However, there are some striking variations in the relative abundance of cattle and sheep at sites with large faunal assemblages dating to this period. For example, cattle were well represented at the late Iron Age farmsteads at Icklingham, West Stow in Suffolk (50 per cent), Manor Farm, Humberstone in Leicestershire (46 per cent), and the nearby village at Elms Farm, Humberstone (43 per cent), but were vastly outnumbered by sheep at the enclosed farmsteads at Haddenham V in Cambridgeshire and Weekley in Northamptonshire (cattle bones contributed less than 20 per cent at these sites: Serjeantson 2006; Whatrup and Jones 1988). The abundance of sheep at Haddenham V is interesting considering the site was a riverside compound located at the junction of the River Great Ouse and the peat Fens. Grazing sheep flocks in this wetland environment would have required careful management to combat parasite infestation. Notably, the site at Haddenham V was abandoned by the middle of the first century A.D. owing to increased flooding (Evans and Hodder 2006).

In the mid- and late Roman periods, cattle become increasingly important in the region – cattle bones constitute more than 50 per cent of the remains in nearly 60 per cent of assemblages. In contrast, sheep represent only 20–30 per cent in most late Roman assemblages (FIG. 3.17), while pig bones rarely contribute more than 5 per cent (FIG. 3.18). Of the sites with larger faunal samples, exceptionally high frequencies of cattle bones were recovered from the complex farmsteads at land off Broadway, Yaxley, Cambridgeshire (73 per cent), and at Vicar’s Farm, Cambridge (60 per cent). At Vicar’s Farm there is evidence for increased cultivation of wet clay soils in the third century A.D., which probably required larger numbers of cattle for traction (Lucas 2001). Some farmsteads show an increasing emphasis on cattle at the expense of sheep over time. At Piddington,
Northamptonshire, sheep were the most common species represented in late Iron Age and early Roman deposits, though after the construction of the villa cattle came to dominate in the mid- and late Roman phases (Friendship-Taylor and Friendship-Taylor 2013). Cattle remains were also well-represented in the late Roman period at Bancroft villa in Buckinghamshire, providing over 60 per cent of the total assemblage in that phase (Levitan 1994).

While cattle dominate most faunal assemblages in the region, roadside settlements commonly produce higher proportions of sheep. At these sites, sheep bones average 43 per cent compared to 42 per cent cattle. This is significantly higher than at farmsteads and villas, where they average 34 per cent and 33 per cent respectively. Sheep bones were particularly prominent in assemblages from roadside settlements at Higham Ferrers, Northamptonshire (Strid 2009), Grandford, Cambridgeshire (Stallibrass 1982), and Nettleton and Rothwell, Lincolnshire (Willis 2013b), and perhaps reflect an emphasis on wool production (see below). It is worth noting that sheep were common at Higham Ferrers in both domestic areas of the settlement and in ritual deposits at the shrine (only material from the former is considered here).

Cattle were far better represented at Brancaster on the north Norfolk coast, where they contributed over 60 per cent of the domestic livestock remains in both the middle and late Roman phases (R. Jones et al. 1985). The focus on cattle at this site may have been influenced by the presence of the military in the later Roman period at the Saxon shore fort. This is similar to the pattern observed at Portchester Castle, Hampshire, on the south coast (Grant 1975). However, it must be noted that the mid-Roman samples at Brancaster derived from the civilian settlement, which pre-dated the military presence, suggesting that cattle exploitation was already important in the area.

As in other regions, pig bones are better represented on late Iron Age and early Roman sites. In the Roman period, pig bones are present in relatively high proportions at some roadside settlements, notably at Nettleton and Rothwell (Willis 2013b), Higham Ferrers (Strid 2009), and Icklingham, West Stow in Suffolk (Crabtree 1989). This may reflect local rearing of pigs in these settlements. Pig bones are also relatively frequent at Piddington where they increased from 15 per cent in the late Iron Age/early Roman phase, to 17 per cent in the mid-Roman phase, to 30 per cent in the late Roman phase (Friendship-Taylor and Friendship-Taylor 2013). Here, pork was probably an important part of the diet at the villa.
THE NORTH-EAST REGION

Compared with regions in the south and the midlands, the North-East region has fewer sites with animal bone assemblages. Most are located around the Humber Estuary and on the Magnesian Limestone. As in other regions, more sites produce higher cattle frequencies in the middle and late Roman phases, a change that is largely at the expense of sheep (figs 3.19–3.20).

In this region, high proportions of cattle are typically recovered from military vici. These range from 42 per cent in the early Roman phase at Castleford, West Yorkshire (64 per cent in the mid-Roman phase), to over 80 per cent at Greta Bridge, Co. Durham. One of the largest assemblages was excavated from Piercebridge, Co. Durham. Of over 24,000 fragments of bone from domestic mammals, 64 per cent derived from cattle (Rackham and Gidney 2006). Much of this material was excavated from ditches located close to the eastern gate of the late Roman fort, and much of it probably reflects waste from the processing of carcasses brought in to supply the army. The increasing importance of cattle in the Roman period may have resulted from the development of the Roman infrastructure and the organised supply of livestock. However, this may have taken some time to establish. It is interesting to note that sheep bones were as common as cattle in second-century military deposits at Thornborough Farm, Catterick, North Yorkshire (Stallibrass 2002). Only in the later third and fourth century civilian phases at Catterick and the nearby roadside settlement at Bainesse do cattle remains outnumber sheep. It is possible that this reflected a change in the pattern of livestock supply to the settlement, though sheep and pig bones may have been under-represented in some samples owing to a lack of sieving (ibid., 396, 398–9).

Compared to military vici, cattle were not nearly so well represented at other nucleated settlements. At Dragonby, Lincolnshire (Harman 1996), Wattle Syke, West Yorkshire (Richardson 2013), and Shiptonthorpe, East Riding (Mainland 2006), sheep were more common than cattle in all phases of occupation. At Burnby Lane, Hayton, East Riding, a number of deposits produced parts of sheep carcasses, interpreted as the remains of communal feasting (Millett and Gowland 2015, 183). Lamb and mutton may have been preferred by some communities, though of course wool production may also have been important. This is indicated by the considerable amount of textile equipment recovered at Dragonby (May 1996). However, this may be a product of the scale of excavations at this site, and it would be helpful if more reports could state the volume of soil.

**FIG. 3.19.** Percentages of cattle bones by phase in the North-East case study area

**FIG. 3.20.** Percentages of sheep bones by phase in the North-East case study area
excavated so that finds data could be better calibrated (see Fulford, Ch.8).

Assemblages from villas in the region vary considerably. Cattle increased in abundance from 32 per cent to 57 per cent between the early and late Roman phases at Holme House, North Yorkshire (Gidney 2008). Sheep were better represented in samples from Dalton parlours, West Yorkshire, in both the late Iron Age/early Roman settlement and the late Roman villa. Goat bones were also recovered from a late Roman well (Berg 1990). Dalton parlours was located close to the settlement at Wattle Syke on the Magnesian Limestone, and this may have been an area where sheep husbandry was more common. In contrast, cattle remains dominated the faunal assemblage at Winterton villa, just to the south of the Humber Estuary in Lincolnshire, where they increased from 54 per cent in the second century phase to 61 per cent in the third and fourth century phase (Higgs and Greenwood 1976). High proportions of cattle bone were also recovered from late Roman deposits at Heslington East (Roskams and Neal 2012). This site was located a few kilometres east of the colonia at York and it may have been involved in supplying livestock to the town. Large deposits of cattle bone are certainly well documented from York (O’Connor 1988).

Pig bones rarely contribute more than 20 per cent in most assemblages in the North-East region (FIG. 3.21). High proportions of pig bones were recovered from Cedar Ridge, Garforth, West Yorkshire (Owen 1998), Holme House villa (Gidney 2008), and Burnby Lane, Hayton (Jacques 2015). The deposition of a number of skeletons of young pigs at the latter is suggestive of feasting (ibid.).

**LIVESTOCK PRODUCTION AND BREEDING**

**PRODUCTION SITES: EVIDENCE FOR NEONATAL LIVESTOCK**

Evidence for livestock breeding on rural settlements relies on the recovery of bones of neonatal (newborn) animals. Their deaths may be the result of still-births (perinatal), disease, or possibly the deliberate slaughter of very young animals (suckling), perhaps for their meat and skin. Neonatal bones are very small and thin-walled – the bone cortex is not highly mineralised. This makes them more fragile than bones from older animals, and means that they are usually under-represented in animal bone assemblages, particularly if features are not sieved. Variations in retrieval strategies and differences in preservation make it difficult to compare the intensity of livestock breeding between sites. There may also be variations in what different zooarchaeologists regard as ‘neonatal’. Some describe these bones as ‘porous’, referring to their roughened surface texture, though this does not necessarily mean that the animal was neonatal when it died. In other cases, bones from young, weaned animals may be considered by some observers as neonatal. It would also be useful for zooarchaeologists to be explicit regarding butchery marks found on neonatal bones, which may indicate specialised consumption practices. It is possible that some finds may not be direct evidence of breeding on site.

Despite recovery and potential identification issues, neonatal bones are now commonly reported by zooarchaeologists when they are found. Figure 3.22 shows the percentage of sites that have produced neonatal cattle, sheep, or pig bones (sites with evidence for juvenile horses and domestic fowl are also included in these calculations because they show that the animal bone specialist was looking for and reporting the remains of young animals). Neonatal cattle bones are best represented at villas, featuring in over 60 per cent of assemblages. They are identified at between 40 per cent and 50 per cent of all farmsteads (i.e. open, enclosed, complex, and unclassified), but in

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<th>Phase</th>
<th>0-5%</th>
<th>5-10%</th>
<th>10-15%</th>
<th>15-20%</th>
<th>20-25%</th>
<th>&gt;25%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late Iron Age/Early Roman</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Early Roman</td>
<td>0</td>
<td>2</td>
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<td>0</td>
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<tr>
<td>Mid-Roman</td>
<td>0</td>
<td>2</td>
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<tr>
<td>Late Roman</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>0</td>
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</tr>
</tbody>
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**FIG. 3.21. Percentages of pig bones by phase in the North-East case study area**
only 37 per cent of assemblages from roadside settlements. Neonatal sheep bones are best represented at villas and enclosed farmsteads, where they feature in around 60 per cent of assemblages. They are also noticeably better represented than cattle at enclosed farmsteads and roadside settlements. Neonatal pig bones are far less frequently found than cattle or sheep on farmsteads, but are as common as cattle at roadside settlements. Most striking is the high percentage of villa sites that produce neonatal pig bones (67 per cent), where they are slightly more common than cattle and sheep.

The high proportion of villas with neonatal bones suggests that the consumption of veal, young lambs, and suckling pigs may have been common. It is impossible to tell whether these reflect a pattern of deliberate slaughter or were the result of neonatal mortality, though both may apply. Maltby notes similar evidence from central areas in some towns, and suggests that this may also reflect high-status consumption (Maltby 2015). Specimens recovered from the early phases at Fishbourne, West Sussex, probably represent the remains of delicacies consumed by the high-status inhabitants of the palace (Allen 2011). It is also possible that villas played a key role in managing local production of livestock. In the Hampshire Downs much of the evidence for livestock production in the third and fourth centuries A.D. derives from villas, such as Sparsholt, Houghton Down, Gradeley South, Fullerton, and Dunkirt Barn. These sites may have exported cattle, sheep, goats, and pigs to markets at Winchester.

Cattle were intensively exploited for meat in Roman towns. However, it is interesting to note that around 5 per cent of the cattle bones from Greyhound Yard, Dorchester, were ‘porous’, indicating that they came from young calves (less than six months old, but probably older than neonatal) (Maltby 1993, 320). Veal consumption may have been relatively common in Dorchester from the beginning of the second century. This led Maltby to suggest that some livestock may have been reared by local inhabitants on the land surrounding the town (Maltby 1994a, 94). Of course local availability was probably a factor in large-scale supply of livestock to towns. Neonatal cattle, sheep and pig remains were recovered from all phases of occupation at Poundbury, Dorset – a village settlement located less than a mile from the civitas capital at Dorchester (Buckland-Wright 1987). The recovery of neonatal remains from roadside settlements and a number of villages highlights the agrarian character of these types of site. Unlike towns, which were more likely to be consuming resources from the countryside, many of the smaller nucleated sites were predominantly farming settlements in their own right.

Few military vici in northern England have produced remains of neonatal livestock, though this may be partly the result of preservation bias. It is thought that military sites were supplied with cattle that were driven over long distances; Stallibrass (2009) has argued that lowland Scotland may have been a source of some of the animals. While this would explain the large dumps of butchered cattle bone found at some forts, it is likely that local, pastoral resources were also exploited. The lack of reference to beef products in the Vindolanda tablets suggests that the northern garrisons were not dependent on long-distance supplies of cattle (Bowman 2003, 68). Specimens of neonatal cattle and sheep have been recovered from Watercrook, Cumbria (Fifield 1979), Castleford, West Yorkshire (Berg 1999), and The Lanes, Carlisle (Stallibrass 1993). The latter site also produced neonatal pig bones (ibid.). Numerous bones from cattle slaughtered during their first year were also found at Piercebridge.
LIVESTOCK ‘BREEDS’: SIZE, TYPE, AND ARTIFICIAL SELECTION

Analysis of biometric data – animal bone measurements – can provide useful information regarding the size and shape of domestic animals. Large cattle have now been reported at a number of sites in southern England (Maltby 1981), most notably at the roadside settlement and port at Elms Farm, Heybridge in Essex, where a significant increase in cattle size occurred over the late Iron Age/Romano-British transition (Albarella et al. 2008, 1832, fig. 2). Further size increases were also identified at nearby Colchester, though this occurred in the second century A.D., slightly later than at Elms Farm (Luff 1993, 122, fig. 6.47; Albarella et al. 2008, 1835, fig. 4). Interestingly, size increases are not just restricted to cattle; transformations in the stature of sheep, pigs, horses, and chickens have also been noted (Albarella et al. 2008, 1840, table 4). These changes were argued to reflect innovations in animal husbandry in response to the impact of Roman rule in Britain (ibid., 1844–6).

However, other than the seminal work of Albarella et al. (2008), there has been a lack of research into livestock stature at rural sites compared to urban or military sites where larger faunal assemblages tend to be recovered (e.g. Dobney 2001, 39; Maltby 2010, 292–7). Comparatively large rural assemblages from sites such as Elms Farm, Heybridge (Johnstone and Albarella 2015), and Owslebury, Hampshire (Maltby 1987), are exceptions. Maltby’s synthesis of biometric data from urban sites in England and Wales is undoubtedly insightful for revealing patterns of regional variation in livestock size (Maltby 2010). There are, however, biases involved with only examining evidence from towns. Firstly, animals slaughtered and consumed in towns were those specifically targeted for the urban market. They are not necessarily a reliable indicator of local livestock populations. Secondly, town livestock may have been drawn from a wide variety of sources, with some possibly transported far from their place of origin. In contrast, animal bones from rural settlements should provide a more accurate picture of local livestock populations, though ideally the two need to be analysed together.

It is beyond the scope of this study to provide a comprehensive analysis of all the biometric data from all the rural sites in late Iron Age and Roman Britain. Instead, data from a selection of published reports are surveyed here. The datasets selected are those that are large enough to be statistically valid for inter-site comparison and with good dating resolution. Many reports combine biometric data together under the banner of ‘Roman’ in order to increase the sample size, making it practically impossible to examine social and economic developments in animal husbandry.

Biometric data can be analysed in several ways to investigate animal height, stature, and shape, and to identify the ratio of males to females. Here the analysis will focus on the height and stature of cattle, sheep, and pigs (see below for the discussion of horses), using measurement ranges and means to compare livestock from different sites. While range and means can be influenced by factors such as sex ratios, i.e. more male animals will produce higher means, they are a fairly reliable indicator of variations in livestock size. Full details regarding the methods of analysis of the biometric data are presented in Chapter 1. However, it is important to note that the analysis of livestock breadth or width is referred to here as ‘stockiness’, though strictly speaking stockiness reflects the relationship between the height and the width of the animal.

While the focus in this section is on the size of domestic livestock, evidence for hornless/pollled cattle and sheep is also considered. Most sheep and cattle in Roman Britain were horned varieties, though infrequent finds suggest that hornless livestock were also present. These may have been horned animals that were deliberately dehorned, or were naturally polled as a result of selective breeding or genetic anomalies. Animals that were dehorned should be identified by scarring on the skull, while the skulls of naturally polled animals will have a smooth appearance. Unfortunately, cattle and sheep skulls tend to be quite fragmentary, so it is difficult to get a precise idea of exactly how common polled livestock were. Nonetheless, it is possible that some hornless varieties represented different breeding groups (Maltby 1994a), and therefore a review of their occurrence and distribution is important.

Cattle size

Most cattle found at late Iron Age and early Roman sites appear to have been quite small and slender, though it is unfortunate that there are few published data for cattle withers’ heights that date to these periods. However, on average, cattle tend to measure around 1100 mm at the shoulder, while the tallest individuals generally stood just shy of 1200 mm (FIG. 3.23). One aspect of the late Iron Age data in particular is the remarkable...
degree of uniformity in cattle size. The average length of the astragalus – a bone found in the ankle – almost universally measures around 60 mm, and most sites exhibit a very restricted range of sizes (Fig. 3.24).

In the early Roman period we begin to see some evidence for larger cattle. In southern England, a number of sites have produced cattle astragali measuring over 70 mm in length. At Owlesbury, Hampshire, the average astragalus length does not increase markedly between the late Iron Age and early Roman phases, but the largest specimens are significantly bigger in the latter. Recent strontium isotope analysis of cattle bones at Owlesbury suggests that livestock were being imported to the site from an increased range of sources in the early Roman period, which may account for the appearance of larger cattle after the conquest (Minniti et al. 2014). At a number of early Roman sites in eastern England – Haddon, Cambridgeshire, Heybridge, Essex, and Wavendon Gate, Buckinghamshire – the average astragalus length of c. 65 mm is notably greater than elsewhere. This suggests that cattle in this region were taller than their counterparts elsewhere, as indicated at Haddon in the second century A.D., where the largest animal stood taller than 1300 mm at the shoulder.

As well as an increase in shoulder height, cattle also appear to have become slightly stockier at some sites (Fig. 3.25). Measurements of the breadth of the distal tibia provide a good indication of this size trait. The stockiest cattle appear at Haddon, where the average breadth of the distal tibia, at 60 mm, is broader than the largest examples found at the majority of late Iron Age sites. An increase in the overall breadth of cattle is well documented at Elms Farm, Heybridge, Essex, where a significant increase in stature occurred over the late Iron Age/early Roman transition (Albarella et al. 2008, 1832). At this site, it was suggested that increases in tooth size together with larger bones were caused by the introduction of new breeding stock; teeth respond slower than other bones to size change caused by improved nutrition or artificial selection (ibid.). If new types
of cattle were being imported to eastern England, their interbreeding with local stock may account for the increased average sizes seen at a number of sites in this region.

Continued improvement of cattle stock occurred in the later Roman period. The taller shoulder height of 1300 mm is recorded at a number of sites in the third and fourth centuries A.D. At Bancroft villa, Buckinghamshire, the largest cattle reached 1400 mm at the shoulder, a full 200–300 mm taller than the Iron Age stock. Size increase is also represented by the length of the astragalus, which commonly measures over 60 mm in this phase, while the largest specimens approach 75–80 mm. This is due to the more widespread appearance of stockier cattle at sites outside the eastern region, such as at Shakenoak in the Upper Thames Valley, Frocester in the Severn Valley, and Owslebury on the South Downs. Improvements in cattle size appear to have taken time to spread west across southern England, either through more intensive breeding practices on individual farms or through an expansion in the trade and exchange of larger breeding stock (or both). It is also possible that larger plough oxen became more common on rural sites to support increasing demands for arable surpluses.

In northern England there is some evidence for the appearance of larger cattle types. First- and second-century deposits at the vicus settlements at Carlisle, Cumbria, and Castleford, West Yorkshire, and at the roadside settlement at Baineses, North Yorkshire, have produced cattle with similar

FIG. 3.24. Comparison of cattle size (range and mean of astragalus lateral length)
average shoulder heights to the Iron Age stock found in southern England. However, specimens from later deposits at each of these sites show an increased upper range and mean, especially in the second–third century at Carlisle and in the third–fourth century at Bainesse, where the tallest cattle reached 1300 mm. Whether these animals were locally bred or imported is not known, though the fact that Carlisle and Catterick were largely urbanised from the second century A.D. may indicate that the settlements began to receive larger cattle.

Dobney previously noted that a number of northern military sites had recorded incidences of larger cattle, though he bemoaned the lack of statistical analysis of biometric data (Dobney 2001, 39, table 1). As mentioned above, it is possible that Roman forts in this region were being supplied with cattle transported over long distances. If such a network of droving were in place it may explain why some roadside settlements and military vici in the north began to receive larger cattle in the later Roman period. However, this only makes sense if cattle were being driven from southern and midland England, and not southern Scotland as suggested by Stallibrass (2009). It is likely that military exchange networks were highly complex, perhaps drawing upon cattle from multiple sources. Strontium isotope analysis of cattle bones from military sites is required to investigate this issue further.

Elsewhere in northern England, however, much of the evidence points to the continued husbandry of local, unimproved stock. At Dragonby, Lincolnshire, there is no evidence for any improvement in the size of cattle (Harman 1996). The range and mean of distal tibia breadths remain static between the late Iron Age and late Roman phases of occupation. This is in stark contrast to sites further south, where there are clear increases in the stockiness of cattle. A different, but no less striking, pattern is found at the late Roman villa at Rudston, East Riding (Chaplin and Barnetson 1980). Here, the average

**Fig. 3.25. Comparison of cattle stockiness (range and mean of the breadth of the distal tibia)**
Study of cattle metatarsal lengths found at Great Holts Farm, Essex, in the late Roman period, compared to other sites in the east of England. The Great Holts Farm specimens were recovered from a well alongside some ‘exotic’ artefacts and imported plants, such as stone pine, which may have been ritually deposited (Germany 2003). The well’s waterlogged environment also aided in the preservation of the environmental remains (Murphy et al. 2000, 36–7). It is unlikely, therefore, that the cattle bones are fully representative of herds kept at the site.

The presence of equally large cattle at Orton Hall Farm suggests that the inhabitants of Great Holts Farm were not the only people to have access to imported cattle. It seems unlikely that livestock were merely brought into Britain for ritual sacrifice but for interbreeding with local native stock. This occurred in south-eastern England soon after the conquest, and possibly coincided with an expansion of arable agriculture (see Ch. 2). Larger, stronger cattle would have been more effective on the plough, particularly in areas with heavy clay soils (Great Holts Farm is located on London Clay). More efficient ploughing practices that have taken place at least since the medieval period right up to the last century (e.g. Thomas 2005). These resulted in the appearance of distinctive livestock types with heightened productive and aesthetic characteristics, and they reflect the social and cultural value of domestic animals as much as they do of their economic or productive qualities (Yarwood and Evans 2000).

There is no evidence that Iron Age and Romano-British livestock were subjected to this level of intensive breeding. Nonetheless, as outlined above, there were clear changes in cattle size, and there is some evidence for the presence of regional types. The most notable aspect of the Romano-British data is the increased range of sizes, in both height and stockiness, compared to the more homogeneous and generally small Iron Age stock. But, to what extent did these changes reflect deliberate attempts to breed ‘specialised’ cattle types?

Albarella has previously identified distinctively large cattle in third-fourth century deposits from the villa at Great Holts Farm, Essex (Murphy et al. 2000, 36–9; Albarella et al. 2008, 1844–6). These bones were comparable in size to specimens from contemporary sites in eastern Holland, and were even larger than those from the improved cattle found nearby at Heybridge and Colchester. Therefore, he contended, the Great Holts Farm specimens probably derived from continental cattle, i.e. they may have been ‘first generation, imported breeding stock’ (Albarella et al. 2008, 1833).

FIGURE 3.26 shows cattle metatarsal lengths from Great Holts Farm and from other villas/farmsteads in southern England, alongside earlier material from the military vicus at Carlisle for comparison. The Great Holts Farm specimens are clearly at the top end of the spectrum; the metatarsal measuring c. 255 mm in length is unmatched at any other Romano-British site (as far as this author is aware). The others do fall within the range of metatarsi lengths found at Orton Hall Farm, Cambridgeshire, in the late Roman period, but are clearly larger than most specimens from Shakenoak in Oxfordshire and Frocester in Gloucestershire. The Great Holts Farm specimens were recovered from a well alongside some ‘exotic’ artefacts and imported plants, such as stone pine, which may have been ritually deposited (Germany 2003). The well’s waterlogged environment also aided in the preservation of the environmental remains (Murphy et al. 2000, 36–7). It is unlikely, therefore, that the cattle bones are fully representative of herds kept at the site.

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cattle would also have been important on sites where cereals were intensively farmed. Considerable evidence for large-scale arable processing is found at Orton Hall Farm, where a number of granaries and corndryers have been excavated. The site is interpreted as a centre for milling and brewing and it certainly stands out as an unusual rural site with evidence for high-status material culture. With its location on a major arterial route, it possibly functioned as an estate or administrative collection centre (Mackreth 1996).

It is clear that cattle were not uniform in size across the province, nor did changes in body size occur simultaneously. There appear to have been deliberate attempts to breed larger, more specialised cattle. Improved nutrition from foddering may well have played a part (see Ch. 2), while more intensive selection strategies were undoubtedly employed. The import of larger cattle from the Continent for breeding with native stock also probably occurred, at least in eastern England. The desire for larger cattle could have been related to improved meat yields or perhaps to reflect the status of the owner, though improved efficiency on the plough is likely to have been a major factor.

**Horned and polled cattle**

The morphology of cattle horn types in Iron Age and Romano-British herds is not well understood. The analysis of horncores from modern cattle shows that differences in their size and shape can be related to sex and breed (Sykes and Symmons 2007). This provides difficulties for examining archaeological horncores, particularly since many modern cattle breeds have horns that bear little resemblance to ancient ones. Luff is one of the few zooarchaeologists to have attempted to distinguish between the horncores from bulls, cows, and oxen (castrates) from a Roman site. Using material from a large, horn-working deposit from Chelmsford, Essex (*Caesaromagus*), as a case study, she was able to suggest that the majority derived from relatively young, castrated males (Luff 1994).

Despite this work there has been little research focused upon comparing the sizes and types of horncores found on different sites. One problem is the lack of published metrical data. Some faunal reports provide records of the length of the outer curvature, but do not provide information about the circumference of the base (and vice versa). There is a need for standardisation here, because there is certainly evidence for variation in the proportions of cattle with horns of differing length (fig. 3.27). Cattle at Elms Farm, Heybridge, Essex, were overwhelmingly dominated by small horn varieties (in all phases), while higher proportions of short and medium-horn cattle were present at Fishbourne, West Sussex, Orton Hall Farm, Cambridgeshire, and Flexford, Surrey (Allen 2016c). The sex of the animal is indicated by the shape or robustness of the horn and is not generally related to its length (Armitage and Clutton-Brock 1976). Whether the differences in horn length bear any relation to different varieties of cattle is not known.

Evidence for polled cattle is very rare. Unfortunately, very few faunal reports mention whether such evidence was looked for, such as at Orton Hall Farm where the absence of polled cattle skulls is specifically recorded (King 1996, mf. B14). Several Iron Age examples have been identified from southern England, at All Cannings Cross, Wiltshire (Armitage and Clutton-Brock 1976, 333, fig. 1), Gussage All Saints, Dorset (Harcourt 1979, 151), Ructstalls Hill (Gregory 1978) and Suddern Farm, Hampshire (Hamilton 2000a, 184). The All Cannings Cross example is clearly from a naturally polled animal, while at Gussage All Saints and Suddern Farm evidence for scarring on the basal areas show that deliberate dehorning was practised in this period. In modern

![Comparison of cattle horncore types](http://example.com/fig327.png)

**FIG. 3.27.** Comparison of cattle horncore types (categories based upon the criteria of Sykes and Symmons 2007)
cattle, dehorning is carried out to reduce the possibility of injury to people, dogs, and horses, making the management and transportation of cattle herds easier.

Roman period finds are equally rare. Interestingly, two examples have been recovered from similar, possibly ritual, contexts. At Beauport Park, East Sussex, a hornless skull was found apparently lying on the floor of the *apodyterium* in the bathhouse (Harman 1988, 273), while at Lullingstone villa, Kent, two skulls were placed in the flue channels of a heated room (Meates 1979, 108). It is not known whether the Beauport Park find was from a naturally or deliberately polled animal, though both of the skulls at Lullingstone were said to have had their horns removed. Since naturally polled cattle are so rare from the Iron Age and Roman periods, it seems unlikely that they would have been deliberately bred. Instead, such examples are more likely to have been genetic anomalies.

**Sheep and goats**

It is worth re-emphasising that goats are considered here alongside sheep, owing to the difficulties in separating the two species by their bones. Although goats are sparsely represented in most faunal assemblages in comparison to sheep, the biometric data will undoubtedly include bones from both species, which may impose a slight bias on the results.

Iron Age sheep are commonly thought to have been fairly short, slender animals, and are frequently likened to the relatively unimproved, modern Soay breed (Hambleton 2008, 48–9). Prior to the Roman conquest, sheep shoulder heights averaged 550 mm, though mean heights of 600 mm at Yarnton and Ashville suggest that stock may have been slightly taller in the Upper Thames Valley (FIG. 3.28). There is some evidence that sheep increased in height through the Iron Age; sheep bones dating to the late Iron Age at Gussage All Saints, Dorset, and Suddern Farm, Hampshire, are reported as being comparatively larger than specimens from earlier phases (Harcourt 1979, 151–2; Hamilton 2000a, 181).

Distal tibia width measurements also highlight the small, possibly slender, stature of Iron Age sheep, with specimens as narrow as 16 mm recorded at Burgh, Suffolk (FIG. 3.29). The small size of Iron Age stock was also pointed out by Maltby in his study of faunal data from Wessex (Maltby 1981).

![Comparison of estimated sheep shoulder heights (range and mean)](fig3.28)

FIG. 3.28. Comparison of estimated sheep shoulder heights (range and mean)
Grant noted the presence of a few hornless skulls at Danebury (Grant 1984), while two hornless skulls dating to the early and middle Iron Age were recovered from Suddern Farm, Hampshire (Hamilton 2000a, 181). Middle and late Iron Age deposits at this site also produced several horncores described by Hamilton as ‘strikingly large’ (ibid.). Whether the hornless and the large-horned sheep were genuinely different types or simply genetic anomalies from the same breeding group is open to question.

The onset of Roman rule does not appear to have brought about a widespread change in sheep body size. In most areas of the country, the native Iron Age stock probably continued to be exploited throughout the Roman period (Maltby 2016, 4). Unfortunately, there are few Iron Age sites to compare with Roman-period sites in northern England. Sheep height and stature measurements from the latter consistently fall within the ranges of Iron Age stock in southern England. Also, there is no evidence for size change in sheep at Castelford, Carlisle, or Bainesse, between the late first and fourth centuries A.D. (see Stallibrass 2002, 411 for Bainesse). However, the average withers’ height did increase between the third and fourth centuries A.D. at Wattle Syke, West Yorkshire. This size change was recognised by Richardson who suggested that it may have been due to improved nutrition or a rise in the importance of wethers, which tend to be taller as a result of castration (Richardson 2013, 233).

Interestingly, Wattle Syke is one of the few sites in Britain where the withers’ heights of sheep can be compared to goat. The recovery of many complete or near-complete animal burials made it relatively easy to identify between the two species, both of which were certainly reared at Wattle Syke, as evidenced by the recovery of neonatal lamb and kid bones. In the first to third centuries A.D. sheep tended to be shorter than goats, while the taller sheep of the fourth century A.D. were more similar in height to goats (fig. 3.30). Unfortunately, there are not enough data for goats dating to the earlier phase to establish whether they also increased in size.

In contrast to northern England, evidence for improvements in stature can be found at a number of sites in southern England, particularly in the east. Distal tibia widths average 24–27 mm at Haddon and Stonea Grange in Cambridgeshire, Bancroft in Buckinghamshire, and Fishbourne in West Sussex, and are distinctly larger than Iron Age sheep sizes. A significant increase in the stockiness of sheep occurred at Elms Farm, Heybridge, Essex, during the second century A.D., as shown by Albarella et al. (2008, 1838). As with cattle, size changes occurred simultaneously in the teeth and the post-cranial skeleton, suggesting that Heybridge was in receipt of new breeding stock (ibid., 1836).

At Haddon, there is a distinct increase in the average shoulder height of sheep between the early Roman and the late Roman phase, probably
around the second century A.D. This appears to mirror the appearance of taller sheep at Stonea Grange around the same time (Stallibrass 1996). At the latter site, sheep average just under 650 mm in height in both the middle and late Roman phases, with some reaching as tall as 780 mm in the third to fourth century A.D. (it should be noted that this height is exceptional for sheep). A similar height increase of about 200 mm was also found in sheep over the period between the first and the fourth/fifth centuries at Chichester (Levitan 1989, 253). These height increases possibly reflect intensive selection practices and the introduction of new breeding stock into southern and eastern England but, as with Wattle Syke, they may also suggest an increased importance in the exploitation of wethers.

Maltby has highlighted the recovery of hornless skulls from early Roman deposits at Dorchester and Winchester as possible evidence that urban populations had access to new types of sheep (Maltby 1994a, 94; 2016, 5). Of course, hornless skulls have been recovered from Iron Age sites (see above). However, the association of hornless sheep skulls with exceptionally large metapodials in late Roman pits at Oslebury may represent the appearance of a larger, hornless type in southern England (ibid.). Miles stated that sheep at the late Roman villa at Barton Court Farm, Oxfordshire, were 'relatively robust and often polled, in contrast to the horned, small-bodied Iron Age animals' (Miles 1986, 33). It is uncertain whether these were naturally polled or dehorned animals. Both naturally polled and dehorned sheep were identified at Dragonby, Lincolnshire, as well as two examples of skulls with two horns on one side (Harman 1996, 159). Remains of hornless and horned sheep were found at Springhead roadside settlement in Kent, and in two burials at the nearby villa at Northfleet (Grimm and Worley 2011, 28, 35, 46). Withers’ heights of the two buried animals suggest that they were relatively tall for the site, but were below average compared to the sheep at Haddon and Stonea Grange.

The number of Roman sites that have produced polled sheep can now be extended to include Grateley South, Hampshire (Hammon 2008b), Lavant Culvert, Chichester (Hamilton-Dyer 2004), Orton Hall Farm, Cambridgeshire (King 1996), Neatham, Hampshire (Done 1986), Caister-on-Sea, Norfolk (Harman 1993), and Portland, Dorset (Maltby 2009). Maltby also points out that it is unlikely that horned and hornless types were kept isolated, and we do not yet understand the possible effects of hybridisation (Maltby 2016, 796).

**Pigs**

Most sites produce very few measurable pig bones, making it difficult to detect size changes over time and differences between sites. This is because most pigs were slaughtered at a young age, which reduces the number of long bones that remain intact. Complete teeth are more common than complete long bones, which suffer from...
fragmentation and butchery, and their measurements are more often reported. Third molar lengths average between 30 mm and 33 mm on late Iron Age sites, and there is little variation in size range (FIG. 3.31). In the late Roman phase, third molar lengths average between 32 mm and 35 mm, indicating a slight size increase over time. Compared to bones, size changes in teeth occur more slowly from improved nutrition and artificial selection; there is little evidence for the introduction of new breeding stock which would have a more immediate impact on tooth size.

Evidence for size change in pigs on individual sites is sporadic. Albarella et al. noted an increase in pig size in the second century A.D. at Elms Farm, Heybridge, Essex (Albarella et al. 2008, 1837). However, at Dragonby, Lincolnshire, proximal radius measurements show that the relatively slender Iron Age pigs continued to be exploited throughout the Roman period (FIG. 3.32). Unfortunately, the size of the proximal radius, one of the best represented pig elements, is somewhat age-dependent (Payne and Bull 1988). Nevertheless, at Owlebury, Hampshire, Maltby

**FIG. 3.31** Comparison of pig sizes (range and mean of the length of the third molar)

**FIG. 3.32.** Comparison of pig sizes over time at Dragonby, Lincolnshire (proximal radius widths – data from Harman 1996)
also detected no significant changes in pig size between the late Iron Age and the early Roman period, but noted a small increase in the third to fourth century A.D., due to the appearance of a few larger pigs in this period (Maltby 1987). An increase in the upper size limit of pig third molar lengths occurs in several late Roman assemblages, which may be partly influenced by the presence of wild boar bones. Third molar lengths above 40 mm almost certainly derive from the larger wild boar, as identified at Fishbourne (Allen 2011), Owslebury (Maltby 1987), and Frocester (Noddle 2000). It is possible that there was some interbreeding between domestic pigs and wild boars, particularly if pigs were being released into woodland to feed on fruits, nuts, and fungi, bringing them into closer contact with their wild progenitors.

Maltby has shown that pigs tend to have been larger at Winchester and Dorchester compared to surrounding rural sites, though this may be due to the preferential selection of boars for the urban market (Maltby 2010, 203; 2016, 6). Slightly stockier pigs also appear have been more common at some villas, such as at Fishbourne and Frocester (FIG. 3.33). This may be due to the presence of sty-reared pigs at some villas, which could have affected body size, or because males were more often selected for consumption. Mackinnon has shown that two types of pigs were exploited in Roman Italy: a large, fat, short-legged variety and a small, bristled, long-legged variety (Mackinnon 2001). Literary and iconographic evidence suggests that the smaller, hairy breed was kept for meat and pannaged in woodland, while the larger type was more often sty-reared. These are not directly comparable to pigs in Britain, but it does show that different types may have been present, and were possibly managed in different ways.

**Summary**

A notable aspect of livestock size in the late Iron Age is not only how comparatively small and slender the animals were, but how similar in size they were in most areas. This homogeneity may reflect a lack of variation in livestock breeds or types, perhaps with widespread integration of stock-breeding, though this will only become clearer with ancient DNA analysis. Although similar in size, the degree to which livestock might have varied in other aspects, such as coat colour or wool length, is not known. Greater variation in body size is observable in all three of the main domesticates in the Roman period. The earliest changes occurred very soon after the conquest in the eastern part of southern England, notably around the Thames Estuary and the Fens. The proximity of these areas to the Continent implies that imported breeding stock was entering Britain from the first century A.D. This is supported by the observation of increased tooth sizes occurring alongside changes in stature – improvements
among native stock without introductions from other breeding populations should stimulate changes in body size, while associated changes in tooth size will tend to be delayed (Albarella et al. 2008).

While the introduction of breeding stock seems likely, more intensive selection practices and improved nutrition may also have been a factor in livestock size increases. The large complex farms that developed in the river valleys of lowland England in the early Roman period, with their arrangements of paddocks, trackways and waterholes, appear to have been equipped for more intensive livestock husbandry. The westward spread of larger livestock, of cattle in particular, suggests that these innovations took time to become established in other areas of the province. Also the recovery of bones from exceptionally large cattle in the later Roman period indicates that introductions of new stock occurred on multiple occasions, rather than in a single episode. Key to our understanding of animal management regimes are patterns in slaughter practices, to which we now turn.

**LIVESTOCK EXPLOITATION STRATEGIES**

For the Romano-British farmer, the decision to slaughter livestock had to be weighed against their value as plough animals and producers of dairy, wool, and manure. In many communities, meat production is often a by-product of livestock farming, occurring only when the productive capabilities of an animal has reduced. This section discusses the different types of farming regimes undertaken by farmers in late Iron Age and Roman Britain. It focuses on the relative importance placed on meat production against traction, dairy, and wool. Of course, other products can be exploited from livestock carcasses, including horn, skin, and bone, though these will be discussed in more detail in Chapter 5 in relation to craft-working.

**CATTLE EXPLOITATION**

**Beef production**

As already shown in this chapter, there is a widespread, chronological shift towards assemblages with higher proportions of cattle, a change that appears to have occurred during and after the second century A.D. (cf. Maltby 1981; King 1999a; Dobney 2001; Grant 2004; Albarella 2007). Ageing data from the analysis of dental wear shows that this pattern was accompanied by an increased emphasis on mature cattle on rural sites (Fig. 3.34). Immature cattle, aged around 16–36 months, were most commonly slaughtered in the late Iron Age. In the Roman period (in all phases), adult cattle, aged around 5–10 years, are better represented than immature cattle. Also, the proportion of elderly cattle (c. 8+ years) gradually increases from just over 11 per cent on late Iron Age/early Roman sites to over 25 per cent on late Roman sites. This suggests a desire by farmers in the Roman period to retain more cattle into adulthood, well past the optimum age for prime beef (around 18 months to three years).

In broad terms, there is no major difference in the cull patterns between different types of rural settlement (Fig. 3.35). Villas tend to produce slightly higher percentages of neonatal and juvenile cattle, while immature cattle are slightly better represented on complex and enclosed farmsteads. Sub-adult cattle are markedly more common in assemblages from enclosed farmsteads. The percentages of adult and elderly cattle do not appear to differ between any types of settlement to any significant degree. Generally, the patterns
represent a picture of sustainable, mixed husbandry regimes, which focus on both meat and secondary products. However, there are greater differences between individual sites, with some showing clear changes in slaughter patterns over time.

A number of roadside settlements show an increase in the importance of mature cattle over time, such as Wilcote in Oxfordshire and Springhead in Kent (Grimm and Worley 2011; Hamshaw-Thomas and Bermingham 1993). Albarella et al. have argued that the shift in cattle slaughtering of sub-adult to adult animals by the end of the second century at Elms Farm, Heybridge, indicates that the production of prime beef had reduced in importance in favour of cattle exploited for traction (Albarella et al. 2008, 1836, fig. 5). It is also possible that beef cattle were more frequently exported from roadside settlements to towns, or that more retired draught or dairy cattle were being brought in from farmsteads.

Slaughter patterns at Gorhambury villa, Hertfordshire, and at Owslebury, Hampshire, appear to mirror the ‘provincial’ trend of a primary focus on adult cattle (FIG. 3.36). Of the sites in the Upper Thames Valley, Barton Court Farm stands apart from Claydon Pike and Yarnton, with a selection strategy focused on immature cattle, while the mortality profiles of the latter two sites are more evenly spread between several age groups. The data from Wattle Syke, West Yorkshire, are also more widely distributed, though here there is a greater emphasis on juvenile and elderly cattle.

FIG. 3.35. Cattle mortality profiles by site type (dental wear data from assemblages with over 10 samples)

FIG. 3.36. Comparison of cattle mortality profiles from selected farmsteads and villas
These datasets show that cattle selection strategies varied considerably between different rural sites. Maltby argues that the retention of adults at Owslebury implies that most cattle were kept for breeding and/or working practices (Maltby 1987). He also suggests that the ownership of large numbers of cattle could have been indicative of status and wealth, and thus inhabitants would have been reluctant to dispose of their livestock either by selling/exchanging them or by eating them, unless it was necessary. This was probably also the case at Gorhambury villa, which may have been similar to Owslebury, though the slightly higher proportion of sub-adult cattle suggests that the consumption of prime beef was more important at this site.

The culling of immature cattle at Barton Court Farm indicates a strategy focused on intensive meat production. This slaughter pattern was probably unsustainable without large herds and an equally intensive breeding programme. The problem of herd regeneration led Wilson to suggest that either the main herd was not kept on site, i.e. the settlement was receiving animals from an ‘estate-managed herd’, or that the inhabitants were not primarily engaged in livestock farming and the cattle were being imported from outside sources (Wilson 1986, mf. 8:G1–2). The high proportion of males in this assemblage would also support the argument that it was not representative of a herd kept on site. At Claydon Pike, immature cattle were also a focus for slaughter in the late Iron Age, though not to the same extent as at Barton Court Farm. However, the presence of elderly cattle here suggests that a herd was probably maintained on site. Sykes suggested that the high kill-off of young cattle may have reflected an emphasis on meat and leather production (Sykes 2007, 84). The second century witnessed a significant reduction in the percentage of immature cattle and an increase in the percentage of bulls (and possibly oxen). These changes in the mortality profile and sex ratio were interpreted by Sykes as evidence for an increase in the importance of secondary products and, possibly, the export of draught cattle (ibid., 152, 203–4). Over 50 per cent of the mandibles that could be aged from Arkell’s Land, Gloucestershire (Oxford Archaeology 2013), Prestatyn, Clwyd-Powys (Blockley 1989), and Old Bowling Green, Droitwich, Worcestershire (Woodiwiss 1992) derived from elderly animals (probably over eight years of age). For sites located closer to major towns and other market centres, farmers may have had a ready outlet for exporting draught cattle that were no longer fit for work.

**Traction**

The Piercebridge Plough Group is an enduring symbol of Roman agriculture in northern Europe (fig. 3.37). A statuette of religious significance (Manning 1971, 133–4), it nonetheless highlights the important role of cattle in arable farming. Of course, much of our primary evidence for the use of plough animals comes from animal bones. It has long been assumed that much of this work was undertaken by cattle (Maltby 1981; Grant 1989; 2004). Mules and donkeys may have been used for traction purposes, though their bones are very rarely found on Roman sites and, therefore, the use of these animals is unlikely to have been widespread (though see below for further discussion of equids).

It is now becoming quite clear that cattle were probably the dominant livestock animal in many areas of Roman Britain, particularly after the second century A.D. Although this may be due to an increasing demand for meat from towns and the military, it is very likely that it reflects a significant expansion of arable agriculture (cf. Van der Veen and O’Connor 1998; Dobney 2001; Grant 2004; Albarella 2007, 396–9; Maltby 2016). As already seen, the identification of bones from larger cattle may have been due to a desire for animals that were able to pull ploughs more effectively. Much of the evidence for improved stock is found at sites located in the south and east of England, in areas where arable farming was probably at its most intensive.

Faunal assemblages with high proportions of adult cattle may indicate the presence of draught cattle, as meat from older cattle is widely thought to be a side-product of cereal agriculture (Van der Veen and O’Connor 1998, 132). Over 50 per cent of the mandibles that could be aged from Arkell’s Land, Gloucestershire (Oxford Archaeology 2013), Prestatyn, Clwyd-Powys (Blockley 1989), and Old Bowling Green, Droitwich, Worcestershire (Woodiwiss 1992) derived from elderly animals (probably over eight years of age). For sites located closer to major towns and other market centres, farmers may have had a ready outlet for exporting draught cattle that were no longer fit for work.

**FIG. 3.37.** The Piercebridge Plough Group (Manning 1971, fig. 1) © The Trustees of the British Museum
High proportions of adult cattle are a common feature of animal bone assemblages from major towns. Maltby (2010) has demonstrated that females tend to be more common than males in these assemblages. He argues convincingly that this reflects the exchange of dairy stock, though it is probable that retired draught cattle were also sent to urban markets for slaughter.

The correlation of mortality rates with sex ratios may provide further indications of the use of draught cattle. Maltby (2016) has suggested that rural assemblages with more equal proportions of adult males included plough oxen, which were more often kept on farmsteads for slaughter. Owslebury and Claydon Pike, as mentioned above, both show this pattern. However, it must be remembered that cows can also be used for traction. The most convincing evidence for draught animals lies in identification of oxen (castrated bulls), as these cattle are kept almost exclusively for working the land. Through her analysis of a large assemblage of horncores from Roman Chelmsford in Essex, Luff (1994) was able to show that a substantial proportion derived from young adult oxen. The material appeared to represent waste from horn-working and possibly tanning, and may have reflected a particular desire for horns from young males. The presence of oxen can be determined by differences in the shape of the metapodials. This is because the bones of castrated males will grow differently due to a delay in the fusion of the epiphyses; oxen long bones will grow for a longer period than bulls and will be more slender in comparison (Howard 1963). Unfortunately, there have been very few attempts to identify the presence of oxen from Romano-British assemblages in this manner, mostly owing to the need for large sample sizes and because it is very difficult in general.

Another potential way of identifying plough animals is from pathologies resulting from traction. Mechanical stresses on the skeleton are noticeable as modifications on the distal metapodials (especially the metacarpals) and the phalanges (Bartosiewicz and Gál 2013, 143–54). Splaying of the medial condyle is a particularly useful indicator of increased pressure being exerted on the foot/toe joint over a consistent period of time (Fig. 3.38). Splayed cattle metapodials were frequently recovered from Elms Farm, Heybridge, Essex, and were noticeably more common in post-conquest deposits (Albarella et al. 2008, 1836). Similar pathologies have been noted on cattle bones at other Romano-British rural sites, such as at Longstanton, Cambridgeshire (Swaysland 2006). The recovery of splayed metacarpals at Wroxeter also supports the view that some draught cattle were sent to urban markets (Hammon 2011).

However, the degree of pathological modification in cattle foot bones tends not to be well documented in animal bone reports. It would help greatly if this was quantified in each assemblage using a standardised methodology (i.e. de Cupere et al. 2000), so that the proportion of cattle that may have been used for traction purposes can be better understood.

Dairying

Cattle dairying is generally considered to have been of little importance in Roman Britain, mostly due to the lack of references to it by Roman agronomists, while some ancient historians suggest that the consumption of cow’s milk was particularly unusual (White 1970, 277). Of course, these reflect cultural attitudes in Roman Italy and were not necessarily relevant to Britain. Previously, archaeologists have argued that the lack of evidence for tuberculosis in the human population demonstrates that dairy consumption was rare: the disease can be transmitted from cattle to people through unpasteurised milk (Cool 2006, 94; Hesse 2011, 241). While this may be true, the prevalence of tuberculosis in the Romano-British human population is not yet well understood. Also, the disease is far less of a problem in sheep and goats, and its transmission to people via their milk is known to be far less common (Allen 1988).

There are three possible ways of identifying the production, processing and consumption of dairy products: faunal remains, cheese-making equipment, and residue analysis (see Other evidence for dairying below). Unfortunately, the
interpretation of milk production from zooarchaeological evidence is fraught with difficulties. In specialised dairy economies, a constant supply of milk is maintained when cows give birth every year, because females will continue to produce milk until their offspring are weaned (the same applies to ewes and does – see below). Zooarchaeologists have argued that this type of husbandry strategy should be reflected in a high percentage of calves, lambs, or kids culled in their first year, freeing up the milk for human consumption (Payne 1973; Legge 1981; 1992; though see McCormick 1992 for an alternative view). A high proportion of female livestock should also be expected on sites where dairying was important, though the identification of this pattern is dependent on large numbers of bones being measured to provide a reliable sex ratio.

Based on Romano-British faunal evidence, dairying of cattle was far less important than in sheep (see below). Between the late Iron Age and the late Roman period, the slaughter rate of juvenile cattle averages between 9 and 13 per cent from all rural sites. It must also be noted that cattle aged as ‘juvenile’ in this study may have been older than a year (potentially up to 18 months).

The pattern of juvenile slaughter that might indicate cattle dairying is rarely found at farmsteads and villas. An emphasis on the slaughter of juveniles (less than 18 months) and elderly cattle (beyond six–eight years) is found in the first to third century A.D. at Wattle Syke, West Yorkshire (Richardson 2013), and possibly reflects a focus on dairying. The older animals were probably cows slaughtered after they had ceased to be useful for milking and reproduction. This husbandry strategy may have continued into the fourth century A.D. at Wattle Syke, though a higher proportion of immature and adult cattle are evident in this phase, which indicates an increased focus on meat production (FIG. 3.36).

Intensive dairying would have necessitated herds being located close to markets, owing to the short shelf-life of dairy products (see below for discussion of cheese production). Maltby has shown through detailed analysis of the size of cattle bones from Roman Dorchester and Winchester that adult female cattle were more commonly represented (Maltby 1994a, 90–2; 2010, 146–52). These, he argues, were cows raised by town inhabitants and sent to market after their use as dairy producers had ceased. This argument is strengthened by the recovery of calf bones from Dorchester (see above), possibly from calves slaughtered as a by-product of milk production. Stallibrass found that cows were more common than bulls (and castrates) at Catterick in North Yorkshire and nearby Bainesse, though the ratio of 18 to 12 is hardly overwhelming and the ageing data showed very little sign of juvenile slaughter (2002, 405–7). However, dairying may have been more important at the military vicus at Piercebridge, Co. Durham, where bones of juvenile cattle and sheep were relatively numerous (Rackham and Gidney 2006, 60). A similar pattern was also found at Dragonby, Lincolnshire, where calf bones were quite frequent in each phase of occupation. Harman noted this pattern and suggested that it may reflect the seasonal culling of cattle ‘to allow greater exploitation of milk production’ (Harman 1996, 155).

SHEEP AND GOAT EXPLOITATION

Meat and wool

In contrast to cattle, sheep mortality profiles show a remarkable degree of uniformity between the late Iron Age and the late Roman period (FIG. 3.39). In general, sheep tended to be slaughtered at sub-adult ages, normally between c. 20 months and 4/5 years (cf. G.G. Jones 2006). Juvenile and immature sheep were also slaughtered in

FIG. 3.39. Sheep mortality profiles over time (dental wear data from well-dated assemblages with over 10 samples)
comparatively high numbers, which may reflect an emphasis on meat production and, potentially, dairying (see section below). In contrast, a relatively small proportion of sheep were maintained into full adulthood, perhaps reflecting the maintenance of rams and ewes for breeding purposes.

As with cattle, there do not appear to be any major differences between the cull profiles of different types of rural settlement, though there are some subtle variations (FIG. 3.40). Juveniles and adult sheep are better represented on enclosed farmsteads. In 72 per cent of enclosed farmsteads, juveniles make up more than 20 per cent of the assemblage. This compares with 40 per cent of complex farmsteads, 38 per cent of villas, and 29 per cent of roadside settlements. Similarly, adults represent more than 20 per cent of the assemblage in nearly 50 per cent of enclosed farmsteads. This compares with 36 per cent of complex farmsteads, 31 per cent of roadside settlements, and only 14 per cent of villas. When considered in these terms, the data suggest that a greater emphasis was placed on secondary products at enclosed farmsteads, most notably dairy production (see below).

Some of these patterns may be explained by chronological changes, particularly since enclosed farmsteads were considerably more common in lowland Britain in the late Iron Age and early Roman period (cf. Smith and Fulford 2016, 395, fig. 12.8). Although sheep husbandry practices do not appear to have changed much in terms of the overall pattern of sheep culling, there is a great deal of variation between different settlements (FIG. 3.41). The premature culling of sheep at Owslebury, Hampshire, led Maltby to suggest that while a few clips of wool may have been taken...
from slightly older animals, the lack of mature adults indicates that wool production was probably a by-product of meat production (Maltby 1987). At Claydon Pike, Gloucestershire, sub-adults were commonly slaughtered in each phase of occupation. However, there was a reduction in the proportion of immature lambs being slaughtered in the second century A.D. Sykes interpreted this as reflecting an increased reliance on wool and manure (Sykes 2007, 152–3). Agricultural intensification required more land for arable cultivation, and sheep dung would have been important for fertilising the gravel terraces of the Upper Thames Valley (*ibid.*). In contrast, at Yarnton, a site also located on the Upper Thames gravel terraces, immature sheep were consistently culled throughout the Roman period. This cull pattern is indicative of intensive meat production, and is more commonly seen in Iron Age assemblages in this region (Hambleton 1999). The difference between the two sites suggests that sheep flocks were not kept at Yarnton throughout the year, and may have been brought in seasonally. Such a high rate of juvenile and infant culling would have been difficult to maintain.

Assemblages from Suddern Farm, Hampshire, Cotswold Community, Gloucestershire, and Tolpuddle Ball, Dorset, all show an increase in the percentages of sub-adult and adult livestock in the Roman period. As seen at Claydon Pike, this possibly represents an increased emphasis on wool and manure, though it may also reflect the commercialisation of meat. A reduction in the proportion of immature sheep at some sites could be because lambs were being exported to urban and roadside markets. At Colchester, high percentages of lamb and kid bones were found in numerous assemblages, notably in extramural areas (Luff 1993, 73). Maltby’s survey of urban assemblages has shown that this is not an isolated example, as relatively high proportions of juvenile sheep and goats have been recovered from York, Silchester, Wroxeter, and Canterbury (Maltby 2010, 289).

Maltby has also noted higher percentages of adult sheep on rural sites in the late Roman period, and suggests that this supports the idea that wool provisioning had become a primary concern for many farmers (Maltby 2016, 4). If wool-processing had become a major industry by this time we might expect it to have been centralised around major urban centres and roadside settlements. A high proportion of adult sheep bones in assemblages from Winchester indicate that the delayed slaughter of sheep was a consequence of wool-provisioning (*ibid.*). Sheep ageing data from late Roman roadside settlements show that slaughter patterns varied between different sites. At Birdlip Quarry, Gloucestershire, nearly 60 per cent (n=87) of the sheep were slaughtered at sub-adult age in the third–fourth century A.D. (Ayres and Clark 1999). This is very similar to the pattern at Grandford, Cambridgeshire, where sub-adult slaughter accounted for 75 per cent (n=107) of the sheep assemblage between the second and the fourth centuries (Stallibrass 1982). While these patterns presumably reflect intensive meat production, the fact that most were slaughtered somewhere between the ages of two and five years means that they would have provided several clips of wool prior to slaughter. At these roadside settlements, wool was probably a significant by-product of the sheep-farming economy.

**Dairying**

Zooarchaeological evidence for livestock dairying has been discussed above in relation to cattle, and the same rules (and problems) apply to sheep and goats. The ‘juvenile’ age category represents lambs aged up to one year, when the second molar has erupted but shows little or no wear on the occlusal surface (G.G. Jones 2006, 160). On average, 20 per cent of sheep are culled at this early stage on rural settlements in the late Iron Age and the Roman period (*fig.* 3.39). As noted above, the slaughter of yearling lambs tends to be more frequent on farmsteads than other settlements.

There are a couple of possible explanations for the pattern of juvenile sheep slaughter in Britain. One is that farmers in the Roman period had difficulties in maintaining high numbers of sheep over winter, when food supplies were lower and there was less available shelter. An annual cull of yearling lambs, perhaps focusing on weaker individuals, would help to keep numbers at a manageable level and would maintain a productive flock. Secondly, yearling lamb slaughter was an important form of ritual expression in the countryside. A survey of this evidence will be covered in more detail in Volume 3, but it suffices to say that there is considerable evidence for the seasonal culling of lambs and/or kids at numerous religious sites, such as the temples at Uley, Gloucestershire (Levitan 1993), and Great Chesterford and Harlow in Essex (Legge *et al.* 2000). It is possible that ritual culling (?sacrifice) was also practised at domestic settlements, and this may be reflected in some of the ageing data.

The third explanation is that sheep and/or goat milk was regularly exploited by rural communities. Payne found, in his study of sheep in medieval Asvan Kale, that a high annual cull of animals aged between 6–9 months represented intensive milking (Payne 1973).

The proportion of juvenile sheep culling on enclosed farmsteads in the late Iron Age and
Roman periods is suggestive of dairy production (see above). A few rural settlements have especially high frequencies of juvenile sheep; in some cases over 40–50 per cent of the total population were culled at this age. This includes a number of roadside settlements where yearling lambs and kids were commonly slaughtered, most notably at Higham Ferrers, Northamptonshire. Strid also identified a high ratio of ewes to rams at this site, which may further suggest the importance of dairy (Strid 2009). A clear emphasis on the culling of juveniles (nearly 40 per cent) and sub-adults at Dalton Parlours villa, West Yorkshire, indicates that meat and dairy were important. A similarly high kill-off of yearling lambs at Passewaaijs Hogeweg in the Netherlands during the first century B.C. and first century A.D. has also been interpreted as an emphasis on sheep dairying (Groot 2008, 41–7).

**Dairying: specialised pottery and organic residues**

While sheep (and possibly goat) milk may have been a common consumable in Roman Britain, the extent to which specialised production occurred is less certain. Owing to the difficulties in maintaining the freshness of milk, specialised production was probably located close to its intended markets, near to towns, roadside settlements, and military *vici*. However, this would have been less of a problem if milk was primarily collected to make cheese. Ceramic cheese moulds are known to have been produced by a number of Romano-British pottery industries, with examples from kilns at Alice Holt (Cooke and Powell 2014), Oxfordshire (RPS Coulston 2002), and Doncaster/Cantley (Buckland 1976; Buckland and Dolby 1980; Buckland *et al.* 2001). These vessels tend to be bowl-shaped, commonly with ridges on the inner surface where numerous pre-fired holes were deliberately inserted. Vessels with post-fired piercings may also have been used for cheese-making, though there may be other reasons for these (Fulford and Timby 2001).

Cool suggests that cheese moulds were introduced to Britain by the military, citing the recovery of vessels from kilns dating to *c.* A.D. 50–60 outside the fortress at Longthorpe, Cambridgeshire (Cool 2006, 96). If these vessels were a Roman introduction, their use certainly spread to native communities. Cheese moulds have been found on nucleated rural settlements, such as Icklingham, Suffolk (West 1989), and Chapperton Down, Wiltshire (Malim and Martin 2007), and in small numbers on farmsteads at Maltings Lane, Witham, Essex (Robertson and Davis 2004), Childerley Gate, Site 5, Cambridgeshire (Abrams and Ingham 2008), Langdale Hale, Colne Fen, Cambridgeshire (C. Evans 2013), and Birch Heath, Tarporley, Cheshire (Fairburn 2003). However, it is unlikely that their use was widespread.

There is little evidence for large-scale cheese production at rural sites. At the Western International Market site in Hounslow, Greater London, a deposit of Roman pottery included a mortarium and ‘a large number of jars [which] had been pierced by post-firing holes mainly located in the basal region or lower part of the vessel’ (Gerrard 2007, 274). The recovery of these vessels led the ceramic specialist to argue that the assemblage probably represented the disposal of material relating to a specialist production activity, highlighting cheese-making as the most likely candidate (*ibid.*). The assemblage was also notable for the absence of table wares and drinking vessels. Without residue analysis, however, this interpretation remains speculative.

Analysis of lipid residues from pottery certainly shows that dairy products were being processed and consumed in Britain both before and after the Roman conquest. A large sample of Iron Age ceramics from southern England revealed substantial evidence for ruminant dairy fats, particularly in vessels from the hillforts at Danebury in Hampshire and Maiden Castle in Dorset. These results suggested that milk was an especially important commodity before the conquest (Copley *et al.* 2005, 493). Cool disputes this claim by arguing that pottery use was not overly common in the Iron Age, but may have had a more ‘specific culinary role’ compared to the Roman period when ceramics were more common and had a wider range of uses (Cool 2006, 154). However, the faunal evidence from Danebury would support the suggestion that cattle dairying was important at the hillfort (Grant 1984).

Residue analysis of Roman pottery assemblages is not routinely undertaken, and the current dataset is sparse. Dairy fats were identified in a cheese mould from a Roman deposit at Poundbury, indicating its use for cheese-making (Evans *et al.* 1987). A recent study of mortaria and other cooking pots from Faverdale, Co. Durham, and Stanwick, Northamptonshire, proved that they were also used to process milk products (Cramp *et al.* 2011, 1348).

It has been previously suggested that mortaria were used to make cheese in Roman Britain (Oswald 1943, 45–6). Cool has made the point that cheese-making has two main production stages: before being pressed and strained in a mould, cheese curds must be separated by heating, and this could have been done in mortaria (Cool 2006, 95). However, Cramp *et al.* dispute the claim that mortaria were used for cheese-making, highlighting the evidence for milk fats being mixed
with plant residues, rather than being specifically used for processing dairy (Cramp et al. 2011, 1347). It is clear that much more work in this area is needed to clarify the issue, and it would be very helpful if cattle, sheep, and goat dairy residues could be distinguished.

**PIG EXPLOITATION**

The ‘provincial’ pattern of pig slaughter displays the opposite trend to cattle. Compared to the Roman period, relatively high proportions of pigs were maintained to ‘adult’ age in the late Iron Age, though this is still relatively young at c. 27–36 months (fig. 3.42). Rarely are pigs found to survive beyond three years of age. This is because pigs are almost exclusively kept for meat production. The fact that sows reach sexual maturity within their first year and can produce large litters is the reason why a high kill-off of younger animals can be maintained (in contrast, cows tend to produce only one calf at a time, while sheep will often produce either single or twin lambs). The higher percentage of juvenile and immature pig culling in the Roman period suggests that pork production became more intensive on rural sites.

Pig slaughter patterns varied between different types of rural settlement (fig. 3.43). The timing of pig slaughter appears to have been delayed at roadside settlements compared to farmsteads and villas, where the percentages of sub-adult and adult pigs are higher on average. Pigs tended to be slaughtered at sub-adult age at Elms Farm, Heybridge, Essex, though Albarella et al. (2008, 1837) note that an increase in immature culling occurred following the mid-second century A.D. This, they argued, may have been related to the increase in pig size observed in the same period, allowing pigs to reach an optimum size at a younger age. It is possible that the slight delay in pig slaughter at roadside settlements may be related to the way that pigs were kept. If individual households were keeping smaller numbers of pigs, then the regular slaughtering of immature animals would have been less sustainable. Of course, some pigs may have been traded into these settlements.

It is perhaps surprising that there is comparatively little difference in the slaughter strategies employed at villas and farmsteads. A high frequency of juvenile culling can be explained on some farmsteads as the result of specialised processing or consumption patterns. At Nazeingbury, Essex, the pig assemblage was dominated by a large number of piglets slaughtered before their first year (Huggins 1978). Many of the remains from...
this site were from numerous metapodials, which appear to be from specialist processing of pig joints, and the products could have been destined for the nearby nucleated settlement at Harlow. Another site with a high percentage of juvenile pigs is the banjo enclosure at Nettlebank Copse, Hampshire. This site is thought to have been a centre for seasonal, communal feasting in the late Iron Age, where livestock were specifically selected for consumption (Cunliffe and Poole 2000).

As mentioned above, villas more consistently produce neonatal pig bones than other types of site. This suggests that some villas may have been specialised pig production sites, or were purchasing young piglets from other sources. The consumption of suckling pig was perhaps considered a delicacy by some wealthier citizens. The highest percentages of juvenile pigs (2–14 months old) have been found in the late Roman phase at Barton Court Farm, Oxfordshire (42 per cent; n=26), and at Bancroft, Buckinghamshire (50 per cent; n=22). However, there is a clear emphasis on the consumption of immature pigs, slaughtered between 14 and 21 months, at the majority of villas.

**MEAT PRODUCTION AND PRESERVATION**

How livestock are slaughtered and the ways carcasses are processed provide information about cultural attitudes towards animals. In other words, the treatment of animals during and after their death is defined by the traditions of the local community (Symons 2002). Many modern societies continue to invoke ritual or religious behaviour when slaughtering livestock, such as in Jewish, Sikh, Islamic, and orthodox Christian communities (Albarella pers. comm.). While it is difficult to understand the social and religious meanings behind livestock slaughter in Iron Age and Roman Britain, it is important to consider differences in slaughter and butchery practices since they probably reflect both economic concerns and cultural influences. This section assesses the evidence for carcass processing and meat preservation in the Romano-British countryside. Evidence for secondary processing, such as horn-working, tanning, marrow-processing, and bone-working, is considered further in Chapter 5 in the context of craft activities. Horse butchery is also considered separately (see below).

**METHODS OF SLAUGHTER**

As slaughter techniques may leave little or no trace on the skeleton, the manner in which livestock were killed is generally very difficult to identify. One of the first steps in livestock slaughter is to let the animal bleed out. The main difference is whether the animal was conscious or unconscious when this occurred, and the decision taken here is very much a cultural one. While modern, western slaughter techniques usually involve stunning the animal, under the belief that this is a humane method of killing, many traditional societies require livestock to be conscious (for example, Halal and Kosher slaughter methods specify that animals must be conscious). In many traditional African societies slaughter is usually carried out by cutting major arteries around the neck and allowing the animal to bleed out; in fact, the Suri of Ethiopia perceive this to be the fastest and least painful way for the animal to die (Abbink 2003, 352). In some cases, the head of the animal is held back while the throat is continually sliced until the head is fully removed. Throat-slitting can be detected from fine cut marks on the ventral surface of the atlas bone (Stallibrass pers. comm.), though zooarchaeologists have seldom reported such marks on Romano-British material.

Some animals may have been decapitated, which can be identified by chop marks on bones of the cervical vertebrae or on the occipital condyles of the skull. This type of butchery has been observed on cattle bones from Roman farmsteads at Coldharbour Quarry, Surrey (Ayres and Jones 2013), Whitcombe, Dorset (Buckland-Wright 1990), Lunnfields Lane, North Yorkshire (Brown et al. 2007), and Moor Hall Farm, Essex (Pipe 2011). At Site 2 on the Asselby to Pannal Pipeline excavation in North Yorkshire, the skeleton of a yearling calf was found next to a late Roman infant burial (Gregory et al. 2013). Notably, the calf had been decapitated and meat had been filleted from several long bones, though the skull was later placed back in the deposit with the skeleton. Decapitation as part of ritual cattle slaughter has been identified at the late Roman shrine at Ferry Fryston, West Yorkshire (Orton 2007). Special implements may have been used to slaughter animals at some religious sites. Copper-alloy knives have been found associated with temples at Muntham Court, West Sussex and Nettleton, Wiltshire, which may have been ceremonial rather than conventional items (Bird 2011, 282). Unfortunately, it is impossible to tell whether decapitation was the slaughter method, or whether it occurred after death.

Another possible slaughter method is poleaxing. This is where a poleaxe, or a similar pointed implement, is used to hit an animal on the top/front of the head, leaving a distinctive puncture wound in the frontal bone of the skull (fig. 3.44). Poleaxing instantly kills (or stuns) the animal so that it is not conscious while it is bled out.
However, it is not always certain whether marks seen on some cattle skulls were caused by poleaxing, blunt trauma, or are the result of post-mortem damage. Marks found on an Iron Age cattle skull from Gussage All Saints, Dorset, were argued to have been made by a blunt instrument rather than a sharp one (Harcourt 1979, 159). Poleaxing of cattle has been suggested from marks found on skulls recovered from a number of Roman rural settlements, including the villas at Chilgrove 1, West Sussex (Outen 1979), and Tarrant Hinton, Dorset (Peck and Maltby 2006), and the roadside settlements at Ickham, Kent (Palmer and Powell 2010), and East Anton, Hampshire (Higbee 2011). In addition, a horse skull was suggested to have been poleaxed at Ironmongers Piece villa in South Gloucestershire (Morgan 1985).

Since the zooarchaeological evidence for poleaxing is equivocal, the extent to which it was practised in Roman Britain remains uncertain. Poleaxes are not known from Roman Britain, and are more likely to have been a medieval introduction (Maltby 2011, 77). If this technique was employed at some sites, heavy iron spikes may have been used (these are relatively common in Romano-British finds assemblages, e.g. Down 1979, 151–5). Evidence from several military sites along Hadrian’s Wall suggests that some cattle were shot with projectiles (Stallibrass pers. comm.). This leaves a very distinctive puncture wound in the skull, which is less likely to have been caused by post-mortem damage.

**VARIATIONS IN BUTCHERY PRACTICE**

It is now widely accepted that new, rapid and more intensive methods for processing cattle carcasses developed after the Roman conquest. This change in technique probably reflects the appearance of full-time, professional butchers who were consistently acquiring large numbers of livestock (Maltby 2007, 1). Very few late Iron Age sites produce evidence for this style of butchery, though heavily processed remains found at some oppida, such as Braughing, Hertfordshire, suggest continental influences (Maltby pers. comm.). Regular butchery will often cause repetitive actions, which are reflected in distinctive cut and chop marks on cattle bones, indicating the use of cleavers. It is not surprising that such evidence is found in numerous Roman towns and several military sites (Grant 1989; Maltby 1989; 1998; Berg 1999; Dobney 2001), and it is thought to represent the commodification of meat, skin, horn, and bone (Seetah 2005; 2006).

Maltby has identified several of the most regularly encountered butchery marks found in urban assemblages, such as the head of the femur being chopped through (where the hind leg articulates with the pelvis), and chopping at the rear of the mandible (Maltby 2007, table 2). The scapulae are also subjected to heavy chopping around the glenoid and the neck (see *Meat preservation*). These butchery placements are intended to segment the carcass in a quick and efficient manner.

Distinctive filleting marks that look like shallow scoops are made by cleavers being run along the surface of the bone to strip the meat in quick succession (Seetah 2006). They occur fairly consistently on the same places on the femur, tibia, radius, and humerus, and they are notable because they suggest that raw meat was being removed from the bone. Cooked meat will often get pulled or cut from the bone rather than stripped in this fashion, indicating that filleted meat was being cooked or preserved. This also
frees the bone so that raw marrow can be extracted (see below). Filleting marks are rarely found in rural assemblages, however, and have been notably absent even when looked for, such as at Brighton Hill South, Hampshire (Maltby 1995).

Axially split upper limb bones also occur in a number of town assemblages, again in quite large numbers. This appears to reflect secondary processing of carcass parts in order to remove marrow more easily, and it is quite different to the spiral/oblique fracturing noted in Iron Age and rural assemblages. Maltby noted the absence of these types of marks from the rural settlements at Owslebury, Hampshire, and at Biddenham Loop, Bedfordshire (Maltby 2007, 4).

At farmsteads, the value of secondary products probably meant that livestock were less expendable. The style of butchery employed on Iron Age sites, predominantly involving the use of knives, appears to have prevailed on many Roman rural sites (e.g. Wilson 1978). In many cases, the marks made on the bones are generally small incisions, giving the impression that they were quite skilfully placed, and were probably intended for removing cooked rather than raw meat (see above). The process of disarticulating the carcass appears to have been time-consuming, involving a great deal of care and attention.

Animal bone assemblages from some late Roman villas show that cleavers became fairly regularly used alongside knives to butcher cattle, such as at Halstock, Dorset (Peck 1993), Northfleet, Kent (Grimm and Worley 2011), Fullerton, and Dunkirt Barn, both Hampshire (Hammon 2008c; Worley 2008). At Chilgrove 1, West Sussex, the recovery of longitudinally split humerus and radius bones suggests that a trained, urban butcher may have been present (Outen 1979), while at Snodland villa, Kent, evidence for ‘Roman-style cleaver butchery’ was suggested to indicate evidence for ‘continental’ influences (Hamilton-Dyer 1995). It is possible that itinerant butchers began to ply their trade in the countryside. However, such evidence is exceptional at rural sites. As Maltby quite rightly points out in regard to the faunal assemblage from Owslebury, cleavers may well have been used on rural sites, but only for specific tasks, such as splitting the skull open, rather than specialised butchery (Maltby 1987).

While specialised cleaver butchery is rarely found at farmsteads, evidence from roadside settlements and defended ‘small towns’ is more variable. At Neatham, Hampshire, a pattern of intensive and somewhat haphazard butchery was noticed by Done, who commented that, ‘there was more chopping than was strictly necessary for the efficient detachment of meat’ (Done 1986, 144). Recent research on Roman cattle butchery, however, shows that this intensive method is quicker for dismembering carcasses (Seetah 2006). Nonetheless, Done noticed a difference between material from Neatham and the roadside settlement at Staines, Surrey, where this type of butchery was comparatively rare. The Neatham material may represent cattle that were being rapidly processed, but by less-skilled practitioners. At Elms Farm, Heybridge, Johnstone and Albarella remark that cattle butchery was similar to the ‘Roman style’, suggesting that the population was large enough to require the services of a full-time, specialist butcher (Johnstone and Albarella 2015).

More contradictory evidence can be found in material from the defended ‘small town’ at Worcester. At Sidbury, longitudinal splitting of upper limbs was identified alongside other distinctive marks from early Roman deposits (Scott 1992). Yet at Deansway, in the same settlement, the specialist noted little evidence for specialised butchery (Nicholson and Scott 2004). Maltby has noticed that split upper limb bones tend to be found clustered in discrete deposits in urban settlements, which suggests that they were gathered for secondary processing, perhaps after being passed on by the butcher to another craft-worker (Maltby pers. comm.).

Tongue removal is identified by cuts on the hyoid, a bone found at the rear of the throat (fig. 3.45). Some reports state that heavily chopped mandibles indicate tongue removal (e.g. Johnstone and Albarella 2015). However, as Rixson points out, this is probably related to secondary processing; tongue removal is a far more delicate procedure (Rixson 1988, 56). At the Friends’ Burial Ground site in Staines, Surrey, a large quantity of cattle hyoid bones were recovered with cut marks, alongside mandibles with cuts along the ascending ramus (Chapman 1984). Cut hyoids have also been recovered from the roadside settlements at Springhead in Kent (Grimm and Worley 2011, 34) and The Highway, Shadwell in Greater London (Rielly and Ainsley 2002). It is rare for tongue removal evidence to be found at farmsteads, though this may be due to the poor recovery of hyoid bones.

LARGE-SCALE PROCESSING AND MEAT PRESERVATION

The specialist butchery techniques employed in towns suggest that carcasses were rapidly divided into relatively small joints, with some parts being completely stripped of meat. Of the types of urban-style butchery detailed by Maltby (1989; 2007), blade-trimmed cattle scapulae are perhaps most commonly found on rural sites (Maltby 2016, 793). This trimming is usually focused
around the glenoid, the blade, and the spine. In many instances, the blade is also punctured (fig. 3.46). These perforations are argued to represent hung shoulder joints (Dobney *et al.* 1996; O’Connor 1988; Maltby 2010, 287). This can be done to age the beef and concentrate the flavour of the meat, either for preservation (i.e. smoking, brining, etc.) or so that meat can be sliced from the bone in a particular fashion (i.e. in a butcher’s shop/delicatessen). When found on rural sites, perforated scapulae may represent beef shoulders that had been imported from towns (see below).

Where large quantities of meat were being processed regularly, meat preservation would have been important. Stallibrass reports a ‘superabundance’ of cattle scapulae at the fort at Annetwell, Carlisle, which she suggests were from joints processed in the adjacent *vicus* (Stallibrass 1993, 26–7). Large numbers of trimmed and perforated cattle scapulae were also recovered alongside numerous sheep mandibles in a pit in the Lanes, Carlisle, which suggests that meat was being intensively processed nearby, and possibly smoked (*ibid.*, 51–2). The demand from the army for meat probably encouraged large-scale processing in military *vici*.

As discussed above, evidence for large-scale, specialist processing of livestock is not common on rural settlements. However, an interesting deposit of over 1000 pig foot bones from a Roman well at Nazeingbury, Essex, suggests that it may have occurred on some sites (Huggins 1978). These remains derive from no less than 57 young pigs that were deposited together fairly rapidly. Maltby points out that the site was located around 20 km from Verulamium, and may have supplied the town with pork products (Maltby 2006, 120). High proportions of pig foot bones have also been identified at some villas, such as Fishbourne, West Sussex (Allen 2011) and Castle Copse, Wiltshire (Payne 1997, 338), suggesting that trotters may have been considered a delicacy.

Hook-damaged cattle scapulae have been found on some rural sites, though never in the numbers found at towns. Good examples include Longstanton (Swaysland 2006) and Langdale Hale (Higbee 2013) in Cambridgeshire, and Dunkirt Barn (Worley 2008) and Liss villa (Hamilton-Dyer 2008) in Hampshire. Whether these instances reflect the presence of a specialist butcher at the site or imported joints of cured meat is uncertain. The lack of specialist butchery marks on other bones in these assemblages suggests that dressed shoulder joints may have been imported. Hamilton-Dyer (2008) proposed that Liss villa could have been supplied from nearby Neatham, while joints found at Langdale Hale could have derived from the roadside settlement/port at Camp Ground, Colne Fen, where cattle butchery appears to have been more intensive (Higbee 2013, 122–3, 375–7).

It has been argued that differences in the amount of trimming around the glenoid and along the spine indicates whether shoulder joints were brined/cold-smoked or hot-smoked (Dobney *et al.* 1996, 27). Unfortunately, butchery marks are rarely recorded to this level of detail. Evidence for smoke-houses is also fairly uncommon. Recent excavations by ULAS at Pineham Barn, Northamptonshire, have revealed the foundations of a square-shaped, stone structure with a flue running around the internal perimeter (Booth 2014, 351–2). Structures of similar size and shape have also been excavated at Wainscott and Northfleet in Kent, though environmental evidence suggests that these were used for malting grain (Andrews *et al.* 2011; Clark *et al.* 2009).
Other features tentatively identified as smokers have been examined at Berrick Salome, Oxfordshire (Wilson 2008), Nesley Farm, Gloucestershire (T. Roberts 2013), and Budbury villa, Wiltshire (Corney 2003). However, none of these examples are supported by animal bone evidence. Claydon Pike in the Gloucestershire Thames Valley perhaps presents the best example. Here, a twin-roomed, L-shaped building was constructed just south of the main ‘cottage’ residence in the fourth century a.D. (Miles et al. 2007, 173–5). In the smaller of the two rooms, a damaged hypocaust was connected to the northern half of the larger room by a flue, which was overlain by burnt, stone-floored hearths and a series of pits. A lack of personal items, architectural refinement and pottery argues against a domestic function for the building. Significantly, a large, roughly square pit located just to the opposite side of the main residence contained a large quantity of trimmed cattle scapulae (Miles et al. 2007, 175; Sykes 2007, 204). It is reasonable to suggest that the building was used as a smoke-house for preserving meat.

Quantities of fish bones from the site also suggest that these may also have been smoked at the site in the fourth century A.D.

Brining may have been an important method of preserving meat in the later Iron Age, and attention has been drawn to the possibility that livestock were processed at salt-production sites (Maltby 2006). Cattle and pig bones tend to make up a significant proportion of the faunal assemblages at these sites, signalling the processing of salted beef, ham and bacon. The coastal site at Ower, Dorset, continued to be a major salt-production site into the Roman period (Sunter and Woodward 1987). Compared to most rural sites, pig bones were well represented in assemblages dating to the late Iron Age/early Roman phase (46 per cent) and the late Roman phase (22 per cent). The assemblage was dominated by skull and foot bones, and the ageing data suggest that pigs were predominantly slaughtered between two and three years old (Coy 1987). Maltby points out the proportion of these skull and foot elements is unusually high compared to most other rural settlements, suggesting that haunches of meat may have been exported from the site (Maltby 2006, 119–20).

Salt-production appears to have been central to the economy of the roadside settlement at Nantwich, Cheshire (Arrowsmith and Power 2012; see also Ch. 5). Excavations at Kingsley Fields showed that the primary phase of activity occurred between the late first century and the mid-third century, which included the use of several clay-lined, brine tanks. As with Ower, there was an unusual predominance of skulls deposited in the tanks, including cattle, sheep (no goat), pigs, and red deer, perhaps suggesting that haunches of meat were being exported. Numerous military finds suggest that the site may have been under the control of the army or that the settlement was involved in supplying the military elsewhere. Further evidence of specialist animal processing for hides and horn is presented in Chapter 5.
HORSES, MULES AND DONKEYS
Horses (*Equus caballus*) and donkeys (*Equus asinus*) are both members of the equid family. Horses are native to Britain, though there is a distinct lack of equid bones dating between the late Mesolithic and the late Neolithic/early Bronze Age, which suggests that wild horses became extinct and tamed horses were later reintroduced, becoming widely domesticated by the middle Iron Age (Bendrey 2010, 10–13, fig. 2). Donkeys, on the other hand, are not native to Britain. They are adapted to hot, dry conditions, and it is thought that Britain’s temperate climate represents the limit of their environmental tolerance (Johnstone 2010, 17). Mules are a hybrid of a male donkey (a jackass) and a female horse (a mare). This means that they are sterile and cannot reproduce. Therefore, the presence of mules either represents local cross-breeding of horses and donkeys, or that they have been imported. Mules can grow as large as horses, but tend to be more slender in comparison, and are generally considered to be stronger. Another advantage that mules have over horses as pack animals is that they require less sustenance, but have greater physical endurance (Chuang pers. comm.) It has been argued that mules were particularly important in the expansion of the Roman Empire, and were exploited by the army for travel and logistics (Hyland 1990). The bones from these three equids are incredibly difficult to tell apart. It is generally assumed that the vast majority of equid bones found on Iron Age and Roman sites in Britain are from horses.

This section provides an overview of the evidence for horse exploitation, focusing on their relative abundance, evidence for breeding, and slaughter patterns. The evidence for mules and donkeys in late Iron Age and Roman Britain is summarised.

EXPLOITATION OF HORSES
Relative abundance of horse
Most faunal assemblages of a reasonable size will include horse bones, which show that they played a vital role in the economy of Roman Britain. The frequency of horse bones can vary considerably on rural sites, averaging between 5 and 10 per cent of the major domesticates. However, there are some notable chronological and regional trends (FIG. 3.47). In the Central South region, which includes much of the chalk downland of southern England, horse remains steadily decrease from an average of c. 9 per cent in the late Iron Age to c. 5.5 per cent in the late Roman period. There is a similar decrease in the North-East, though here it occurs between the Iron Age and early Roman period. In contrast, the average percentage of horse increases over time in the Fens region and the Thames Estuary region, from c. 5 per cent in the late Iron Age to 8–10 per cent in the Roman phases.

Horse remains tend to be far more common on rural sites than they are in towns, a pattern that is mirrored in the medieval period (Albarella pers. comm.). Maltby has shown that horse bones were consistently better represented in deposits at Owslebury in Hampshire compared to Dorchester and Winchester, where they rarely contributed.

**FIG. 3.47.** Mean percentage of horse bones from rural settlements over time in selected regions
more than 5 per cent of the total cattle/horse assemblage (Maltby 2010, 206, fig. 49, 269–70). Maltby’s survey of town assemblages has shown low horse percentages to be a fairly common urban trend (ibid., 269). The difference between towns and their rural hinterlands can be clearly seen in the frequency of horse bones that have been recovered from sites in Colchester compared with rural sites in Essex (fig. 3.48). The rarity of horse bones on urban sites is a result of cattle, sheep, and pigs being

![Farmsteads in Essex](image1)

![Roadside settlements in Essex](image2)

![Colchester, Essex](image3)

![Upper Thames, Cotswolds and Severn Estuary](image4)

![North-East Thames Estuary and London Basin](image5)

![The Fens](image6)

![South Central](image7)

**Fig. 3.48.** Percentages of horse bones from sites in Essex (Colchester data from Maltby 2010, 257–8, after Luff 1993)

**Fig. 3.49.** Mean percentages of horse bones from complex and enclosed farmsteads
a much more important source of food (Maltby 2016, 6; see also Dobney et al. 1996, 46).

The intensity of horse exploitation may have differed between different types of rural settlement. Other than in the Central South region, horses are consistently better represented at complex farmsteads than at enclosed farmsteads (fig. 3.49). At some rural sites, horse bones are better represented than pigs, such as at Winnall Down/ Easton Lane, Hampshire, where horse bones accounted for nearly 12 per cent of the major domesticate remains in the late Iron Age/early Roman period, compared to only 7 per cent pigs (n=2431) (Maltby 1985b; 1989). Similarly, horses accounted for 12 per cent of the late Roman assemblage from Balksburry Camp, Hampshire, compared to less than 5 per cent pigs (n=821) (Maltby 1995). Exceptional numbers of equid bones were recovered at Copse Farm, Oving, on the Sussex coastal plain, which led the excavators to posit that the site’s inhabitants were engaged in the management and trade of horses (Bedwin and Holgate 1985). Certainly, trade with the Continent is suggested by pottery vessels and fine metal artefacts. This settlement was possibly part of the Chichester oppidum prior to the Roman conquest, and continued to be occupied into the later first century A.D. in the client kingdom of the Regni.

**Horse husbandry**

Horses are thought to have held a special status in the British Iron Age, as indicated by their common depiction on native, pre-conquest coinage (Creighton 2000, 13-21). Yet there has been much debate surrounding the ways that horses were bred and managed during this period. If horses were highly valued then it is possible that access to them was restricted and their breeding tightly controlled. The lack of perinatal horse remains on Iron Age sites led Harcourt (1979, 158) to suggest that horses were not deliberately bred by people, but instead seasonally rounded up from feral herds and broken in for riding. Grant suggested that the high ratio of male horses at Danebury in Hampshire indicates that they were not bred at the hillfort, but brought in from elsewhere (Grant 1984, 521). More recent Iron Age finds of perinatal horse bones suggests that controlled breeding may have occurred at some settlements. Examples have been identified at Rooksdown, Hampshire (Powell and Clarke 1996), Gravelly Guy, Oxfordshire (Mulville and Levitan 2004, 472), Bradley Hill, Somerset (Everton 1981, 223), and Latton Lands, Wiltshire (Poole 2008). The distribution of bones from immature horses from Iron Age sites remains sparse, however. Their status as prestige animals probably meant that the consumption of horse meat was fairly irregular (see below).

Compared to other domestic mammals, immature horse bones are also fairly uncommon on Roman-period sites, though they appear to have been more prevalent after the conquest. Bones from horses that have not undergone epiphyseal fusion are twice as common on Roman sites compared to their Iron Age predecessors (fig. 3.50a). Not all of these sites were necessarily settlements where horse breeding occurred, since the epiphyses of some bones may fuse as late as four years old. Nonetheless, perinatal horse bones have been recovered from several Roman sites, such as at Wortley villa, Gloucestershire (Maltby 2016), Langdale Hale, Cambridgeshire (Higbee 2013), West End, Haddenham, Cambridgeshire (Phillips 2005), Tort Hill West, Cambridgeshire (Albarella 1998), Monkton, Kent (Bendrey 2008), and Wavendon Gate, Buckinghamshire (Dobney and Jacques 1996). The remains from Langdale Hale are interesting given that the site has been associated with military supply networks through the Fens (C. Evans 2013; see also Ch. 4). DNA analysis of six adult horse bones from the site suggests that three out of four Roman individuals probably derived from stock bred on the Continent, possibly in the Iberian Peninsula, while two Iron Age individuals were likely to be of native origin (Bower et al. 2013, 140–3).

The lack of evidence for specialised horse breeding in Roman Britain is somewhat surprising given that the army would have required a regular supply of horses, not only for the cavalry but for the maintenance of the cursus publicus, which is said to have been supported by around 128,000 horses and mules across the empire (Casson 1994). Excavated in 1971, the gyrus at the Lunt Fort, Warwickshire, is the only known cavalry training arena in the province (Hobley 1975). Some horses may have been imported from the Continent – auxiliary units were expected to supply their own mounts (Hyland 1990, 77). However, importing horses would have been expensive and, therefore, it is unlikely to have fulfilled military requirements. It is possible that the Roman cavalry were responsible for horse-rearing, or breeding occurred in the military vicī. Bones from sub-adult horses have been recovered from deposits at Castleford, West Yorkshire (Berg 1999, 236) and Piercebridge, Co. Durham (Rackham and Gidney 2006, 121), though only in small numbers. These may have been animals already supplied to these settlements for breaking-in, or for consumption considering their young age at death. Literary sources suggest that horses were requisitioned from local landowners, given as tribute from client kingdoms, and sourced from stud farms set up directly by the military (Hyland 1990, 77; Johnstone 2008, 130). This
would suggest that local breeding centres were responsible for supplying the army (Johnstone 2008, 138). Since the military in Britain was predominantly stationed in the north and in Wales, areas where zooarchaeological evidence is sparse, this may account for the lack of evidence for stud farms.

If the presence of immature bones is an indication of horse-breeding, there is little evidence that it occurred more commonly on certain types of farmstead. One-third of complex farmsteads and enclosed farmsteads produce remains of young horses (FIG. 3.50b). This is slightly higher than the proportion of all farmsteads (28 per cent), but lower than the proportion of villages (42 per cent). In some cases, this may represent ritual slaughter of young horses rather than indicating horse-breeding. Excavations of a central enclosure at the late Iron Age, nucleated settlement at Beckford, Worcestershire, produced the remains of several horses, including two that died at less than a year old and another prior to 15 months. The excavators suggest that the site may have been a centre for horse-rearing (Oswald 1974). This may be true, but the possibility that the enclosure was in fact a ritual focus for the settlement where young horses were slaughtered must also be considered.

It is possible that horses were more commonly slaughtered for their meat or skins at younger ages in the Roman period. Unfortunately, horse ageing data is rarely recorded in enough detail to be presented in most zooarchaeological reports, mainly owing to small sample sizes. Where sizeable datasets have been made available, however, there is reasonably good evidence to show that horses died at a fairly broad range of ages on rural settlements. The mortality profiles for Roman horses at Haddon, Cambridgeshire, and Thornhill Farm, Gloucestershire, are remarkably similar (FIG. 3.51). These data are based on crown heights of premolars and molars, and they have been aggregated where possible to reflect individual mandibles so that the patterns are not greatly biased by loose teeth. At both settlements the death of relatively young horses is apparent. Around 20 per cent of both populations were culled by five years, around 60 per cent by 8–9 years, and less than 10 per cent made it past 15 years. If this is an accurate reading of horse-cull patterns, it suggests that horses were intensively managed. Horses can be broken in for riding between two and four years, so the death of animals at this age either suggests that some had suffered from disease or injury and had become too lame for work or riding purposes, or they were slaughtered to be eaten. Maltby raises the possibility that horses were exploited for meat in the early Roman period at Easton Lane, Hampshire (Maltby 1989).

FIG. 3.50. Percentage of sites with immature horse bones by phase (a), and by site type (b) (n.b. calculated as a percentage of all sites with evidence for neonatal cattle, sheep/goat, and pig, immature horse and domestic fowl)
A similar age at death pattern was observed at Orton Hall Farm, Cambridgeshire (King 1996, 217). Although detailed ageing data were not available, one-fifth of the total number of horse bones derived from animals below three-and-a-half years, though many teeth from animals up to 14 years were also recovered. The likelihood that so few horses lasted beyond 15 years is perhaps surprising, since they can happily live well beyond this age. It may be that the investment required to care for horses over a certain age outweighed their economic importance, leading to some being slaughtered before reaching old age. It is possible that most of the younger animals represent colts and stallions that were surplus to requirements; only a small proportion of males are likely to have been kept for breeding purposes. However, far more data are needed to see if these patterns were typical for Romano-British rural sites or whether intensive horse husbandry was a particular feature of these settlements.

Butchered horse bones are found at rural sites, though it is difficult to assess properly how widespread the processing of horse carcasses was. In many cases, reports simply state that horse bones were found with butchery marks, but without recording whether this might have reflected meat consumption, skinning, or secondary boneworking. A few sites record instances of filleting marks on the pelvis and the upper limb bones, which surely point to the consumption of horse meat in the Roman period, such as at East Kent Access Road, Kent (Strid 2015) and Poundbury, Dorset (Buckland-Wright 1987). Horses were certainly not raised for meat as intensively as cattle, sheep, and pigs, owing to their value as transport and working animals. Nonetheless, a full review of horse butchery from Iron Age and Romano-British rural sites is sorely needed to understand this issue more clearly.

Remains of immature horses are rarely found at roadside settlements; only 15 per cent have produced unfused bones (FIG. 3.50b). They are even rarer at defended ‘small towns’ and larger urban settlements. The recovery of juvenile horse bones from late Roman deposits in the northern extramural area of Alcester, Warwickshire, is a rare example (Maltby 2001). Maltby has explicitly noted the rarity of immature horse bones in deposits at Winchester, particularly those from animals that had died under three years old (Maltby 2010, 210). Here, measurements of crown heights indicated that the majority of urban horses survived past ten years of age (ibid.).

Evidence for horse butchery is also rarely found at major towns and defended ‘small towns’. As with rural sites, the reporting of butchery marks suffers from a lack of standardisation. Skinning marks were identified on a horse metacarpal from the Faccenda Chicken Farm site in Alchester (Gillian Jones 1984, 38). Some evidence for horse consumption was found at Lincoln, where chop marks around the glenoid cavities of three scapulae and knife marks along the blade of one were noted, consistent with the proportioning of joints and the filleting of meat (Dobney et al. 1996, 46). Maltby noted a similar pattern in the horse assemblage from Winchester (Maltby 2010, 208–9). Here, horse carcasses were rarely processed by specialist butchers, who more often plied their trade with cattle. Only occasionally were horse limb bones selected for marrow extraction, and more often for boneworking (see Ch. 5).

The value of horses as mature, working animals in towns means that their meat was very rarely consumed. This is also implied by the recovery of afarrier’s tool kit from Chichester, which included a pair of emasculators for castrations and a butteris for cleaning and shaping hooves (Down...
1989, 202, 206, fig. 27.9). The gelding of male horses would have been carried out on those that were surplus to breeding requirements and intended for labour. Geldings are preferred for work purposes as they tend to be calmer and easier to handle than stallions. This would also be a useful method for controlling local equine populations.

**Horse size**

It is commonly thought that the native, Iron Age, horse was small and similar in stature to modern ponies (Hambleton 2008, 70–1). It is also assumed that many horses would have been imported to Britain during and after the conquest, particularly by the army for military purposes, but also for breeding with native stock (Maltby 2016, 6). Unfortunately, there is not a large biometric dataset for horses from this period, and of those that are available many suffer from small sample sizes. One of the biggest problems is that there are very few multi-phased sites with sufficient data with which to track changes in horse size over time. Nevertheless, comparison of horse withers’ heights from different phases at Gravelly Guy, Oxfordshire (Mulville and Levitan 2004), Elms Farm, Heybridge, Essex (Johnstone and Albarella 2015), and Haddon, Cambridgeshire (Baxter 2003) covers the period from the early Iron Age to the late/post-Roman period (Fig. 3.52). At Gravelly Guy, the average withers’ height remained just below 1300 mm (around 12.0–12.3 hands) throughout the Iron Age. Although the early Iron Age and late Iron Age sample sizes are small, the data show very little change over time. A larger middle Iron Age sample also shows little variation between the shortest and tallest horses at the site.

Late Iron Age data from both Elms Farm, Heybridge, and Haddon suggest that horses were similar in height to those at Gravelly Guy. A rise in horse height occurred at Elms Farm during the Roman period, a trend also noted by Albarella et al. (2008, 1838–9), who suggested that horses of c. 1400 mm represented a ‘substantial increase’. They compared the difference in height as being similar to the difference between a modern Exmoor pony and a large New Forest pony. While the chronology of the Elms Farm data indicates that this size increase occurred gradually between the late Iron Age and the middle Roman period, data from Haddon suggest that a height increase occurred quite rapidly around the second century A.D. In fact, the average height of horses at Haddon in the first and second centuries is very similar to that seen in the Iron Age. However, not only does the mean height increase at Haddon into the middle Roman period, but also the upper and lower ranges. Horses as tall as 1550 mm are found in later Roman deposits, representing an increase even more substantial than that observed at Elms Farm.

Horse bones recovered from Roman Winchester suggest a wide range of heights, from as short as 1163 mm to as tall as 1500 mm (Maltby 2010, 211–12). Clearly, larger horses were present in the town after the mid-second century A.D. alongside shorter stock, which were common in the countryside around Winchester in the late Iron Age and early Roman period. It is possible that horses in the town derived from a relatively wide range of sources. Dobney et al. note the appearance of relatively tall horses at Lincoln, c. 1400–1500 mm, as early as the first century A.D. (Dobney et al. 1996, 124). They suggest that these may be from imported animals, perhaps owned by cavalry officers or state officials (ibid., 46).

Measurements of the distal tibia show that the increases in horse height were also associated with an increase in stockiness (Fig. 3.53). Samples dating to the late Iron Age and first/second century A.D. average between 61.5 mm and 63.5 mm, while those dating to the later Roman period average 66–67 mm. A mean measurement of 70 mm at Rudston, East Riding, is exceptionally large. This relates to a relatively small sample (n=5) recovered from a single, fourth-century well (Chaplin and Barnetson 1980), and may not be fully representative of horses found at the site.
Nonetheless it does demonstrate the occurrence of larger equids in the late Roman period compared to the late Iron Age and earlier Roman phase. At Owslebury, Hampshire, an increase in the average distal tibia width occurs between the first–second century phase and the third–fourth century phase (Maltby 1987). The size average and range from mid-second to late fourth-century deposits at Winchester closely mirrors the late Roman phase at Owslebury (Maltby 2010, 211).

There are several possible explanations for the observed size increase in horses. The introduction of improved breeding stock from the Continent is a distinct possibility. The Roman army and state officials would almost certainly have brought horses with them, though presumably access to these animals would not have extended to the native population under normal circumstances. Horses may have been imported by merchants arriving in the first and second centuries A.D. Larger horses may have been desired for riding purposes and perhaps as status symbols. The introduction of improved stock could have been purchased for interbreeding with native animals. Of course, more intensive selection of the largest native stock for breeding may also account for these changes.

Improved horse management and nutrition may explain some of the size increases. Presumably most horses would have been grazed on open grassland. However, the introduction of hay and other fodder, particularly protein-rich legumes, to the diets of immature horses could have enhanced their rate of skeletal development. Improvements in sheltering and living conditions over the winter months may also have affected horse development by allowing them to conserve more energy.

The effect of gelding on the skeletal development of horses is not well understood. In other domesticates, castration is known to delay epiphyseal fusion, which allows for the elongation of the long bones (Davis 2000). The decision to geld a horse is as much a cultural decision as it is a practical one. Leaving a stallion intact is seen in some societies as a statement of horsemanship. An increased emphasis on geldings in the Roman period could have increased the average and upper size ranges of horses.

Alternatively, the introduction of mules could have a similar effect on bone measurements. It is possible that mules were more common on Roman-period sites than is currently realised. As will be seen below, the identification of mules in zooarchaeological assemblages is very difficult.

**DONKEYS AND MULES IN LATE IRON AGE AND ROMAN BRITAIN**

One of the more accurate ways of discriminating between horses, mules and donkeys is to apply discriminant function analysis to measurements taken from long bones (Johnstone 2005). Unfortunately, most reported finds of mule and donkey in late Iron Age and Romano-British assemblages are far from conclusive. Many identifications are either based on limited biometric data or more simply on observations of bones being uncharacteristically small or slender (Table 3.1). Very few have been subjected to discriminant function analysis. Examination of equid bones from different regions of the Roman Empire suggests that the proportion of mules and donkeys to horses varied significantly (Johnstone 2008, 132–4). Donkeys were only prominent around the Mediterranean, which is unsurprising given that they are poorly adapted to temperate environments. Mules, on the other hand, were unexpectedly common in most regions. Johnstone’s research has shown that they may have represented as much as 40 per cent of the equids from Roman sites in areas such as the Rhineland and the Balkans, while horses were better represented in...
Gaul (64 per cent) and especially so in Britain (82 per cent) (Johnstone 2008, 134). Given that mules cannot be bred without the presence of male donkeys, it is perhaps surprising that the former are more common in most regions. This may suggest that mules were commonly raised in specialist breeding centres, and then exchanged through markets.

The idea that mules and donkeys were exploited by the Roman army is understandable, due to their usefulness as pack animals. Mule bones have been identified at military forts and *vicus* in Britain, including the fortress at Longthorpe, Cambridgeshire, and the forts at Hayton, East Riding, and Castleford, West Yorkshire (Johnstone 2004). Recent excavations at Healam Bridge vicus in North Yorkshire produced the remains of a partial skeleton of a possible mule (a report is currently forthcoming: Jacques pers. comm.).

Bones of both sub-species have been tentatively identified at late Iron Age sites, suggesting that animals may have been imported prior to the conquest. Discriminant function analysis of equid bones has suggested the presence of donkey at Danebury, Hampshire, and Thorpe Thewles, Stockton-on-Tees, and mule at Skeleton Green, Hertfordshire (Johnstone 2008, 134). These sites were each engaged in long-distance exchange prior to the conquest, and the presence of donkeys and mules may have been a result of this trade. Similarly, the recent, though cautious, identification of donkey bones from a mid- to late Iron Age deposit on the Isle of Thanet, Kent, would be one of the earliest known examples from Britain (Strid 2015). Certainly, trade with the Continent increased considerably at this site during the later Iron Age (Andrews et al. 2015). The presence of donkeys in late Iron Age Britain is very uncertain because of the diminutive size of the native horse stock. If nothing else, this shows the real difficulty facing zooarchaeologists in identifying mules and donkeys in this period.

The development of the administrative infrastructure after the Roman conquest, including the establishment of towns and the road system, may have generated a greater need for mules and donkeys. The identification of a mule mandible at Billingsgate Buildings, London, appears to be reliable (Armitage and Chapman 1979), as does the specimen from the roadside settlement at Scole-Dickleburgh, Norfolk (Johnstone 2004).

Mule and donkey bones also occur at some farmsteads and villas, though again some need further qualification. Sites that were more integrated with the ‘Roman’ economy, such as Claydon Pike, Gloucestershire (Sykes 2007) and Beddington, Surrey (Locker 2005), may have had access to these animals. Using discriminant function analysis, Chuang identified several mule bones from Orton Hall Farm, Cambridgeshire (Chuang 2016). Certainly, the original report noted the presence of some comparatively slender equids, which may have been associated with the considerable evidence for surplus arable production (e.g. corndrying, milling and storage (Mackreth 1996, 225). If mules were present at this site they could have been exploited for transporting processed grain, perhaps linked to military supply networks in this region (see Ch. 4). The presence of some exceptionally large, plough cattle were also found at this site (see above), suggesting that improved livestock were being imported.

While further identifications of donkeys and mules will no doubt come to light as zooarchaeologists become increasingly aware of the possibility that they may be present on Roman sites, it should be assumed that they were not widely exploited. Recent isotopic analyses of Roman specimens are beginning to suggest that most mules were probably imported (Chuang pers. comm.). Their rarity means that they were probably highly valued, and access may have been restricted (Johnstone 2008). On the one hand, ownership of a mule or a donkey may have been a prestige indicator, while, economically, these animals could have significantly improved transport logistics for farmers engaging in the wider market economy.

**DOMESTIC FOWL**

The term ‘domestic fowl’ may refer to any bird species that is held in captivity and exploited for meat, eggs, and feathers, or kept as a pet. However, in late Iron Age and Roman Britain, the chicken (*Gallus gallus domesticus*) was probably the only bird that was fully tamed and reared for food, and possibly for cockfighting and religious sacrifice. Ducks and, to a lesser extent, geese are fairly common on Roman sites, though their bones are rarely found in quantities that suggest they were husbanded. Most duck and goose remains probably derive from wild birds (Parker 1988, 209; Albarella 2005). Another domestic fowl candidate is the common pheasant (*Phasianus colchicus*). Pheasants are native to southern Asia, though several Roman writers have indicated their presence in Italy as early as the first century A.D. (Zeuner 1963, 458). Pheasant bones have been reportedly identified on a few Roman sites in Britain (K. Poole 2010, 159; Yalden and Albarella 2009, 107). Given the rarity of their bones, however, it is unlikely that pheasants were widespread. It is possible that they were kept by the elite in parks and gardens. For this reason, the
<table>
<thead>
<tr>
<th>Species</th>
<th>Site</th>
<th>Site type</th>
<th>Date</th>
<th>Details</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>donkey</td>
<td>East Kent Access (Zone 13), Kent</td>
<td>farmstead</td>
<td>Middle Iron Age</td>
<td>observation of slender bones only</td>
<td>Strid 2015</td>
</tr>
<tr>
<td>donkey/mule</td>
<td>Thorne Thewles, Co. Durham</td>
<td>farmstead</td>
<td>Late Iron Age</td>
<td>donkey id. based on femur measurements (Johnstone 2004), though reanalysis suggests this is uncertain (Chuang 2016); mule id. based on metatarsal measurements (Johnstone 2004) – reanalysis suggests horse (Chuang 2016)</td>
<td>Johnstone 2004; Chuang 2016</td>
</tr>
<tr>
<td>donkey/mule</td>
<td>Danebury, Hampshire</td>
<td>hillfort</td>
<td>Late Iron Age</td>
<td>two metacarpals suggested to be donkey by Johnstone (2004), but reanalysis suggests mule and horse (Chuang 2016) identified from metatarsal, though no shaft measurement given (Chuang pers. comm.)</td>
<td>Johnstone 2004; Chuang 2016</td>
</tr>
<tr>
<td>mule</td>
<td>Skeleton Green, Hertfordshire</td>
<td>oppidum</td>
<td>Late Iron Age</td>
<td>femur and metacarpal (latter confirmed by biometrical analysis, though no methods specified)</td>
<td>Sykes 2007, using unpub. data from B. Wilson</td>
</tr>
<tr>
<td>donkey</td>
<td>Claydon Pike, Gloucestershire</td>
<td>farmstead</td>
<td>Late Iron Age–Early Roman</td>
<td>based on metacarpal length (no DFA carried out)</td>
<td>Ayton 2012</td>
</tr>
<tr>
<td>donkey</td>
<td>St John’s School, Leatherhead, Surrey</td>
<td>farmstead</td>
<td>Late Iron Age–Early Roman</td>
<td>two measured, slender metatarsals (undecided if donkey or mule) donkey suggested from width of femur (Locker 2005); possible mule identified by metacarpal (Johnstone 2004), though reanalysis suggests horse (Chuang 2016); revised DFA on metatarsal indicates mule (Chuang 2016)</td>
<td>Johnstone 2004; Chuang 2016</td>
</tr>
<tr>
<td>donkey/mule</td>
<td>Runfold, Surrey</td>
<td>farmstead</td>
<td>Early Roman</td>
<td>three small metacarpals – identifications based on log ratio method (Highbee 2006), but these are questionable due to large intraspecific overlap (Chuang pers. comm.)</td>
<td>Highbee 2006; Chuang pers. comm.</td>
</tr>
<tr>
<td>donkey/mule</td>
<td>Beddington, Surrey</td>
<td>farmstead; villa</td>
<td>Early Roman; Roman</td>
<td>morphology of mandibular teeth 20 bones from one individual (identified from metatarsal measurements, though no DFA carried out) three ‘definite’ donkeys all identified from the first phalans; these are unusually small and reanalysis is recommended</td>
<td>Bendrey 2009; Ayton 2011</td>
</tr>
<tr>
<td>mule</td>
<td>Wainscott, Thetford, Norfolk</td>
<td>farmstead</td>
<td>Early Roman</td>
<td>radius (no methods mentioned)</td>
<td>Wilson and Allison 2010</td>
</tr>
<tr>
<td>donkey</td>
<td>Wainscott, Kent</td>
<td>farmstead</td>
<td>Middle Roman</td>
<td>morphology of mandibular teeth</td>
<td>Bendrey 2009</td>
</tr>
<tr>
<td>donkey</td>
<td>Rothwell Haigh, Leeds, West Yorkshire</td>
<td>shrine</td>
<td>Mid–Late Roman</td>
<td>no indication of element or metrical analysis</td>
<td>Ayton 2011</td>
</tr>
<tr>
<td>donkey</td>
<td>Procester Court, Gloucestershire</td>
<td>farmstead/ villa</td>
<td>Roman</td>
<td>radius (no methods mentioned)</td>
<td>Wilson and Allison 2010</td>
</tr>
<tr>
<td>donkey</td>
<td>Barnskey Park, Gloucestershire</td>
<td>farmstead</td>
<td>Roman (pre-villa phase)</td>
<td>three phalans, but no measurement given or reason for identification</td>
<td>Noddle 1985a</td>
</tr>
<tr>
<td>donkey</td>
<td>Berinsfield, Oxfordshire</td>
<td>farmstead</td>
<td>Roman</td>
<td>morphology of mandibular teeth indicates donkey (Levine 2004), plus donkey identified from first phalax by Davis method and mule identified from metatarsal by DFA (Chuang 2016)</td>
<td>Levine 2004; Chuang pers. comm.</td>
</tr>
<tr>
<td>donkey</td>
<td>Cleveland Farm, Ashton Keynes, Wiltshire</td>
<td>farmstead</td>
<td>Roman</td>
<td>3 mule bones identified (2 metacarpals and 1 metatarsal); further mule bones confirmed by Chuang (though he raises some doubt over measurement scheme, due to high ratio of mules)</td>
<td>Johnstone 2004; Chuang pers. comm.</td>
</tr>
<tr>
<td>mule</td>
<td>Orton Hall Farm, Cambridgeshire</td>
<td>farmstead</td>
<td>Roman</td>
<td>3 mule bones identified (2 metacarpals and 1 metatarsal); further mule bones confirmed by Chuang (though he raises some doubt over measurement scheme, due to high ratio of mules)</td>
<td>Johnstone 2004; Chuang pers. comm.</td>
</tr>
</tbody>
</table>

*Table 3.1: Records of possible and certified identifications of donkey and mule bones from Iron Age and Roman Britain (N.B. DFA = discriminant function analysis)*
<table>
<thead>
<tr>
<th>Animal</th>
<th>Site</th>
<th>Location</th>
<th>Type</th>
<th>Identified through</th>
<th>Observation/Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>mule</td>
<td>Haddon, Cambridgeshire</td>
<td>farmstead</td>
<td>Roman</td>
<td>DFA of first phalanx</td>
<td>Chuang 2016</td>
</tr>
<tr>
<td>donkey</td>
<td>East Kent Access (Zone 6 and 7), Kent</td>
<td>village</td>
<td>Roman</td>
<td>Observation based on slender bones only</td>
<td>Strid 2015</td>
</tr>
<tr>
<td>donkey</td>
<td>Bnding, Isle of Wight</td>
<td>villa</td>
<td>Roman</td>
<td>Based on greatest length of metatarsal</td>
<td>Worley 2013</td>
</tr>
<tr>
<td>donkey</td>
<td>Magna Castra, Herefordshire</td>
<td>villa</td>
<td>Roman</td>
<td>Possible donkey (observation based on size – questionable)</td>
<td>Noddle 1985b</td>
</tr>
<tr>
<td>donkey</td>
<td>Staines, Elmsleigh House, Surrey</td>
<td>roadside settlement</td>
<td>Roman</td>
<td>Report states: ‘Bones of donkey proportions were also found, as were those of a pony (New Forest type)’. No further details given</td>
<td>Chapman and Shanks 1976</td>
</tr>
<tr>
<td>donkey</td>
<td>Wikote, Oxfordshire</td>
<td>roadside settlement</td>
<td>Roman</td>
<td>Presence of a donkey ‘check tooth’ [sic] noted, presumably an upper or lower molar crown, but no indication of how it was differentiated from horse &amp; mule</td>
<td>Johnstone 2004; Chuang pers. comm.</td>
</tr>
<tr>
<td>donkey</td>
<td>Stonea, Cambridgeshire</td>
<td>roadside settlement</td>
<td>Roman</td>
<td>Based on metatarsal, but incomplete number of measurements for DFA</td>
<td>Johnstone 2004; Chuang 2016</td>
</tr>
<tr>
<td>mule</td>
<td>Scole-Dickleburgh, Norfolk</td>
<td>roadside settlement</td>
<td>Roman</td>
<td>Partial skeleton currently undergoing DNA and isotope analysis – strong indication of mule; possible donkey indicated by DFA of tibia and femur</td>
<td>Jacques pers. comm; Chuang pers. comm; Johnstone 2004; Chuang 2016</td>
</tr>
<tr>
<td>mule</td>
<td>Healam Bridge, North Yorkshire</td>
<td>vici/roadside settlement</td>
<td>Roman</td>
<td>Possible mule metacarpal identified through DFA (Johnstone 2004); supported by reanalysis</td>
<td>Johnstone 2004; Chuang 2016</td>
</tr>
<tr>
<td>mule</td>
<td>Longthorpe, Cambridgeshire</td>
<td>fortress</td>
<td>Roman</td>
<td>Probable metatarsal identified through DFA (Johnstone 2004); supported by reanalysis (Chuang 2016)</td>
<td>Johnstone 2004; Chuang 2016</td>
</tr>
<tr>
<td>mule</td>
<td>Castleford, West Yorkshire</td>
<td>fort/vici</td>
<td>Roman</td>
<td>Partial skeleton suggested to be mule from DFA of tibia and 2 metatarsals (first phalanges suggest horse); another first phalanx indicated as mule skull (no details provided)</td>
<td>Johnstone 2004; Chuang 2016</td>
</tr>
<tr>
<td>donkey</td>
<td>Newstead, Scottish Borders</td>
<td>fort</td>
<td>Roman</td>
<td>Based on DFA of femur; supported by reanalysis</td>
<td>Ewart 1911</td>
</tr>
<tr>
<td>mule</td>
<td>Hayton, East Riding</td>
<td>fort</td>
<td>Roman</td>
<td>Metacarpal and tibia identifications based on DFA; first phalax identification based on Davis’ method</td>
<td>Johnstone 2004; Chuang 2016</td>
</tr>
<tr>
<td>mule</td>
<td>Chichester (Cattlemarket site), West Sussex</td>
<td>town</td>
<td>Roman</td>
<td>Donkey suggested from DFA of radius, though other elements from same skeleton indicate horse; mule identified from DFA of a metatarsal and 2 first phalanges</td>
<td>Johnstone 2004; Chuang 2016</td>
</tr>
<tr>
<td>mule</td>
<td>Wroxeter (Baths Basilica site), Shropshire</td>
<td>town</td>
<td>Roman</td>
<td>Certain and possible mules identified by DFA of 2 metacarpals</td>
<td>Johnstone 2004; Chuang 2016</td>
</tr>
<tr>
<td>mule</td>
<td>Hunt’s House, Southwark, Greater London</td>
<td>town</td>
<td>Roman</td>
<td>Articulated forelimb (id. based on metacarpal) – however, DFA strongly suggests horse (Chuang pers. comm.); possible wild horse (Equus przewalskii) also suggested by Bendrey (1999)</td>
<td>Bendrey 1999; Chuang pers. comm.</td>
</tr>
<tr>
<td>donkey</td>
<td>Tripontium, Warwickshire</td>
<td>town</td>
<td>Roman</td>
<td>Bones recovered from a well – further analysis required</td>
<td>Noddle 1972</td>
</tr>
<tr>
<td>mule</td>
<td>East London cemetery, Greater London</td>
<td>town</td>
<td>Roman</td>
<td>DFA on femur (Johnstone 2004); supported by reanalysis (Chuang 2016)</td>
<td>Johnstone 2004; Chuang 2016</td>
</tr>
</tbody>
</table>
exploitation of wild and exotic birds will be examined in Volume 3 – this section focuses on chickens.

**CHICKEN EXPLOITATION**

Chickens are not native to Britain. The date of their earliest introduction is, however, contentious. Yalden and Albarella prefer a late Iron Age date for their introduction, citing a number of sites where their bones have been identified (Yalden and Albarella 2009, 100). However, several early Iron Age examples have been recorded at Blackhorse Road, Hertfordshire (Legge et al. 1989), Houghton Down, Hampshire (Hamilton 2000b), and Gravelly Guy, Oxfordshire (Mulville and Levitan 2004, 468, table 11.5). None of these examples have been radiocarbon dated, and it was suggested that the Gravelly Guy specimens may have been intrusive (*ibid.*). The date of the Houghton Down specimens is more secure, having been recovered from a sealed pit alongside fifth–fourth century B.C. material (see below for further details).

It has been argued that chickens were originally domesticated, not for meat consumption, but for sacrifice and cockfighting (Simoons 1994, 145). Recent studies have suggested that these were primary factors for their introduction to Britain (Sykes 2012; Doherty 2013). The rarity of chickens in Iron Age Britain suggests that they had not been present for long enough to be regarded as a common food source. Indeed, it was Julius Caesar who stated that the consumption of chickens (alongside geese and hares) was considered ‘unlawful’ (taboo) by northern European populations (*BGall.* V, 12). However, an increasing abundance of chicken on Roman settlements suggests that cultural attitudes towards their consumption began to change after the Claudian conquest (Allen and Sykes 2011, 16–17; Yalden and Albarella 2009, 100–2). The excavation of a possible cockfighting pit, built in the *palaestra* of the Legionary fortress bathhouse at Exeter, suggests that the practice was popular among soldiers and was perhaps associated with gambling (Bidwell 1979, 42–3).

**Relative abundance of chicken**

Maltby has previously reviewed evidence for the relative abundance of chicken bones on different site types in Roman Britain (Maltby 1997). He found a marked difference between urban sites, which produce comparatively high frequencies of chicken bones, and farmsteads, where they tend to be rare. Military sites also produce relatively high chicken counts while villas and nucleated settlements tend to produce percentages in between towns and farmsteads (Maltby included small towns such as Alcester, alongside roadside settlements and military *vici* in his ‘nucleated settlement’ category). Maltby suggested that these broad differences may have been influenced by dietary preferences, and there are hints that higher percentages of chicken bones are recovered on sites where pigs are also well represented (Maltby 1997, 412; see also King 1984). However, Maltby’s dataset included far fewer sites than are now available, while areas of Kent, Somerset, and Yorkshire were poorly represented (Maltby 1997, fig. 1). This meant that he was not able to examine regional or chronological variations.

Taphonomic factors affect the recovery of bird bones to a greater degree than larger mammals, meaning that they tend to be under-represented. Cattle remains tend to be over-represented owing to intensive carcass processing. To reduce the level of bias against bird bone counts, Maltby calculated chicken percentages against sheep/goats and pigs, using only assemblages with a minimum of 100 identified fragments of these three species (Maltby 1997, 406). It would be more accurate to calculate the proportion of chickens as a percentage of all bird bones. However, the general lack of wildfowl remains from late Iron Age and Roman sites means that this is impractical, and would significantly reduce the number of samples available for analysis.

In view of this, the approach adopted here follows that of Maltby (see Ch. 1 for detailed methods).

Chicken bones are generally found in very small numbers on late Iron Age sites, averaging just 0.5 per cent compared to sheep/goat and pig bones (FIG. 3.54a). During this period, chicken consumption may have been popular among the elite, as indicated by relatively high percentages from *oppida*, particularly in assemblages from Braughing in Hertfordshire and Fishbourne in West Sussex (FIG. 3.56). In contrast, chicken bones were rare in late Iron Age deposits at Danebury, Hampshire. Only five chicken bones were identified out of a bird assemblage of 120 specimens collected between 1979 and 1988 (Grant 1991, 480). After the conquest, the average percentage of chicken bones increases to nearly 3 per cent by the mid-Roman phase and just over 3 per cent in the late Roman period. This chronological change is mirrored by the percentages of sites where their bones are present. Chickens are present on a third of late Iron Age settlements, which compares to nearly 80 per cent of sites dating between the second and the fourth centuries A.D. (FIG. 3.54b).

The number of sites with chicken bones also allows for the examination of regional patterns. In every region in the south and east of England, chickens average less than 1 per cent compared to sheep/goats and pigs in the late Iron Age (FIG. 3.55). After the conquest there is a steady increase...
in mean percentages through to the late Roman period, apart from the North-East region where chickens do not average above 1 per cent until the late Roman phase. Higher proportions of chicken in late Roman assemblages in this region tend to derive from defended ‘small towns’ and military vici, such as at Thornborough Farm, Catterick, North Yorkshire (8.5 per cent), and Piercebridge, Co. Durham (4.25 per cent). At the high-status rural settlement at Burnby Lane on the outskirts of the roadside settlement at Hayton, East Riding, chicken increased from 2.5 per cent in the mid-Roman phase to over 21 per cent in the late Roman phase (Jacques 2015). However, chicken consumption never appears to become popular on sites away from the road network in the North-East. Malby’s (1997, 412) assertion that chickens are better represented at ‘Romanized settlements’ is supported by differences between site types (FIG. 3.56). A recent survey of chicken abundance in major towns has shown that, although there is considerable intra-site variation between urban samples, chickens average 11.4 per cent of the total count of domestic fowl, sheep/goat, and pig bones (Maltby 2010, 273). Notably high percentages have been recorded in samples from the coloniae at Colchester and Tanner Row, York (Luff 1993; O’Connor 1988). The urban mean is more than twice as high as the average from defended ‘small towns’ (4.8 per cent). However, defended ‘small towns’, villas, military vici, and roadside settlements, produce notably higher...
mean percentages of chicken compared to farmsteads and villages. These differences may be partly affected by fragmentation and recovery rates. Urban assemblages tend to be better preserved than rural assemblages, though chickens are often poorly represented on rural sites with large, well-preserved assemblages, such as Owslebury (Maltby 1987). Although the mean percentage of chicken bones is very similar on both complex farmsteads and enclosed farmsteads, a higher proportion of complex farmsteads produce chickens. This is unlikely to be due to variations in preservation and fragmentation, and probably reflects the chronological trend of increasing proportions into the late Roman period, suggesting that chicken consumption became more popular in the countryside over time. Overall, the variation in chicken abundance between site types probably reflects dietary preferences of different sections of the Romano-British population.

**Chicken husbandry**

Conclusive evidence for chicken-breeding requires the identification of bones from immature birds. Unfortunately, immature bird bones are even more susceptible to adverse preservation conditions and fragmentation than bones from adult birds. Similar to mammals, immature bird bones have a porous and gracile appearance, though it is not easy to estimate the absolute age of immature birds.

Another important factor is the presence of medullary bone, which indicates the presence of hens in lay. Medullary is a calcium-rich deposit that forms in the shaft cavities of long bones of hens; it is necessary for the production of egg shell (Driver 1982).

As mentioned above, chickens may have been imported to Britain in the early Iron Age, though it is not known when breeding populations became fully established. At Houghton Down, Hampshire, the early Iron Age burial of a cockerel and a hen were accompanied by a few immature fowl bones (K. Poole 2010, 156). This may suggest that breeding had occurred in Britain, though the birds could have been deliberately selected and imported as a group for burial. K. Poole (2010, 158) suggests that although finds of late Iron Age date are rare, it seems likely that breeding populations had become established by this time, probably resulting from multiple introductions (FIG. 3.57).

Evidence for immature chicken bones has been identified in less than 5 per cent of assemblages including neonatal mammal bones that date to the first century B.C. and first century A.D. (FIG. 3.58a). It is possible that many birds were imported during this period, or were only being bred at a few settlements. Pre-conquest evidence for chicken-breeding comes from the oppidum at Skeleton Green, Braughing, Hertfordshire. Here, around half of the chicken bones derived from birds that had not reached full maturity and many had died within their first 16 weeks (Ashdown 1981, 236). It seems likely that birds were being reared at Braughing to supply local elites with chicken for feasts.

In the early and mid-Roman phases, the proportion of assemblages with immature chicken bones doubles to more than 10 per cent, suggesting that chicken-breeding became more widespread. These figures still only represent a handful of sites, though bones from juvenile birds are expected to be heavily under-represented. By the late Roman period, the proportion of assemblages increases further to almost 15 per cent, which indicates that rearing chickens was more prevalent by this time. This is supported by the much greater abundance of bones found on late Roman sites (see above).
Compared to cattle and sheep, chickens are fairly easy to breed and they do not require large plots of land. Evidence that chickens were being bred and raised in towns has been identified at Winchester where 23 per cent of the chicken bones were found to be from immature birds, while 39 per cent of broken shafts included medullary bone (Maltby 2010, 224–5). This is higher than at Silchester, where immature birds accounted for around 10 per cent of the chicken assemblage from mid-Roman deposits (Ingrem 2011, 249). Here, the sex ratio was also heavily biased towards hens as only three out of 22 metatarsal bones exhibited spurs or spur scars, which generally belong to cockerels (ibid.). However, Serjeantson reported a much higher proportion of males in late Roman deposits at Silchester, which she suggested may have represented birds used for cockfighting or for ritual sacrifice (Serjeantson 2000, 499). Variation in the proportions of immature chicken bones were reported from different sites in Colchester, ranging from 4 per cent in first-century A.D. deposits at the Gilberd School site to 27 per cent in first to second century deposits at Balkerne Lane (Luff 1993, 88–9, table 5.3). In Lincoln, evidence for egg consumption is indicated by numerous bird-shell fragments recovered from sieved deposits from the waterfront site (Dobney et al. 1996, 49). Overall, the evidence suggests that chicken husbandry may have been an important feature of town life, with birds being exploited for meat, eggs, and sport.

The recovery of immature chicken bones varies considerably between different types of rural site (FIG. 3.58b), being most common at villas (22 per cent), followed by roadside settlements (13.5 per cent), but only rarely featuring at farmsteads and villages (c. 5 per cent). This pattern may be partly due to differential disposal practices, as fine debris from food waste tends to be deposited in central areas of settlements, which could account for the better recovery of bird bones at villas (cf. Wilson 1996). A number of unfused chicken bones from birds aged between 3.5 and 7 months were recovered from pre-villa and villa phase deposits at Dunkirt Barn, Hampshire (Worley 2008). Other villas where multiple, immature chicken bones have been recovered include Liss, Hampshire (Hamilton-Dyer 2008), Bays Meadow, Worcestershire (Noddle 2006), Castle Copse, Wiltshire (Allison 1997), and Frocester,
Although these bones rarely exhibit butchery marks, they probably represent the consumption of juvenile birds, though chickens may have been bred nearby.

At Castle Copse, spurred tarsometatarsals outnumbered unspurred examples by 20 to 3, which, together with negatively skewed metrical data, represent an emphasis on cockerels (Allison 1997, 331–2). This contrasts with metrical data from the farmstead at Wavendon Gate, Buckinghamshire where hens outnumbered cocks by 11 to 4 (Dobney and Jacques 1996). The difference in the sex ratio between these two sites may be due to recovery, though it is difficult to see why one sex would be favoured over the other. The dominance of males at Castle Copse may reflect an interest in cockfighting. On the other hand, it could indicate differences in the intensity of breeding practices undertaken at the two sites, particularly if cockerels were deemed surplus to breeding requirements.

It is also worthy of note that there is some evidence for an increase in the size of chickens over time during the Roman period, as has been found at Elms Farm, Heybridge, Essex (Albarella et al. 2008, 1840–2). This suggests intensification in chicken breeding, though further research is required in this area.

CONCLUSIONS

The expansion of Roman rule into Britain was accompanied by the establishment of towns, a major road network, the development of markets, and the arrival of the military in the north and the west. This undoubtedly affected animal husbandry practices after the conquest, particularly in lowland Britain. The zooarchaeological evidence now permits a wider consideration of several of these issues, including regional variation, the impact of urban markets, the military command economy, and the importance of the wool industry.

REGIONAL VARIATION

Faunal assemblages in southern and eastern England are now numerous enough to reveal interesting regional patterns of livestock exploitation. This is highlighted by the high proportion of sheep in the Cotswolds compared to the cattle-dominated Severn and Upper Thames valleys. It is also notable that assemblages from rural settlements of different types will broadly follow local trends. For example, the high proportions of cattle on Sussex coastal plain villas differ from the sheep-based assemblages found at several Hampshire Downs villas. These follow local patterns of livestock exploitation and do not
necessarily conform to villa-based trends (cf. King 1984). Similar regional characteristics are seen elsewhere, such as the high proportions of cattle found on sites in the London Basin. It is unfortunate that much of the zooarchaeological evidence is still heavily biased towards southern and eastern England. Samples from the north and west of the province are limited in number, hindered by adverse preservation conditions and a comparative lack of modern excavation. However, it is also possible that pastoral farming in these regions never reached a scale that would lead to large accumulations of animal bones on rural sites. It seems unlikely that pastoral farming developed in these areas in the same way as in lowland Britain, though this remains to be seen. Nonetheless, many of the patterns observed in different landscapes in the south and east continued from later prehistory, indicating long periods of sustained land-use. Rather than stimulating major changes in local patterns of pastoral farming, the Roman period heralded a period of expansion and intensification of existing, Iron Age animal husbandry regimes.

AGRARIAN EXPANSION AND THE URBAN MARKET

While regional variations in livestock exploitation are detectable, there is a common chronological trend that transcends all the main southern and eastern regions: the increase in the proportion of later Roman assemblages with higher frequencies of cattle. The shift to cattle farming was at least partly driven by a demand for beef by urban populations, alongside an associated expansion of arable agriculture (Dobney 2001; Maltby 2007). The organised provisioning of cattle to settlements with large populations required surplus animals being sent from farms to urban markets. However, we do not know how this system worked in practice. It has been previously suggested that urban cattle provisioning may have been one of the main drivers for breeding larger animals (Luff 1993). The earliest detectable size changes in cattle appear in the Thames Estuary region, an area dominated by major urban centres at London and Colchester. Significant size increases occurred very rapidly at Elms Farm, Heybridge, Essex, over the late Iron Age/early Roman transition, implying that breeding stock was imported from the Continent (Albarella et al. 2008). However, similar size increases are also found at sites around the Fens in the early Roman period, a region without major urban centres. Here, there appears to have been considerable expansion at rural settlements and investments in more intensive arable regimes (C. Evans 2013). It is worth pointing out that the Fenlands have been identified as the location of an imperial estate, though there are contrasting arguments about the validity of this theory (Salway 1970; Taylor 2000; Fincham 2002; Malim 2005).

More intensive cattle breeding was accompanied by broad changes in slaughter patterns. The late Iron Age practice of slaughtering a high proportion of immature cattle decreased in the Roman period. Ageing data suggest that more cattle were maintained into adulthood on farmsteads, while the majority of cattle in towns were also predominantly adult (c. 6 years+) rather than the younger, ‘prime beef’ animals (c. 18 months–3 years old). Maltby’s assertion that retired dairy cattle were sent to market is convincing, though we do not yet understand whether these animals were being drawn from herds that were maintained on the outskirts of towns or from farmsteads. As discussed above, the evidence for cattle dairying at rural sites is weak, though this could be due more to our inability to identify it through zooarchaeological data. The use of cattle for traction was probably more significant. Increasing numbers of larger, mature cattle may be a sign that land was being more intensively cultivated, or that previously marginal land was being turned over to arable (see Ch. 2). Foot pathologies found on cattle bones certainly indicate the levels of mechanical stress that were placed on draught animals. While plough cattle may have been more common, their use for cart-pulling also probably increased in order to transport arable produce and other manufactured goods, such as pottery, tile and other building materials such as timber and stone (not least for town walls). This follows the assertion of Albarella et al. that changes in cattle size accompanied an increase in their use as traction animals (Albarella et al. 2008, 1844). While the demand for cattle products at large settlements is in little doubt, this may have been met by animals that had long been exploited for secondary products. Cattle were not being intensively reared for meat in the countryside, which suggests that towns were being supplied from a huge surplus of cattle that were sent to market as a by-product of arable farming.

While cattle were not primarily reared for meat, the opposite is true for pigs. Ageing data indicate that pigs tended to be slaughtered at younger ages on Roman rural settlements compared to Iron Age sites. This probably reflects attempts to increase the amount of meat available for consumption. Pigs may also have been more intensively managed to supply urban markets. Large-scale processing of pork products is indicated at some coastal, salt-processing sites in Dorset and the Thames Estuary (Maltby 2006). Much of this evidence dates to the late Iron Age, though some of these sites continued into the early Roman period.
Similar evidence from Nazeingbury, in the form of large numbers of pig foot bones, suggests that ham or bacon may have been processed in the countryside and sent to urban markets at London or Verulamium (Maltby 2015, 184). However, as Maltby has pointed out, pigs were probably also kept in towns (Maltby 1994a). He argues that this is indicated by the presence of bones from larger pigs in urban deposits, which suggests that they were sty-reared rather than pannaged. The presence of town pigs is supported by the micromorphological identification of pig slurry at Leicester (Morris et al. 2011, 29). The increasing size of pigs on rural sites in the late Roman period may also reflect a shift towards the use of sties in the countryside, a more intensive system of pig management.

MILITARY PROCUREMENT AND THE COMMAND ECONOMY

Several of the key assemblages in north-western England derive from military vici and forts. These tend to include evidence for large-scale processing of cattle. Stallibrass has lamented the fact that assemblages from local farmsteads are almost non-existent, meaning that we cannot fully understand how the army was being supplied with such large numbers of cattle over several centuries (Stallibrass 2009, 101). It is possible that most farmsteads in the north did not have the capacity to raise large numbers of surplus livestock. Complex farmsteads with arrangements of paddocks are common in the Central Belt, but are rare north of the Humber (Allen and Smith 2016). Stallibrass argues that military supplies may have been augmented by long-distance droving of livestock, suggesting lowland Scotland as a potential source (Stallibrass 2009, 108). Her argument is based on seventeenth–nineteenth century livestock procurement models, though it is uncertain how relevant these are for the Roman period. The idea that livestock were being sent to military sites from southern Scotland assumes that large-scale animal husbandry was common in these areas. Also, Hadrian’s Wall would have presented an obvious, albeit permeable and controlled, barrier to movement after the second quarter of the second century A.D.

If the Roman military were procuring large numbers of livestock, it is difficult to see why they would not exploit resources to the south, where cattle production was intensifying and where considerable improvements in livestock size have been identified. A range of other goods were certainly supplied to the northern garrisons from the south (e.g. Black-Burnished ware and Severn Valley ware: Allen and Fulford 1996; see Bidwell, Ch. 7). It is notable that cattle slaughter profiles from towns and forts tend to show broadly similar patterns, with a clear emphasis on the culling of adult animals, particularly cattle aged six years and over (Berg 1999, 267, table 39; Stallibrass 2002, 407, fig. 407; Maltby 2010, 288, table 2.227). This suggests that military procurement strategies may have been similar to the organisation of urban livestock supply. As with towns, cattle that ended up at forts were probably animals that were surplus to requirements on rural settlements, and therefore were by-products of an expanding arable economy. Isotopic analysis potentially offers the greatest insights into the issue of livestock mobility, though there may be problems in distinguishing between cattle raised in southern Scotland and north-west England (Stallibrass 2009, 109). The recovery of bones from larger cattle at northern sites in the later Roman period suggests that cattle from the south may have been driven north. This remains to be proven, but it will be interesting to know where cattle were being driven from and how the system of military procurement was organised.

Pigs were certainly kept primarily for their meat. Higher proportions of pigs have been identified on early Roman military sites, which may reflect their convenience for the army for regular meat provisions. It has been suggested that legionaries had a particular preference for pork (King 1984). However, late Iron Age/early Roman rural assemblages also tend to produce relatively high frequencies of pigs in most regions. This suggests that military sites, in fact, follow a national pattern and high proportions of pigs need not be explained exclusively by the presence of the army (though they may have had a significant influence in some areas). In general, later Roman rural assemblages with high pig frequencies are less common. This may partly be due to the increasing abundance of cattle, which appear to depress sheep and pig proportions, and perhaps because an expansion in the use of arable land took away wooded areas that were traditionally used for pannaging larger herds of pigs.

The degree to which livestock were sent to military sites on-the-hoof or as ready-processed items – i.e. preserved meat, horn, hides, etc. – probably varied. The large quantities of intensively butchered cattle bone found at some sites suggest that live animals were imported for rapid slaughter and processing. This evidence would support Stallibrass’ argument for seasonal droving supplies (see above). However, records from the Vindolanda tablets also point to numerous orders for animal products (Bowman 2003). For example, the army appears to have had a preference for goatskin, which they utilised for a range of items from tents to shield covers. Goat bones are generally rare on
military sites in the north, which does not tally with the demand for goatskin suggested by written records. It seems likely, therefore, that goat products were processed elsewhere and sent to the garrisons (see Ch. 4 for further details). The tablets also detail an order for 170 hides (presumably from cattle) from Catterick, North Yorkshire (Tab. Vindol. II, 343). During excavations at Catterick, Wacher found large quantities of leather, which he argued may have been associated with a late first–early second century tannery (Wacher 1971, 177). However, the archaeological evidence for this has been questioned, and it is possible that the hides were produced elsewhere and were awaiting collection at Catterick (Stallibrass 2002, 403). Frere suggests that cattle (or cattle products) were delivered to the army as tax imposed on the Brigantes (Frere 1987, 216). This idea is also difficult to support in the absence of written evidence. Nonetheless, archaeological evidence points to a highly organised system of livestock requisitioning, processing and supply.

THE WOOL INDUSTRY

It has long been argued that the Romano-British wool industry intensified in the third and fourth centuries A.D. This is largely taken from literary sources that mention British woollen products. It was Diocletian who felt it necessary to assign top prices to the Birrus Britannicus – a waterproof cloak – and the Tapete Britannicum – a woollen rug – in his price-fixing edict, suggesting that these items had an empire-wide reputation for quality (Frere 1987, 272). However, broad trends in sheep slaughter patterns do not support the argument that wool production became more important. In general, Romano-British mortality profiles point to the exploitation of sheep for their meat, and possibly dairy (see above). Undoubtedly, wool would have been important to most communities, but it does not appear to have been the main focus of sheep husbandry. The lack of emphasis on wool has previously been highlighted by Albarella, who showed clear differences between sheep mortality profiles from Iron Age sites and a medieval site that produced high proportions of older animals, almost certainly a reflection of intensive wool production (Albarella 2007, 394–5, fig. 2).

Rather than a widespread shift in sheep husbandry practices, an increased emphasis on the slaughter of older animals has been observed on particular Roman sites. At Cotswold Community, Gloucestershire, Tolpuddle Ball, Dorset, and Suddern Farm, Hampshire, a late Iron Age/early Roman pattern of juvenile slaughter was replaced by an increased proportion of adult sheep in late Roman phases, suggesting that wool became more important. It is also notable that these sites were located in the Cotswolds, the South Wessex Downs, and the Hampshire Downs, areas where sheep husbandry was traditionally more common, and they were not far from the major urban centres at Cirencester, Dorchester, and Winchester. Furthermore, unusually high proportions of sheep have also been identified at some roadside settlements, such as Higham Ferrers and Grandford. It is possible that the introduction of improved varieties of sheep, such as the larger, hornless type identified by Maltby (1987; 1994a), reflect a desire for animals with particular characteristics, perhaps new types of wool.

Wool production and processing was probably more intensive in urban settlements. The presence of a gynaecium, a woollen-mill, is cited in the Notitia Dignitatum as being located at ‘Venta’, which could potentially relate to Winchester (Venta Belgarum), Caistor St Edmund (Venta Icenorum), or Caerwent (Venta Silurum). Wild suggests that Winchester would be the most obvious candidate, owing to its location in the Hampshire Downs, though the archaeological evidence is currently lacking (Wild 1970, 9). It is also worth noting that spindlewhorls are less abundant on rural sites in the Roman period compared with the Iron Age (see Ch. 5 for discussion). Whether this reflects the increased centralisation of wool processing or a difference in raw materials used for spindlewhorls is difficult to detect.

SUMMARY

Overall, the zooarchaeological data points towards major investments in pastoral farming in the Roman period. These changes did not happen at the same time in the same places. In some areas, developments in husbandry practices occurred rapidly, soon after the conquest; in others, they took longer to become established. The population expansion that occurred in Roman Britain no doubt generated a demand for this surplus – not only for meat, but also for secondary products and raw materials for the growing craft industry.