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Ermine Street, Cambridgeshire,
1996

The Archaeology of the A1(M) Alconbury to
Peterborough Road Scheme

Peter Ellis, Gwilym Hughes,
Peter Leach, Catharine Mould
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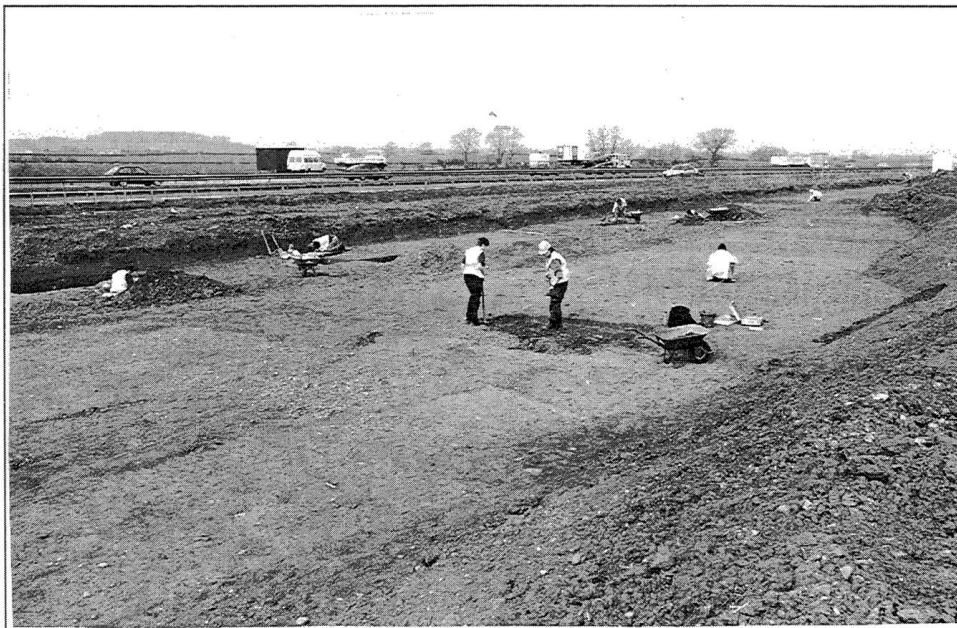
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appropriate packaging of the shellfish, and rapid, reliable transport which would have been essential, might well have been the responsibility of the Romans because the speed with which this commodity would have to travel, and the long distances involved, would have necessitated a high degree of organisation and effort. It would probably have been a lucrative enterprise that depended on good roads, fast animals and a ready market for oysters.

That the merchandise arrived in good condition is attested by the fact that they were still alive on arrival at Tort Hill - with their two valves still held tightly shut and causing problems with opening. If the oysters had been dead their shells would have gaped, and the easily-removed meat would probably have been cooked in highly flavoured sauces to disguise its lack of freshness.

The fresh condition of the shells shows that they were not subjected to physical or chemical erosion on the surface after

disposal but were rapidly buried in soil conditions that were favourable to their preservation.

In the centuries immediately prior to the Roman invasion and occupation of Britain, and after their departure, oysters were mostly eaten in large numbers only in settlements close to the coast. Inland, oysters are recovered in smaller numbers and less frequently from sites belonging to these periods. Whilst there is no positive evidence to account for the scarcity of oysters in late Iron Age and the Saxon inland sites, undoubtedly a major factor in their widespread distribution across Britain during the first four centuries AD was the Roman road network and transport system. It was not until the early middle ages, when, possibly, the introduction of new oyster farming techniques produced oysters that would keep better over longer distances, could they be sold in larger quantities further from the coast. And not until the introduction of the railways in the 19th century were oysters as widely available again as in the Roman period.



THE ANIMAL BONES

by Umberto Albarella

Summary

Small assemblages of animal bones were hand-retrieved from the Roman sites of Norman Cross, Tort Hill East and Vinegar Hill, and from the late Iron Age and Roman site of Tort Hill West. In all periods most bones derive from the fills of ditches associated with rural settlements. The majority of the bones belong to the main domestic mammals - cattle, sheep, pig and horse. There is no evidence of major changes in the frequencies of these species between the main phases of occupation. Unusually for British Roman sites horse bones were abundant. This might be related to a specific function of these sites possibly due to their location near the Fens and along Ermine Street. Neonatal bones of all the main species suggest that these were - at least in some periods - reared on site. Butchery marks were found on bones of all periods, but a peculiar pattern, typical of Roman sites across Europe, was only found at Tort Hill East in Period 2.

Introduction

A total of 104 kg of animal bone was collected from four of the sites as follows:

Norman Cross: 5.5 kg

Tort Hill East: 41.5 kg

Tort Hill West: 38 kg

Vinegar Hill: 19 kg

Only bones which derived from contexts which could be phased and that were not seriously affected by problems of residuality or contamination were taken into account. Because of this a high percentage of insecurely dated bones from Vinegar Hill has been excluded from this analysis.

Bones from Periods 2A and 2B at Tort Hill East were considered together.

Methods

No programme of coarse sieving for the recovery of animal bones was carried out, although a few small samples were taken for flotation and fine sieving. The flotation residues from these latter samples produced a very small number of animal bones which were added to the total of those picked by hand (Table 28). The assemblage from sieving was too small to provide quantitative information on the loss of smaller bones caused by a recovery bias. Since the bones derive almost entirely from hand-collection an under-representation of smaller species and body parts is to be expected on these sites.

The mammal bones were recorded following a modified version of the method described in Davis (1992) and Albarella and Davis (1994). In brief, all teeth (lower and upper) and a restricted suite of parts of the postcranial skeleton were recorded and used in counts. These are: skull (zygomaticus), scapula (glenoid articulation), distal humerus, distal radius, proximal ulna, carpal 2-3, distal metacarpal, pelvis (ischial part of acetabulum), distal femur, distal tibia, calcaneum (sustentaculum), astragalus (lateral side), naviculo-cuboid, distal metatarsal and proximal parts of the 1st, 2nd and 3rd phalanges. At least 50% of a given part had to be present for it to be counted. For birds the following were always recorded: scapula (articular end), proximal coracoid, distal humerus, proximal ulna, proximal carpometacarpus, distal femur, distal tibiotarsus and distal tarsometatarsus.

Horncores with a complete transverse section and 'non-countable' elements of particular interest were recorded, but not included in the counts. Wear stages were recorded for all P4s and dP4s as well as for the lower molars of cattle, caprines and pig, both isolated and in mandibles. Tooth wear stages follow Grant (1982) for cattle and pig and Payne (1973 and 1987) for caprines. A full list of measurements can be found in Albarella (1997). These in general follow von den Driesch (1976). All pig measurements follow Payne and Bull (1988). Humerus HTC and BT and tibia Bd measurements were taken for all species as suggested by Payne and Bull (1988) for pigs. Measurements taken on equid teeth follow Davis (1987). The width of caprine teeth represents the 'maximum' width.

Provenance and preservation

The animal bones derived from a variety of different contexts and features, but at all sites the majority was found in ditch fills, including a ring ditch from Period 2 at Tort Hill West. A number of bones also derived from gullies and, to a lesser extent, from pits, from layers, from a midden at Tort Hill East Period 3 and from a palaeochannel at Vinegar Hill Period 3.

The preservation of the bones varied but was, on average, fairly good at Tort Hill East and worse at the other sites, in particular at Norman Cross. The natural fragmentation - as opposed to that caused by human action - was higher at Tort

Hill West than at Tort Hill East. In the former site, most identifiable specimens are represented by isolated teeth, which are the most durable elements and therefore those which are found and identified even when the levels of preservation and fragmentation are high. Whereas in the two main periods at Tort Hill West, teeth (upper and lower) represent more than half of the 'counted' specimens, this proportion goes down to 50% at Tort Hill East Period 3 and to 35% at Tort Hill East Period 2

The fragmentation of the bones is probably the result of a complex series of factors including human butchery (discussed below) and a variety of taphonomic processes. Among these the action of scavengers on the bones was quite severe. Gnawing marks were common throughout and suggest that many bones may have been moved by dogs and other scavengers from the place where they were initially discarded and were not therefore in a primary deposit. Gnawing marks were more common at Tort Hill East than Tort Hill West, despite the poorer preservation at the latter site. This probably indicates that at Tort Hill West the amount of gnawing was so intense that bones could no longer be identified. The same type of clayey soil was present at the two sites and cannot be a factor in this difference in preservation. Most of the gnawed bones belong to cattle, although chewed bones of equid, sheep and pig were also found. A few sheep and pig bones from Tort Hill West bear clear marks of partial digestion (see Payne and Munson 1985).

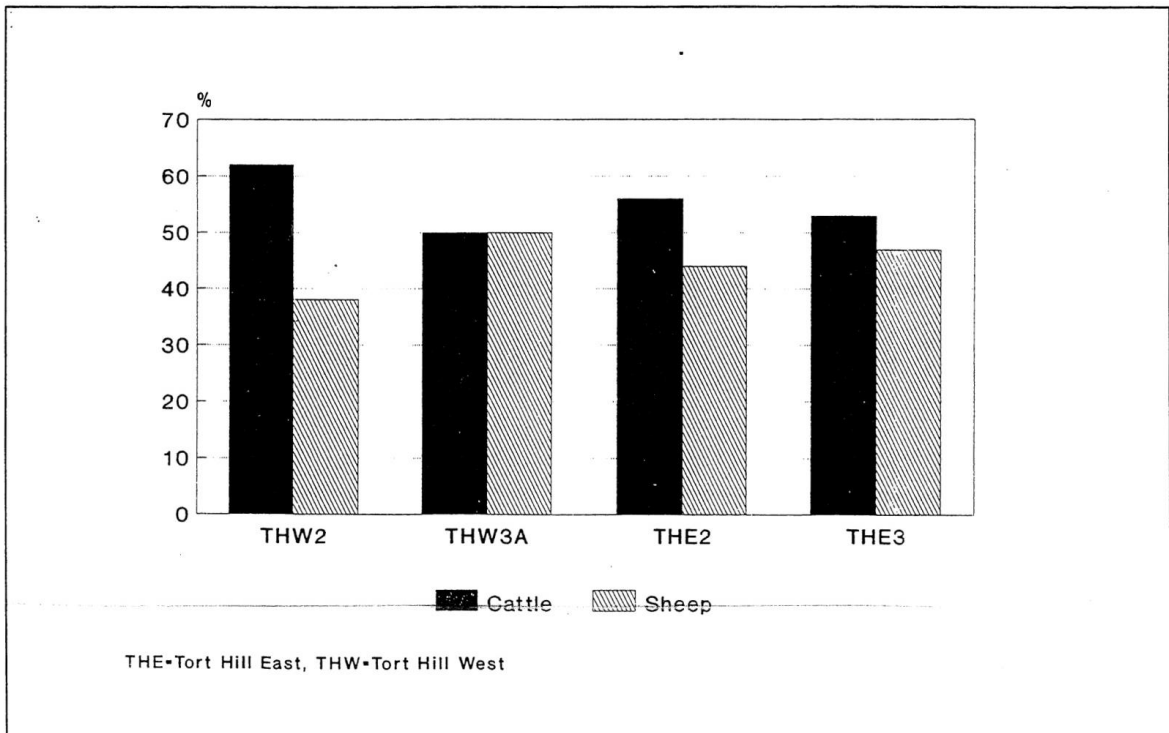


Fig 60 Animal bone: percentages of cattle and sheep bone in a time sequence

Table 28 Animal bone: Number of identified specimens (NISP). The assemblage is largely hand-collected; the few specimens from sieved samples have been added to the counts. 'Sheep/goat' also includes the specimens identified as 'sheep', and 'frog/toad' also includes the specimens identified as 'frog'. The figures in brackets are not included in the totals. See Table 32 for chronology. * 15 specimens derive from a partial skeleton. ** 14 specimens derive from a partial skeleton.

Period	Site	Norman Cross				Tort Hill East				Tort Hill West				Vinegar Hill				Total
		1	2	Tot	Tot	1	2	3	4	Tot	Tot	1	2	3	4	Tot	Tot	
cattle (<i>Bos taurus</i>)		2	14	16	3	47	47	2	99	1	64	78**	4	147**	11	30	41	303
sheep/goat (<i>Ovis/Capra</i>)		4	8	12	37	41	1	79	5	39	64	14	122	1	5	2	221	
(sheep (<i>Ovis aries</i>))		(-)	(2)	(2)	(10)	(10)	(-)	(20)	(-)	(9)	(14)	(2)	(25)	(-)	(2)	(-)	(49)	
(goat (<i>Capra hircus</i>))		(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	
pig (<i>Sus scrofa</i>)		1	1	2	3	6	6	15	3	14	15	1	32	2	2	2	50	
equid (<i>Equidae</i>)		4	4	4	2	19	17	38	4	9	55	1	69	19	4	23	134	
cattle/equid														1		1	1	
dog (<i>Canis familiaris</i>)					16*			16*		5	10		15	1		1	32	
dog/fox (<i>Canis/Vulpes</i>)											1		1				1	
domestic fowl (<i>Gallus gallus</i>)		4	4	4		1		1									5	
lapwing (<i>Vanellus vanellus</i>)										1			1				1	
crow/rook (<i>Corvus corone/frugilegus</i>)					1			1									1	
frog/toad (<i>Anura</i>)					35			35									35	
(frog (<i>Rana</i> sp.))		(-)	(-)	(-)	(8)	(-)	(-)	(8)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(8)	
(toad (<i>Bufo</i> sp.))		(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	

Not all contexts had evidence of disturbance. Bones in articulation - suggesting material still found in a primary deposit - derive from ditch F111 (context 1102) at Norman Cross Period 2, ditch F515 (context 5068) at Tort Hill East Period 2B, (a horse foot) and F509 (context 5013) at Tort Hill East Period 3. A partial skeleton of a dog came from F507 (context 5058) at Tort Hill East Period 2B and one of cattle from Tort Hill West Period 3A. Both these last two contexts are from ditches, where these animals - probably killed by a disease or some accident - were eventually discarded. Context 1204 from ditch F7 at Vinegar Hill Period 3 produced a number of complete and totally unbutchered bones of cattle and horse, none of which articulate. These are specimens deriving from animals which were not eaten and which ended up there possibly as a consequence of the reworking of a deposit containing complete skeletons.

Occurrence and frequency of species

At all sites and all periods the bone assemblages are dominated by the main domestic mammals - cattle, caprines, pig and equids. Domestic birds are rare and wild animals virtually absent - they are just represented by a lapwing (*Vanellus vanellus*) bone from Tort Hill West Period 2 and a corvid (*Corvus frugilegus/corone*) bone from Tort Hill East Period 2, both of which may not be remains of human consumption (Table 28).

The predominance of domestic mammals and the scarcity of wild game are typical of Roman sites in Britain. Domestic fowl (or possibly pheasant or Guinea fowl) is never found in great abundance in Roman sites, so the scarcity of this species also conforms to the general pattern of the period. Although the frequency of domestic fowl is likely to be underestimated because of a recovery bias, there can be little doubt that in Roman Britain this species was less common than in the subsequent Saxon and medieval times.

A few fish scales came from the flots. Their almost complete absence is probably due to the fact that the small bones of these animals are easily overlooked during excavation. A number of amphibian bones (Table 28) were found in a ditch fill at Tort Hill East Period 2 (context 8008).

In many sites in Britain there is evidence for a decrease in the importance of sheep at the transition between the Iron Age and the Roman period. Cattle seem to become increasingly more frequent during the Roman occupation (King 1978; Grant 1989). The Roman enclosure of Werrington, in Cambridgeshire (King 1988) has provided results consistent with this trend, but the evidence from the Ermine Street sites is different. Cattle are more frequent at the late Iron Age level at Tort Hill West than in the subsequent Roman periods, and no meaningful differences could be noted between earlier and later Roman periods (Fig. 60). Although the possibility that the Tort Hill sites represent an exception to the rule has to be considered, it is also possible that the higher frequency of cattle bones at Tort Hill West Period 2 is the consequence of the difference in preservation between different phases. If we also take into

account that we are dealing with small samples the evidence from Tort Hill must, sadly, be considered inconclusive.

Unlike Tort Hill West, most Iron Age sites in Britain have produced animal bone assemblages in which sheep predominate. At the site of Edix Hill, Barrington, also in Cambridgeshire (Davis 1995), bones were also hand-collected and recorded with a system similar to that used in this study, but sheep were twice as common as cattle.

It is difficult to assess to what extent differences in the relative frequency of cattle and sheep at different sites depend on differences in preservation and recovery. However, it is probably worth mentioning that in other Roman rural sites in the area, such as Grandford (Stallibrass 1982) and Stone (Stallibrass 1996), sheep bones outnumber those of cattle. At the Roman Fort of Longthorpe, near Peterborough (Marples 1974), cattle is predominant. The Ermine Street sites, with their roughly equal number of sheep and cattle in the Roman levels, seem to be intermediate in this respect.

All caprine bones which could be identified to species level belong to sheep (Table 28). The absence - or scarcity - of the goat is not surprising as this species is rare in Iron Age and Roman sites throughout Britain. No goat bones were found at Werrington, Grandford and Longthorpe. However, at Stone about 10% of the caprine bones belonged to goat.

Equid bones and teeth are very common in all four sites, in particular in Roman times (Tables 29 and 30). A biometrical analysis, detailed in the archive, of three complete equid first phalanges, using a method devised by Davis (1982), suggested that these specimens all belong to horses rather than donkeys. This is consistent with the evidence from complete tooth rows which also indicate that teeth have morphological characters typical of horses. Donkeys were important animals for the Romans, who used them as pack-animals and for ploughing light soils in the Mediterranean (Columella VII.1.2). However, we do not know to what extent their use in the colder and damper climate of Britain was equally successful. The archaeological evidence seems to suggest that donkeys were in fact uncommon in Roman Britain.

Table 29 Numbers and percentages of identified specimens (NISF) for the main domestic animals in the main periods

	Tort Hill East				Tort Hill West			
	Period 2		Period 3		Period 2		Period 3	
	n	%	n	%	n	%	n	%
cattle	47	43	47	42	64	51	64	32
sheep/goat	37	34	41	37	39	31	64	32
pig	6	6	6	5	14	11	15	8
equid	19	17	17	15	9	7	55	28
TOTAL	109		111		126		198	

See Table 32 for chronology. The 14 cattle specimens deriving from a partial skeleton at Tort Hill West Period 3A have, in this table, been considered as just 1 specimen

High frequencies of horse bones have only been found in Roman sites in Britain which had a specific function, such as the amphitheatre at Silchester (Grant 1989), or sites where 'ranching' was an important farming activity (King 1978). At all other sites, horse remains are only found in small numbers. The high frequency of horses at the Ermine Street sites is therefore interesting, especially in view of the fact that two of the sites represent roadside settlements and the other two lie close to the road. Perhaps the inhabitants of these sites became specialised in providing horses for people travelling along Ermine street.

Table 30 Animal Bone: numbers and percentages of identified specimens (NISP) for main domestic mammals for all sites by Period

	Pre-Roman late Iron Age		1st-3rd cent. AD		late 2nd-4th cent. AD	
	n	%	n	%	n	%
cattle	64	51	127	38	95	45
sheep/goat	39	31	106	32	68	32
pig	14	11	24	7	9	4
equid	9	7	76	23	41	19
TOTAL	126		333		213	

Pre-Roman late Iron Age' includes Tort Hill East Period 2; '1st-3rd cent. AD' includes Norman Cross Period 1, Tort Hill East Periods 1 and 2, Tort Hill West Periods 3A and Vinegar Hill Period 2; 'late 2nd-4th cent. AD' includes Norman Cross Period 2, Tort Hill East Period 3, Tort Hill West Period 3B and Vinegar Hill Period 3. The 14 cattle specimens deriving from a partial skeleton at Tort Hill West Period 3A have in this table been considered as just 1 specimen

Frequency of body parts

These assemblages are too small to allow any detailed analysis of the distribution of the body parts. Although different anatomical elements were present in different numbers, this variation could be entirely explained by taphonomic and recovery biases - namely more fragile and small elements were more rarely found. The better preservation at Tort Hill East explains the relatively higher number of post-cranial bones on this site. Most body parts of the main domestic animals were found. If animals were sold or purchased at these sites, this must have occurred in the form of living beasts or complete bodies, rather than of dressed carcasses. This latter practice would have indeed caused a bias in the distribution of the body parts.

The scarcity of horncores, detailed in the archive, is worth mentioning. The absence of chopping or cut marks on these elements suggests that horn-working was uncommon in the excavated areas. It is possible that horns were worked in other areas of the sites or exported elsewhere. However, the possibility that most animals present on site were hornless - possibly females - must be considered.

Kill-off patterns

A number of neonatal and very juvenile bones of cattle, sheep, pig, horse and domestic fowl indicate that these species were bred on site (Table 31).

Table 31 Animal bone: occurrence of neonatal and juvenile bone

Site	Period	cattle	sheep	pig	equid	Domestic fowl
THE	2		x			
	3	x				x
THW	2				x	
	3A	xxx			xx	
VH	3			x		

The presence of living equids (probably horses) on site is also attested by the finding of a shed milk tooth at Tort Hill West, Period 3A. A shed milk tooth of cattle was found in a cleaning layer at Tort Hill East which predominantly included 3rd-century material.

The small sizes of the assemblages makes interpretation of the ages at slaughter of the main domestic animals very difficult. Both cattle and sheep were killed at a variety of ages (see Albarella 1997 for a full list of the ageing data), which, in turn, suggests a variety of functions. Given their large size, cattle must have provided by far the greatest amount of meat, but they were probably mainly reared as traction animals. Sheep were bred for different purposes which included meat - there is a high number of immature mandibles (stages C and D) in all Roman levels - as well as their wool and milk. The Romans preferred sheep's milk to cow's milk (White 1970). Pig, as always, was an exclusively 'meat' animal.

It must be emphasised that the kill-off patterns discussed above only concern specimens which died on site and do not necessarily reflect a more general culling strategy for all animals present on site. The evidence of on-site breeding and the location of these sites along a main road suggests that they leaned more towards production than consumption. It is therefore possible that some animals were sold on to market or to travellers, so do not appear in the archaeological record.

Butchery

Forty (ie 12%) of the 337 post-cranial bones of the main domestic mammals bear recognisable butchery marks. The percentage would be much higher if we were taking into account 'non countable' fragments of cattle long bones which, in the Roman period, were often heavily chopped.

Maltby (1989) has noted a prevalence of cut marks in cattle bones deriving from Roman rural sites, whereas a prevalence of chop marks could be noted in assemblages from Roman towns. Cut and chop marks were more or less equally represented at the Ermine Street sites, whereas the admittedly small number of marks from the Iron Age level are all cuts rather than chops. However, the samples are definitely too small to claim a significant difference in butchery techniques between the Iron Age and the Roman period.

An interesting pattern is represented by the presence of a number of assemblages of intensively chopped cattle long bones, all deriving from Tort Hill East Period 2. Only cattle long bones, chopped both transversally and longitudinally,

are present in these contexts; these are all broken into small fragments. This butchery practice has been frequently recorded on Roman sites in Britain, by the author at Elms Farm, Essex, and Orton's Pasture, Rocester, Staffordshire (Albarella 1996; Albarella and Lawless in prep.), and at Lincoln (Dobney *et al* undated) and Stonea (Stallibrass 1996), as well as beyond the Province (Grant 1989; King 1978).

The breakage of the long bones into fragments certainly enabled the extraction of marrow, but such an intensive process may have different explanations, such as the use of these bones for making soups (van Mensch 1974 quoted by King 1978) or for producing glue (Schmid 1972). More recently Dobney *et al* (undated) have argued that the specialised production of marrow and marrowfat may be a more likely explanation. Whatever the explanation there is little doubt that this technique is typically Roman. At the Ermine Street sites, these peculiar assemblages have only been found at Tort Hill East Period 2, in five different contexts.

Cut marks on cattle and equid phalanges from the Roman levels at the two Tort Hill sites are related to skinning and indicate an interest in the hides of these animals. A few more horse bones bear butchery marks, suggesting that horse flesh may have been occasionally used - either for feeding people or dogs. Butchered horse bones have been found at other Roman sites in Britain, such as Grandford and Stonea (Stallibrass 1982; 1996).

The size of the animals

Measurements of bones and teeth can be found in Albarella (1997). These represent a useful database for comparison with other sites, but they are too few to allow meaningful comparisons between different phases of occupation at the Ermine Street sites. There are, however, just sufficient cattle lower third molars to enable such a comparison. No significant differences were noted between the size of the animals between different phases (a Student's t-test was applied), but it is difficult to say whether this is just due to the insufficient size of the samples. A difference was however detected when the Ermine Street measurements were compared with those from the 1st century AD site of Dodder Hill, Hereford and Worcester (Davis 1988), the cattle from the Ermine Street sites being significantly larger (Fig. 61). Since artiodactyl molar teeth show little sexual dimorphism (Degerbøl 1963; Payne and Bull 1988) and are also less susceptible than bones to environmental variations,

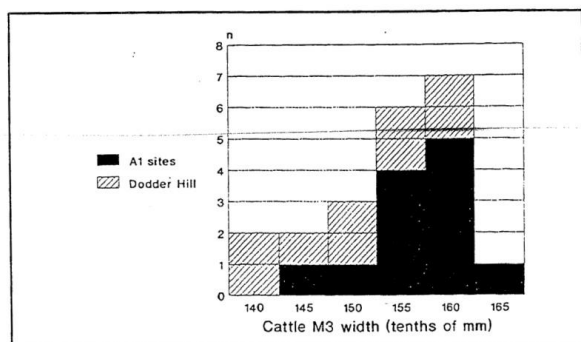
it is likely that the difference between the two sites is attributable to the presence of two different types of animals. Regional or chronological variations are both possible explanations for the larger size of the Ermine Street cattle. It is also possible that the larger Roman cattle imported from the continent (see Teichert 1984; Lauwerier 1988) had provided a greater contribution to the genotype of the Ermine Street animals than at Dodder Hill.

Conclusions

Most of the evidence that we have about the Roman animal economy in Britain derives from towns, forts and villas, whereas we have insufficient information from farmsteads and villages. Any new contribution from such sites, even though from small assemblages such as those of the Ermine Street sites, is therefore most welcome. Despite the limitations due to their small size, the animal bone assemblages discussed in this report indicate that:

- the animal economy of the Ermine Street sites was entirely based on domestic resources,
- all the main domestic species were bred locally; this supports the assumption that these were mainly 'producer' sites,
- unlike other Roman sites in Britain, horses played an important role in the local economy; they were probably also bred locally,
- no obvious difference could be found in the frequency of species and the size of the animals between the late Iron Age and the Roman phases at Tort Hill West; however, the presence of a typically Roman butchery practice by the 2nd-3rd century AD at Tort Hill East, suggests that by then the area was occupied by people leading a Roman way of life.

The animal bones alone cannot provide sufficient information for an understanding of the function of the Ermine Street sites and of the excavated features. However, the fact that a variety of living animals was definitely kept on site may raise questions about where these animals were bred and where their grazing areas were. The possibility that some of the identified enclosures may represent pens for animals should perhaps be considered. Finally, the high frequency of horses may lead to the speculation that the local economy was strongly influenced by the location of these sites along a main road. This might have stimulated the people living in the area to trade with travellers or at a local market, presumably easily accessible through Ermine Street.



Width of the cattle lower third molars from the 1st-3rd cent. AD levels at the four Ermine Street sites and from the 1st cent. AD site of Dodder Hill (Worcestershire) (Davis 1988). Despite the small samples the Ermine Street specimens are significantly (at the 5% level) larger than those from Dodder Hill, according to a two tailed Student's t-test (probability = 0.035)

Fig 61 Animal bone: width of cattle molars

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