AML REPORT 4927

1607

FAUNAL REMAINS UNIT
DEPARTMENT OF ARCHAEOLOGY
UNIVERSITY OF SOUTHAMPTON

30.4.85

ANIMAL BONES FROM FOUR LATE BRONZE AGE SITES ON THE MARLBOROGH DOWNS, WILTSHIRE

J.M. MALTBY

ANIMAL BONES FROM FOUR LATE BRONZE AGE SITES ON THE MARLBOROUGH DOWNS, WILTSHIRE

Introduction

Animal bone samples from the following four sites, all of which were excavated between 1976 and 1980 by C. Gingell of the Trust for Wessex Archaeology, are considered in this report.

1. Bishop Cannings Down, near Devizes. Excavations revealed an unenclosed Late Bronze Age occupation site with at least two round houses. Most of the archaeological material was found in ploughsoil above the occupation surface and can be regarded as occupation or abandonment debris from the settlement.
2. Dean Bottom. Apart from an earlier Beaker pit, the pottery on this settlement can be dated to c.10th-8th centuries b.c., slightly later than the abandonment of Bishop Cannings Down The 1979 excavations uncovered a house terrace, which formed part of an enclosed settlement associated with a well defined field system. Most of the animal bones were again obtained from the abandonment surface and the topsoil above it.
3. Rockley Down. This was a similar enclosure in character and date to that at Dean Bottom. The excavation placed a section through the enclosure ditch and uncovered part of the occupation area.
4. Burderop Down. This larger, open settlement was also of Late Bronze Age date but may have been abandoned slightly later than the other three settlements. Once again the majority of the faunal material was associated with layers of topsoil above the abandoned surface of the settlement. Relatively few bones came from below-ground features. An exception was the Late Bronze Age recut of an Early Bronze Age disc barrow ditch, which was examined during the excavations.

These samples represent a rare opportunity to compare contemporary prehistoric assemblages excavated by similar methods in a relatively small area. Air photography in this area of the Wessex chalklands has revealed a dense system of enclosures on relatively high ground. The settlements were all situated at 650-700 feet. They were associated with field systems which faded out at c.750 feet leaving the tops of the ridges of the downlands free of fields but suitable for sheep pasture. Below, the field systems stopped at c.600 feet in the lower reaches of the coombes. The land below was probably used for pasture and was more accessible to water. There appears to have been extensive abandonment of arable cultivation of this high ground after 800 b.c. Therefore these assemblages represent an opportunity to examine the pastoral economy of a section of the Wessex chalklands in the period prior to the slightly better known Iron Age pattern of development in the area.

BISHOP CANNINGS DOWN

9,056 animal bone fragments were recorded from the excavations. The assemblages were subdivided into four main groups; layers 1-3 were successive 5 cm spits of ploughsoil above the features which consisted mainly of small postholes. The bones from all these small features were amalgamated for the purposes of this report.

Layers 1-3 each contained over 2,000 fragments (Table 1). The densities of these bones per cubic metre were plotted across the site and the results mirrored the results obtained for other categories of finds. 1,487 fragments were recorded from the various features including 28 articulated bones of a sheep/goat in layer 138. Expressing the number of fragments of the major identified species as percentages, cattle fragments were the most common in each of layers 1-3 (59-69%) but ranked second (41%) behind sheep/goat (54%) in the features. Overall, cattle fragments contributed 61% of the sample of the major identified species (Table 2). Sheep/goat (36% overall) was the only other species represented in any numbers. Pig (2%) was poorly represented and none of the other species contributed over 1% of the sample.

On all four sites in this report, unidentifiable fragments were classified where possible into large mammal (cattle, horse or red deer) or sheep-sized mammal (sheep, goat, pig, dog, roe deer) categories. In all cases the vast majority of such fragments would have belonged to cattle and sheep respectively, since they dominated the identifiable fraction of the assemblage. At Bishop Cannings Down, large mammal fragments outnumbered sheep-sized fragments in all of the subdivisions, although the latter were better represented in the features rather than in the spits of ploughsoil. This contrast was similar to the variations in the cattle and sheep/goat assemblages discussed above. Overall, large mammal fragments made up 53% of the unidentified categories, compared to 26% for sheep-sized mammal. The remaining 21% consisted of small unidentifiable mammal fragments which could not be assigned to either of the above categories (Table 2). Overall, 77% of the assemblage could not be identified to species, indicative of the poor preservation and high fragmentation of the assemblage.

Cattle

1,272 fragments were identified. The types of skeletal element making up that assemblage in each of the major subdivisions of the site are set out in Table 3. Loose teeth were easily the most common element represented. These are the densest elements of the skeleton and high numbers of loose teeth are indicative of the poor survival of other elements. Overall, 52% of the assemblage consisted of loose teeth, the figure ranging only between 48-55% in the various divisions. Apart from loose teeth, only mandible fragments (10%) survived in any numbers, indicating the good, albeit fragmentary survival of such bones.

Another indication of how well an assemblage has been preserved is its degree of fragmentation. For this and other samples in this report the following method of fragmentation analysis was carried out. Each fragment was recorded in one of five categories (complete, .75 of a bone, .50 of a bone, .25 of a bone, <.25 of a bone). The numbers recorded in each size category for the major large bones of cattle (mandible, scapula, humerus, radius, femur, tibia, and metapodials) are shown in Table 4. These large bones were chosen to obtain an assessment of how fragmented the sample was. For each layer an index of fragmentation was calculated as follows. Each complete bone was scored as 1.0, 3/4 bones scored .75 and so on. Those recorded as <.25 of a bone was scored at .10, which was considered to be a fair indication of the average size of such fragments. The index of fragmentation was obtained by dividing the total score by the total number of fragments of the selected bones. The index can therefore be considered as an indicator of the mean size of these bones in the samples. At Bishop Cannings Down the cattle aseemblage was indeed found to be very fragmented with an overall Index of Fragmentation of only .14 (minimum possible would be .10 in this analysis). Only in the features did the Index rise to over .20. The results taken in conjunction with the presence of large numbers of fragmentary unidentified large mammal fragments confirm the high degree of fragmentation of cattle bones.

Excluding loose teeth from the totals, 6% of the cattle fragments bore evidence of carnivore gnawing (presumably by dogs). The poor preservation of the sample can be attributed to this and particularly to subsequent trampling, weathering and plough disturbance.

Such poor preservation restricted the range of analyses possible on the sample. The most reliable means of ageing the animals represented is by the study of the toothwear and eruption of the mandibular cheek teeth. However, only two cattle mandibles produced such evidence. Loose teeth were found in abundance but ageing analysis of these has several handicaps. One problem is that there could have been a bias in the retrieval of such small elements, although to judge by the vast numbers of small fragments of tooth and bone recovered from all these sites, the standard of retrieval was very good. A second difficulty is that it is hard to distinguish between the first and second molars in many instances and this hinders the overall interpretation of the mortality pattern. However, it was possible to perform an analysis of the toothwear of the deciduous lower fourth premolar (d4) and the lower third molar (M3). The former tooth erupts in the prenatal skeleton or soon after birth and is not shed until at least three years of age . The M3 does not erupt in most breeds of cattle until at least two years of age and this may be later in some breeds (for discussion of cattle tooth eruption ages see Grigson 1982). Comparison of the numbers of these teeth therefore will give some indication of the age structure of the cattle represented on the site. Table 5 shows the number of these teeth in wear, just in wear or unworn. 13 of the 27 d4s at Bishop Cannings Down were unworn and another four were only just in wear. Only 15 M3s were recorded of which 13 were worn. Such a high proportion of d4s in an early stage of development indicates that there was a high mortality of young

calves. Some of the teeth were complete enough to record the wear stage using the system devised by Grant (1975). Most of the d4s in wear bore relatively light wear on them (stage f or less - Table 5). Similar analysis on the M3s showed that most of them were at wear stage g but few showed heavy wear, indicating that few very old animals were represented.

Other skeletal elements of calves are likely to have been particularly susceptible to destruction by the poor preservation conditions because of their porosity and fragility. However, the presence of a large proportion of calves at Bishop Cannings Down is supported by the recording of 48 porous bones of cattle in the deposits. Excluding loose teeth, this figure represents 8% of the cattle assemblage. It is significant too that the frequency of porous bones increased in the lower spits of ploughsoil and they provided 29% of the cattle sqample in the features, which preserved such bones better.

Sheep/Goat
---

750 fragments were recovered. Using the identification criteria employed by Boessneck et al. (1964), 41 of these could definitely be assigned to sheep, whereas no goat bones were identified (Table 1). All 17 d4s could be assigned to sheep using Payne's (pers. comm.) criteria for differentiation.

The types of element represented in the sheep/goat sample are shown in Table 6. In each of layers 1-3 loose teeth contributed over 50% of the fragments showing that the sheep/goat sample was also poorly preserved. Apart from loose teeth, only the mandible, radius, tibia and metapodia were commonly represented. This reflects the sturdy nature of the shafts of these bones and they are usually the best represented of sheep/goat bones in archaeological samples. The more fragile elements such as the scapula, os coxae, femur, phalanges and vertebrae were poorly represented.

Several groups of articulated bones were discovered in layer 138. The largest group consisted of some of the ribs, thoracic vertebrae, cervical vertebrae and sternebrae of one animal. The remains were quite fragmentary and other fragments could have belonged to the same animal. The vertebral epiphyses were just fusing. A scapula and a pair of humeri of an adult sheep were discovered in the same layer. Finally, four carpals of a sheep/goat were found together in the same layer. It is possible that all these bones belonged to the same animal. Apart from these bones, there is some evidence that the sheep/goat assemblage was better preserved in the features. Loose teeth only contributed 32% of the fragments (excluding articulated bones). Analysis of the fragmentation of the major bones also revealed a slight increase in the average size of fragments in the features (Table 4), although in all deposits the Index of Fragmentation stood at a low .24. 30 (8%) of the sheep/goat bones were recorded as gnawed. Scavenging added to substantial attrition due to other post-depositional factors resulted in the poor preservation of the assemblage.

Analysis of the ageing data (Table 5) revealed that sheep of all ages were present. Fewer neonatal animals were represented than in the cattle sample (although 7% of the sheep/goat bones were porous. Most d4s were worn and most had attained wear stages between f-h, representing animals killed in their first, second and probably third years. M3s outnumbered d4s and most of these were at stage d of the wear sequence or higher and belonged to animals over three years of age and substantially older in most cases.

Other Species

The poor representation of pig is remarkable and its low numbers cannot be attributed to preservation conditions alone. Horse and dog were also poorly represented in comparison to Iron Age assemblages in the Wessex chalklands (Maltby 1981: 184; Grant 1984). Other species recovered in small numbers were red deer (Cervus elaphus), roe deer (Capreolus capreolus), hare (Lepus sp.), badger (Meles meles), pine marten (Martes martes), frog/toad, a species of thrush (Turdus sp.) and rook/crow (Corvus frugilegus/corone corone). The three rabbit bones and probably the mole bone were later intrusions into the assemblage (Table 1).

Unidentified Categories

The types of element represented in the large mammal and sheep-sized mammal categories are shown in Table 7. Once again, the more fragile elements (skull, vertebrae, ribs) were greatly outnumbered by other small unidentifiable but denser fragments. The more fragile elements did, however, increase slightly in relative abundance in the assemblages from the features, supporting the previous observations that the samples from the features were better preserved.

DEAN BOTTOM

13,654 Fragments were recorded from the site. 546 of these were recovered from the Beaker pit. Apart from this feature (F23) the bones from the 1977-1978 excavations were not recorded because of heavy plough disturbance. The relatively few bones from trenches B-C of the 1979 excavations were also excluded apart from those of the dog skeleton (F2).

The Beaker Pit

This storage pit (dated to c.1750 b.c.) produced a well preserved assemblage. Although unidentifiable categories (69%) outnumbered the bones identified to the major species (Table 8), the more fragile ribs and vertebrae fragments formed a much higher proportion of the large mammal and sheep-sized mammal groups than in other deposits from the site. Loose teeth provided a much lower percentage of both the cattle and sheep/goat assemblages (Table 9), suggesting that a more representative sample of their skeletons had survived. Another indication of good preservation was the fact that 230 fragments were ivoried in texture. Most of the fragments were noticeably less weathered than other samples under investigation and only 11 records of canid gnawing (8%) were made. 17 bones bore evidence of butchery marks, mostly knife cuts, and 28 fragments were charred.

It is hazardous to speculate about meat diet or animal husbandry from a relatively small sample derived from one deposit, despite its good preservation. The absence of horse and the rare appearance of pig bones are, however, worthy of note. Ageing evidence was limited but the sheep/goat sample included 25 porous bones and belonged to very young animals. It may imply that there was a high rate of neonatal mortalities, either through natural causes or by deliberate culling. In either case it would indicate that lambing took place in the vicinity, as would be expected from the location of the settlement. Seven of the cattle bones were also porous but the number of teeth and mandibles was too small for any detailed analysis of mortality patterns. The few measureable bones indicated that some of the adult sheep were larger than the late Bronze Age specimens recovered from the four sites under study.

The Late Bronze Age Deposits

The animal bones were subdivided into the following groups for analysis:-

Layer 1 - ploughsoil.
Layer 1B - lower ploughsoil/topsoil.
Layers 2-3 - loam above the settlement surface.
Layer 33 - abandonment surface to the north of the terrace.
Feature 5, Layers 35 + 37 - upper metalling and silt beneath it on the south of the terrace.
Feature 5, Layers 44-52 - lower metalling and silts.
Feature 6 - calf burial beneath structure.

Feature 2, Layer 39 - dog burial in a scoop of chalk.
Other layers - (Layers 34, 36, 38-43).

Including the bones from the burials, 13,108 fragments were recorded. Layers 1, 1B, 2-3 and 33 all produced over 1,000 fragments (Table 10). Most of the assemblage was poorly preserved and severely fragmented. However, considering the small volume of earth excavated, the density of bones was quite high. In general, the density of fragments was higher on the north side of the terrace than to the south of the structure above and in the upper layers of Feature 5. This confirmed the observations of the animal bone distribution made during excavation.

Sheep/goat fragments were the most common of the identified species in all layers (48-65% mean = 59%). Cattle ranged from 27-40% (mean 34%). Pig (4%), horse (1%) and dog (1%) were poorly represented. Cattle fragments were slightly better represented in layer 33 and Feature 5 than the layers of loam and ploughsoil above them (Table 11). Overall, unidentifiable fragments formed 75% of the assemblage (range 72-82%). Sheep-sized fragments were more common than those of cattle in all layers apart from layer 1.

Cattle

The calf burial (Feature 6) was carefully excavated from beneath the structure. 99 cattle bones were recorded from it. Virtually all the limb bones were recovered, as were the majority of ribs, thoracic, lumbar and sacral vertebrae. However, the skull and cervical vertebrae were not recovered. An atlas and skull fragments in an adjacent layer, however, probably belonged to this animal. All epiphyses were unfused and the bones were porous. Two mandibles were recovered but the toothwear on them indicated that they belonged to different animals. The first had slight wear on the d4 (Grant stage b) and the first molar (M1) was just erupting. The second mandible had rather more wear on the d4 (Grant stage f). The former more complete specimen is more likely to have belonged to this burial. It is likely to have been at most six months of age at death (Grigson 1982).

The types of cattle fragments recovered from the rest of the Late Bronze Age levels are summarised in Table 12. 43% of the 1,084 fragments were loose teeth, indicating the fragmented and poorly preserved nature of the assemblage. The percentages of loose teeth were higher in layers 1, 1B and 2, which generally preserved the cattle assemblage less well than the other deposits. The high degree of fragmentation is indicated in Table 13. The overall Index of Fragmentation was a low .15, although larger cattle fragments survived in slightly greater numbers in layer 33 and the lower layers of Feature 5. Small bones such as the carpals, tarsals and phalanges survived more commonly in a more complete state, although many of these too had been fragmented either by carnivore scavenging, trampling, weathering and plough damage. 70 cattle bones (11% of the assemblage excluding teeth) were recorded as gnawed, a high percentage considering its highly fragmented nature.

Although the preservation conditions were unfavourable for the survival of fragile bones, the cattle assemblage nevertheless contained a relatively high proportion of the teeth and bones of calves. Apart from the two mandibles in Feature 6, 12 mandibles bore some evidence of toothwear. Six had completed the tooth eruption sequence (P4 in wear), whereas three had only slight wear on the d4 and the M1 unerupted (calves of under 6 months). Another specimen had the M1 just in wear (probably belonging to an animal of about one year old). Among the loose teeth, the toothwear of 32 d4s was recorded and half of these were either unworn or just in wear (Table 14). All of these would have belonged to animals under six months of age. Of the 16 in wear, nine were complete enough to record the toothwear stage. At least three of these would also have belonged to animals that died under a year old. Despite their greater fragility and smaller size, d4s outnumbered M3s, although the high fragmentation of loose teeth may have precluded the identification on many M3s. There does appear, however, to have been a high kill-off of young cattle. 83 (13% of the cattle assemblage excluding teeth) of the cattle bones were recorded as porous. These bones are likely to have been particularly susceptible to destruction. This observation is supported by the fact that porous bones appeared much more commonly in layers 44-52 (29%), where the cattle assemblage was better preserved. 17 cattle bones bore evidence of butchery and this number included a few calf bones.

Sheep/Goat

1,897 fragments were recorded. No goat bones were recovered using the criteria for differentiation used by Boessneck et al.(1964), whereas 52 bones definitely belonged to sheep. Using Payne's (pers. comm.) criteria for differentiating d4s, only one specimen could be assigned to goat, whereas 54 belonged to sheep. The assemblage was poorly preserved and was dominated by loose teeth (51% - Table 15). The ploughsoil contained a greater proportion of loose teeth (53-63%), whereas there were lower figures for loose teeth in layers 33 and 44-52, which again appear to have preserved the faunal assemblage better. These layers also produced higher figures for the Index of Fragmentation of sheep/goat bones (Table 13). Apart from loose teeth, only fragments of mandible, radius, tibia and metapodials were found in any numbers, reflecting the bias towards more sturdy elements. 93 (10% excluding loose teeth) of the bones bore evidence of canid gnawing and this combined with other destructive agencies (particularly trampling) again explains the poor survival of the sheep/goat sample.

Ageing evidence was restricted mainly to loose teeth. Most epiphyseal fusion points had not survived and only a dozen mandibles produced any evidence of toothwear. Eight of the mandibles had the permanent premolars and M3 in wear, two had just the first two molars in wear and one just had the first molar (and deciduous premolars) in wear. This bias towards adult animals may simply be the result of the poorer preservation of the younger mandibles. Table 14 shows that 40 d4s were identified compared to only 25 M3s, five of which were unworn. This would imply the presence of a much higher proportion of

immature animals than suggested by the mandibles. Table 14 also gives the wear stages of the d4 and M3 using Grant's (1975) method of recording. 13 of the d4s were at stage f or less, almost certainly implying that at most only the M1 was in wear. Most of these would have belonged to first year mortalities. Five d4s had heavy wear, suggesting that they belonged to mandibles with two molars in wear and probably represent animals killed in their second or third years. The majority (19) were at stage g. This stage lasts for a relatively long but variable length of time but it is possible that most of them would have belonged to animals killed between 6-18 months of age. At Owslebury (Maltby in prep.) most d4s at wear stage g only had the M1 in wear. Amongst the 17 M3s with recorded toothwear, 8 were at stage g and belonged to mature animals, probably over four years old and substantially older in some cases. 6% of the sheep/goat bones were porous but these bones would have been under-represented because of survival bias. Eight bones bore knife cuts.

Pig

Pig fragments (143) were again poorly represented. The types of fragment represented are shown in Table 16. Loose teeth (42%) were again the most common element and mandibles (23%) were the only other element well represented. The limited ageing evidence attested the presence of both adult and immature animals but no clear pattern of kill-off emerged from this analysis. Pig bones suffered from the same high degrees of fragmentation as sheep/goat and cattle.

Dog

Feature 2 contained 74 bones from the burial of one animal. The skull, mandibles, most of the forelimbs, cervical and thoracic vertebrae were represented, together with the femora, tibiae and a patella. All epiphyses were fused and the skeleton belonged to an adult animal. Several of the other 35 dog bones recovered may have belonged to one animal. Several metatarsals belonging to a large animal were recovered in layers 1B and 2. The presence of complete and partial skeletons of dogs in suggests that their carcases were not butchered for human consumption.

Other Species

Horse (36 fragments) was again poorly represented at Dean Bottom. 11 of these were tooth fragments. Other species were represented by a few fragments each. These were red deer (Cervus elaphus), whose six fragments included three of antler, two from Feature 5, and were possibly the offcuts of tool manufacture. The other species represented - weasel (Mustela nivalis), stoat (Mustela erminea), badger (Meles meles); short-tailed vole (Microtus agrestis), water vole (Arvicola terrestris), pine marten (Martes martes) - are not thought to have had any economic importance. The bones of rabbit, mole and probably the partridge (Perdix perdix) were later intrusions into the deposits.

Unidentified Categories

Table 17 shows the types of fragments recorded in the large mammal and sheep-sized mammal categories. Both samples were dominated by the longbone and unknown fragment categories. The more fragile ribs, vertebrae and skull fragments formed a much smaller proportion of the assemblage. Only in layers 33 and 44-52 did such fragments contribute more than 20% of these samples, again indicating the better preservation of bones in those layers.

ROCKLEY DOWN

The small sample of 1,512 fragments was initially subdivided into the following groups for analysis:-
Layer 1 - topsoil (ploughsoil).
Layer 2 - topsoil in situ.
Layer 4 - downland soil, furrowed.
Layer 8 - occupation layer.
Feature 1 layers 2B/3 - topsoil in enclosure ditch.
Feature 1 upper layers - upper layers of enclosure ditch.
Feature 1 lower layers - lower layers of enclosure ditch.

The number of fragments in each group is shown in Table 18. For the purposes of analysis, these initial groups were amalgamated into those associated with the infill of the enclosure ditch (Feature 1, layer 5 and below) and all others. Even these samples were small compared to the other sites in this study, although there are similarities with the deposits from the other sites. Sheep/goat and cattle were again the dominant species. The latter was better represented in Feature 1 than in the other deposits (Table 19). The other domestic species were poorly represented. Water vole (Arvicola terrestris) and golden plover (Pluvialis apricaria) were also present. Some rabbit bones intruded into all deposits apart from the lower layers of Feature 1. The three mole bones were also probably intrusive.

Amongst the unidentified bones, those of sheep-sized mammal and large mammal were found in roughly equal numbers, although the large mammal category was better represented in Feature 1. There is evidence to suggest that the assemblage was much better preserved in Feature 1. Table 20 lists the types of cattle and sheep/goat fragments represented and, although the samples are small, loose teeth formed a higher percentage of both assemblages in the other layers. Comparisons of the sizes of the major bones also produced high indices of fragmentation for both sheep/goat and cattle in Feature 1. The ditch, which was infilled after only a few years, probably attracted the dumping of larger material during deliberate infilling. The bones in the ditch would have not been subjected to trampling or plough damage. Consequently larger fragments, particularly of cattle were recovered. Amongst the unidentifiable portion of the assemblage, relatively more large mammal skull fragments, ribs and vertebrae were recovered from Feature 1 than the other deposits, again indicating the better preservation of bones in the ditch. However, 15 cattle bones and six of sheep/goat in Feature 1 had been gnawed, indicating that some of the assemblage had been subjected to canid scavenging.

There was only limited ageing evidence from Rockley Down. Three cattle mandibles with toothwear data were recovered from Feature 1; two belonged to mature animals and the third still had its milk dentition in late wear. One maxilla had its M1 only just in wear and belonged to an animal probably under a year old. The presence of young calves is attested by the discovery of 13 porous bones (10% of the cattle assemblage excluding loose teeth). Both sheep/goat mandibles with evidence of toothwear belonged to immature animals; one just had the deciduous

premolars in wear; the second had some wear on the first molar as well. Both were probably under a year old. Two cattle and a sheep/goat fragment bore evidence of butchery.

BURDEROP DOWN

This site produced the largest assemblage (18,390 fragments), although these were obtained from a much larger excavated area than the other sites. The density of bones from this open settlement was in fact less than from Bishop Cannings Down and Dean Bottom. The assemblage was subdivided into the following units for analysis:-

Layer 1 - topsoil/ploughsoil (in the area of the main excavation only.
Layer 2 - base of topsoil/top of occupation surface.
Layer 20 - sarsen spread.
Feature 42 - disc barrow ditch - separate from the main excavation area - nearly all the material was from a Late Bronze Age recut.
Other Features - mainly postholes.

The large majority of the bones were found in layers 1-2 (Table 22). A rough count of bone fragments during finds processing revealed that densities of bone increased near the structures discovered on the site and also above layer 20. These observations were confirmed during this analysis. Layer 1 included 155 intrusive rabbit bones and the bones of moles and birds in this layer were probably also intrusive. In addition, the good condition of a few sheep/goat bones in layer 1 was in such contrast to the vast majority of the very fragmented and poorly preserved assemblage in this layer that it is likely that these too were of more recent origin. The samples from layer 20, Feature 42 and the other features all produced less than 1,000 fragments.

Sheep/goat (61% overall) dominated the identified fragments with cattle (29%) ranked second. Pig bones were better represented (8% overall) than from the other sites in this report. The dominance of sheep/goat was less marked in the features than in the topsoil layers. Pig fragments in particular were much better represented in the features. Horse and dog, however, were still poorly represented throughout (Table 24).

Unidentified fragments provided over 70% of the fragments in all subdivisions (77% overall). In contrast to the identified portion, large mammal fragments outnumbered sheep-sized mammal fragments in most layers.

Cattle

The preservation of the Burderop Down assemblages in general was poorer than the other sites investigated. The composition of the cattle assemblage (Table 25) reflects this. Loose teeth formed an even greater proportion of the assemblage (71%). Only in the small samples from Feature 42 and the other features did the percentage of loose teeth fall below 70%. The cattle sample was also highly fragmented with very low Indices of Fragmentation in most layers (Table 26). 11% of the cattle bones were recorded as gnawed and this represents very much a minimum figure. A combination of scavenging, trampling, weathering and plough disturbance had resulted in this very fragmented, poorly

preserved sample.

No cattle mandibles survived with any teeth in place. Table 27 shows the tooth eruption evidence for the d4 and M3. As at Dean Bottom and Bishop Cannings Down, d4s still outnumbered M3s but a much smaller proportion of them were unworn or in early wear. Where it was possible to record Grant's (1975) wear stages, all the specimens were found to be heavily worn. The evidence for the presence of large numbers of young calves is therefore less clear than on the other sites. Only 5% of the cattle bones were porous but this figure may largely reflect the poorer preservation conditions, since the percentage of porous bones was noticeably higher in the features, in which bone survival was better. Whether the same explanation would account for the decrease in the proportion of unworn d4s is uncertain. Loose teeth did survive, although often severely fragmented, and the lack of unworn d4s may reflect that calves were culled less frequently at Burderop Down.

Sheep/Goat

2,604 fragments were recorded of which 2,028 (78%) were loose teeth (Table 28). This again reflects the extremely poor preservation of the assemblage. Only the samples from Feature 42 and the other features contained less than 70% loose teeth. Apart from these, only mandibles, radii, tibiae and metapodia contributed more than 1% of the sheep/goat sample. The samples from all but Feature 42 were very fragmented and the overall Index of Fragmentation was a low .18 (Table 25).

No mandibles with teeth survived and the ageing analysis was limited to loose teeth. 61 d4s and 48 M3s provided some evidence of toothwear. All but one of the d4s was in wear and the majority were at wear stage g. Among the M3s, 21 of the 34 with Grant wear stages recorded were at stage g and belonged to adult animals of four years or older (Table 27). The results bore similarities with those obtained from Dean Bottom (Table 14). Only 2% of the bones were porous, however, again reflecting the poor preservation conditions.

19 sheep bones were identifed using Boessneck et al.'s (1964) key of differentiation between bones of sheep and goat. Using Payne's metnod of analysis, only 1 of 61 d4s belonged to a goat, all the others belonging to sheep.

Pig

328 fragments were identified, 69% of which were loose teeth. Mandible and skull fragments were the only others found in any numbers. Very few of the postcranial bones survived (Table 29).

Other Species

46 horse fragments were recovered of which 28 (61%) were loose teeth. Dog was represented by only 10 fragments. Other species present were red deer (Cervus elaphus), roe deer (Capreolus capreolus), hare (Lepus sp.), fox (Vulpes vulpes), water vole (Arvicola terrestris), short-tailed vole (Microtus

agrestis), woodmouse (Apodemus sp.) and mallard (Anas platyrhynchos). The foolowing species were all probably later intrusions; pigeon/dove (Columba sp.), partridge (Perdix perdix), kestrel (Falco tinnunculus), thrush species (Turdus sp.), mole and rabbit.

Unidentified Categories

The large unidentified portion of the Burderop Down sample also displayed evidence of the poorer survival of bones. Within both the large mammal and sheep-sized mammal categories, only a small percentage of the more fragile skull fragments, ribs and vertebrae were found. Once again the bias towards the denser elements was slightly less marked in Feature 42 and the other features, indicating slightly better survival of bones in those deposits.

Discussion

Animal Bone Preservation

Excluding the Beaker pit at Dean Bottom, the samples analysed from the four sites contained 42,066 fragments. This represents one of the largest collections of Late Bronze Age faunal data to have been examined in Britain to date. Unfortunately the value of these assemblages are lessened by the consistently poor preservation conditions. Most of the material on all the sites was associated with topsoil or loams above the occupation areas. The results of scavenging, trampling, weathering and, in some cases, ploughing had resulted in a high degree of fragmentation, high percentages of unidentified fragments (75-77% overall on the four sites), and a heavy bias towards loose teeth amongst the identified material. Such poor preservation restricts the range of analysis and makes comparisons with other better preserved assemblages difficult. It must be accepted that the vast majority of the bones of the animals eaten at these settlements did not survive or were rendered unidentifiable by the processes outlined above. It is doubtful that the preserved fraction represents a true cross-section of the relative number of species or the ages of the animals consumed. More fragile elements, especially those of young animals would have had a much smaller chance of survival in these conditions than dense elements.

Differential preservation of animal bones therefore presents difficulties in comparisons between species and assemblages. It is possible, however, to obtain some measure of the relative levels of preservation in faunal samples, provided they have been recovered by roughly similar techniques and standards of excavation. All these sites were carefully excavated by hand and the standard of bone retrieval appears to have been extremely good. During the analysis of the individual sites it was clear that there were consistent patterns of differential preservation of the assemblages that could be examined by various methods of quantification. For example, the percentages of loose teeth of both cattle and sheep/goat usually rose in layers where other factors (such as high indices of fragmentation, larger percentages of unidentified fragments, low numbers of ribs, vertebrae and skull fragments amongst the unidentified categories) also suggested that the assemblages had been more poorly preserved. When the percentages of cattle and sheep/goat loose teeth were plotted against each other (Figure 1), a consistent pattern emerged with both percentages rising in a consistent manner in more poorly preserved assemblages. Those deposits with the lowest percentages of loose teeth (the Beaker pit at Dean Bottom, Burderop Down Feature 42, Rockley Down Feature 1) were all substantial features dug below the ground surface and these consequently had preserved assemblages less likely to have been trampled and weathered. Dean Bottom layers 33 and 44-52 were the next best preserved. There was then a group of assemblages (Bishop Cannings Down layers 1-3, Dean Bottom layers 1, 1B, 2-3, Burderop Down other features, and Rockley Down other deposits) which contained poorly preserved assemblages with 40-60% cattle loose teeth and 45-70% sheep/goat

loose teeth. Most of these assemblages were derived from layers of topsoil and loam. Finally, three of the Burderop Down samples stood apart with over 70% loose teeth in both the cattle and sheep/goat samples. Apart from the sample from the other features at Bishop Cannings Down, the relationship between the percentages of loose teeth of the two species appears to have been positively correlated.

This analysis suggests that the samples from the topsoil and loams from three of these sites were of a similar state of preservation and their contents can be compared with some degree of confidence. Comparisons between those samples and those from Burderop Down should be treated with great suspicion because of the very poor preservation of the latter samples. Similarly the deposits that produced better preserved assemblages should only be compared with the samples from the topsoil and loams with caution.

Species Representation

All four assemblages were dominated by cattle and sheep fragments and there is no doubt that these species formed the bulk of the meat diet and were also the principal animals exploited. The location of all these settlements would have favoured the exploitation of sheep with pasture available on the tops of the chalk ridges above the field systems and on the fallow fields as well. The potential for the exploitation of cattle was more limited because of the lack of substantial bodies of water near these settlements and limited suitable pasture. High percentages of sheep should therefore be expected and it is likely that they were by far the most common species at Rockley Down, Dean Bottom and Burderop Down. However, the exact proportion of sheep to cattle is difficult to measure, since it is impossible to obtain realistic figures for this from such fragmentary samples. Both the cattle and sheep samples were poorly preserved and it is by no means clear whether their bones had suffered similar degrees of destruction.

Figure 2 compares the relative abundance of sheep/goat expressed as a percentage of sheep/goat and cattle fragments in each of the major groups of bones. It is clear that the samples from layers 1-3 at Bishop Cannings Down contained much lower percentages of sheep than the other three sites. Only the small sample from Rockley Down Feature 1 approached these low figures for sheep and it has been argued that that assemblage may have biased towards the disposal of larger bones, which would have favoured the recovery of cattle. Comparisons of the Bishop Cannings Down samples with those of similar standards of preservation from Dean Bottom and Rockley Down suggest that the observed variations in these percentages do indeed reflect a real difference in the relative numbers of these species represented at these settlements.

There are several possible explanations for the greater importance of cattle at Bishop Cannings Down. The settlement was situated c.8 miles from the other three settlements and was not part of the same settlement system. Although it was located at a similar height on the chalk downlands with limited access to

water, it is situated only c.1.5 miles from the Vale of Pewsey, an area much more suitable for the exploitation of cattle. It was also inhabited at a slightly earlier date than the other sites and it is possible that cattle generally had decreased in importance on these later settlements.

It seems that the meat diet was only rarely supplemented by pork. Pig fragments were poorly represented at Bishop Cannings Down (2%), Dean Bottom (5%) and Rockley Down (4%). The area, which was substantially cleared of tree cover by the Early Bronze was not suitable for the exploitation of pigs. In this respect, it should also be noted that few pig bones were recovered from the Beaker pit at Dean Bottom. Pigs were of little importance on these sites. If they were exploited at all, it would only have been in small numbers. It is possible that some (or even all) of the pig bones belonged to animals reared elsewhere and imported to these settlements. Only at Burderop Down did pig fragments (8%) increase to levels more commonly associated with samples of Iron Age date from the Wessex chalklands (Grant 1984: 105). Pig bones are usually considered to survive less well than those of cattle and sheep/goat. The increase in the proportion of pig fragments at Burderop Down despite the poorer preservation of the faunal samples there suggests that pigs were of rather more importance there. Whether this variation is due to locational or temporal factors is open to question.

The low incidence of horse (max. 2%) is also noteworthy considering the relatively high levels it obtained on many Iron Age sites (Grant 1984: 117). It does not seem to have been heavily exploited (at least for meat) on these Late Bronze Age sites. Horse bones were also poorly represented at the Late Bronze Age settlement at Runnymede Bridge (Done 1980: 75).

Exploitation of Cattle

The most remarkable aspect of these assemblages was the high proportion of calves represented, particularly at Bishop Cannings Down and Dean Bottom. Considering that the poor preservation of the samples would have biased the samples towards older animals, the number of deciduous premolars in an early stage of development was very high. If these samples reflect in any way the mortality patterns of cattle, it would appear that a substantial percentage were killed in their first year. A similar hiigh rate of calf mortality has been found in the Middle Bronze Age levels at Grimes Graves, Norfolk (Legge 1981). Analysis of large samples of mandibles from a midden suggested that about half the cattle represented were killed by about six months of age. Legge, in a detailed discussion of the possible interpretation of such a mortality profile, concluded that the best explanation for such a high mortality rate amongst calves was that the cattle herds were bred principally for dairy husbandry. Culling of a large number of (mostly male) calves would allow for the consumption of milk by the human population and still allow sufficient females to mature and perpetuate the stock. Such an interpretation would also fit best the more limited ageing data from Bishop Cannings Down and Dean Bottom. At Grimes Graves it was also suggested that:-

"milk production may be important in the prehistoric

> economy where the animal husbandry potential is limited; better established systems, in more fertile areas or with more extensive pastures may well be able to afford a greater indulgence in the more extravagant economies of beef production." (Legge 1981: 89)

The results from these studies would lend support to that hypothesis. It is believed that pasture suitable for cattle would have been limited near these settlements. Consequently an emphasis on milk production would lessen the pressure on pasture and would be the most efficient management policy for cattle on these lands.

There remains the problem of interpreting the Burderop Down cattle mortality data. Deciduous premolars in an early stage of development were much rarer on this site and there were generally fewer porous bones of calves. Again there are several possible explanations. The first may be simply that the extremely poor preservation of the faunal samples at Burderop Down destroyed more of the bones and teeth of calves than on the other sites. It may be significant that the small sample from the features at the site, which had comparable standards of preservation of bone to the topsoil layers at Bishop Cannings Down and Dean Bottom, produced a similar proportion of porous bones. Even loose teeth were noticeably more fragmentary in the majority of the Burderop Down sample. The more fragile deciduous premolars may have suffered a greater degree of destruction than teeth of older animals.

Alternatively, if we accept that it is unlikely that the differences in preservation of the samples can totally explain the variations in the toothwear patterns, it follows that a smaller proportion of calves were killed at Burderop Down. If that was the case (and only better preserved samples from similar sites in that area would resolve this question), an explanation has to be sought. One possibility would be that the change was a temporal one. The settlement at Burderop Down was abandoned at a slightly later date than Dean Bottom. If the majority of the assemblages were derived from abandonment material, they may be temporally distinct. In which case it is possible to postulate that there had been a shift in emphasis in cattle husbandry since the demise of Dean Bottom, with less emphasis on milk production. Alternatively, the results may imply that the inhabitants at Burderop Down had more access to cattle pasture and could afford a more expansive system of cattle husbandry. The fact that Burderop Down was a much larger open settlement implies that it was different in character to the small tightly grouped enclosure settlements such as Dean Bottom and Rockley Down. Its inhabitants may also have persued a different regime of cattle management. The above explanations assume that the pastoral economies of these settlements were independant. This need not have been the case and their economies could have been linked in some way. Differences in the ages of cattle (and other species) on different settlements may have been caused by redistribution of particular ages of animal between sites. Burderop Down may have acted as a centre for such redistribution. However, to speculate further would be stretching imperfect ageing well beyond safe limits.

Sheep Exploitation

Sheep of all ages were represented on all these settlements. There does appear to have been a substantial culling of animals killed in their first and second years but nevertheless large numbers of sheep attained maturity. Given the poor preservation of the samples, a detailed interpretation of the mortality pattern is impossible. Superficially the pattern appears to be similar to the pattern found commonly on Iron Age sites in Wessex, with high first year mortality rates but a substantial proportion of the stock kept until quite old age (Maltby 1981; Grant 1984: 106). Better preserved samples are required, however, before a clear picture of sheep exploitation in the Late Bronze Age of the Marlborough Downs can be distinguished.

The assemblages were too fragmentary for detailed analysis of butchery and metrical analysis to be worthwhile. These data are stored in archive at the Faunal Remains Unit and a copy also rests with the excavator together with other archival material from the sites.

The analysis of these Late Bronze Age samples has demonstrated that even poorly preserved faunal assemblages can, with care, provide interesting results. In particular, these samples have produced the first evidence for cattle management concentrating on dairy production in prehistoric Wessex. It is possible to postulate that such an intensive exploitation of the high ground in the Late Bronze Age suggests that pressures on space had developed during the Bronze Age. A regime of dairy management of cattle would have been the best means of exploiting limited area of suitable pasture. It is possible that the collapse and abandonment of this system of settlement at the end of the period may have resulted in the change of cattle management witnessed on the Iron Age chalkland settlements elsewhere in Wessex.

Bibliography

Boessneck, J., Muller, H.H. and Tiechert, M. (1964) Osteologische Unterscheidungsmerkmale zwischen Schaf und Ziege. Kuhn-Arcniv 78: 1-129.

Done, G. (1980) The animal bone. In D. Longley, Runnymede Bridge 1976: Excavations on the Site of a Late Bronze Age Settlement. Guildford, Surrey Archaeological Society Research Volume 6, 75-9.

Grant, A. (1975) The animal bones. In B. Cunliffe (ed.), Excavations at Portchester Castle. I; Roman. London, Society of Antiquaries, 378-408, 437-450.

Grant, A. (1984) Animal husbandry in Wessex and the Thames Valley. In B. Cunliffe & D. Miles (eds.), Aspects of the Iron Age in Southern Britain. University of Oxford, Committee for Archaeology, 102-119.

Grigson, C. (1982) Sex and age determination of some bones and teeth of domestic cattle: a review of the literature. In B. Wilson, C. Grigson & S. Payne (eds.), Ageing and Sexing Animal Bones from Archaeological Sites. Oxford: British Archaeological Reports (British Series) 109: 7-24.

Legge, A.J. (1981) The agricultural economy. In R.J. Mercer (ed.), Grimes Graves, Norfolk: Excavations 1971-72: Volume I. London: Department of the Environment Archaeological Reports 11, 79-103.

Maltby, J.M. (1981) Iron Age, Romano-British and Anglo-Saxon animal husbandry - a review of the faunal evidence. In M. Jones & G. Dimbleby (eds.), The Environment oof Man: the Iron Age to the Anglo-Saxon Period. Oxford: British Archaeological Reports (British Series) 87: 155-203.

TABLE 1

Species represented at Bishop Cannings Down (Fragments)

Species	Layer 1	2	3	Other	Total
Cattle	398	440	296	138	1272
Sheep/Goat	162	217	188	183*	750
Pig	11	9	14	13	47
Horse	5	5	2	1	13
Dog	2	3	1	1	7
Red Deer		1	1		2
Roe Deer			1		1
Hare	1	1			2
Unid. Large Mammal	1042	1187	1006	440	3675
Sheep-sized Mammal	355	508	522	406	1791
Unid. Mammal	282	410	490	301	1483
Unid. Bird			1		1
Badger			1		1
Pine Marten		1			1
Frog/Toad				4	4
Thrush sp.		1			1
Rook/Crow		1			1
Rabbit	3				3
Mole			1		1
TOTAL	2261	2784	2524	1487	9056
Sheep	7	8	5	21	41

* includes 28 articulated bones.

TABLE 2

Percentages of Fragments of Major Species and Unidentifed Categories represented at Bishop Cannings Down

	Layer				
Major Species	1	2	3	Other	Total
Cattle	69	65	59	41	61
Sheep/Goat	28	32	37	54*	36
Pig	2	1	3	4	2
Horse	.9	.7	.4	.3	.6
Dog	.3	.4	.2	.3	.3
Red Deer		.1	.2		.1
Roe Deer		.1	.2		.1
Hare	.2				.1
Total Fragments	579	676	503	336	2094

Unidentified	1	2	3	Other	Total
Large Mammal	62	56	50	38	53
Sheep-sized Mammal	21	24	26	35	26
Unid.Mammal	17	19	24	26	21
Total Fragments	1679	2105	2018	1147	6949
% Unidentified	74	76	80	77	77

* = including articulated bones. Excluding articulated bones in these layers, cattle = 45%, sheep/goat = 50%; the other figures remain unaltered.

TABLE 3

Fragments of Cattle Represented at Bishop Cannings Down

	Layer 1	2	3	Other	Total	%
Skull frags.	14	16	20	9	59	5
Mandible	30	55	30	10	125	10
Loose teeth	214	212	162	75	663	52
Scapula	15	22	12	5	54	4
Humerus	15	9	6	2	32	3
Radius	3	9	5	2	19	1
Ulna	4	6	8		18	1
Os Coxae	5	6	3	3	17	1
Femur	6	5	3		14	1
Patella		1		1	2	.1
Tibia	10	19	3	2	34	3
Carpals	4	3	4		11	.9
Calcaneus	5	5		1	11	.9
Astragalus	8	3	1	1	13	1
Centroquartal	1	2		1	4	.3
Other tarsals	1	2	2		5	.4
Metacarpal	7	19	6	1	33	3
Metatarsal	18	10	9	4	41	3
Metapodial	5	4	2	5	16	1
1st Phalanx	14	14	9	4	41	3
2nd Phalanx	10	8	7	5	30	2
3rd Phalanx	3	1	1	2	7	.6
Sesamoids		2	1	3	6	.5
Ribs		1		1	2	.2
Cervical verts.	2	3	2		7	.6
Thoracic verts.	1			1	2	.2
Lumbar verts.		2			2	.2
Sacrum	1				1	.1
Caudal verts.	2	1			3	.2
TOTAL	398	440	296	138	1272	
% Loose Teeth	54	48	55	54	52	

TABLE 4

Fragmentation of Cattle and Sheep/Goat Bones at Bishop Cannings Down

	Layer				
Cattle	1	2	3	Other	Total
Complete		1		1	2
0.75	2	4	2	1	9
0.50		3	1	2	6
0.25	10	13	12	7	42
<0.25(0.10)	97	131	61	20	309
Total Frags.	109	152	76	31	368
Frag. Index	.13	.14	.15	.21	.14

Sheep/Goat	1	2	3	Other	Total
Complete				1	1
0.75		2	1	9	12
0.50	11	12	5	11	39
0.25	25	35	19	20	99
<0.25(0.10)	29	35	39	36	139
Total Frags.	65	84	64	77	290
Frag. Index	.23	.24	.19	.28	.24

Total frags. = total number of mandible, scapula, humerus, radius, femur, tibia, metacarpus, metatarsus and metapodial fragments.

TABLE 5

Ageing Data from Bishop Cannings Down

	Layer				
Cattle	1	2	3	Other	Total
Porous bones	3	14	13	18	48
%	2	6	10	29	8
d4 unworn	1	7	4	1	13
just in wear	2	1	1		4
in wear	2	6	2		10
M3 unworn	1				1
just in wear		1			1
in wear	5	4	2	2	13

	Grant Wear Stage										
	b	c	d	e	f	g	h	j	k	l	m
d4	1	2	2	1	2			2	1		
M3	1	1			1	9		1			

	Layer				
Sheep/Goat	1	2	3	Other	Total
Porous bones	8	6	3	11	28
%	10	6	6	8	7
d4 unworn				1	1
just in wear					
in wear	3	8	4	1	16
M3 unworn		1	3		4
just in wear			1		1
in wear	5	9	5	2	21

	Grant Wear Stage										
	b	c	d	e	f	g	h	j	k	l	m
d4					3	6	4	1			
M3	1	1	4	4	4	7					

Wear stages after Grant (1975).

TABLE 6

Fragments of Sheep/Goat Represented at Bishop Cannings Down

	Layer 1	2	3	Other	Total	%
Skull frags.	4		2	5	11	1
Mandible	7	13	8	16	44	6
Loose teeth	83	116	110	50	359	48
Scapula	3	1	1	5 (1)	10	1
Humerus	1	3	3	6 (2)	13	2
Radius	15	21	14	11	61	8
Ulna	3	1	2	3	9	1
Os Coxae		2	3	7	12	2
Femur	8	2	1	1	12	2
Tibia	15	18	9	14	56	7
Carpals	1	1		5 (4)	7	1
Calcaneus	1	1		1	3	.4
Astragalus	1	3	1	1	6	.8
Centroquartal			1	1	2	.3
Metacarpal	4	10	8	9	31	4
Metatarsal	12	14	17	13	56	7
Metapodial		2	3	2	7	1
1st Phalanx	1	4	2	3	10	1
2nd Phalanx	1	1	2	1	5	.7
3rd Phalanx	1		1	2	4	.5
Ribs		1		8 (6)	9	1
Cervical verts.	1	2		4 (2)	7	1
Thoracic verts.				13 (12)	13	2
Lumbar verts.				1	1	.1
Sacrum		1		1	1	.1
Sternebrae				1 (1)	1	.1
TOTAL	162	217	188	183 (28)	750	

( ) = number of articulated bones.

% Loose Teeth	51	53	59	27	48
(excluding articulated bones)				32	

TABLE 7

Percentages of Types of Element Represented in the Unidentified Large Mammal and Sheep-sized Categories at Bishop Cannings Down

	Layer				
Large Mammal	1	2	3	Other	Total
Skull fragments	2	2	4	4	3
Teeth fragments	.2	.4	.2		.2
Ribs	7	8	8	11	8
Vertebrae	1	3	2	3	2
Longbone frags.	31	28	22	19	26
Unknown frags.	57	59	65	63	60
Total	1042	1187	1006	440	3675

	Layer				
Sheep-sized Mammal	1	2	3	Other	Total
Skull fragments	.6	.8	1	.7	.8
Teeth fragments	.3				.1
Ribs	5	8	9	19	10
Vertebrae	1	1	2	1	1
Longbone frags.	76	72	66	47	65
Unknown frags.	17	19	23	32	23
Total	355	508	522	406	1791

TABLE 8

Species Represented in Dean Bottom Beaker Pit

	F	%
Cattle	44	26
Sheep/Goat	112	67
Pig	6	4
Red Deer	2	1
Roe Deer	4	2
Unid. Large Mammal	124	33
Sheep-sized Mammal	183	49
Unidentified Mammal	68	18
Unidentified Bird	2	
Jay	1	
Total	546	

F = number of fragments.

TABLE 9

Fragments of the Major Domestic Species Represented in the Dean Bottom Beaker Pit

	Cattle	Sheep/Goat	%	Pig
Skull frags.	4	30	27	
Mandible	6	9	8	1
Hyoid		1	1	
Loose teeth	6	9	8	1
Scapula		3	3	1
Humerus		3	3	
Radius	5	12	11	
Ulna	1	5	4	
Os Coxae	2	1	1	
Femur		8	7	
Tibia	1	5	4	
Carpals	1			
Calcaneus	1	2	2	
Astragalus		5	4	
Centroquartal	1	1	1	
Other tarsals	1	1	1	
Metacarpal	1	4	4	
Metatarsal	1	2	2	
Metapodial		1	1	2
Ribs	1			
Cervical verts.	4	3	3	
Thoracic verts.	1	2	2	
Lumbar verts.		4	4	1
Sacrum	1	1	1	
TOTAL	44	112		6

TABLE 10

Species represented in Late Bronze Age Deposits at Dean Bottom (Fragments)

Species	Layer 1	1B	2-3	33	35-37	44-52	F6+39	Other	Total
Cattle	274	214	261	189	38	97	99	11	1183
Sheep/Goat	442	372	631	240	47	131	4	30	1897
Pig	34	18	50	16	9	11		5	143
Horse	11	7	7	7	2	2			36
Dog	5	14	12	2		1	74	1	109
Red Deer			3	1	1	1			6
Unid. Large Mammal	883	715	919	422	145	172	1	57	3314
Sheep-sized Mammal	845	951	1504	582	182	385	2	102	4553
Unid. Mammal	266	307	587	231	125	109		24	1649
Unid. Bird			4						4
Badger	1		1						2
Pine Marten			1						1
Stoat		2							2
Weasel			1						1
Water Vole		1	8		1				10
Short-tailed Vole		1	1	1		1			4
Unid. Rodent		2	3		1				6
Frog/Toad	1		2	2	1	2			8
Partridge	2								2
Rabbit	47	37	72	2		7		2	167
Mole		4	6		1				11
TOTAL	2811	2645	4073	1695	553	919	180	232	13108
Sheep	6	13	16	13	1	2		1	52

TABLE 11

Percentages of Fragments of Major Species and Unidentifed Categories represented in Late Bronze Age Deposits at Dean Bottom

	Layer						
Major Species	1	1B	2-3	33	35+37	44-52	Total
Cattle	36	34	27	42	39	40	34
Sheep/Goat	58	60	65	53	48	54	59
Pig	4	3	5	4	9	5	4
Horse	1	1	.7	2	2	.8	1
Dog	.7	2	1	.4		.4	1
Red Deer			.3	.2	1	.4	.2
Total Fragments	766	625	964	455	97	243	3201*
Unidentified	1	1B	2-3	33	35+37	44-52	Total
Large Mammal	44	36	31	34	32	26	35
Sheep-sized Mammal	42	48	50	47	40	58	48
Unid. Mammal	13	16	20	19	28	16	17
Total Fragments	1994	1973	3010	1235	452	666	9516
% Unidentified	72	76	76	73	82	73	75

* = excluding the burials in F2 and F6 but including other small assemblages not listed above.

TABLE 12

Fragments of Cattle Represented in Late Bronze Age Deposits at Dean Bottom

	Layer								
	1	1B	2-3	33	35-37	44-52	Other	Total	%
Skull frags.	15	12	19	21	5	15	2	89	8
Mandible	28	30	39	36	5	15	2	155	14
Hyoid			1	1				2	.2
Loose teeth	136	99	121	56	19	29	4	464	43
Scapula	15	3	10	12	2	6		48	4
Humerus	13	7	9	7	1			37	3
Radius	7	5	7		1	2		22	2
Ulna	2	9	1	1	1	1		15	1
Os Coxae	6	6	1	6		1	1	21	2
Femur	1	2	9	5		1		18	2
Patella			1					1	.1
Tibia	4	6	4	10	1	2		27	2
Carpals	5	3	2	2			1	13	1
Calcaneus	4	1	2	3				10	1
Astragalus	1	4		2		1		8	.7
Centroquartal			1	1		1		3	.3
Other tarsals	1	2	1					4	.4
Metacarpal	11	7	4	5	2	2		31	3
Metatarsal	9	5	11	8		5		38	4
Metapodial	3	4	4	1		2		14	1
1st Phalanx	6	3	5	2		5		21	2
2nd Phalanx	3	3	1		1			8	.7
3rd Phalanx	1	1	2			1		5	.5
Sesamoids	2		1	3				6	.6
Ribs		1		1		2		4	.4
Cervical verts.				2		2	1	5	.5
Thoracic verts.			1	1		1		3	.3
Lumbar verts.			1	2		2		5	.5
Sacrum			2	1				3	.3
Caudal verts.	1	1	1			1		4	.4
TOTAL	274	214	261	189	38	97	11	1084	
% Loose Teeth	50	46	46	30		(30)			

Total excludes bones of the calf skeleton in F6.

TABLE 13

Fragmentation of Cattle and Sheep/Goat Bones at Dean Bottom(L.B.A.)

	Layer							
Cattle	1	1B	2-3	33	35-37	44-52	Other	Total
Complete				1				1
0.75		1	2	2		3		8
0.50		3	2	5	1	4		15
0.25	5	10	16	23		8		62
<0.25(0.10)	86	55	77	53	11	21	2	305
Total Frags.	91	69	97	84	12	36	2	391
Frag. Index	.11	.15	.15	.19	(.13)	.23		.15

	Layer							
Sheep/Goat	1	1B	2-3	33	35+37	44-52	Other	Total
Complete		1		1		2		4
0.75	2	5	6	12		7	1	33
0.50	12	11	19	11	1	4	1	59
0.25	36	27	56	24	1	15	4	163
<0.25(0.10)	80	77	160	59	12	29	4	421
Total Frags.	130	121	241	107	14	57	10	680
Frag. Index	.19	.20	.18	.26	.14	.28	.27	.21

Total frags. = total number of mandible, scapula, humerus, radius, femur, tibia, metacarpus, metatarsus and metapodial fragments.

TABLE 14

Ageing Data from Dean Bottom (L.B.A.)

Cattle	Layer 1+1B	2-3	33	35-37	44-52	Other	Total
Porous bones	31	20	11		20	1	83
%	12	14	8		29		13
d4 unworn	7	1	3	1			12
just in wear	2				2		4
in wear	8	5	2	1			16
M3 unworn	1	1		1			3
just in wear	1		1				2
in wear	4	3	3	1			11

	Grant Wear Stage b	c	d	e	f	g	h	j	k	l	m
d4		1			2		1	2	3		
M3	2					7		1	1		

Sheep/Goat	1+1B	2-3	33	35-37	44-52	Other	Total
Porous bones	12	24	9	1	7	2	55
%	4	7	6		9		6
d4 unworn							
just in wear	2				1		3
in wear	29		6		1	1	37
M3 unworn	3	1	1				5
just in wear	1						1
in wear	13		4		2		19

	Grant Wear Stage b	c	d	e	f	g	h	j	k	l	m
d4	1		1	4	7	19	4	1			
M3	3	1	1	1	2	8					

Wear stages after Grant (1975).

TABLE 15

Fragments of Sheep/Goat Represented in Late Bronze Age Deposits at Dean Bottom

	Layer								
	1	1B	2-3	33	35+37	44-52	Other	Total	%
Skull frags.	6	9	30	10	2	5		62	3
Mandible	21	28	69	29	4	16	1	168	9
Hyoid		1	4	3		1		9	.5
Loose teeth	280	199	291	99	27	55	18	969	51
Scapula	5	4	8	5	1	6	1	30	2
Humerus	7	5	9	3				24	1
Radius	20	18	49	17	1	11	3	119	6
Ulna	5	11	13	7		3	2	41	2
Os Coxae	3	9	13	1				26	1
Femur	8	6	22	5	1	3	2	47	2
Patella			1			1	1	3	.2
Tibia	30	23	32	18	2	8	1	114	6
Carpals	2	2	1	1		2		8	.4
Calcaneus	1	1	5	1				8	.4
Astragalus		1	7	2				10	.5
Centroquartal	2		2					4	.2
Other tarsals			1					1	.1
Metacarpal	13	15	21	5	2	6	1	63	3
Metatarsal	25	17	22	22	2	7	1	96	5
Metapodial	1	5	9	3	1		1	20	1
1st Phalanx	6	4	7	4	2	3		26	1
2nd Phalanx	2	4	4	2	1		1	14	.7
3rd Phalanx	1		2					3	.2
Sesamoids		1						1	.1
Ribs		2		1	1	2		6	.3
Cervical verts.	2	3	4	1		1		11	.6
Thoracic verts.		1	1	1				3	.2
Lumbar verts.		1	1			1	1	4	.2
Sacrum	2	1	2					5	.3
Caudal verts.		1	1					2	.1
TOTAL	442	372	631	240	47	131	34	1897	
% Loose Teeth	63	53	46	41	(57)	42		51	

TABLE 16

Fragments of Pig Represented in Late Bronze Age Deposits at Dean Bottom

	Layer								
	1	1B	2-3	33	35+37	44-52	Other	Total	%
Skull frags.	1		2	2	1	1		7	5
Mandible	6	2	18	3	2	2		33	23
Loose teeth	20	12	17	3	4	4		60	42
Scapula		1	3	2				6	4
Humerus			2		2		1	5	3
Radius			1					1	.7
Ulna		1		1				2	1
Femur	1		1			1		3	2
Tibia						1		1	.7
Carpals	1							1	.7
Astragalus	1							1	.7
Other tarsals			1					1	.7
Metatarsal							1	1	.7
Lat. Metapodial			2	2				4	3
Metapodial							1	1	.7
1st Phalanx	3	1		2			2	8	6
2nd Phalanx			2	1				3	2
3rd Phalanx	1	1	1			1		4	3
Cervical verts.						1		1	.7
TOTAL	34	18	50	16	9	11	5	143	

TABLE 17

Percentages of Types of Element Represented in the Unidentified Large Mammal and Sheep-sized Categories at Dean Bottom (L.B.A.)

	Layer							
Large Mammal	1	1B	2-3	33	35+37	44-52	Other	Total
Skull fragments	2	4	7	12	5	16	2	6
Teeth fragments	.2	.3	.2					.2
Ribs	5	9	9	14	5	8	3	8
Vertebrae	2	3	4	5	1	3	3	3
Longbone frags.	25	17	11	15	20	11	33	17
Unknown frags.	66	67	69	53	68	62	59	65
Total	883	715	919	422	145	172	58	3314

	Layer							
Sheep-sized Mammal	1	1B	2-3	33	35+37	44-52	Other	Total
Skull fragments	2	3	2	6	3	5	2	3
Teeth fragments	.1	.1	.1			.3		.1
Ribs	7	13	14	17	10	17	16	13
Vertebrae	2	1	3	4		8	4	3
Longbone frags.	73	59	56	44	53	42	45	57
Unknown frags.	16	24	25	29	35	28	33	25
Total	845	951	1504	582	182	385	104	4553

k

TABLE 18

Species represented at Rockley Down (Fragments)

Species	Layer 1	2	4	8	2B/3	F1	Other	Total
Cattle	39	4	5	23	10	53	1	135
Sheep/Goat	51	15	15	31	18	40	1	171
Pig	5	2		3	1	1		12
Horse	3				2	3		8
Dog		1				1	1	3
Unid. Large Mammal	144	38	34	84	46	113	16	475
Sheep-sized Mammal	192	40	38	84	40	72	14	480
Unid. Mammal	60	13	21	37	16	18	2	167
Unid. Bird				1				1
Water Vole	1			1				2
Unid. Rodent	1							1
Golden Plover						1		1
Rabbit	25	7	8	4	4	3	2	53
Mole		1				2		3
TOTAL	521	121	121	268	137	307	37	1512
Sheep				2	2	3		7

TABLE 19

Percentages of Fragments of Major Species and Unidentifed Categories represented at Rockley Down

	Layer		
Major Species	F1	Other	Total
Cattle	54	35	41
Sheep/Goat	41	57	52
Pig	1	5	4
Horse	3	2	2
Dog	1	1	1
Total Fragments	98	231	329

Unidentified	F1	Other	Total
Large Mammal	56	39	42
Sheep-sized Mammal	35	44	43
Unid. Mammal	9	16	15
Total Fragments	203	919	1122
% Unidentified	67	80	77

TABLE 20

Fragments of Cattle and Sheep/Goat Represented at Rockley Down

	Cattle							
	F1	Other	Total	%	F1	Other	Total	%
Skull frags.	4	9	13	10	2	2	4	2
Mandible	12	10	22	16	1	5	6	4
Hyoid	1		1	.7	1		1	.6
Loose teeth	12	35	47	35	18	88	106	62
Scapula	2	5	7	5		1	1	.6
Humerus	2	1	3	2	3		3	2
Radius	2	3	5	4	2	8	10	6
Ulna	2	1	3	2		2	2	1
Os Coxae		4	4	3		1	1	.6
Femur	3	1	4	3	2	3	5	3
Patella					1		1	.6
Tibia	1	2	3	2	5	4	9	5
Carpals	3		3	2	1		1	.6
Calcaneus						2	2	1
Astragalus		2	2	1		2	2	1
Centroquartal	1		1	.7				
Metacarpal	3	2	5	4	2	5	7	4
Metatarsal	1	2	3	2	2	4	6	4
1st Phalanx		1	1	.7		3	3	2
2nd Phalanx	1	1	2	1		1	1	.6
Ribs		1	1	.7				
Cervical verts.	1		1	.7				
Lumbar verts.	2	2	4	3				
TOTAL	53	82	135		40	131	171	
% Loose Teeth	(23)	(43)	35		(45)	67	62	

TABLE 21

Fragmentation of Cattle and Sheep/Goat Bones at Rockley Down

Cattle	Layer F1	Other	Total
Complete	3	2	5
0.75	4		4
0.50	3		3
0.25	7	3	10
<0.25(0.10)	9	21	30
Total Frags.	26	26	52
Frag. Index	(.39)	(.19)	.29

Sheep/Goat	F1	Other	Total
Complete		1	1
0.75	5	4	9
0.50	2	2	4
0.25	4	7	11
<0.25(0.10)	6	16	22
Total Frags.	17	30	47
Frag. Index	.37	.28	.31

Total frags. = total number of mandible, scapula, humerus, radius, femur, tibia, metacarpus, metatarsus and metapodial fragments.

TABLE 22

Percentages of Types of Element Represented in the Unidentified Large Mammal and Sheep-sized Categories at Rockley Down

	Layer		
Large Mammal	F1	Other	Total
Skull fragments	5	1	2
Teeth fragments	1		.2
Ribs	12	3	5
Vertebrae	2	3	3
Longbone frags.	16	20	19
Unknown frags.	64	72	70
Total	113	362	475

Sheep-sized Mammal	F1	Other	Total
Skull fragments		1	.8
Teeth fragments		.2	.2
Ribs	8	7	7
Vertebrae		3	3
Longbone frags.	64	66	66
Unknown frags.	28	22	23
Total	72	408	480

TABLE 23

Species represented at Burderop Down (Fragments)

Species	Layer 1	2	20	F42	Other	Total
Cattle	853	234	39	58	51	1235
Sheep/Goat	1670	648	118	67	101	2604
Pig	194	77	10	20	27	328
Horse	46	4	2	2	1	55
Dog	8	1			1	10
Red Deer	1	1				2
Roe Deer	5			3		8
Hare	2	1			1	4
Unid. Large Mammal	3957	1352	282	170	244	6005
Sheep-sized Mammal	2959	1431	206	142	303	5041
Unid. Mammal	1869	712	78	52	166	2877
Unid. Bird	3	1			1	5
Fox	1	1				2
Mouse (Apodemus sp.)					1	1
Water Vole	4	1		1	4	10
Short-tailed Vole	1				1	2
Unid. Rodent	4	2	1		3	10
Mallard		1				1
Pigeon/Dove	1					1
Partridge	2					2
Kestrel	1					1
Thrush sp.	1					1
Mole	23	1			1	25
Rabbit	155	3			2	160
TOTAL	11760	4471	736	515	908	18390
Sheep	11	4	1	3		19

TABLE 24

Percentages of Fragments of Major Species and Unidentifed Categories represented at Burderop Down

	Layer					
Major Species	1	2	20	F42	Other	Total
Cattle	31	24	23	39	28	29
Sheep/Goat	60	67	70	45	55	61
Pig	7	8	6	13	15	8
Horse	2	.4	1	1	.5	1
Dog	.3	.1			.5	.2
Red Deer	.1	.1				.1
Roe Deer	.2				.2	.2
Hare	.1	.1			.5	.1
Total Fragments	2779	966	169	150	182	4246
Unidentified	1	2	20	F42	Other	Total
Large Mammal	45	39	50	47	34	43
Sheep-sized Mammal	34	41	36	39	42	36
Unid. Mammal	21	20	14	14	23	21
Total Fragments	8785	3495	566	364	713	13923
% Unidentified	76	78	77	71	80	77

TABLE 25

Fragments of Cattle Represented at Burderop Down

	Layer 1	2	20	F42	Other	Total	%
Skull frags.	15	6	1	4	5	31	3
Mandible	30	10	2	12	6	63	5
Loose teeth	640	174	28	13	24	879	71
Scapula	5	2	1	6		14	1
Humerus	8	5		4	1	18	1
Radius	5	1			1	7	.6
Ulna	7	3	2	1		13	1
Os Coxae	11	5		5	1	22	2
Femur	6	4		2		12	1
Tibia	7	3			2	12	1
Carpals	9			2	2	13	1
Calcaneus	12	1	2	2	1	18	1
Astragalus	5				1	6	.5
Centroquartal	1		1	1		3	.2
Other tarsals	4	2				6	.5
Metacarpal	16	5		1	1	23	2
Metatarsal	23	3	1	1	1	29	2
Metapodial	8	1		1		10	.8
1st Phalanx	15	5			3	23	2
2nd Phalanx	10	3	1			14	1
3rd Phalanx	4	1			2	7	.6
Sesamoids	6					6	.5
Cervical verts.	2			1		3	.2
Sacrum	1			1		2	.2
Caudal verts.				1		1	.1
TOTAL	853	234	39	58	51	1235	
% Loose Teeth	75	74	(72)	(22)	(47)		

TABLE 26

Fragmentation of Cattle and Sheep/Goat Bones at Burderop Down

	Layer					
Cattle	1	2	20	F42	Other	Total
Complete						
0.75	1			1	2	4
0.50				1		1
0.25	4			9		13
<0.25(0.10)	106	34	4	16	12	172
Total Frags.	111	34	4	27	14	190
Frag. Index	.11	.10		(.19)	(.19)	.13

Sheep/Goat	1	2	20	F42	Other	Total
Complete		1				1
0.75	2			3	1	6
0.50	8	11	1	12	5	37
0.25	51	38	9	7	5	110
<0.25(0.10)	160	74	13	16	21	284
Total Frags.	221	124	23	38	32	438
Frag. Index	.15	.19	.18	.31	.21	.18

Total frags. = total number of mandible, scapula, humerus, radius, femur, tibia, metacarpus, metatarsus and metapodial fragments.

TABLE 27

Ageing Data from Burderop Down

Cattle	Layer 1	2	20	F42	Other	Total
Porous bones	6	3		5	4	18
%	3	5		11	15	5
d4 unworn	1	1		1		3
just in wear	1					1
in wear	8	1		1		10
M3 unworn						
just in wear	1					1
in wear	6	1			1	8

Cattle	Grant Wear Stage b	c	d	e	f	g	h	j	k	l	m
d4								5			1
M3	1					1		1	3		

Sheep/Goat	1	2	20	F42	Other	Total
Porous bones	8	3		1	1	13
%	3	2		2	2	2
d4 unworn						
just in wear					1	1
in wear	34	16	4	1	5	60
M3 unworn	3	2				5
just in wear		1				1
in wear	28	10	3		1	42

Sheep/Goat	Grant Wear Stage b	c	d	e	f	g	h	j	k	l	m
d4	1		1		4	12	2		2		
M3	6	2	2	2	1	21					

Wear stages after Grant (1975).

TABLE 28

Fragments of Sheep/Goat Represented at Burderop Down

	Layer						
	1	2	20	F42	Other	Total	%
Skull frags.	7	6		1	1	15	.6
Mandible	31	22	2	9	7	71	3
Hyoid		1		1	1	3	.1
Loose teeth	1368	489	90	21	60	2028	78
Scapula	2	3		1	1	7	.3
Humerus	16	7	2	1	3	29	1
Radius	51	21	5	6	5	88	3
Ulna	7		2	1		10	.4
Os Coxae	9	9		1		19	.7
Femur	9	5	1	2	2	19	.7
Patella	2					2	.1
Tibia	45	29	2	8	5	89	3
Carpals	14	2	1			17	.7
Calcaneus	3	1		2		6	.2
Astragalus	11	2		1		14	.5
Centroquartal	3	2				5	.2
Other tarsals	2					2	.1
Metacarpal	20	10	6	2	3	41	2
Metatarsal	40	26	5	8	6	85	3
Metapodial	7	1	1	1		10	.4
1st Phalanx	11	7		1	2	21	.8
2nd Phalanx	7	2	1		2	12	.5
3rd Phalanx	2				1	3	.1
Cervical verts.		3			2	5	.2
Thoracic verts.	1					1	.1
Lumbar verts.	1					1	.1
Sacrum	1					1	.1
TOTAL	1670	648	118	67	101	2604	
% Loose Teeth	82	75	76	(31)	59		

TABLE 29

Fragments of Pig Represented at Burderop Down

	Layer 1	2	20	F42	Other	Total	%
Skull frags.	5	5		3	4	17	5
Mandible	16	7	1	4	7	35	11
Loose teeth	147	53	9	12	6	227	69
Scapula	1				2	3	1
Humerus	2	1		1		4	1
Radius	1					1	.3
Ulna	1	2				3	1
Tibia	4	2			1	7	2
Fibula	1					1	1
Carpals	2	1			1	4	1
Calcaneus	4				3	7	2
Astragalus	2	1				3	1
Other tarsals		1				1	.3
Metacarpal	1				1	2	.6
Metatarsal		1				1	.3
Lat. Metapodial					1	1	.3
1st Phalanx	1				1	2	.6
2nd Phalanx	4	1				5	2
3rd Phalanx	1	1				2	.6
Cervical verts.	1					1	.3
Lumbar verts.		1				1	.3
TOTAL	194	77	10	20	27	328	
% Loose Teeth	76	(69)					

TABLE 30

Percentages of Types of Element Represented in the Unidentified Large Mammal and Sheep-sized Categories at Burderop Down

	Layer					
Large Mammal	1	2	20	F42	Other	Total
Skull fragments	.5	.7	1	.6	3	.7
Teeth fragments	.6	.1				.4
Ribs	1	2	2	19	7	2
Vertebrae	.4	.7		5	.8	.6
Longbone frags.	16	17	17	11	11	16
Unknown frags.	82	79	80	65	78	12
Total	3957	1352	282	170	244	6005

	Layer					
Sheep-sized Mammal	1	2	20	F42	Other	Total
Skull fragments	.1	.3		1	2	.3
Teeth fragments	.1					.1
Ribs	1	3	1	13	12	3
Vertebrae	.3	.9		3	2	.6
Longbone frags.	85	81	91	65	66	82
Unknown frags.	13	15	8	18	19	14
Total	2959	1431	206	142	303	5041