ANR Report 44/06

1286

Gorhambury Villa, Herts: The Animal Bones.

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Introduction

A total of 15,815 mammal bones were recovered from securely dated deposits of Iron Age, Roman and Medieval date. Bird, small mammmal and fish remains were also found, these were examined and have been made the subjects of separate reports (pp). The mammals, birds and small mammals were recorded using the method of Jones et al 1981, copies of the descriptive and metrical archives are held at the Ancient Monuments Laboratory. Sieving was carried out on most major deposits, based on a 10kg sample size, this facilitated the recovery of many of the birds, small mammals and fish which would otherwise largely have been missed.

The following species were identified; ox (Bos domestic), ovicaprid (Ovis domestic/Capra domestic), goat (Capra hircus), sheep (Ovis domestic), pig (Sus domestic), horse (Equus domestic), red deer (Cervus elaphus), roe deer (Capreolus capreolus), dog (Canis domestic), cat (Felis domestic), hare (Lepus sp.), and rabbit (Oryctolagus cuniculus).

Detailed tables (see pp) summarise the number of bones for each species in each layer, the table below summarises the number of bones in each phase.

	Iron Age	C1st	C2nd	C3rd/4th	Medieval	Total
ox	81	441	473	370	81	1462
ovicaprid	39	247	345	186	107	942
goat	–	1	10	–	2	13
sheep	–	–	–	–	1	1
pig	42	334	362	137	76	971
horse	18	42	82	74	61	279
lar (ox sized)	192	1474	1922	1205	281	5119
sar (ovic sized)	73	737	1044	407	189	2499
red deer	1	3	7	5	5	21
roe deer	–	4	4	1	–	9
dog	22	60	44	38	4	168
cat	–	–	–	1	–	1
hare	–	8	12	5	1	27
rabbit	–	2	–	–	–	2
unidentifiable	139	1382	1622	1017	292	4525
total	607	4735	5927	3446	1100	15815

The ovicaprid category has been used when sheep and goats cannot be separated. Goats were positively identified from horn cores and a single femur, and sheep from a horn core. The Boessneck (1969, 354) index for separating sheep and goat based on the relative proportions of the distal ends of the metapodials did not suggest any goats were present, so it is assumed that the large majority of ovicaprids are sheep. The lar (large artiodactyl) group could also include fragments of horse and red deer, although it is likely to be largely ox. The sar group (small artiodactyl) is mainly ovicaprid material, but could also include pig and roe deer. Loose teeth were included in the counts, which although if present in large numbers can be

potentially misleading do also give some indication of the degree of fragmentation. No ageing was attempted on loose teeth, only those teeth attached to some fragment of mandible.

To assess the relative proportions of the three main domestic animals in each period two methods of counting were employed. The 'Epiphyses only' method devised by Grant (1971, 377) and used on both the Fishbourne and the Portchester bone was compared with the relative percentages of the total number of fragments. Both methods were calculated including and excluding the lar category with ox and the sar category with ovicaprids.

Epiphyses only inc lar & sar

	IA	1st	2nd	3/4	Med
Ox	42%	45%	47%	65%	41%
Ovic	32%	34%	31%	23%	36%
Pig	26%	22%	22%	12%	22%

Epiphyses only exc lar & sar

	IA	1st	2nd	3/4	Med
	43%	48%	49%	70%	40%
	30%	28%	27%	20%	36%
	27%	24%	25%	13%	24%

Total no. inc lar & sar

	IA	1st	2nd	3/4	Med
Ox	47%	41%	41%	56%	45%
Ovic	30%	28%	27%	20%	36%
Pig	20%	20%	20%	12%	20%

Total no. exc lar & sar

	IA	1st	2nd	3/4	Med
	44%	43%	45%	62%	39%
	26%	25%	23%	18%	30%
	30%	32%	32%	20%	30%

These tables do suggest that there was a relative increase in the number of cattle kept in the third and fourth centuries, than in the preceeding periods. The table based on total numbers including lar and sar fragments supresses this increase, but the method based on counting epiphyses of limbs and mandibles retaining at least one tooth was employed to assess whether the increase in cattle was merely a factor of greater fragmentation on a large carcase. However it does appear that the proportion of cattle did increase in the late Roman period, largely at the expense of pig. It must be remembered that the quantity of material from the late Roman period is low, compared with that of the first and second centuries.

Spacial Distribution of Bone

The spacial distribution was examined to assess whether any selective dumps of particular bone types could be found. In the Iron Age deposits the quantity of bone was low and 62% of the bone was recovered from ditch deposits, notably 1281, 165, & 74. In ditch 1281 66% of the 155 bones from this feature were ox and lar fragments. In hut 1680 56% of the 98 bones from this feature belong to this category. This heavy fragmentation of ox resulting in a large number of non specific lar fragments is evidence of intensive butchery on a large carcase and subsequent fragmentation for marrow extraction, (see butchery section). Horse remains were (except for one bone) restricted to two Iron Age contexts, hut 1680 and ditch 1281, and part of a ?single dog were found in the fill of ditch 165.

During the first century the proportion of bone from ditches compared with other features decreases to 50%, the most prolific ditch being ditch 74 which produced 1456 bones. The position of this ditch immediately west and to the north of the first villa was conveniently accessible for rubbish disposal. Layer 77 of ditch 74 which contained 1144 bones had a relatively high quantity of pig (10%), largely composed of mandibles, maxillae and skull remains, the latter two areas are especially subject to

fragmentation. 78% of the bones from this layer were lar, sar and unidentifiable also indicating a high degree of fragmentation in this layer. Heavy fragmentation can also occur when bone is left on a surface and subjected to trampling and other destructive forces before being cleared into a pit, ditch etc. However one of the features of bone treated in this manner is a abraded, eroded surface which is not a feature of the Gorhambury bone. Similarly a high incidence of canid gnawing wouls suggest that bones may have initially remained unburied, so that dogs could easily scavange. However the incidence of ganwing from the whole site was low and there were no examples of large amounts of ghawing in any single deposit. It therefore appears more likely that that intensive use of the carcase, especially of the larger domestic mammals, ie ox has resulted in heavy fragmentation. Supporting this view the species that were not eaten eg horse and dog are little fragmented. In cesspit 622 layer 659 contained 468 bones of which 84% were unidentifiable fragments, since other layers in this feature also contained well preserved bird remains fragmentation was clearly not due to any post depositional forces. First century deposits are also typified by levels with small quantities of bone, out of 150 contexts containing bone 110 had 20 or less, and only 6 contexts had over 100 fragments. Small quantities of bone were recovered from levels within the masonry building, timber building and Building 723.

37% of the bone from the whole site came from second century deposits, 34% of which came from ditch levels, ditch 74 and 1281 are still being filled although part of 74 is now built over by part of the later villa,19% of the second century bone still came from ditch 74. In ditch 1481 some selective dumping was observed, in five layers 79 bones were assigned to the lar category with 9 from horse, no other species were identified. Small groups of bone were recovered from the two masonry villas. The granary robber trench contained 365 bones of which 70% were sar and unidentifiable, and a spread deposit (1028) contained 337 bones of which 80% were lar, sar and unidentifiable. The bone from the latter two contexts indicates a high degree of fragmentation. The robber trench also contained 25 bones from a single dog. Remains of deer though few do not seem to be restricted to any particular type of deposit.

In the third and fourth century occupation of the site only 2% of the bone came from ditches, ditches having largely been dug in the Iron Age and first century these had been filled by the end of the second century. Although there does not appear to be a difference overall in the species and type of bone recovered, there does appear to be a concentration of ox and lar fragments from the well deposits, 78% of all well material is ox and lar, eg in well 5 this totals 61 out of 62 fragments, in 544 31 out of 48 fragments, 1923 26 out of 28 fragments, in 917 24 out of 45 fragments, (20 are unidentifiable), also there was an absence of pig in well 917. These may represent specific dumps of material broken up for marrow extraction. The Industrial area (721) seems to have much more varied bone refuse, although 20 out of the 25 ovicaprid remains are loose teeth, similarly the hut deposits were more varied.

The medieval occupation of the site produced bone from various spreads of material often over roman levels, some 365 bones (not included in the table came from a plough pan layer which contained both medieval and roman bone, the latter where

underlying deposits had become mixed.

Butchery

Evidence of butchery has been recorded as those marks or breakage points caused by a specific instrument such as a chopper, knife or saw. The former two were most commmonly used in all periods. Fragmentation which does not show specific butchery marks may also be the result of rather crude butchery such as the smashing of bone for marrow extraction as previously discussed. However this section will concentrate on butchery with evidence of the instrument used. Since the majority of bone from this site is from Roman deposits most of the evidence of butchery is Roman also, the Iron Age and Medieval bone was insufficient to suggest any different techniques for dismembering carcases.

Ox; Only a few horn cores were present, and there was no evidence of the method of their removal from the skull, they may have been removed from the site so that the horn could be removed for horn working. Skull fragments tend to be very heavily fragmented, with a few examples of knifecuts, probably a result of skinning. On the mandible chopmarks were seen about the gonion, diastema and through the molar alveoli, (the latter may be a tertiary activity for marrow extraction), in the first and second century material. In one third/fourth century mandible knifecuts were seen across the diastema. In the separation of joints scapulae were mainly chopped across the neck and occasionally across the glenoid cavity (similarly to Exeter, Maltby 1979 and conversely to Brancaster, Wall et al in press). Humeri were chopped midshaft and across the distal articulation, the proximal ends of this bone do not survive well. Similarly radii are chopped midshaft and also across the proximal joint surface, ulnae (all first century) were chopped across the articulation, part of the same action chopping through the proximal radius. Butchered metacarpals were only found in Roman deposits and were chopped through the midshaft as were metatarsals, since metapodials bear little meat this is unlikely to be for joint preparation, and Maltby (1979, 39) has suggested the midshaft may be chopped for the extraction of marrow. Os coxae, largely from second century deposits were usually chopped through the acetabulum, and also through the ilium neck. The number of femora present is low, both in the ox and lar categories, the few butchered examples were chopped through the midshaft, and one second century example through the proximal joint surface associated with the chopping of the acetabulum of the pelvis. Similarly tibiae were scarce with a few examples of proximal and midshaft chopping. The tibiae from Exeter (Ibid) were very fragmentary, perhaps the tibiae and femora from Gorhambury were so fractured for marrow removal that their remains are classified within the lar long bone fragment category. The few examples of butchered calcanea and astragalii represent the limits of the meat bearing area of the hind limb. Many rib fragments were cut by knives, a result of cutting along the flanks of the animal. Phalanges were mainly whole with only two examples of knifecuts, these bones have little meat value.

Butchery on ovicaprids tended to be less intense than on ox since a much smaller carcase was involved, however skulls still tend to be fragmented, and one skull shows where the horns have been chopped away. One second century goat horncore was chopped above the junction with the skull and also showed knifecuts in this

area, one ovicaprid horncore fragment was chopped from the skull. Mandibles were fairly complete showing little indication of butchery and seem to have been regarded as waste material. The few examples of scapula and humerus butchery could be evidence that these two bones formed a single meat joint, although some examples of chopmarks across the midshaft of the humerus could suggest some preference for a smaller joint. Radii are mainly chopped across the midshaft (in one second century example sawn), with one instance of knifecuts across the proximal joint surface. No butchery was recorded on metacarpals except for one sar fragment chopped across the midshaft. Regarding the hind limb ox coxae are sometimes chopped through the acetabulum and occasionally through the ilium neck and the femur through the midshaft (as was the only goat femur identified in second century deposits) and one second century example has knifecuts in this area. Tibiae tend to be broken/chopped across the midshaft area, the most common parts of the tibiae to be found are the joined shaft and distal area which apart from being more robust than the proximal end since the distal epiphysis fuses earlier, may also represent the waste end of the limb, leg joints commonly being cut off at the mid area of the tibia as suggested at Exeter (Ibid 53). Metatarsals showed more evidence of ?butchery than metacarpals, three were chopped across the midshaft, one with knifecuts at the midshaft and another with knifecuts at the proximal end. These marks may be more closely associated with bone working than butchery since two first century and one second century metatarsals were perforated at the proximal end, possibly the preliminary stages of bone working as was one midshaft section which had been slightly shaved and polished. Phalanges were invariably complete. As with ox rib fragments ovicaprid ribs often showed knifecuts indicating cutting along the flanks. Vertebrae were chopped both medio-laterally and also in a saggital/axial direction probably in the preparation of chops.

Pig butchery included skull fragments that had been chopped and another cut with a knife. One first century atlas had been chopped and cut with a knife.But only one mandible had been chopped, this was located at the diastema. Most butchery of scapulae was across the neck where chop marks were sometimes practised repeatedly, and one set of knifecuts was found. One first century scapula was chopped across the glenoid cavity, and a second century scapula had repeated knife cuts in this area. Humeri were mostly chopped across the midshaft, and less frequently at the distal joint surface. Similarly the radius was most often chopped across the midshaft and occasionally across the proximal joint surface, allied with three second century examples of ulna chopped across the articulation. Regarding the hind limb, examples of butchered os coxae and femora are few, although many of these bones are fragmented, chop marks and knifecuts were seen about the ischium of the pelvis. The femur showed showed a few chop marks across the midshaft and at the proximal joint surface, knifecuts were seen at the distal joint surface and across the midshaft. All tibia butchery seems to take place on the shaft mostly as chop marks and occasionally as knifecuts. One second century tibia shaft was sawn through. Two second century astragali were chopped, one in the mid area and the other at the distal area. The numerous metapodials recovered did not show any evidence of butchery.

Although it does not appear that horse was eaten in any period both a first century and medieval tibia had a knifecut on the

shaft, and an Iron Age metatarsal shaft had been perforated, the former may be the result of skinning and the latter preliminary bone working.

A red deer scapula had been chopped across the neck (first century), a medieval metacarpal chopped across the shaft, and both roman and medieval antlers chopped and sawn. A roe deer medieval humerus was chopped across the shaft, and an antler chopped at the cranial end. A hare femur (second century) had been cut by a knife at the proximal end, this could also have occured at the table rather than as preliminary butchery.

Knifecuts were seen on the midshaft of the tibia of dog in both second century and medieval deposits. Since dogs do not have a lot of flesh covering the bone at this point this could be a skinning mark.

Ageing

Of the two methods using for ageing domestic mammals, tooth eruption and wear, and epiphyseal fusion of long bones the former method is the more reliable. Of the data and methods for tooth eruption for ox, ovicaprid and pig the method devised by Grant (1975) is probably the most detailed but also requires a fair degree of completeness in the mandible, this method in conjunction with the stages devised by Maltby (1979) was used.

Ox; a total of 96 ox mandibles had any ageing information, at the lowest level this was represented by a single tooth in a mandible fragment. 6 were Iron Age, 27 were 1st century, 33 were 2nd century, 18 were 3rd/4th century, and 12 were medieval. The following table indicates the mandibles assigned to Maltby's stages:

Stage	1	2	3	4	5	6
IA	–	1	1	–	–	2
1st	–	4	–	–	8	10
2nd	–	5	–	4	9	14
3rd/4th	–	1	–	1	3	8
Med.	2	1	2	1	3	2

Although numbers are low apart from the 1st and second century deposits it appears the the majority of cattle attained at least stage 5 and often 6 during the Roman period, (these represent all columns of the third molar in wear, and the fourth premolar in wear respectively). The small quantity of ageable material from the late Roman period did not permit any speculation as to a change in the slaugtering pattern allied with the relative increase in cattle previously suggested. The most diverse ageing is seen in the medieval mandibles, but again the quantity is too small to be reliable. Regarding the use of the Grant ageing system the following results were obtained;

IA: 39e 42
1st: 39 39 43 44 45 46 46 46e
2nd: 38 38e 39 43 44 45 45 46 46e 48e 50 51
3/4: 36 36e 37 45 45 45 49
Med: 45 45e 46

These values are achieved by adding up the tooth scores, e means the value has been estimated owing to an absent tooth. Grant has suggested that values of around 40 may be from an animal aged 3.5 to 4 years (Grant 1975, 395) of which the great majority of specimens from Gorhambury are equal to, or greater than this value. A study of the epihpyseal fusion, which is not discussed in detail here, as it is a less reliable method, also supports the view that the majority of cattle in the Iron Age at Gorhambury were mature animals, the actual age attributed to them cannot be precise, but their primary functions were of breeding, traction and milk, with the quality of meat as a secondary consideration. Three mandibles (two 1st century, and one 3rd/4th) had the third pillar of the third molar missing, this a genetic anomaly.

Ovicaprid; (it is likely that these are mainly sheep), the mandibles were generally less fragmented than ox, providing more detailed information about their age structure. These mandibles were examined in the same manner as ox and the following quantities were available; 8 Iron Age, 46 1st century, 44 2nd century, 10 3rd/4th century, and 13 medieval. Using the Maltby stages the following results were found (the stage achieved should be regarded as a minimum since not all mandibles were complete).

Stage	1	2	3	4	
IA	4	–	2	2	(75%)
1st	11	2	13	8	(76%)
2nd	6	4	12	15	(59%)
3rd	1	1	2	2	(67%)
Med	2	1	–	5	(60%)

The bracketed percentages represent the proportion of ovicaprid jaws that did not achieve stage 4 or later (stage 4 is all columns of the third molar in wear). Maltby has suggested (Ibid 42), that stages 2 and 3 represent animals of approximately 15 to 26 months. Although the low numbers must be treated with caution the slaughter of ovicaprids took place at both stages 2 and 3 and particularly in the fist century at stage 1. Stage 1 concerns the eruption and wear of the first molar (for which a rough guide can be ascertained from Silver's (1969, 297) figures of 6 months for semi wild hill sheep). This implies a greater exploitation of sheep than cattle for meat, and Maltby has suggested that the slaughter of non breeding stock between stages 2 and 3 could have already provided at least one fleece. (Ibid, 43). The Grant system tended to highlight the older animals, mainly due to the author's own selectivity regarding which specimens were recorded by this method, however it does give a guide to the wear stages of the older animals as can be seen below.

IA: 21e 34e 39
1st: 32 35 36e 39 39 39 41
2nd: 34e 35 35 36 37 39 39 39 40 41 42 44
3/4: 42 47
Med: 39 43 44 44

The ages suggested by Grant for these values include; 21-24 = 1.5-2.5 years, 31-32 = 3-3.5 years, and the oldest animals of values 45 & 47+ may be 7-8 years. (Grant 1975, 397). It would seem that as at Exeter and Portchester flocks of mature breeding

stock were maintained with a few aged individuals, while a proportion of 'fat lambs' and older juveniles were culled. The evidence from epiphyseal fusion does not dispute this interpretation.

Pig mandibles were aged in a similar manner, 7 Iron Age, 33 1st century, 37 2nd century, 10 3rd/4th century and 10 medieval mandibles had teeth remaining in them. The following table shows Maltby's stages as applied to pig.

Stage	1	2	3	4	5	6	
IA	–	1	–	1	2	2	(70%)
1st	–	4	3	7	3	14	(55%)
2nd	4	5	2	8	–	14	(56%)
3/4	1	–	–	1	3	4	(56%)
Med	–	2	–	7	–	6	(60%)

The percentages represent the proportion that did not achieve stage 6, because of the low figures only the 1st and 2nd centuries may have any validity, the remainder being included for completeness. However well over half the pigs were slaughtered before all columns of the third molar were in wear, with the possibility that a greater proportion of mandibles without the first permanent molar in the 2nd century. A tentative age for this group using Silver (1969, 299) could be less than 6 months, or using the 18th century data under 1 year and suggests a preference for piglet at this time. The high fecundity rate of pig, an animal whose main uses are breeding and meat means that a more variable age structure is usually found than for cattle and ovicaprids. The Grant age system was used but again was biased towards the older animals by the authors selection, so it has been ommitted. The excessive wear on one 1st century mandible gave a Grant value of 47+, such variable wear is a consequence of the pig's omniverous habits and the animal is likely to have been a great deal younger the this value would suggest. From the measurement of the third molar it would appear that all the pigs in all periods at Gorhambury were within the domestic size range. Epiphyseal fusion confirmed a wider age range for pig than cattle and ovicaprids, but as it does not add any further information than that gained from the mandibles it has not been discussed here.

All the horse remains were from adult animals, as previously mentioned there is no evidence that horse was eaten, these are likely to have all been working animals, either for riding or traction. A horse's working life can begin at three to four years and with care sometimes continue until they are in their twenties.

Similarly the dog remains all suggested adult animals, except for a single mandible from the 3rd/4th centuries in which the third and fourth premolars had not erupted, which takes place at 5–6 months (Silver 1969, 299). These may have been household dogs or working animals, their size is discussed in the next section.

Size and Sex Determination.

A number of measurements of complete bones permitted the estimation of the shoulder height of some domestic species. The following ranges were found;

Ox; (using Fock 1966, and Matolsci 1970)

1A	107.5 cms	n = 1
1st	110.1 - 121.7 cms	n = 2
2nd	107.3 - 123.0 cms	n = 4
3/4	104.3 - 114.4 cms	n = 3
Med	123.0	n = 1

The size of cattle compared with those from Gadebridge (Harcourt 1974, 257) suggests that the Gorhambury roman specimens show a smaller range (Gadebridge = 115 - 136 cms, n = 6). Magiovinium, a roman road site settlement close to Gorhambury (Locker in press), showed a withers height range for cattle of 107.1 - 140.0 cm, (n = 46), the Gorhambury examples fit within the lower range of this larger sample. More measurements were available for the distal width of the tibia however. The Gorhambury tibiae compare well with both Magiovinium (Locker in press) and Portchester (Grant 1975, 399) although the Exeter cattle are slightly smaller than those from the other three sites. Two indices can be used for sexing metacarpals;

$$\frac{\text{the distal length}}{\text{length}} \times 100 \qquad \frac{\text{min. transverse diaphyseal breadth}}{\text{length}} \times 100$$

as shown by Grant (1975, 399), unfortunately there were too few complete metacarpals from Gorhambury fro this technique to be of any real use. Of the five specimens available it appeared that one small female and one male were present in the first century, one male and one castrate in the second century, and one ?castrate/female in the 3rd//4th group, but this small sample does not provide any information as to possible herd structures.

Gorhambury range	50.5 - 68.7 mm	n = 20
Portchester	50.0 - 69.0 mm	n = 143
Magiovinium	50.8 - 71.5 mm	n = 19
Exeter	48.7 - 65.1 mm	n = 20

Ovicaprid; (using Teichart 1975)

1st	59.0 cms	n = 1
2nd	56.8 - 62.9 cms	n = 4
3/4	61.3 cms	n = 1
Med	56.1 - 63.8 cms	n = 5

All the estimates of ovicaprid withers heights are based on metapodials except for one radius which is within the metapodial range. Comparison with the withers height of the sheep from Gadebridge (60.9 - 64.9 cms n = 9, estimated from Harcourt's total lengths (1974, 258)) and those from Magiovinium (Locker in press) calculated at 57.2 - 69.4 cms, the Gorhambury specimens have a lower bottom range than the other two, but a similar upper range to Gadebridge, and a lower upper range than Magiovinium. It is possible that the nature of the site at Magiovinium, a road side settlement could lead to the maintenance of stock of more diverse form than that of the villa sites, where more rigorous farm practices would ensure the maintainence of animals of similar conformation (or ?breed).

Horse; (using Kieswalter In von den Driesch & Boessneck 1974).

1A	118.3 - 131.7 cms	n = 3	(approx 11 to 13hh)
1st	134.7 cms	n = 1	(" 13hh)
2nd	127.6 - 145.6 cms	n = 4	(" 12 to 14hh)

3/4 129.5 - 155.4 cms n = 2 (.. 13 to 15hh)
Med 125.5 - 138.2 cms n = 4 (.. 12 to 14hh)

The approximate conversion to hands high shows that apart from the upper range of the 3rd/4th centuries most horses were of small to large pony size. A withers height of 15 hands is considered to be a small horse. As previously mentioned these were adult, probably working animals, and compare well in size with those from Magiovinium (Locker in press), for which the metapodials suggested a size of 12 to just under 15hh (n = 25). The few horse bones from Gadebridge (Harcourt 1974, 259) were also from ponies of 13 - 14hh.

Dog, (using Harcourt 1974)
1st 36.8 cms n = 1
2nd 37.5 cms n = 1
3\4 54.7 cms n = 1
(other dog remains for whom the shoulder height could be estimated came from poorly dated contexts.) The dog was represented by a variety of forms during the roman period, as shown by Harcourt 1974, from very small lap dogs to large hunting of guard dog types. The size range from Gorhambury is not remarkable in this respect.

Hunting

Neither red deer nor roe deer are present in large quantities, but would have provided both sport, possibly hunted on horse back and using dogs, and welcome variety in the diet, their antlers would have provided a useful raw material for bone working. Hares could have been trapped or hunted. The two rabbit bones in a first century deposit are likely to be intrusive.

Pathology

The incidence of pathology was low. For ox malocclusion was observed on the fourth premolar and first molar of a 1st century mandible, and on the third molar of two 2nd century mandibles. Antemortem loss of the 2nd premolar was seen on a 1st century mandible. Exostoses were seen on two 1st century metatarsals, one on the distal joint surface, and one on the midshaft lateral surface. These conditions might be attributable to some sort of stress from traction. Exostoses were also observed on two first phalanges, of first century date, both over the shaft area.

Ovicaprids showed less incidence of pathology, and are probably less prone to post cranial pathology since they are not used for any work. One first century mandible showed swelling around the alveoli of the first molar, the result of infection, and ossified tendons were seen on a 3rd/4th century tibia.

Pig pathology was restricted to the jaws and feet. A 2nd century mandible had caries in the second molar, and one third century mandible showed the antemortem loss of the 1st molar with associated pathology in the mandible. One 2nd century metapodial showed evidence of a fracture, and a 3rd/4th metapodial had exostoses on the shaft.

A 2nd century horse metatarsal was fused at proximal end with the tarsal bones, a relatively common condition in both cattle and horse, called 'spavin' and may be related to stress in work. A

3rd/4th metatarsal had exostoses developing across the proximal joint surface.

In the 3rd/4th century a dog mandible showed antemortem loss of the fourth premolar, and exostoses over the distal joint surface of a humerus.

Conclusions

Analysis of the animal bones from the villa site at Gorhambury has shown the economic development of an Iron Age farmstead into a villa economy in which cattle were always the most important stock, and have been shown to increase in relative importance in the 3rd/4th centuries, despite a smaller quantity of material being available from thia later phase. Similarly some specific dumpings of bone were noted in this period, compared to the more random disposal in the first two centuries. In his survey of Roman sites in Britain King (1978, 211) has shown that it is common for sheep to decline at the expense of ox and pig in the late Roman period. But in his view the native sites tend to favour sheep more. However at Gorhambury in the limited material available from the Iron Age both methods used to assess the importance of cattle, sheep and pig favour cattle. The suitability of the landscape for cattle may have outweighed the traditional trends. During the roman period the town of Verulanium may have have provided an important outlet for surplus stock, there is however no evidence on site for the export of prepared joints from the villa, any sales may have concerned live animals. Wooded areas around the villa would have been useful both for hunting and providing pannage for pigs. The bone from the medieval period indicates the continuence of occupation over the site, with no observable changes from the earlier material.

I should like to thank Mr R T Jones (Ancient Monuments Laboratory) for processing the computerised data.

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