

Landscape Evolution in the Middle Thames Valley Heathrow Terminal 5 Excavations Volume 2

Animal Bone

(Section 13)



by S Knight and J M Grimm

SECTION 13

ANIMAL BONE

by S. Knight and J.M. Grimm (with S. Hamilton-Dyer)

Introduction

This report brings together all animal bone recovered to date from the Heathrow Terminal 5 excavations. This includes material from POK, WPR, GAI, PSH, LFA and TEC, dating from the Neolithic to the modern period. The total assemblage was 20,949 fragments (80106g) with a fifth of these recovered from samples and a tenth recorded as individual objects.

As the poor condition of bone limited analysis of animal husbandry, investigation was predominantly feature-based, with important contexts selected for those most likely to inform directly on animal use and disposal.

Methods

As excavation proceeded, all bone fragments were entered onto the main finds database by a series of different specialists, and this has led to some inconsistencies, as the methodology followed and level of knowledge in each case are not always comparable. The intention, however, is that all bone fragments from all areas were recorded to a basic standard, including origin (bulk or sample), weight, species, element, certainty of identification, and condition. This information has here been used with caution, if at all, and should be viewed as assessment level rather than definitive information.

Animal bone was often in such poor condition as to be unrecognisable, and the vast majority of bones were undiagnostic fragments, so more detailed recording of bones was frequently not possible, and in the main thought to be inefficient in terms of time input and expected outcome.

A restricted fragment count was undertaken for those pieces from PSH, TEC and LFA that could be assigned with confidence to species. This information was entered into a separate specially designed Microsoft Access database, by the author and Jenny Bredenberg, with frequent checks for consistency. Both followed Grant's (1975) 'epiphyses only' method, slightly adapted to include loose canines, lower third molars, lower fourth premolars, antler, horn core, atlas and axis. This will under-represent animals that do not have antler or horn cores, and is allowed for in the discussion.

Andy Bates had previously recorded in full the bones from three features from WPR (Perry Oaks) excavations. These results have been incorporated into this discussion where possible but it was not possible to fully integrate the raw data. Sheila Hamilton-Dyer identified the bird and small mammal bones.

Recording a suite of fragments limits the information available to a certain extent, for example butchery or gnawing marks on a long bone shaft fragment would not be fully recorded or quantifiable, but only noted as a comment in the main finds table. However the condition of bone is so poor that little such information is present.

Zones were recorded following Dobney and Rielly (1988); each part had to be more than 50% complete to be included in the quantification and conjoining fragments that were demonstrably from the same bone were counted as one bone in order to minimise distortion. Bone elements were displayed graphically, in order of expected survival (Brain 1981), to identify bias in bone representation.

Sheep and goat were separated where possible using modern reference collections and Boessneck (1969). Fusion status, mandible wear stages (following Grant 1982 and Levine 1982) and measurements (following von den Dreisch 1976) were recorded in the database.

The poor bone condition meant that relatively few butchery marks were observed; these were sketched or described, and helical fractures (made when the bone is fresh) were recorded (Outram 2002). Gnawing and burning position, extent and severity was also recorded. Bird bones were identified to family and measurements and zones recorded using Cohen and Serjeantson (1990) and the reference collection of Sheila Hamilton-Dyer. Withers heights were calculated using Matolcsi (cattle), Keisewalter

(horse) and Teichert (sheep) quoted in von den Dreisch and Boessneck (1974) and ages estimated using Silver (1969).

Articulating bones were given an animal bone group (ABG) number to distinguish them from the disarticulated assemblage, since the nature and purpose of their deposition may have differed.

Results

Much of the bone was very poorly preserved, with 36% very poor, 24% poor, 30% moderate and 7% in good condition, with 3% displaying significant post-depositional damage. Pig bones were most likely to be in good condition, and, unsurprisingly, unidentified bone the least likely to be recorded as well preserved.

The poor preservation had in many cases resulted in the total loss of the bone surface. Well-preserved bones were often from waterholes and stained dark brown, indicating that they had been waterlogged, but many had started to, or were in an advanced state of lamination. The presence of vivianite on a large proportion of bones indicates a phosphorous rich environment, compatible with the use of these features for stock watering.

Poor preservation was particularly pronounced on the Middle Iron Age material, with similarly high levels in the Romano-British assemblages, and highest in the Early Neolithic. However the Bronze Age material was in general better preserved and thus condition cannot simply be attributed to the length of time the bones lay in the soil matrix. Post-medieval and, particularly, Saxon bones were often well preserved, and it is likely that the methods of disposal influenced the condition to a considerable extent.

37% of fragments were completely undiagnostic even to size category, and only 25% of bones could be attributed to species. Of these the larger mammals were most common, with cattle and horse comprising 73% of identified species and large mammals 66% of those from size categories. In view of the extremely poor preservation in most contexts, smaller animals are thought to be severely under-represented.

Cattle and horse predominate over sheep and pig in all phases with the exception of the small number of modern contexts, but the pattern is least pronounced in the Early

Bronze Age, 2nd-3rd century AD and Saxon period. Although it is tempting to attribute the lower proportions of large mammals in these contexts to better preservation, this does not hold true for the Roman period deposits, which were badly preserved. In addition the heavily cattle-dominated Middle Bronze Age material is in moderately good condition. Although neither this nor the Bronze Age assemblage is particularly large and may not be wholly representative, it does seem that some variation in species proportions by phase is evident.

	Unspecified	Bulk	Object	Sieved	Total
Number	14	14692	2163	4080	20949
Weight (g)	51	67640	10897	1518	80106
Average fragment weight (g)	4	5	5	<1	4

Table 1: Total number and weight of all animal bone fragments.

The bone element proportions show an extremely high incidence of the more robust parts of the skeleton; loose teeth comprised 45% of identified elements, followed by the mandible, at 10%, rib fragments at 7%, and the other elements comprised no more than 3% each.

The probable loss of the smaller and less robust elements caused by adverse soil conditions will have severely biased the assemblage, making interpretations of animal husbandry very tentative. Chemical attrition will have biased the assemblages to differing extents in favour of larger, older animals. In addition, gnawing, butchery and other impacts on the bone surface will have been obscured, limiting interpretation of consumption practice and the nature of scavenger activity.

Neolithic

Stanwell Cursus

There is very little material from this feature, and no obvious concentration in any area of the cursus. All surviving bone was from secondary fills, some alluvial. As would be expected from an assemblage that had been adversely affected by poor preservation, most are cattle or sheep/goat teeth or unidentified fragments, and are probably unrepresentative of the original bone content of the fills, which may have

been connected to continuing use of the monument, or may have been incidental inclusions. One deposit in the northernmost area contained some calcined pieces in a deliberate backfill, and while this may be from hearth sweepings it could otherwise have resulted from the direct discard of bones after cooking nearby; none were identified so no conclusions can be drawn. In a secondary deposit located in a more southerly part of the cursus were some gnawed sheep-sized ribs, perhaps discarded food refuse that had been chewed by dogs before becoming incorporated into the ditch fill through their agency or during periodic ground clearance, some time after the ditch had been cut.

C4 Cursus (ditch 621211)

Little bone was recovered from this feature, and was very badly preserved. What could be ascertained was that some antler fragments were present, but it was not possible to say whether they were from a pick, had been worked or were from a hunted animal rather than gathered shed antler. Other bones were unidentified or cattle-sized long bone, all in secondary deposits and most were second in the fill sequence, presumably indicating a period of deposition, whether accumulation of bone from the surrounding ground surface, placement or dumping of bone within the ditch.

Grooved ware pit 631011

Cattle and pig were represented mainly by teeth, probably a result of poor preservation destroying the less dense elements. Some calcined sheep-sized bones were present in the upper fills, although they could not be identified which makes further interpretation difficult. Cremated bones are brittle but hard and may have survived while unburnt pieces were eroded, and may simply represent dumped hearth debris. However they could have been deposited in the pit after nearby intervals of cooking or deliberate burning of animal parts.

Mortlake Ware pit 527124

The only bones from this feature were tiny unidentified fragments in the fourth fill, a deliberate backfill.

Perry Oaks

A small assemblage from tree-throw 148110 consisted almost entirely of sheep/goat, pig and cattle teeth and unidentified fragments, with medium- and large-mammal tarsals and metatarsals. In the main this assemblage appears to have been resulted from the destruction of less dense bones, rather than the element distribution representing any particular activity.

Summary

There is very little in way of evidence for animal husbandry, and of the age at death it is only possible to say that one old cattle was represented. Sheep/goat, pig and red deer were present, but deer was not necessarily hunted or eaten, as the antler may have been gathered. Species may be feature-specific, with cattle and sheep in the Middle-Late Neolithic dated fills of the Stanwell C1 Cursus, deer (tools?) in the C4 Cursus, and cattle and pig in the grooved ware pit. However, the assemblage is too biased to be able to say for certain, and there are no firm parallels that can be drawn with similar monuments elsewhere at this period. While the ceremonial site of Durrington Walls contained a large proportion of pig and cattle (Harcourt 1971), perhaps suggesting that these species are particularly frequent on ceremonial sites, a range of species including aurochs and red deer have been found in other, presumed ritual, Grooved Ware pits in the region (Lewis 2000), which have much stronger 'signatures' than at T5.

Wild animals were also common in the Dorset cursus on Cranbourne Chase (Legge 1991). The apparent absence of such wild species at Stanwell may be a result of poor preservation rendering more fragments unidentified, although the Dorset cursus also contains a high proportion of loose teeth, with the bone 'eroded away', and again may not be representative. Because only domestic animals were observed at T5 it may be that these fills reflect general husbandry practice, *cf.* the earlier dated Runnymede Bridge (Done 1991), having been incidentally accumulated from the surrounding ground surface rather than specifically deposited, although at both cursus' the bones derive from middle fills.

Antler fragments in the C4 Cursus were also seen at the early Neolithic interrupted ditched enclosure at nearby Staines Road Farm, Surrey (Lewis 2000: 69) which contained both worked and natural antler. At a greater distance, Grimes Graves mines

in Norfolk and Durrington Walls in Wiltshire (Clutton-Brock 1984) both contained large quantities of antler deposited in below ground features. While these may be tools discarded *ad hoc* after breakage, their deposition could have been linked to the continuing use or function of the monument as a place of deposition.

Poor condition probably resulted in severe under-representation of less dense elements. The recovered assemblage could conceivably have become included in the fills by chance from the surrounding ground surface where only the densest bones survived a period of exposure, but it seems likely that bones were deposited deliberately and only a small proportion remained after a period of time in the ground had fully eroded the less dense parts. Some evidence of burning was seen in the cursus and pit, possibly related to deliberate heating of bone in cooking or as disposal methods during the use of the monuments, or perhaps from hearth waste, although there is no specific evidence either way. No concentrations were seen in any particular areas of the cursus or enclosure, and localized activity could not be identified.

Early Bronze Age and Beaker

HE3 Enclosure (ditch 584081)

Very little bone was found in this feature, and shallow alluvial fills suggest gradual incidental filling which would favour the larger animals and more dense bones. This is reflected in the bone element representation which includes large mammal long bone fragments, of which a cattle radius was identified. Modern contamination further compromises the ability of this assemblage to indicate activity.

Summary

Very little animal bone was recovered from this phase. The most notable deposit in this phase originated from a pit cut into the top of the cursus, perhaps connected with the continuing use of the monument. Non-intensive exploitation of meat / marrow bearing elements could suggest the disposal of waste from ceremonial feasting or another activity that was not simply survival strategy, and involved both cattle and horse. The latter species is thought to have been reintroduced to Britain in the Bronze Age although a possibly earlier animal was noted at Durrington Walls (Harcourt 1971), and it could be that these animals afforded the owner high status. The discard of any unutilised domestic animal parts may have served a similar role of stressing the

importance of the person disposing of them, or of the occasion whereby food was so plentiful as to allow some wastage.

Other features are few, with bones that appear to be incidental inclusions. In all deposits of this date the cattle bones are fused, with no immature animals. However younger bones may survive less well and therefore be under-represented. This is also the case for those elements that are naturally less dense, although some well-preserved deposits contained fragile parts such as the distal epiphyses of the femur and ribs, and if younger bones were present here they may be expected to have survived.

The predominance of cattle is typical of the Bronze Age in this region, unlike horse, which may reflect the special nature of the cursus (or more likely, the poor preservation of bone biasing the assemblage towards larger mammals). This may be environmentally determined to an extent, rather than cultural choice, since cattle have high water requirements and can live healthily on much wetter pasture than sheep (liver fluke), which are commonly kept on higher ground.

Middle Bronze Age fields and settlements

Waterhole 557027 (Farmstead 2)

This waterhole had a large assemblage; two of the deliberate deposits (second and third in the sequence) contained dense animal bone, most in good or fair condition. Only cattle and sheep/goat (no positive goat) were identified, a narrow range of species for the size of this assemblage which is larger than that from the periods immediately earlier and later which may therefore originate from a limited scope of activity, perhaps purely domestic/consumption. In both deposits neonatal individuals and porous bones from young animals were recovered; elements of the young animal(s) are not replicated between contexts and may signify the deposition in consecutive deposits of remains from the same carcass(es), or that the two contexts may not be strictly separate.

Both deposits contained a similar range of elements with a notably low proportion of sheep/goat phalanges, vertebrae and skulls. Poor preservation will under-represent the less dense ribs and vertebral fragments, and smaller elements such as phalanges. This explanation is, however, less convincing for the low numbers of mandibles, which

normally survive well, and when cattle elements are considered it can be seen that the larger bones are also absent, although some head fragments are represented. It may be that skins, perhaps removed with the hooves and sometimes heads still attached, were deposited elsewhere, perhaps indicating zoned activity, the separation of different processes in time at least. Some articulating parts were present, with no other indicators of reworking such as loose teeth, which suggests deposition into this feature was direct. In 557039, one neonatal sheep/goat and another neonatal cattle were represented by several bones, and these animals may have been natural fatalities that were disposed of in springtime into a convenient nearby (disused?) feature. In 557029 a possible partial female adult sheep was observed, as were parts of a sheep/goat hind limb (calcaneum, astragalus, pelvis and femoral head).

Ditch 539096 (Farmstead 1)

All bones from this feature were probably incidental inclusions as the ditch gradually filled and parts of surrounding surface or discarded items slipped in. The second deposit contained a cattle tooth and metapodial and unidentified fragments in poor condition, and in the third another cattle tooth, antler fragments and sheep metatarsal, and all surviving elements were fairly dense. The fifth fill contained just one unidentified fragment, and no episodes of deliberate deposition of quantities of animal bone can be proposed.

Ditch 539283 (Farmstead 1)

Most bones from this feature were in moderate and a small proportion in good condition. Apart from most fragments being unidentifiable, some bones of sheep/goat (only sheep identified), pig, medium mammal and small mammal were found. Bones from large mammals like horse and cattle are absent. The only elements present were: skull, horn core, mandible, vertebra, tarsals, metapodials and phalanges. The assemblage thus likely resembles primary butchery waste (O'Connor 1993). A high proportion of the bones show different stages of burning (charred, calcined), as the assemblage consist of butchery waste; they cannot originate from the sweeping of hearths. It is more likely that waste was burnt to reduce the amount and subsequently buried in disused features.

The assemblage resembles the assemblage from the LAI/ERB waterhole 569176, indicating that burning of and the subsequent deposition in disused features was a common practice which continued to happen throughout (pre)history.

Summary

Bone from the waterhole and the ditches examined seem to have been formed by different processes; in two direct deposits of large numbers of bone with some articulating parts or whole animals or burnt butchery waste were made, and in the other bone appears to have been mainly incidental inclusions. This could reflect differences in location and the means by which they went out of use, with the former used as a rubbish dump after ceasing to function as a water source or ditch, and the latter simply accumulating discarded items from the surrounding ground surface during gradual silting. Presumably, therefore, the former was disused while the surrounding area remained in use for pasture, and nearby lambing/calving or butchering activity took place. Alternatively the waterhole may have been chosen as a repository for young animals for a specific reason; other deposits of whole animals (including an aurochs) are known from the area in this period (Brown & Cotton 2000: 83) and there may be a non-functional explanation for such activity (it would be more economically sound to consume the individual).

The identified fragments from the waterhole were fairly complete (65% on average) and while this is a very crude count it does indicate that these bones had not been too fragmented, and perhaps that much of this deposit was not from functional consumption where the main aim was to extract as much nutrition as possible. Deposits rich in whole bones are known from nearby Innova Park, and were regarded as indicating non-intensive or specialised exploitation. The bones from the waterhole were waterlogged, and maybe the high proportion of relatively whole bones resulted from rapid committal in silts which temporarily prevented further erosion and breakage.

Bone preservation varies, dependent predominantly on the differing means by which bones entered deposits. A large number of immature bones have nevertheless survived, as have lots of sheep-sized mammal bones, and the elements represented are not typical of a heavily biased assemblage, with many of the less dense elements (such as distal femur and proximal tibia) present. One sheep but no goat was

positively identified and the latter species cannot definitely be said to have been present. A single large red deer skull with antler attached, split along the suture either to extract the brain or enable the antler to be used, was recovered from the re-cut waterhole 594272.

In contrast to the preceding period, much of the cattle bone from this period was unfused (a minimum of 3 individuals under 10 months and one over 42 months), with numbers of immature sheep/goat as well (at least two under 3 years and another neonate, and one over 3 yrs). Mature sheep ranged from 585-688mm at the shoulder, averaging at 638mm, fairly large for the period in southern Britain (ABMAP), although as gender analysis was not possible it is possible that the average size has been affected by a large number of males (Davis & Beckett 1999: 13).

The predominance of sheep would not necessarily be expected in this area and period, where cattle are normally best represented, and is a change from the previous phase. Large numbers of sheep are known from marginal areas as they are hardier than cattle, but it is likely that their high numbers here are more a result of the small sample size or type of activity. For instance consumption waste might comprise mainly smaller or younger animals that were cooked with the meat on the bone, than husbandry practice which could favour adults and cattle. In this case though, where it seems that the bones were recovered from deposits where stillborn animals were put, the assemblage will obviously be biased towards younger domestic animals, and it is difficult to present an economic interpretation of husbandry from this evidence. The restricted range of species is interesting but probably due to the restricted number of features.

Late Bronze Age / Early Iron Age fields and settlements

Pit 609020 (Farmstead 4)

This feature contained 1887 fragments, a mixture of calcined, carbonised and scorched bone in a range of conditions, found with the remains of several pots (not obviously charred). Only 40 could be identified to species, and of these sheep/goat were most common, followed by pig and small mammal bone, and a small number of cattle. Tooth fragments accounted for 16 of these, and 227 of the total, illustrating the extreme destruction of the assemblage. Bone elements were mostly metapodials,

mandibles, and single examples or a small number of humerus, tibia, pelvis, phalange, rib, vertebrae and skull.

The remains must have been deliberately burnt but there is no particular bias of elements or species that could indicate routine cooking of specific parts. There is not more than one of each individual definitely present, but at least four species were recorded, including fairly young pig and sheep, presumably the remains from a single episode, deposited in a pit dug especially for the purpose. Cremation of whole animals, feasting involving discard of bones into a fire, or deliberate waste disposal strategy (burning used to reduce the remains to a size suitable for disposal) may have been the cause of this deposit.

During cremation skeletal elements may be subject to different intensity of burning depending on the covering of flesh or other items preventing oxidisation in places. The material here is calcined on the inside of the medullary cavity as well as the break edges, indicating breakage before or during firing, probably of green bone (McKinley pers. comm.), and the varied intensity of burning would be consistent with this interpretation. Sherratt (1991, 50) proposes that remains from sacred ceremonies would need special treatment to dispose of them 'safely' or appropriately, and gives burning or burial as instances, so accounting for the deposition of the bone in an apparently purpose-dug pit. Other examples of cremated animals in pits of this date are normally associated with human remains, with sheep/goat common in cremations and pig in inhumations (MacGregor *et al* 2004). Since the deposit includes large mammal, it could therefore result from a different practice, maybe feasting, but cremation or more mundane functional activity cannot be ruled out.

Waterhole 621155

Relatively little was recovered from this feature and only from one context; apparently slippage from one side. Condition is variable and two fragments were gnawed; almost all are large mammal with one medium sized mammal and possibly the larger individuals were over-represented as a result of degradation of smaller bone elements. Cattle tibia, femur and metatarsal are present, perhaps dragged to this area by dogs and slumped in or dumped after spoiling by dogs, as well as large mammal vertebrae and medium mammal ribs which are more likely to be food waste.

Perry Oaks

An Early Iron Age waterhole [180080] contained mainly large mammal (cattle, horse and red deer) and dense bones, and again some had been gnawed. Lenses of fairly large bones were interspersed with deposits of sparse poorly preserved bone and loose teeth reflecting the differing intensity of depositional activity. It is interesting that two red deer humerus fragments were recovered, although it is not clear whether they were from the same bone, indicating exploitation of deer presumably for flesh, as wild individuals were not present in the rest of the T5 assemblage of this date, although they are known at nearby Runnymede (Serjeantson 1996).

Summary

There is relatively little bone from this phase, and certainly not enough to inform on animal husbandry practice in this period. However, several features contain interesting assemblages, including the remains of a minimum of four individuals that had been burnt, in pit 609020. The variety of species, range of elements and type of burning suggests deliberate selection of whole animals of different species, and this is an unusual deposit that may be related to ceremonial activity. Conversely, the waterhole deposits contained lenses of what appears to be domestic waste between fairly bone-sterile fills which were presumably formed in the absence of meat waste dumping by humans. Periodically, dogs may have been actively transporting food waste into the area, either in or around the waterhole, to be later eroded into fills.

Middle Iron Age settlement

Roundhouse ring gully 574040 (Roundhouse 19)

The number of bones from this feature is relatively small, consisting of unidentified fragments, dense bones such as the mandible and teeth (cattle and pig) that survive well, and a dog metapodial. There is nothing to suggest deliberate inclusion or dumping of waste and it appears that the bones were chance inclusions.

Pit 529306 cut through top of Stanwell Cursus

In this very shallow feature (which produced a C14 date of 386-203 cal BC from charred barley grain), which contains only one (deliberate) fill, specific activity rather than gradual build up is inferred. Well-preserved large mammal limb bones

(substantially complete cattle metatarsal and tibia and horse metacarpal and femur) and ribs, as well as sheep bone fragments, had been disarticulated and some smashed for marrow. Charcoal was present and one unidentified fragment had been burnt, although most did not provide any evidence of discard by fire or cooking (unlike Late Bronze Age Runnymede, where a lamb had been cremated and deposited in a pot in a midden; Needham and Sørensen 1988: 124). The large size of some of the fragments, which have clearly not been exploited for marrow, suggests that, for the bone in this feature, some of the nutritional value of the animal was not utilized. Whether this was due to an abundance of meat, a deliberate avoidance whether from taste or taboo, or a purposeful 'sacrifice' of food is uncertain. The presence of burnt material could indicate nearby cooking or disposal of animal products, but not whether this was undertaken nearby or close to the time of disposal.

Waterhole 593190

All deposits in this feature that contained bone were thought during excavation to have originated from the erosion of surrounding upcast or topsoil. The third deposit contained mostly horse with cattle and sheep/goat, several nearly complete bones and in good condition. With the exception of a loose tooth and a possibly gnawed pelvis fragment, they appear to have been directly deposited, and in some cases mineral encrustation indicates leaching of minerals from water onto bone which presumably occurred post-depositional in a watery environment. The sixth contains two articulated medium mammal vertebrae and large pieces of cattle humerus and scapula, all in good condition, suggesting fairly direct deposition after butchery (including the removal of horn cores or casing), but again some evidence of gnawing indicates exposure of some bone waste. The eighth deposit also contained mineralised bone in fair condition, and horse teeth probably from a single individual, which had been lost from the jaw during reworking or perhaps degradation of the bone. In the eleventh deposit, near the top of the feature, only a large mammal long bone fragment in poor condition was recovered, and this is likely to be an incidental addition from ground surface. Upper fills may be less well preserved due to their proximity to the surface which could result in flawed interpretation as indirect deposits due to greater fragmentation and destruction.

After the re-cut of a possibly re-vetted shaft, well preserved but laminated cattle, (immature) horse and medium mammal bones were deposited with two whole (Late

Iron Age) pots in the waterlogged silt at the base. They are large pieces but in mixed condition and it is difficult to ascertain whether they were deliberate; the cattle were butchered before deposition, and may be general waste. A fourth deposit formed through erosion consisted of a cattle mandible in poor condition, a dense bone that may have been discarded elsewhere and eroded into this feature, or been reworked from previous fills during re-cutting.

Waterhole 521098

Two deposits contained animal bone. In the third were large mammal fragments, with only equid identified and long bone fragments, teeth and one vertebra. Two fairly whole right equid tibiae were present, and this species may therefore have been less intensively exploited than others, and it may be that there is some significance in the replication of this element and species. Bone condition is variable but some are very badly preserved, and the loose teeth present suggest some fragmentation had taken place. The assemblage is dominated by dense elements, and it is evident that these have been waterlogged then cracked as they dried out, which may have resulted in the complete destruction of many bones which had been originally dumped into this feature. The assemblage in the fifth deposit is slightly larger, mainly cattle, one equid and one sheep/goat, with relatively few meat bearing bones, although they are not totally absent. Some unfused epiphyses are present, but bones are in poor-moderate condition and the smallish size of the fragments suggests indirect deposition, perhaps of redeposited midden waste, although no evidence of gnawing to indicate exposure on the ground surface was observed.

Enclosure ditch 588260 (EC1)

Bone was recovered from several deposits within this feature, and was thought to have originated from both erosion and waste dumping. The first of the secondary deposits in one intersection contained just three unidentified large mammal fragments, but the second in the sequence contained poorly preserved cattle metatarsal and four burnt bones in one intervention, and other large and medium-mammal bones were seen in another three interventions. The third fill contained sheep/goat teeth in two interventions, burnt large mammal long bone and calcined medium mammal fragments in two others and unidentified pieces. In the fourth were cattle tooth and sheep/goat bones, and cattle and other tooth fragments. Most of the bones in this

deposit were in poor condition, and many were probably accidental inclusions from erosion and not directly reflecting activity in this period, although hearth/floor sweepings may be present in the second and third fills.

Perry Oaks

Roundhouse gully 8 [ditch intervention 127203] contained tooth fragments and many unidentified bones, again mostly casual inclusions, but a red deer ulna may be of note, as this species is relatively rare in this period. Two interventions through the gully [group 113114] revealed significant bone but both have very little in the lower and upper fills, almost all in poor condition and unidentified, with a high proportion of teeth. The larger assemblages in the middle deposits are again poorly preserved with large mammal and dense elements best represented, as well as bone fragmentary loose teeth, and this assemblage is likely to be heavily biased by destruction of the more fragile bones. Despite this, dog, young pig and sheep are represented, but these are relatively rare compared to cattle.

Similarly the inner gully of Roundhouse 8 [113117] was dominated by large mammal long bones and teeth.

Summary

Much of the bone from this phase has been affected by poor preservation, and relatively little can be deduced about specific activities or husbandry. Some symbolic deposits may be present in the base of the re-cut of waterhole 593190, but this is open to interpretation, and much of the bone seems to be general refuse. Waterhole 593190 appears to contain deliberately deposited bones, some of which have apparently not been reworked or exposed, presumably made when this feature was no longer used for stock watering, and further fills contained only small pieces of bone eroded gradually in. Similarly most of the bones in the enclosure ditch seem to have accumulated naturally, with a few deliberate deposits, representing the dumping of waste periodically cleared from structures or habitation areas.

Late Iron Age / Early Romano-British settlement

Waterhole 593173

Only one deposit contained bone, a secondary fill with a small number of bones in moderate or good condition of largely unfragmented elements. Cattle were most common with some sheep/goat, equid and pig, but large mammal predominated, and the bone elements represented were generally denser ones (mandible, radius, tibia, scapula) as would be expected from an assemblage that had suffered degradation. Gnawing was seen on several examples and may have contributed to the destruction, but some unfused parts were complete suggesting that certain elements had survived intact and had been protected once they had entered the silt at the base.

Waterhole 521096

First in a sequence of fills was found one long bone and a cattle tooth, both perhaps eroded in from the topsoil or ground surface. The fourth deposit contains cattle and sheep/goat, in good to moderate condition, and is a mixture of bones with several immature and one loose tooth, suggesting reasonable preservation but some fragmentation. After the main shaft area had filled, the seventh deposit contained the most animal bone, and was spread across a greater area. Only large mammals were identified, cattle and equid, and loose teeth (many probably from one equid mandible, aged 6-7 years) were common despite good bone condition, so fragmentation must have affected this assemblage. The overlying deposit also contained loose tooth that may have been from this mandible, suggesting post-depositional bone destruction. This deposit contained very little other bone, in variable condition. The uppermost (ninth) deposit contained four equid teeth, a cattle tooth and metapodial fragment, which might suggest inclusion of reworked material or erosion from surrounding soils, but, considering the evidence from the other deposits, probably indicates destruction of bone *in situ*.

Waterhole/pit 569176

The main bone-containing deposits were the middle and upper layers, especially the fourth fill in the sequence, presumably after the waterhole/pit had fallen into disuse. Pottery was common in those contexts with the most bone, as well as some burnt flint and fired clay, indicating general domestic waste. All bones were of medium or small mammal, despite bone preservation being worse than for example waterhole 521096.

This suggests that spatial variation may have determined what was deposited in a feature, as well as differences in preservation, since they are on the same geology (Taplow terrace gravels) and at the same height above sea level. 569176 is deeper and this could serve to better protect bones once deposited, but the lower, better protected fills in 521096 are also biased in favour of large animals, indicating that depth is not a determining factor of content.

The two features are 122m distant, and a difference in zoning or deposition is therefore implied. The fact that much of this is burnt (and the presence of charcoal) suggests hearth debris, and this could indicate a proximity to the centre of occupation, which together with the bias towards certain size categories, concurs with Wilson's (1985) theory. His premise was that smaller animals could be butchered and deposited in the centre of settlements with less difficulty than that of larger animals, which would have been cumbersome and deposited at the outskirts. Standing water at the base probably dates to the use of this feature as a waterhole, but subsequent deposits may indicate the abandonment of this feature and its re-use for waste, perhaps when settlement or activity in the area became more intense.

The larger fills contain articulating parts and no loose teeth, and so had not been disturbed or redeposited, although gnawing indicates that some of the bones had been accessible to scavengers before deposition or when in the feature. The remains of small mammal bones in the fourth fill probably date to a time when this pit was left open, assuming they had not burrowed in since, supporting the interpretation of a semi-filled feature within reach of wild or free ranging domestic animals. The sides remained steep and apparently uneroded, so the feature was not necessarily open for any length of time. A minimum of two sheep (one immature and one mature) in the fourth fill were represented by both meat and waste bones, and no specific activity could be inferred, and if these two individuals had been killed at the same time, not all of their remains were deposited in the same place.

The overlying deposit contained only one sheep/goat and several unidentified fragments, which had presumably eroded in. Above this were more sheep or sheep-sized limb bones, again burnt and possibly eroded or slumped in, as were the overlying burnt sheep/goat pelvis, radius and unidentified bones, perhaps part of the same deposit. The tenth deposit was slightly larger and contained only sheep/goat

bones, again burnt and probably from the same formation processes (hearth sweepings perhaps, after the earlier dump of mixed butchery, consumption and burnt waste).

Summary

Several of the waterholes contained very little bone, perhaps because a lot had been eroded away, or because little bone waste had been deposited within them. The fragmentary nature of the material and the probable bias towards larger and older animals prevents the investigation of husbandry practices. However, it is interesting to note that one contained a predominance of large mammal and another medium and small mammal bone, with a high proportion of burnt fragments, suggestive of butchery and domestic processing/consumption respectively. This could be related to the activity areas in which they were located (or the activities which took place around them after their original purpose had been discontinued). The partial remains of two sheep/goat in one context is typical of other Iron Age settlements such as Danebury (Knight 2002), where bones from different individuals appear to have been mingled but remained in pristine condition prior to deposition. This reflects waste management systems, although the exact methods are unknown. Carcass parts on the bone may have been distributed into family or other groups and therefore waste built up in individual areas (either above ground or within features), or communal waste been temporarily stored before deposition into open features. The former is perhaps more likely considering the good condition of bone, but no definitive conclusions are attempted here.

Early / Mid Romano-British settlement

Waterhole 527388

Bone was recovered from four secondary deposits, the 2nd 4th, 5th and 9th in the sequence, and differed significantly between them. In the second were a few bones in good surface condition, although split and cracked with some vivianite formed from waterlogging and the presence of phosphorous. Generally the bone fragments were large, from cattle, sheep/goat and equid, and a mixture of elements were present. One may have been gnawed, in common with the contents of earlier waterhole fills, and another was butchered. The fourth contained a larger quantity of bone but a high proportion of these were unidentified to species, and all identified bones were from

large mammals especially cattle, including one possible bull. Preservation in this deposit was worse with more abraded bones and frequent gnawing. However the loss of less dense and smaller bones does not seem to have been excessive since teeth and mandibles were not over-represented, and fragile unfused proximal humerus and distal femur were present. A mixture of meat and waste bones were present, with articulating cattle first and second phalanges and large fragments despite chopping, suggesting rapid or undisturbed deposition after an initial period of exposure or trampling. In contrast the fifth contains just two teeth and one unidentified fragment, and the ninth a single cattle tooth, perhaps a result of worse preservation or incidental inclusion of bone from the surrounding ground surface.

Summary

The waterhole contained a series of deliberate and incidental bone deposits; large bones perhaps from processing of cattle carcasses and deposition of the waste in disused features. Relatively few of the Romano-British bones could be recorded in the restricted fragment count, and their condition varied widely, with gnawing rare but present. Bones were found in many features (waterholes and ditches) of various dates (E/MRB (11), 2/3rd Century (18), M/LRB (1) and RB (10)), so very little can be interpreted from this period.

Domestic animals were represented, with cattle, sheep/goat, equid and a lower than expected incidence of pig. However this is a small sample and because pigs are often killed young their bones are more fragile and less likely to be well represented. Mature and immature cattle (one of each) and one sheep between 18 and 42 months and another around 10 months of age were present. Cattle withers heights were calculated for animals of 1131 to 1320mm, including one large male, and a equid at 1172mm. Equid bones were substantially complete and the marrow and perhaps meat was probably not eaten; the same follows for some of the cattle bones too. A range of elements was identified, as would be expected from bones from a wide area and date range.

Saxon

Waterhole 555805

Several secondary fills in this feature contained bone, but few in any quantity. The second contained young sheep/goat mandible and skull fragments, and in the fourth was another young adult sheep/goat mandible and skull fragment with a distal red deer metacarpal, young male pig tooth and large and medium mammal long bones and ribs. The seventh deposit contained just large mammal vertebrae and rib fragments, and two deliberate deposits placed ninth and eleventh in the sequence contained a cattle maxilla and phalange and a cattle tooth and unidentified fragments respectively, all apparently accidental inclusions rather than large scale dumping of bone waste. The thirteenth fill contains only an elderly sheep/goat mandible, in poor condition, and similarly little was recovered from the succeeding fills (a cattle tooth large mammal skull fragment in the fifteenth, sheep-sized pelvis fragment in the sixteenth, sheep/goat tooth with long bone and unidentified fragments in the seventeenth, and more unidentified pieces in the twentieth. Very little can be suggested concerning the nature of these fills; it appears that most were deliberate deposits of general refuse, following butchery and consumption.

Sunken-featured building 509180

The first fill is deliberate and contains numerous bone fragments of horse, pig and cattle (in that order of frequency), with small amounts of large mammal long bone in the third and just a dog lower canine tooth in the fourth. In the initial fill, what were originally recorded as articulated lower red deer limbs are actually left equid metatarsal and metacarpal (with abaxials) and associated phalanges and sesamoids, from the deposition of at least two horse feet, and this is the only definite evidence of this species in the feature. It is possible that they were deposited with attached skin, but there is no evidence to confirm this, and these parts of the carcass may have been dumped after primary butchery as low value meat waste. The pig was represented by a humerus, radius and two ulnae, pelvis and unfused phalanges, all potentially from a single immature individual under one year. Other items are medium and large mammal ribs and vertebrae, and cattle humerus and some are burnt. However this feature may contain intrusive material (a clay pipe is present). Butchery or consumption waste with some unusual deposits is suggested; the horse bones are of

low meat utility so they are likely to be the former, deposited soon after primary butchery and not further disturbed, rather than indicating any particular underlying preferences, such as horse meat avoidance or 'special' deposition of meaningful parts. The young pig remains may also have been deposited after the animal had been cooked or butchered as the absence of the dense teeth indicates that this was not deposited as a whole individual, and the both left and right forelimb parts are present rather than a single limb that had been deposited whole.

Pit Cluster 1: 525340, 525323, 525287, 525293, 525295, 525327, 525331, 525333, 525335, and 525299.

Only two pits contained bones in more than one fill, and all were in secondary deposits, often forming the first or only fill. In 525340 small scale working and general waste is suggested by red deer antler chopped through the beam, with some sheep and pig teeth, medium and large mammal long bones, one butchered and some gnawed. In 525323 a small number of well preserved bones in the second fill consisted of medium and large mammal including sheep mandible, long bone and pelvis, and in the third deposit were slightly more but all unidentified large and especially medium mammal fragments, including a small number of gnawed and burnt items. The small size of many fragments suggests heavy utilisation typical of comprehensive animal product consumption.

Pit 525287 contained two sheep teeth (one young and another mature), and a large number of bones unidentified to species (teeth, long bones and skull fragments), of which a small number were burnt and/or gnawed. Other pits contained very little in the way of animal bone: 525293 contained only cattle maxilla and scapula fragments; 525335 a large mammal pelvis and scapula and medium mammal skull fragment; and 525295 a large number of unidentified fragments (medium and to a lesser extent large mammal) with only cattle and pig, including a neonatal tibia, positively identified, and many teeth. However the condition of bones in these features is good, so the small number of bones is more likely to derive from fragmentation or a propensity to deposit bone elsewhere (e.g. fields for manuring) than poor preservation.

525331 again contained a number of unidentified medium mammal long bones, skull, rib and vertebral fragments from food consumption as well as antler working waste, pig and cattle teeth, and chopped horse and cattle bones. In contrast 525333 only

contained medium mammal bones, with some sheep/goat (lower limb and rib bones and a jaw from a young individual); helical fractures suggest marrow was extracted. The two pits may contain waste from different activities: a mixture of butchery, consumption and craft in the former and more everyday food waste in the latter. However the relatively sparse bone representation in all pits tends to suggest that most bone waste was not deliberately deposited in pits.

Sunken-featured building 538325

A large proportion of the Saxon animal bone derived from this feature, which contained a wide range of species including (in order of frequency) pig, sheep/goat, cattle, horse, red deer (antler) and probable domestic fowl. A slight over-representation of head and foot bones, seen in horse, domestic fowl and to a lesser extent pig and cattle, and this could be taken as evidence for predominantly butchery-based waste deposited in this disused feature. However, a mixture of cattle and sheep/goat elements including ribs and vertebrae were present and these are more what would be expected of general domestic refuse rather than specific activity. Chop marks were common, as would be expected of fully utilised food waste, and the abundance of sheep-sized animals could also suggest food rather than butchery waste. Fragmentation during butchery or consumption could therefore account for the low proportions of meat bearing bones recognised, or some may have been cooked with the flesh and deposited elsewhere. Pig bones were from young individuals (including foetal animals) exploited for meat, and sheep/goat and cattle were also not all mature. Antler had been worked indicating small scale craft production of antler items.

Small mammal fragments were only partial and may have originated from reworking of midden deposits or potentially from the loss of certain elements during excavation either from recovery bias or sampling strategy. Small mammals may have hibernated there as or soon after the feature filled, or could have burrowed in afterwards.

Posthole 582423 contained a frog/toad limb bone and frog humerus, as well as medium mammal long bones, and this could suggest amphibians were hibernating or trapped in the post pipe during its period of disuse, and perhaps indicating a damp environment. Alternatively, the amphibians may have been hibernating in midden material when it was used to pack the post in the hole during construction.

Summary

The waterhole appears to contain bone accumulated incidentally, and other pits seem to have lenses of bone-dense material interspersed with small fragments that may have eroded in after being on the surface long enough to be gnawed, despite their otherwise generally good condition. Several pits have very little bone content indeed and pits were probably not the main receptacle for bone waste, which might rather be spread on fields, and for which a large amount is required (Williamson 2002, 70). However some pits seem to contain bones that may have originated from specific activities, such as butchery or table waste, which implies occasional spontaneous deposition into whichever feature happened to be open, rather than a particular waste disposal strategy. The SFB (538325) fill differs, as it contains a large volume of bone, particularly considering the shallow depth remaining, probably deposited after abandonment (rather than filling up when the structure was in use, in which case some of the larger elements would not be expected, although small mammals may have inhabited the area beneath floorboards). The presence of amphibians in the post pipe to the east could indicate animals hibernating in the matter of the rotting post or void when disused, or pit fall victims trapped in the hole between cutting the feature and placing the post during construction. This is less likely as the post was thought to have been piled. Alternatively, it is possible that they burrowed in, although bioturbation was not noted during excavation.

Chop marks are typical for the period, as is the evidence for fragmentation for full exploitation of cattle, sheep and pig (but not horse). Limited wild (one red deer metapodial) and avian (the foot bones of a domestic fowl) resources were exploited, and dogs were present, although represented only by one tooth, and there is the possibility that this robust element was residual. Bones from some species were mainly 'waste' elements, and others had more of a range, but this is probably a reflection of the small sample size rather than differential processing, for instance horse hide waste with pig, sheep/goat and cattle butchery/consumption waste. Small scale working of antler was also practised.

Relatively large numbers of pig and horse (the latter over-represented by the articulated parts) and the low proportion of cattle may be caused by restricted sample size rather than specific husbandry patterns, although at some sites in this area pigs do seem to be common (Cowie & Harding 2000) and may have been useful for clearing

woodland as well as their meat. However, minimum numbers suggests sheep to be more numerous, at least four individuals, with two individuals each of horse and pig, then only one cattle, dog, fowl and deer definitely present (excluding the shed antler). Small numbers of wild resources are typical of the period.

All horse and cattle bones were fused, but for pig and sheep/goat a range of ages was identified; one pig of around 2 years and another neonatal were present, suggesting breeding on site, and of the sheep/goat one individual over 20 months and another under 16 months were present. The tooth eruption and wear analysis indicated one very old, two subadult and one immature animal, presumably retained for their secondary products, although poor preservation may have destroyed many of the less robust younger bones. Where sex could be identified, one male pig and a probable bull were present. Mature cattle and horses may be working animals and this interpretation is perhaps supported by pathological modifications to an equid astragalus, the dorsal articular surface of which has almost completely degenerated. Although the data base is very small, it seems that sizes are larger than for the preceding period, with withers heights for sheep at 631mm and horse 1333mm, 1327mm (these two perhaps from the same animal) and 1436mm, as a result of Romano-British improvement of livestock and/or the import of new animals (King 1991: 17).

Medieval

Waterhole 529139

A small number of moderately-good preserved bones were recovered from this waterhole. Most fragments belong to large mammals, cattle and horse, and only one sheep/goat and one medium mammal bone were found. The elements recovered were mainly teeth with some tibia, scapula and humerus fragments. The fact that the assemblage contains only dense elements and mainly derives from older large mammals, makes it likely that it is biased and/or reworked. Furthermore, the small quantity of recovered bones and the fact that at least one bone showed signs of being waterlogged, it is likely that these bones eroded into the hole instead of being deliberately deposited as a result of human activity.

Waterhole 533018

The small assemblage from this waterhole is moderately to poorly preserved. The only to species identifiable bone is the part of a cattle scapula. The other fragments were either entirely unidentifiable or grouped as large or medium mammal. The elements recovered are: mainly vertebra with some being skull, scapula or tibia. They seem to represent a mixture of butchery waste (skull and vertebra) and food remains (scapula and tibia). The small quantity of bones suggests that they eroded in to the waterhole.

Waterhole 569022

A small amount of bone was recovered from the third deposit, consisting only of a cattle tooth and abraded metacarpal into void formed from the removal of an object. The sixth deposit was made into standing water, and a single abraded cattle phalange was seen in this context. Further deposits consist only of teeth; cattle and sheep in the fifteenth and horse in the sixteenth, probably all accumulated gradually as the waterhole silted up. There is little bone in general from this deposit, and probably all eroded from the surrounding ground surface or periodic inclusions, so limited interpretation is possible.

Field Boundary 559635

In the primary deposit a single unidentified fragment may have eroded in. Then, in the next fill more unidentified, large mammal long bone and horse femur were recovered, with a gnawed pig humerus and medium mammal long bone. Third in the sequence were medium mammal rib and long bones including a femur, and a cattle metapodial. All were abraded, probably erosion deposits and may be wide ranging in date; there is nothing to accurately indicate activities or husbandry.

Summary

The medieval assemblage is small and much appears to have been incidentally included as the features silted up. Four bones that may have originated from a single immature roe deer in pit 555777 may indicate deliberate deposition. They were not complete and may have been fully exploited for food; deer remains may have been buried to avoid detection of illicit hunting and consumption of venison. The assemblage as a whole was quite poorly preserved, with some in good condition, but little gnawing. Horse and cattle were most common, with smaller numbers of

sheep/goat, pig and roe deer, and this may have been due to bias from poor preservation favouring larger animals. Prior to deposition two of the horse bones had been marked during butchery, with possible skinning marks on a horse metatarsal and cuts from disarticulation of a horse femur; it is likely that horses were not eaten by humans at this date, but the skin would have been used and meat may have been fed to dogs. The horse remains, not necessarily from more than one individual, included the teeth from an individual aged 8-9 years and a canine tooth, indicating a male. None of the cattle or horse bones were unfused, and the one withers height that could be calculated was a middle-sized horse at 1418mm. The two pig elements recorded in full were a mandible and tooth, possibly from the same individual, aged as subadult, and this probably reflects the difference in husbandry practices between species, with pigs killed relatively young for their meat, and cattle kept to maturity to provide secondary products (milk, traction, manure, etc.), a typical pattern for this period. The assemblage is atypical in certain respects, for instance the low proportion of sheep, in a period where sheep farming for wool was popular, but is probably not representative due to preservation and small sample bias.

Other

Cattle burial 728003

A mainly complete Iron Age cattle skeleton was recovered from the main fill, with some unidentified large mammal fragments in the overlying backfill. It is in poor or very poor condition with a gnawed proximal ulna, presumably where this part of the carcass was exposed, and mineral (iron) accretion has contributed to the bone destruction. The only obviously missing parts were vertebrae, and these fragile parts may be destroyed during recovery and processing. Right side elements were less well represented, but phalanges were present indicating good recovery, so the missing parts may have been truncated or degraded after deposition. The remains were too fragmentary for sexing, but all bones were fused indicating this was a young adult (30-36 months using modern figures), with the lower third molar in light wear. Although well within the range of sizes given on ABMAP for Iron Age animals, it is slightly below average. Animal burials are fairly common in the Iron Age and their meaning has been much debated, ranging from the disposal of diseased animals to

sacrificial offering (Maltby 1985; Wait 1985; Hill 1995), and the location of this individual on an earlier field boundary may be significant.

Ditch 723001

The remains of a horse dated to the post-medieval period were recovered from this ditch, but it was not complete and the head and some other bones including the humerus were missing. It was in variable condition, but mostly well preserved on the surface at least, with some post depositional damage from trampling and crushing, which suggests it was not well covered after burial. Some lamination and staining suggests that the carcass may have been waterlogged for part of the time. The estimated size of this animal varied according to which bone elements were measured but generally fell into the fairly small category (1.4-1.5m at the shoulder). Slight exostosis on the right metacarpal may have been age related, but exact ageing was impossible due to the missing teeth, although all bones were fused. Interestingly, the right tibia was 24mm longer than the left (these two bones gave the upper and lower values for height respectively) and the possibility that more than one animal is represented was considered. However some bones do definitely articulate, and it may be that this was simply natural variation, or a response to an injury, which may also have caused the pathological changes in the right metacarpal.

Ditch 601120

The well preserved remains of a fairly small dog or fox (withers height of 423-453mm) were found in this boundary ditch with pottery of post-medieval and Roman date. No head bones were present but a range of the larger bone elements were found, with more left hind limb bones and more right fore limb bones. All bone elements were fused and this animal appears to have been mature when it died, with no illness that affected the remaining bones. It may be that this is a relatively recent inclusion of an animal killed as a livestock pest or for sport, with the head removed as a trophy or with the skin.

Treethrow 544104 (Sheila Hamilton-Dyer)

This feature contained the partial skeleton of a buzzard with no legs, vertebrae, skull or phalanges. The buzzard is always likely to have been common except for persecution and pesticide poisoning in the 19th and 20th century; it may have been perceived as a threat to poultry and to rabbits in warrens (Reid-Henry & Harrison

1988). This individual is quite large (example measurements: left humerus TL 108.1, left ulna TL 128.1, left radius 121.1) but is in the overlap area of males and females (Otto 1981).

Discussion and summary

Change over time

Taphonomic analysis showed that most assemblages are only small and biased towards larger and older animals. This makes it impossible to tell what the original species proportions or kill patterns were. Changes over time are thus likely to be obscured. Given below is the general pattern of husbandry and hunting seen in archaeozoologically investigated sites of the different periods. As most of the currently investigated database is biased by taphonomic processes, only broad comparisons were possible.

Neolithic

In the South, the earlier Neolithic economies were based on cattle, reflected in a proportion of 60-88% in the bone assemblages (Grigson 1982). Recent analysis of fat residues on pottery from Neolithic, Bronze Age and Iron Age sites in Britain revealed that cattle was probably used mainly for extracting dairy products (Copley *et al.* 2003). However, Entwistle & Grant (1989) state that, in analogy to modern pastoral societies, aspects of social and symbolic importance should not be underestimated. Due to environmental changes (regeneration of woodland), pig dominates (42-68%) the later Neolithic assemblages in the South (Grigson 1982). Sheep is rare on Neolithic Wessex sites (Coy 1982) and probably elsewhere as well. Goat does not seem to be present, although there are problems with its identification due to a close resemblance between early sheep and goats in general.

Although humans started to make an imprint on the landscape, wild animals did not necessarily experience more stress. At least, initially they would have benefited from the clearances in the wood and the greater amount of food concentrated in one place (fields and settlements). The many finds of red deer antler, both worked and unworked, and the largely absence of post-cranial skeletal elements, suggests that

shed antlers were collected instead of killing-off deer on a regular basis. Small quantities of roe deer are also found in the Neolithic assemblages (Grigson 1982).

The Neolithic assemblage from Heathrow Terminal 5 contained cattle, sheep/goat and pig bones, as well as some antler fragments indicating, although no worked pieces were found, the use of antler as a raw material. The absence of horse bones might be explained by the fact that they were only re-introduced in the Late Neolithic/Early Bronze Age.

Bronze Age

Generally cattle dominate again in the Bronze Age assemblages, although local variations are likely caused by local environment and local preferences. Cattle decrease in size and only in the Roman period they increase again (Coy 1982). During the Bronze Age, sheep became more important. Wild mammals decreased due to further deforestation and aurochs possibly goes extinct. However, antler from red deer is still used and wild boar and roe deer are still present among the bone material.

The presence of horse in Early Bronze Age pit 529306 in the Terminal 5 assemblage clearly underlines its reintroduction to Britain around this time. The assemblage is dominated by cattle although a few sheep bones and pieces of red deer antler were found as well. It seems that the age at death of cattle and sheep is lower in the Middle Bronze Age than in the Early Bronze Age. Mature sheep might be fairly large compared to sheep from other southern assemblages.

Iron Age

During the Late Iron Age the main livestock animal is sheep of which a high proportion is killed young, indicating a mixed economy based on milk, wool and meat. The proportion of cattle is still fairly high (30-45%) and, especially on high status sites, they are slaughtered young. Pigs are generally only present in small numbers, although at certain high status sites in the southeast they can reach 20-50%. Horse is only occasionally eaten and goats are not common (King 1991). The keeping of domestic fowl starts in the pre-Roman Iron Age with them mainly being raised for meat. Egg production becomes more important in the Late Iron Age (Benecke 1993). Wild is less exploited in the Iron Age although red and roe deer are occasionally found (Coy 1982).

Species encountered in the Iron Age assemblages from Terminal 5 include: horse, cattle, sheep/goat, pig, dog and red deer. The scarcity of domestic fowl in the pre-Roman Iron Age together with the mainly poor preservative conditions on the site explains the absence of chicken bones.

Romano-British period

Generally, the more Romanised a site became, the fewer sheep bones and the more pig bones are found in the assemblages. The proportion of domestic fowl rises, although age and sex analysis shows that they are still mainly kept for their meat (Benecke 1993). With the import and improvement of the existing stock, height at the withers of cattle, sheep and pig rises (Wild 1982). This is especially seen in bone assemblages from the highly Romanised Southeast. In the later period there is a drift towards higher cattle and pig percentages as well as more variation among domestic fowl bones.

The low proportion of pig in the Terminal 5 assemblage might be due rather to the poor preservative conditions that would affect young bones more, than lead to the conclusion that the site was less Romanised than average. The large range of size variation in cattle might point to imported or improved breeds mixed with local breeds rather than being the result of sexual dimorphism. As the Romans introduced donkeys, mules and hinnies and their osteological identification is very difficult, the remains are safely grouped as 'equid'.

Saxon

The post-Roman period and the subsequent Saxon period sees a return to pre-Roman Iron Age conditions with a higher percentage of sheep and a decline in pig bones. Small quantities of wild animals are still found in the animal bone assemblages. The period is further characterised by an increasing consumption of fish (King 1991).

The Terminal 5 assemblage of the Saxon period was characterised by large numbers of pig and horse and smaller proportions of sheep and cattle. As most horse bones were unfragmented and no butchery marks were seen, this species was probably not eaten. The high values for the height at the withers of sheep and horse might reflect the continued use of Romano-British improved stock.

Medieval period

The medieval period, especially towards the later period, sees a further specialisation of animal husbandry. For instance, Benecke (1993) shows, by comparing age and sex analyses, that different strategies in fowl keeping are recognisable (i.e. mainly meat, mainly egg and intermediate).

The range of species present in the medieval assemblage from Terminal 5 includes mainly horse and cattle with small proportions of roe deer, sheep/goat and pig. Although the assemblage might be biased towards larger animals, the small proportion of sheep in an otherwise thought wool-based economy, is striking.

Abstract

Although the assemblage is mainly biased towards larger and older animals, it largely fits in with the existing data for the various periods. In general, most bones derive from domesticated animals with only a small portion being from wild animals. The presence of small quantities of red and roe deer show their occasional importance as game and as a source of (shed) antler. Many features, especially the waterholes, seem to have been filled with small amounts of bone that eroded in from the surrounding area. Only after features came into disuse, they were filled up with (burnt) waste. Some unusual combinations of articulated bones in the earlier periods might indicate ritual behaviour.

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Heathrow Terminal 5 Animal Bone

[illegible]

Heathrow Terminal 5 Animal Bone

Element		Lateral		Medial		Dorsal		Ventral		Caudal		Cranial		Cervical		Thoracic		Lumbar		Sacral		Total					
		1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2				
Patella																							2				
Pelvis	1																						104				
Phalanx																							64				
Radius																							182				
Rib																							347				
Sacrum																							1				
Scapula																							191				
Sesamoid																							3				
Skull																							181				
Sternum																							5				
Tarsal																							6				
Tibia																							203				
Tibio-Fibula	1																						1				
Tooth																							1				
Tooth, unspecified																							2052				
Ulna																							37				
Unidentified																							14705				
Urostyle	1																						1				
Vertebra																							164				
Grand Total	6	23	24	5	1	2939	68	968	13	71	2	1	1	902	4144	2332	164	2	227	8	36	828	2	352	30	7806	20949

Table 2: All animal bone recorded in the overall database (raw unverified fragment counts made without recourse to reference collection and by several different individuals)

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