

The Exploitation of Animals in Roman Britain

Mark Maltby

Introduction: the History of Romano-British Zooarchaeology

The study of the exploitation of animals in Roman Britain using archaeological evidence is a relatively recent development. Although classic studies of the province often included sections on animal husbandry or diet, the evidence was based on a very limited number of archaeological investigations and often relied heavily on historical inference drawn from Roman agronomists (e.g. White 1970). The advent of historical zooarchaeology from the 1970s onwards has resulted in the study of assemblages from many hundreds of Romano-British sites, producing a burgeoning and increasingly unwieldy archive. As the information has increased several syntheses for the evidence have been produced (e.g. Grant 1989; 2004; King 1991; 1999; van der Veen and O'Connor 1998; Cool 2006; Albarella, Johnstone and Vickers 2008). This chapter will draw both upon these previous surveys and incorporate new evidence.

The Scope of this Review

Evidence for the exploitation of animals in Roman Britain is derived from many facets of archaeological and, to a lesser extent, documentary sources. These will be mentioned where relevant but this chapter will focus primarily on the zooarchaeological evidence. It will largely exclude discussion of the roles of animals in ritual and religion, as this is covered in other chapters in this volume. The main theme that will be examined is that of innovation. Put simply, in what ways did human exploitation of animals change in the Romano-British period?

It should be noted from the outset that, although there some common trends that can be seen with regard to the exploitation of animals in Roman Britain, there are also many variations. It can be shown that bone assemblages can vary significantly chronologically, regionally, intra-regionally, between different types of settlement, between settlements of the same type and within individual settlements themselves. Arguably, it is these differences that tell us more about the complexities of the pastoral economy and the meat diet than the similarities.

The review will focus initially on domestic mammals and their exploitation. This will be followed by a shorter summary of the evidence for the exploitation of other mammals, birds and fish.

Cattle

Previous reviews of Romano-British diet have concluded that beef was comfortably the meat most commonly consumed. Cattle bones form the highest component of many faunal assemblages (King 1984; 1991; 1999; Grant 2004), whereas Iron Age assemblages are more commonly dominated by sheep/goat (Hambleton 1999; Albarella 2007). Even in cases where minimum number calculations indicate that more sheep were eaten than cattle, the much heavier carcass weight of cattle would mean that beef still formed the bulk of the meat diet (Grant 2000, 428).

King's (1984; 1999) analyses of species representation in a wide range of assemblages demonstrated that in addition to the general dominance of cattle, there were variations in the percentages of cattle, sheep/goat and pig on different types of site. This calculation masks a considerable amount of variation that has been encountered in assemblages both within and between settlements but King's surveys showed that cattle tend to be best represented on military sites and large towns - settlements that would have contained higher proportions of people not directly involved with food production. The increased demand for food created by urban populations and military personnel are likely to have been a major factor in the change of emphasis in Romano-British meat production.

The consensus view has been that the dominance of cattle tended to increase in the later Roman period following King's (1984) original results (Grant 2004; Albarella 2007) with cattle forming a higher proportion of the bones on all types of settlement. Although this generalization can still be supported by the evidence, there are a lot of variations and numerous exceptions to this trend. For example, in a recent survey of Romano-British assemblages from 28 sites in 14 large towns where material from different periods could be compared, cattle percentages (in relation to sheep/goat and pig) increased in the later Roman period in 17 cases but decreased or remained static in the other 11 (Maltby 2010, 266-7). In addition to changes in the diet, there are a number of factors that can account for variations in species in assemblages including

differential preservation, butchery and disposal practices (see below). More detailed and critically evaluative reviews of species representation are required to provide a more comprehensive understanding of the extent that beef production became more important in the later Roman period.

A major change that accompanied the increased emphasis on beef production concerned how cattle carcasses were processed. It has long been recognised that butchery methods involved the greater use of cleavers and heavy blades in carcass processing than has been encountered in British Iron Age assemblages (Grant 1989; Maltby 1989). Assemblages from large urban and military sites in particular have evidence for consistent treatment of carcasses utilising these implements, which have left characteristic butchery marks (Maltby 1989; 2007; Seetah 2006). In particular, the appearance of distinctive indentations (scoops) on the shafts of upper limb bones made by heavy blades during the removal of meat is testament to the processing of carcasses by specialist butchers. Whilst such butchery is found frequently in urban and military assemblages, similar filleting marks have been found much less consistently, on small nucleated settlements and villas. They tend to be even less frequent and often absent on other rural settlements (Maltby 2007; 2010). These methods, which may well have had military origins, would have increased the speed of processing and were thus favoured by butchers dealing with large numbers of carcasses (Seetah 2006).

There is abundant evidence for large-scale processing of cattle in towns and examples of substantial accumulations of waste emanating from this can be found in all the major towns that have received extensive excavations (Maltby 1984; 2007; 2010). This is one of the major reasons why species representation varies so greatly within them. Areas (both intra- and extra-mural) that include large dumps of processing waste have invariably produced high percentages of cattle. Examples include Rack Street, Exeter (Maltby 1979), Chester Street, Cirencester (Maltby 1998) and Balkerne Lane, Colchester (Luff 1993).

Other common finds on urban and military sites are cattle scapulae with distinctive blade marks on the edges of the articular surface (glenoid) and neck. These scapulae were disarticulated from the humerus. Holes in the blade of some of the scapulae suggest they were hung probably during preservation by smoking and salting. Well

known examples have been illustrated from York (O'Connor 1988) and Lincoln (Dobney, Jacques and Irving 1996) and perforated specimens have been recorded in several other major towns (Maltby 2007). In addition, scapulae with similar blade marks on the neck and the glenoid to those commonly found in towns have also been recovered on some villas and other rural settlements such as Owslebury in Hampshire (Maltby 1989) and Marsh Leys Farm in Bedfordshire (Maltby 2011). This raises the possibility that preserved shoulders of beef may have been traded. There is evidence for a substantial increase in salt production during the Romano-British period in many areas of England (de Brisay and Evans 1975; Bradley 1992; Lane and Morris 2001; Hathaway 2006; Rippon 2008) raising the probability that much of the meat eaten was in the form of cured products.

Marrow and grease were other cattle products that were commonly utilised in Roman Britain. In addition to evidence that many bones were routinely broken for pot-boiling, there is evidence that upper limb bones were sometimes collected for bulk processing. In addition to the characteristic filleting marks described above, these bones were split longitudinally to release marrow. Large accumulations of these split bones have been found mainly, but not exclusively, on major urban sites such as Gloucester and Winchester (Maltby 2007). Such accumulations have often been interpreted as evidence for the production of stock or broth. However, marrow can also be utilised for other products. Dobney, Jacques and Irving (1996, 25), for example, have suggested that marrow was obtained from mandibles in Lincoln may have been used in oil lamps.

Studies of mortality patterns based on tooth ageing evidence have shown that in many settlements a high percentage of cattle were not slaughtered until adulthood (Grant 2004, 373; Maltby 2010, 288). In most cases, however, relatively few of the adult cattle were from very old animals. Therefore, although cattle were undoubtedly valued for dairy products and traction power, cattle were commonly slaughtered for beef as young or mature adults (perhaps mainly between four to eight years of age). Many major towns have high percentages of cattle of this age. Examples include Winchester, Dorchester (Maltby 1994), Caerwent (Maltby 2010, 288), Lincoln (Dobney, Jacques and Irving 1996), Silchester (Grant 2000; Ingrem 2006), Exeter (Maltby 1979) and Colchester (Luff 1993). Similar results have been obtained in

assemblages from small towns such as Alcester, Warwickshire (Maltby 2001) and Heybridge, Essex (Albarella, Johnstone and Vickers 2008, 1837). Military sites producing assemblages with high percentages of adult cattle include South Shields (Stokes 2000) Loughor (Sadler 1997) and Portchester Castle (Grant 1975).

Cattle mortality rates on villas and other rural settlements appear to be more variable. Although many assemblages contain high percentages of adult cattle, the peak of slaughter of animals of this age is often less marked. Examples include Owslebury, Hampshire (Maltby 1994), Odell (Grant 2000), Marsh Leys Farm and Newnham villa in Bedfordshire (Maltby 2011), and Abingdon and Barton Court Farm villa in Oxfordshire (Grant 2000). Most of these assemblages include fairly high percentages of cattle slaughtered between one and three years of age. These animals were not required for breeding, working or sale. This may indicate that the inhabitants at these settlements were sufficiently wealthy to afford to cull or acquire potentially productive immature cattle for their meat. However, this is not necessarily related to status, as the phenomenon seems to occur at both villa and non-villa sites.

Veal was seemingly eaten in relatively small amounts compared to mature beef. Teeth and bones of young calves have been found on many sites but never in very high percentages. Some of these calves may have been natural mortalities but others, particularly those found in towns such as Dorchester (Maltby 1994), probably reflect deliberate slaughter of animals acquired for their meat.

Another aspect of cattle in Roman towns is the bias towards smaller cattle. Most breadth measurements of cattle limb bones in assemblages from Roman towns are positively skewed. Examples can be drawn from Cirencester (Maltby 1998, 362), Winchester (Maltby 2010, 150) and Alcester (Maltby 2001). This probably indicates that the majority of the cattle were females, although this interpretation is complicated by the introduction of larger cattle in some parts of Roman Britain (see below). However, the comparative lengths and breadths of metacarpals display sexual dimorphism and measurements of complete bones consistently indicate that most of the adult cattle in urban assemblages belonged to females. Good examples can be found in Colchester (Luff 1993, 61), Lincoln (Dobney, Jacques and Irving 1996) and Winchester (Maltby 2010, 148). Unfortunately most metacarpals on Roman sites have

been broken to release the marrow but distal measurements also demonstrate the bias towards smaller (female) cattle in urban assemblages. Examples include York (O'Connor 1988, 55), Exeter (Maltby 1979) and Dorchester (Maltby 1994). If this interpretation is correct, it seems that the procurers of cattle in towns and forts were preferentially acquiring mature but not very elderly female cattle and/or farmers were supplying cattle at an age when their productivity in breeding and milking decreased.

Assemblages containing a more even distribution of distal metacarpal breadths, which may indicate the presence of higher percentages of adult males, include the rural sites at Owslebury, Hampshire (Maltby 2010, 148), Frocester villa, Gloucestershire (Noddle 2000) and Marsh Leys Farm, Bedfordshire (Maltby 2011). This may indicate that plough oxen were more often likely to have been retained for slaughter on farms after they ceased working. Evidence for the use of cattle for ploughing is also indicated by the presence of pathological conditions on cattle foot bones. In several samples, including those from Wroxeter (Hammon 2005) and several rural settlements in Bedfordshire, severe pathology tended to be more prevalent in larger specimens. This suggests that more males were affected.

Metrical analysis has also shown that some Romano-British cattle were substantially larger than their Iron Age counterparts. Increases in the average size of cattle from early in the Roman period have been demonstrated in, for example, Hampshire (Maltby 1981) and Essex (Albarella, Johnstone and Vickers 2008) The latter have also shown have shown that exceptionally large cattle were present at Great Holts Farm, Essex in the third century and have argued convincingly that new stock were introduced to Britain from the continent from the early Roman period.

However, there are regional and chronological variations in the presence of larger cattle in Roman Britain. Most of the sites which have produced evidence for substantial numbers of larger cattle are located in the South-East and the Midlands. Assemblages from south Wales and the South-West do not show much in the way of size improvements throughout the Roman period (Maltby 1981; 2010; Hammon 2005).

Sheep and Goats

Apart from the exceptional case of Uley, Gloucestershire where goats were raised specifically for slaughter at the temple (Levitan 1993), sheep greatly outnumber goats in assemblages where the two species have been differentiated. In major towns, they have not provided more than 10% of any assemblage even including horn core counts and they usually contribute much less than that (Maltby 2010, 268).

Sheep are regarded as the mainstay of Iron Age animal husbandry (Albarella 2007), although their percentages in faunal assemblages can vary quite substantially regionally (Hambleton 1999; Albarella 2007). As noted above, they tend to be better represented on non-villa rural settlements than on other types of Romano-British settlement (King 1984; 1999), and on early Roman sites, although there is wide range of variability. Minimum number counts indicate that sheep continued to be the most common animal slaughtered on many sites, possibly including some towns, but, as discussed above, when carcass weights are brought into consideration, lamb and mutton were much less important than beef in the average diet.

This is not to say that meat production was not an important consideration in sheep husbandry. Although mortality data show a lot of variation, many faunal assemblages have substantial numbers of sheep killed between six months and three years of age. Often there is a peak of slaughter of sheep aged between 18 and 36 months, indicating a focus on the culling of sub-adult and young adult animals once they had reached a good carcass size. Some assemblages, particularly in the later Roman period, have quite high percentages of adult animals, supporting the contention that woollen textile production was a significant consideration in sheep husbandry for some Romano-British farmers (Grant 2004, 378; Maltby 2010, 290; Wild 2002). Young lambs were slaughtered in quite large numbers on some sites. In some cases, particularly on rural sites, these may simply have been stock surplus to breeding or market requirements. However, as in the case of veal, lamb may have been regarded as a luxury meat. At Colchester, there were high percentages of lambs in several assemblages, particularly from intra-mural sites (Luff 1993, 73). Relatively high percentages of lambs have also been found in assemblages in the centres of several other towns (Grant 2004, 378; Maltby 2010, 290). Sheep associated with temples and foundation deposits have tended to consist mainly of juvenile and immature animals (King 2005; Maltby 2012).

Although, sheep as small as the native Iron Age stock continued to be exploited throughout the Roman period, particularly in western and northern areas (Maltby 2010, 294-5), there is, as in the case of cattle, evidence for significant improvement in the stature of the stock in some areas of the province. The average of sizes of sheep were slightly larger in the Midlands towns of Gloucester, Cirencester and Alcester than in Exeter in the south-west (Maltby 2001; 2010, 294-5) Large sheep have been found on several sites in Essex dating from the second century onwards (Albarella, Johnstone and Vickers 2008). Some of these sheep may have derived from stock imported from the continent. Hornless sheep have been found on a number of Romano-British sites in areas where only horned sheep were found previously (Maltby 2010, 181). Hornless skulls appear in early Roman features in Winchester and Dorchester (Maltby 1994), indicating that the inhabitants had access to new types of sheep from early in the Roman occupation. Such skulls have not been found on several Iron Age and early Roman rural settlements in their hinterland and only appear in late Roman deposits at Owslebury, where they were associated with large metapodials, implying that hornless sheep were larger than the horned variety. Assemblages from later Roman Winchester included a higher proportion of hornless sheep than at Owslebury and they also produced more bones from large sheep (Maltby 2010, 182) suggesting that the hornless type may have been of larger stature. However, it seems unlikely that the two types were kept totally isolated and the effects of potential hybridization are poorly understood.

Pigs

Pigs generally rank third behind cattle and sheep/goat in most Romano-British assemblages (King 1999; Grant 2004; Maltby 2010, 264-5). However, there are again some consistent variations in their relative abundance. They tend to be better represented on most military sites, major towns and some villas than in small towns and other rural settlements (King 1984; 1999). The reasons for this could include dietary preferences, status, and the usefulness of pigs as meat producers for settlements where large amounts of meat were consumed. Taking carcass weights into account, pork products were probably more commonly eaten than lamb and mutton in most military and large urban centres.

There are some interesting variations in pig abundance which transcend beyond gross settlement comparisons. For example, pig remains are consistently very well represented in urban deposits in towns in south-east England, such as Colchester and London compared with many other urban assemblages elsewhere in England. This may reflect that more pigs were kept in the region. It may also reflect a continuation of a late Iron Age phenomenon which saw high levels of pigs on some of the oppida and other trading centres in the region, such as Silchester and Braughing (King 1984; Hambleton 1999; Grant 2000; Albarella 2007). This could be related to well documented continental trading and cultural influences that emerged in that region during that period. There is evidence to suggest that pig carcasses were prepared for shipment during that period, a trade probably facilitated by the increase in salt production (Maltby 2006). Smoked and cured ham and bacon are likely to have been commonly traded products throughout the Roman period. Large-scale processing of pigs is evidenced, for example, in a dump of pig foot bones discarded at Nazeingbury, Essex (Huggins 1978). The carcasses processed there may well have been destined for the urban market.

Another striking pattern is that pigs are often better represented on sites near the forum and basilica and other centrally located sites within towns than in their suburbs. Examples include Caerwent, Exeter, Dorchester, Winchester and Wroxeter (Maltby 2010, 264-5). This may again be linked to the greater demand for pork products by those of higher status within the towns. The link between wealth and pig consumption is also evidenced by their high percentages at high status sites such as Fishbourne (Grant 2004) and the Winchester Palace site in Southwark (Reilly 2005).

In contrast, less prestigious rural settlements generally have fewer pigs than found on urban settlements in their vicinity, as can be demonstrated in the Dorchester and Winchester hinterlands (Maltby 1994; 2009). It would appear that the supply and demand of pork was more heavily focused on urban markets and on some high status settlements as well as major military centres.

As expected, few Romano-British sites have produced large percentages of adult animals. Most pigs are killed for their meat prior to this. There is again a lot of variability between assemblages but many include high percentages of pigs killed in

their second and third years. Younger piglets have been found less consistently but form a significant component of some assemblages, again particularly on some (but not all) sites near the centres of some towns such as Caerwent, Silchester, Leicester and Dorchester (Grant 2004, 379; Maltby 2010, 291). It has been speculated (e.g. Maltby 1994), but never proven, that some pigs were raised within towns.

Discussions about the sizes of pigs in Roman Britain are limited. At Heybridge, Essex, Albarella, Johnstone and Vickers (2008) have demonstrated from measurements of teeth and bones that there small but significant improvements in the sizes of pigs in the second century. Pig distal tibiae breadths in later Roman Winchester were nearly all larger than those from the neighbouring rural settlement of Owslebury (Maltby 2010, 203). Although, this may reflect greater numbers of males being consumed in the town, it may also indicate that Winchester had access to pigs (both male and female) of larger stature than those eaten at Owslebury. Similarly large pigs were found in Dorchester (Maltby 1994). MacKinnon (2006) has shown from zooarchaeological, documentary and pictorial evidence that two types of pig were commonly exploited in Roman Italy: one was hairy and slender, often fattened in woodland; the second tended to be larger, hairless and raised in sties. Similar variations in husbandry methods and stock types may account for the variations observed in Roman Britain, although much more research is needed on this topic.

Horses and other Equids

Horses of course played an important role within the Roman army (Hyland 1990) and one assumes that many were imported to Britain during the occupation to supplement native stock. At Heybridge, Albarella, Johnstone and Vickers (2008) have shown a significant increase in the average size of horses from the second century onwards. These were comparable in size to a New Forest pony. This is slightly higher than averages obtained from several Roman towns (Maltby 2010, 297).

Horses tend to be better represented on rural settlements and suburbs of towns than in their centres where they rarely form more than 5% of the total cattle and horse assemblage (Maltby 2010, 269-70). This is because they were much less important as a source of food than cattle, sheep and pig. They tend to be found in relatively higher frequencies on all types of rural settlement, often forming over 10% of the total cattle

and horse assemblage (Maltby 1994) but there is little evidence that they were exploited frequently for food. Although, butchery marks have occasionally been found on Roman horse bones, they were exploited for meat much less intensively than cattle. Their bones tend to be less fragmented and there are many more examples of partial and complete horses being deposited than those of cattle. Horses were primarily valued as a means of transport and as beasts of burden. There are very few examples compared to the other domestic species of immature horse bones on Roman sites, indicating that most could expect to be kept alive for as long as they were considered to be useful unless they died of natural causes.

Donkey and mules has been positively identified on a small number of Roman sites (Johnstone 2010). The potential presence of mules has been overlooked by most zooarchaeologists, although neither mules nor donkeys were probably present in Britain in large numbers.

Dogs and Cats

Dogs were commonly kept by the inhabitants of Roman Britain. Their carcasses were occasionally skinned but very rarely eaten. They were kept as pets, farm animals, as guards and, judging from the evidence of several mosaics, for hunting. It has long been recognized that the Roman period was one where there was a significant increase in the diversity of dogs. Dogs ranged greatly in stature from animals the size of wolfhounds to as small as a Yorkshire terrier (Harcourt 1974; Clark 1995). Such diversity indicates the importation of new types. From metrical analysis alone it is impossible to assign the different sizes of dogs to breeds but there must have been specialist breeding.

Dogs including peri-natal puppies have been found commonly as complete or partial skeletons. Sometimes these are isolated burials, in other cases large numbers of dogs were deposited in the same feature (sometimes with other skeletons). Examples of multiple burials have been found in Dorchester, Winchester (Maltby 2010) and Springhead, Kent (Grimm 2008). To what extent these can be regarded as ritual depositions beyond the burial of carcasses not required for processing is the subject of debate that goes beyond the remit of this chapter.

Cats are less commonly found than dogs and, although they have been recorded on many sites, it is only usually in small numbers. They first appeared in Britain in the Iron Age and may have been kept to control vermin as well as pets in Roman settlements (Kitchener and O'Connor (2010).

Hunted Animals

Generally speaking, deer remains occur very infrequently on Romano-British sites. Red and roe deer rarely provide over 1% of the food mammal counts on urban sites and some of these counts include antler collected for working (Maltby 2010, 271). Deer bones appear more frequently (but rarely in high percentages) on some sites of higher status (Allen in press), supporting the widely held belief that deer hunting may have been mainly the prerogative of the upper echelons of Romano-British society. This is further supported by the introduction of fallow deer to Fishbourne Palace and the subsequent establishment of a herd presumably for the pleasure of the owners and their guests (Sykes *et al.* 2011). Confirmed identifications of fallow deer have been restricted to a handful of Roman sites mainly in southern England (Sykes 2010).

Hares also have been found in many Romano-British faunal assemblages but again usually only in small numbers. They rarely form over 1% of the mammal assemblage and where hares are present, it is usually on sites of high status such as Winchester Palace, Southwark (Reilly 2005) or Whitehall villa, Northamptonshire. Authenticated identifications of rabbits in Roman Britain are extremely rare, the most convincing example coming from Beddingham villa, Essex (Sykes and Curl (2010). This was possibly imported from the Mediterranean.

Identifications of wild boar are complicated by their similarity to large domestic pigs, particularly if they are killed immature. They are occasionally recorded, however. One of the best examples comes from the legionary fortress at Caerleon, south Wales, Here a wild boar was eaten with venison and cranes possibly at a banquet hosted by a high-ranking officer (Hamilton-Dyer 1993).

Birds

General reviews of birds in Roman-Britain can be found in Parker (1998), Yalden and Albarella (2009, 95-153) and for large towns, Maltby (2010, 272-9). The main results

of these surveys have shown that domestic fowl (chickens) became significantly more important during the Roman period, although they would not have formed a significant part of the diet. Although introduced to Britain in the Iron Age, its distribution was restricted and its use as a source of food debatable (Sykes 2012). In the Roman period, the evidence suggests that chickens became more ubiquitous but not evenly exploited. Higher percentages of chickens have generally been found in urban and military assemblages than in those from small towns and villas and they tend to be most poorly represented in non-villa rural assemblages (Maltby 1997). Again, this would appear to reflect the dietary preferences of different sectors of the Romano-British population. They were exploited for their eggs as well as their meat and probably used for cockfighting (Sykes 2012). They have also been found in substantial numbers of human graves and associated with other ritual sites such as Uley (Levitan 1993). There is some evidence to suggest that chickens, particularly males, tended to increase in size during the Roman period (Albarella, Johnstone and Vickers 2008).

The domesticated status of ducks and geese in Roman Britain is less clear (Albarella 2005). Ducks and geese of various sizes are present on Roman sites in modest numbers (Yalden and Albarella 2009, 102-5). The former tends to outnumber the latter, which usually is found more frequently in later Roman sites. Other avian species likely to have been eaten that occur quite frequently on Roman sites include pigeons (some of which may have been domestic), woodcock and a range of other waders including crane, plus partridge, and black grouse (especially in northern England). Non-native pheasants have been recorded on several sites and a peafowl bone was identified at Portchester Castle (Yalden and Albarella 2009). Other rarities included the butchered wing of a great auk on the Isle of Portland (Maltby 2009). Ravens and small corvids are common, but are rarely claimed to have been eaten. The former has often been suggested to be linked with ritual practices (e.g. Fulford 2001).

Fish

Locker (2007) has produced a comprehensive survey of fish assemblages found in Roman Britain and this section largely summarizes those results. The first point to make is that fish remains have been found extremely rarely on late prehistoric sites in southern Britain despite the increasing number of excavations where sieved sampling

has been carried out. This has led to the suggestion that there may have been a taboo on the exploitation of marine resources (Dobney and Ervynck 2007).

There is no doubt that fish were more commonly eaten during the Romano-British period, although the evidence is patchy and handicapped by the inconsistency of sieving. Eel is the species that has been found most frequently. The distribution of most species tends to reflect whether they were locally available. For example, York has produced relatively high frequencies of freshwater species such as cyprinids, whereas cod is more common on London sites. Salmon were quite common on sites in the north and the Midlands (Locker 2007). Bream, bass, gadids and wrasse caught in the inshore waters off Portland were the species most commonly exploited as well as eels in Dorchester and neighbouring sites (Maltby 2009). There is little evidence for deep sea fishing.

Most commentaries on Roman food have highlighted the importance of garum and other fish-based sauces in the diet. Although they have been found on several Romano-British sites (including urban deposits in London, Lincoln, York and Dorchester), processing sources of small fish locally available (Locker 2007), the occurrences are rare and the importance of this food resource may have been over-emphasized. Indeed, although isotopic studies attest to the variable presence of marine foods in the diet of some of the inhabitants, these studies have shown that such sources remained a small component of the diet (Redfern, Hamlin and Athfield 2010).

Summary

This brief review of the zooarchaeological evidence has confirmed that the Romano-British meat diet was dominated by the acquisition of beef and, to a lesser extent, pork, lamb and chicken. Other meats including goat, venison, other game, and fish supplemented some diets but rarely contributed significant portions of them. There is some evidence that people of higher status enjoyed more varied diets and perhaps bestowed largesse by hosting banquets that contained rarer meats. There are some indications that those living in towns had access to, or preferred to eat, a wider range of meats than their contemporaries in some rural farms.

There is clear evidence that the beef supply to fortresses and large towns in particular relied heavily on the work of specialist butchers. They mainly acquired, or were

supplied with, adult cattle, which they intensively processed for sale both as fresh and preserved meat. They could also provide the raw material for large-scale processing of marrow, hides, horns and bone, either by themselves or by other specialists. The acquisition of cattle for the urban and military markets must have had a significant impact on traditional means of slaughtering and the distribution of beef. It is less clear to what extent specialist butchers were involved in processing pigs and sheep and it is feasible that there was a more diverse system of acquisition and distribution of their products.

There were changes in general husbandry practices in the Romano-British period. More sheep were kept until their second and third years before slaughter for meat and it seems that increasingly more of them were allowed a longer life to produce wool for the expanding textile market in the later Roman period. Some pigs may have become largely confined to sties. Plough cattle possibly became increasingly important on farms and milk would certainly have been acquired from cattle, goats and sheep, although there is little evidence for intensive dairy production. Chickens would have been a more common sight during the Roman period, perhaps particularly in and around towns.

Through a combination of importation, more controlled breeding and better husbandry practices, larger cattle, sheep, pigs, horses and even chickens have been found in some parts of Roman Britain, allowing improvements in meat production in particular. Conversely, Romano-British people would have encountered a much greater range of dogs than their ancestors.

There remains much further research to be carried out on human and animal relationships in the Roman period. The advent of isotopic analysis and genetic studies is already beginning to have a major impact on improving our knowledge of the movements, diet and ancestry of both animals and humans in this period. Traditional zooarchaeological analysis can embrace these studies to develop deeper understanding of how animals were exploited and perceived by different sections of the community across Roman Britain

References

- Albarella, U. (2005) Alternate fortunes? The role of domestic ducks and geese from Roman to Medieval times in Britain, 249-58 in G. Grupe and J. Peters (eds.), *Feathers, Grit and Symbolism: Birds and Humans in the Ancient Old and New Worlds* (Rahden: Verlag Marie Leidorf)
- Albarella, U. (2007) The end of the Sheep Age: people and animals in the Late Iron Age, 389-402, in C. Haselgrove and T. Moore (eds.), *The Later Iron Age in Britain and Beyond* (Oxford: Oxbow)
- Albarella, U., Johnstone, C. and Vickers, K. (2008) The development of animal husbandry from the Late Iron Age to the end of the Roman period: a case study from South-East Britain. *Journal of Archaeological Science* 35, 1828-48
- Allen, M. (in press) Chasing Sylvia's stag: placing deer in the countryside of Roman Britain, in N. Sykes, K. Baker, R. Carden and R. Madgwick (eds.), *Deer and People: Past, Present and Future* (Oxford: Windgather)
- Bradley, R. (1992) Roman salt production in Chichester Harbour: rescue excavations at Chidham, West Sussex. *Britannia* 23, 27-44
- Clark, K (1995) The later prehistoric and protohistoric dog: the emergence of canine diversity. *Archaeozoologia* 7, 9-32.
- Cool, H. (2006) *Eating and Drinking in Roman Britain* (Cambridge: Cambridge University Press)
- de Brisay, K. and Evans, K. (eds.) (1975) *Salt: the Study of an Ancient Industry* (Colchester: Colchester Archaeology Group)
- Dobney, K. and Ervynck, A. (2007) To fish or not to fish? Evidence for the possible avoidance of fish consumption during the Iron Age around the North Sea, 403-18 in C. Haselgrove and T. Moore (eds.), *The Later Iron Age in Britain and Beyond* (Oxford: Oxbow)
- Dobney, K., Jacques, D. and Irving, B. (1996) *Of Butchers and Breeds: report on vertebrate remains from various sites in the City of Lincoln* (Lincoln: Lincoln Archaeological Studies)
- Fulford, M. (2001) Links with the past: pervasive 'ritual' behaviour in Roman Britain. *Britannia* 32, 199-218.

- Grant, A. (1975) The animal bones, 378-408 in B. Cunliffe, *Excavations at Portchester Castle. Volume 1 Roman* (London: Society of Antiquaries Research Report 32)
- Grant, A. (1989) Animals in Roman Britain, 135-46 in M. Todd (ed.), *Research on Roman Britain: 1960-1989* (London: Britannia Monograph 11)
- Grant, A. (2000) Diet, economy and ritual evidence from the faunal remains, 425-82 in M. Fulford and J. Timby, *Late Iron Age and Roman Silchester: Excavations on the Site of the Forum-Basilica 1977, 1980-86* (London: Britannia Monograph 15)
- Grant, A. (2004) Domestic animals and their uses, 371-92 in M. Todd (ed.), *A Companion to Roman Britain* (Oxford: Blackwell)
- Grimm, J. (2008) A dog's life animal bone from a Romano-British ritual shaft at Springhead, Kent, 54-75 in N. Benecke (ed.), *Beiträge zur Archäozoologie und Prähistorischen Anthropologie* (Langenweißbach: Gesellschaft für Archäozoologie und Prähistorischen Anthropologie 6)
- Hambleton, E. (1999) *Animal Husbandry Regimes in Iron Age Britain* (Oxford: British Archaeological Reports British Series 282)
- Hamilton-Dyer, S. (1993) The animal bones, in V. Zienkiewicz, *Excavations in the Scamnum Tribunorum at Caerleon. Britannia 24*, 132-6
- Hammon, A. 2005. Late Romano-British-early Medieval Socio-economic and Cultural Change: analysis of the mammal and bird bone assemblages from the Roman city of *Viroconium Cornoviorum*, Shropshire. University of Sheffield: Unpublished PhD Thesis.
- Harcourt, R. (1974) The dog in prehistoric and early historic Britain. *Journal of Archaeological Science* 1, 151-76.
- Hathaway, S-J. (2006) Poole Harbour: a review of early and more recent archaeological investigations with evidence for Iron Age and Romano-British salt production. *Proceeding of the Dorset Natural History and Archaeological Society* 127 (for 2005), 53-8
- Huggins, P. (1978) Excavation of Belgic and Romano-British farm with middle Saxon cemetery and churches at Nazeingbury, Essex, 1975-6. *Essex Archaeology and History* 10, 29-115
- Ingrem, C. (2006) The animal bone, 167-88 in M. Fulford, A. Clarke and H. Eckardt, *Life and Labour in Late Roman Silchester. Excavations in Insula IX since 1997* (London: Britannia Monograph Series 22)

- Johnstone, C. (2010) Donkeys and mules, 17-25 in T. O'Connor and N. Sykes (eds.), *Extinctions and Invasions: A Social History of British Fauna* (Oxford: Windgather)
- King, A. (1984) Animal bones and the dietary identity of military and civilian groups in Roman Britain, Germany and Gaul, 187-217 in T. Blagg and A. King (eds.), *Military and Civilian in Roman Britain* (Oxford: British Archaeological Reports British Series 137)
- King, A. (1991) Food production and consumption – meat, 15-20 in R. Jones (ed.), *Britain in the Roman Period: Recent Trends* (Sheffield: J.R. Collis)
- King, A. (1999) Meat diet in the Roman world: a regional inter-site comparison of the mammal bones. *Journal of Roman Archaeology* 12, 168–202.
- King, A. (2005) Animal remains from temples in Roman Britain. *Britannia* 36, 329-69.
- Kitchener, A. and O'Connor, T. (2010) Wildcats, domestic and feral cats, 83-94 in T. O'Connor and N. Sykes (eds.), *Extinctions and Invasions: A Social History of British Fauna* (Oxford: Windgather)
- Lane, T. and Morris, E. (2001) *A Millennium of Salting: Prehistoric and Romano-British Salt Production in the Fenland* (Sleaford: Lincolnshire Archaeology and Heritage Report 4)
- Levitan, B. (1993) The vertebrate remains, 257-345, in A. Woodward and P. Leach, *The Uley Shrines* (London: English Heritage Archaeological Report 17)
- Locker, A. (2007) *In piscibus diversis: the bone evidence for fish consumption in Roman Britain*. *Britannia* 38, 141-80.
- Luff, R. (1993) *Animal Bones from Excavations in Colchester 1971-85* (Colchester: Colchester Archaeological Report 12)
- MacKinnon, M. (2006) Bones, text and art in Roman Italy, 52-9 in M. Maltby (ed.), *Integrating Zooarchaeology* (Oxford: Oxbow)
- Maltby, M. (1979) *Faunal Studies on Urban Sites: The Animal Bones from Exeter* (Sheffield: University of Sheffield)
- Maltby, M. (1981) Iron Age, Romano-British and Anglo-Saxon animal husbandry: A Review of the Faunal Evidence, 155-204 in M. Jones and G. Dimbleby (eds.), *The Environment of Man: The Iron Age to the Anglo-Saxon Period* (Oxford: British Archaeological Reports British Series 87)
- Maltby, M. (1984) Animal bones and the Romano-British economy, 125-138 in J. Clutton-Brock and C. Grigson (eds.), *Animals and Archaeology: Volume 4:*

- Husbandry in Europe* (Oxford: British Archaeological Reports International Series 227)
- Maltby, M. (1989) Urban-rural variation in the butchering of cattle in Romano-British Hampshire, 75–106 in D. Serjeantson and T. Waldron (eds.), *Diets and Crafts in Towns* (Oxford: British Archaeological Reports British Series 199)
- Maltby, M. (1994) The meat supply in Roman Dorchester and Winchester, 85–102 in A. Hall and H. Kenward (eds.), *Urban-Rural Connexions: Perspectives from Environmental Archaeology* (Oxford: Oxbow Monograph 47/ Symposia of the Association of Environmental Archaeologists 12)
- Maltby, M. (1997) Domestic fowl on Romano-British sites: inter-site comparisons of abundance. *International Journal of Osteoarchaeology* 7, 402-14
- Maltby, M. (1998) Animal bones from Romano-British deposits in Cirencester, 352–70, in N. Holbrook (ed.), *Cirencester Excavations V: The Roman Town Defences, Public Buildings and Shops* (Cirencester: Cotswold Archaeological Trust)
- Maltby, M. (2001) Faunal remains (AES76-7), 265–90 in P. Booth and J. Evans, *Roman Alcester: Northern Extramural Area* (London: Council for British Archaeology Research Report 127)
- Maltby, M. (2006) Salt and animal products: linking production and use in Iron Age Britain, 119-24, in M. Maltby (ed), *Integrating Zooarchaeology: Proceedings of the 9th ICAZ Conference, Durham 2002* (Oxford: Oxbow)
- Maltby, M. (2007) Chop and change: specialist cattle carcass processing in Roman Britain, 59-76, in B. Croxford, N. Ray, R. Roth and N. White (eds.), *TRAC 2006: Proceedings of the 16th Annual Theoretical Roman Archaeology Conference, Cambridge 2006* (Oxford: Oxbow)
- Maltby, M. (2009) Bones: mammals, birds and fish, 27-43 in S. Palmer, *Excavation of an Enigmatic Multi-period Settlement on the Isle of Portland, Dorset*. (Oxford: Archaeopress British Archaeological Reports British Series 499)
- Maltby, M. (2010) *Feeding a Roman Town: Environmental Evidence from Excavations in Winchester, 1972-1985* (Winchester: Winchester Museums Service)
- Maltby, M. (2011) Animal bone, 123-128 in M. Luke, M. and T. Preece, *Farm and Forge: Late Iron Age/Romano-British Farmsteads at Marsh Leys, Kempston, Bedfordshire* (Bedford: Albion Archaeology)

- Maltby, M. (2012) Sheep foundation burials in Roman Winchester, 152-63 in A. Pluskowski (ed.), *The Ritual Killing and Burial of Animals: European Perspectives* (Oxford: Oxbow)
- Noddle, B. (2000) Large vertebrate remains, 217-244 in E. Price, *Frocester: A Romano-British Settlement, its Antecedents and Successors: Volume 2 The Finds* (Stonehouse: Gloucester and District Archaeological Research Group)
- O'Connor, T. (1988) *Bones from the General Accident Site, Tanner Row. The Archaeology of York, Volume 15, Fascicule 2* (York: Council for British Archaeology)
- Parker, A. (1988) The birds of Roman Britain. *Oxford Journal of Archaeology* 7, 197-226
- Redfern, R., Hamlin, C. and Athfield, N. (2010) Temporal changes in diet: a stable isotope analysis of late Iron Age and Roman Dorset, Britain. *Journal of Archaeological Science* 37, 1149-60
- Reilly, K. (2005) Animal bones, 158-66 in B. Yule, *A Prestigious Roman Building Complex on the Southwark Waterfront: Excavations at Winchester Palace, London, 1983-90* (London: Museum of London Archaeological Service Monograph 23)
- Rippon, S. (2008) Coastal trade in Roman Britain: the investigation of Crandon Bridge, Somerset, a Romano-British trans-shipment port beside the Severn Estuary. *Britannia* 39: 85-144
- Sadler, P. (1997) Faunal remains, 396-409, in A. Marvell and H. Ower-John, *Leucarum: Excavations at the Roman Auxiliary Fort at Loughor, West Glamorgan 1982-4 and 1987-8* (London: Britannia Monograph 12)
- Seetah, K. (2006) Multidisciplinary approach to Romano-British cattle butchery, 109-16 in M. Maltby (ed.), *Integrating Zooarchaeology* (Oxford: Oxbow)
- Stokes, (2000) A cut above the rest? Officers and men at South Shields Roman fort, 145-51, in P. Rowlet-Conwy (ed.), *Animal Bones, Human Societies* (Oxford: Oxbow)
- Sykes, N. (2010) European fallow deer, 51-8 in T. O'Connor and N. Sykes (eds.), *Extinctions and Invasions: A Social History of British Fauna* (Oxford: Windgather)
- Sykes, N. (2012) A social perspective on the introduction of exotic animals: the case of the chicken. *World Archaeology* 44, 158-69.

- Sykes, N., Baker, K., Carden, R., Higham, T., Hoelzel, R. and Stevens, R. (2011) New evidence for the establishment and management of European fallow deer (*Dama dama dama*) in Roman Britain. *Journal of Archaeological Science* 38, 156-65.
- Sykes, N. and Curl (2010) The rabbit, 116-26, in T. O'Connor and N. Sykes (eds.), *Extinctions and Invasions: A Social History of British Fauna* (Oxford: Windgather)
- Sykes, N., White, J. Hayes, T. and Palmer, M (2006) Tracking animals using strontium isotopes in teeth: the role of fallow deer (*Dama dama*) in Roman Britain *Antiquity* 80, 948-59.
- van der Veen, M. and O'Connor, T. (1998) The expansion of agricultural production in later Iron Age and Roman Britain, 127-43, in J. Bayley (ed.), *Science in Archaeology: An Agenda for the Future* (London: English Heritage)
- White, K. (1970) *Roman Farming* (London: Thames and Hudson)
- Wild, J. (2002) The textile industries of Roman Britain. *Britannia* 33: 1-42.
- Yalden, D. and Albarella, U. (2009) *The History of British Birds* (Oxford: Oxford University Press).