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THE ANIMAL BONES FROM A ROMANO-BRITISH WELL AT OAKRIDGE II, BASINGSTOKE

By MARK MALTBY

INTRODUCTION

The site of Oakridge II (SU640534) lies on a gentle north-facing slope of a dry valley on the chalk downs north of Basingstoke (350 OD). Excavations during 1965–66 revealed a large settlement complex dating from the Middle Iron Age to the late Romano-British period. Features discovered included a well which was completely excavated to a depth of 87 feet 6 inches. The excavation of this well and the rest of the site has been described in the previous volume of the *Proceedings* (Oliver 1992). This report will describe in some detail the large assemblage of animal bones recovered from the well.

Full details of the stratigraphy and dating of the well can be found in Mary Oliver's report (1992). To summarise these briefly, the top of the feature consisted of a weathering cone with a diameter of 16 feet at the ground surface. The cone narrowed down to a diameter of 4 feet at about 13 feet below ground surface and continued to be this wide for most of its depth. It was slightly wider (5 feet) below 72 feet. (Subsequent descriptions of depths will be abbreviated as follows:– "67–6" = 67 feet 6 inches; "77–7" = 77 feet 7 inches and so on.)

The bottom of the shaft (85–0 to 87–6) included late 1st century AD pottery which demonstrates that the well had an early Romano–British origin. Between *c* 85–0 and 80–0 (Phase 3A), finds included large deliberate dumps of animal bones and pottery dated to the late 2nd century. A second major period of dumping was recognised above 80–0 (Phase 3B). There was a large quantity of animal bones and late 3rd/early 4th century pottery between 77–6 and 79–9. Despite the long interval between the two periods of intensive dumping, there is little evidence for natural weathering and it is assumed that the well must have been covered at this time (Oliver 1992).

The shaft does not appear to have been covered over as efficiently after the second major dumping period. Several feet of material accumulated over *c* 50 years prior to the next period of largescale dumping. Fills between *c* 77–4 and 68–9 contained chalk rubble and higher proportions of amphibians and small mammal bones and few bones of larger animals.

Between *c* 68–9 and 51–0 there was another series of deliberate depositions dating to the later 4th century (Phase 3C). In addition to large accumulations of animal bones, several human skeletons were also deposited. Above 51–0, the fill of the shaft consisted mainly of weathered chalk, within which a number of animal skeletons were encountered but there was a marked increase in small mammal and amphibian bones, which were particularly common between 36–0 and 42–0. A few further skeletons of larger mammals were located between 30–0 and 40–0 but above that faunal material was very sparse. It is possible that the contents of the well slumped after the last major infill, as organic matter deteriorated and the upper fills (above 51–0) represent mainly natural infilling that may have lasted for 2–300 years (Phase 3D). The cone at the top of the shaft contained 2nd century material probably incorporated from the collapse of a nearby enclosure ditch into the cone.

Structure of this Report

The animal bones were identified, recorded and analysed at the Faunal Remains Unit (FRU), Department of Archaeology, University of Southampton in 1988. The full report of this work was submitted to the Ancient Monuments Laboratory of English Heritage. That report is too lengthy and detailed to be reproduced in full as printed text in this volume. The report and its supporting 35 Figures and 50 Tables has, however, been reproduced in microfiche form for this volume and is available to those who wish to seek further details. Tables and Figures referred to in the current discussion are as numbered in the microfiche report. The report which follows will concentrate mainly on the major conclusions of the analysis supported by summary discussions of the assemblages of the different species represented.

Methods of Analysis

The mammal bones were identified by the author using the comparative collections of the FRU. Most of the bird bones were identified by Jennie Coy using both the FRU's collections and those of the Natural History Museum at Tring. Methods of recording, counting and analysis employed are described in the microfiche report.

Distribution of the Bones

Table 1 lists the number of fragments identified, their approximate weight (in grams), the weight of the unidentified fragments and the total weight of animal bone fragments for each of the 116 depths where animal bones were recorded. Excluding 291 fragments that could not be assigned to depth (some were unmarked and in unlabelled bags; others were wrongly labelled), 24,426 identified bones were recorded. These weighed over 168 kg. In addition, over 44 kg of unidentified fragments were recorded.

There was a great deal of variability in the weights of bone recorded at different depths. For example, over 10 kg of animal bones were recorded at some depths (57–0; 59–6; 77–7; 78–0). These marked the peaks of two dense accumulations of bones. Other parts of the shaft, however, produced very low figures. Above 29–0, animal bones were rarely encountered at all. Apart from a red deer antler at 17–0, and a pair of cattle mandibles and other fragments at 9–3, no significant finds of animal bones were recorded. The weights of bones recovered from the rest of the shaft (below 29–0) are illustrated in Figure 1.

The results show marked variability in the distribution of the bones. Major accumulations were found below 75–0, and particularly between 77–6 and 79–9 (Table 1). Relatively large weights were also recorded between 80–0 and 84–9. Bone weights decreased dramatically between 70–0 and 74–9. There was a concentration of bones at 67–4, which was the major reason for the increase of weights between 65–0 and 69–6 (Figure 1) but bone weights did not begin to rise again consistently until about 63–6. In the zone above that, stretching to about 52–6, there was another major concentration of bones. Between 40–0 and 49–9, however, negligible weights of animal bones were recovered and, although higher weights were recorded between 29–0 and 39–9, these were insignificant in comparison with the two major concentrations of bone lower down. Unidentified fragments tended to provide a greater proportion of the weights of bones in the fills below 75–0 (Figure 1).

The analyses of the distribution of animal bones in the well suggest that there were two major zones filled with dense accumulations of bones of the major domestic species. More detailed analysis discussed in subsequent sections will demonstrate that there were significant differences in the contents of these assemblages. The analyses here also showed that evidence for largescale dumping was not found above 50–0 and there was an increase in the proportion of bones of wild animals above 55–0. Unidentifiable fragments were better represented in the lower fills and their distribution supports the view that the vast majority of them belonged to the major domestic species.

The Species Represented

Table 2 lists summarises the numbers of fragments identified to each species or, in some cases, groups of species, together with minimum number estimates. It shows that the 24,717 fragments belonged to a minimum of 840 animals and at least 38 species were represented. Fragment counts demonstrated the importance of five domestic species (cattle, sheep, goat, pig and dog), although the number of dogs represented, in particular, was inflated by the presence of large numbers of neonatal mortalities. In fact, small mammals and amphibians were the best represented animals in terms of minimum numbers estimates, providing 58% of the individuals represented. Given the probability that the small bones of these animals are certainly considerably under-represented because of retrieval bias, their original numbers must have been much higher.

Preservation of the Bones

Bones recovered from below the water table at 73–9 were consistently stained a dark brown colour typical of the preservation of bones in such waterlogged conditions. Such staining was not encountered at depths above 74–0. The distribution of bones bearing evidence of carnivore gnawing marks (Table 3) shows that the incidence of gnawing was very low. Only 115 fragments bore any evidence. This demonstrates that most of the bones were deposited in the shaft without previously being accessible to scavenging animals, particularly dogs.

The only notable group of gnawed bones was found between 60–6 and 61–8. 40 sheep/goat bones were affected. All the bones which bore chewing marks in this group were either mandibles, metapodials or phalanges. It appears that a group of at least ten limb extremities had been accessible to dogs prior to disposal. Damage, however, was generally slight.

Apart from two bones from the weathered cone of the shaft that were probably redeposited from other features, no gnawed bones were observed above 45–0. Apart from the sheep/goat bones already described, the incidence of gnawed bones was minimal until 77–7. Even there the gnawed fragments contributed well under 1% of the total number of fragments of the major domestic species. Only below 80–0 is there any suggestion that a slightly greater proportion of the bones had been scavenged prior to deposition.

The species and types of element bearing gnawing marks are given in Table 4. The totals include two bones which had marks characteristic of rodent gnawing; a cattle tibia from 64–10 and a cattle mandible fragment from 82–4. Most of the 50 observations of gnawing on sheep/goat fragments were found between 60–6 and 61–8. No bones specifically identified as goat bore gnawing marks, whereas 13 definitely belonged to sheep. Most of the gnawed cattle elements were from upper limbs and most were found below 77–7. The horse assemblage included a higher percentage of gnawed fragments than the other domestic species.

The distribution of burnt bones was even more restricted. None were found above 77–7 and only 47 cases were observed in all (Table 3; Figure 3). All seven charred fragments from 77–7 were bird bones and they may have been from one domestic fowl skeleton. Nine further burnt bird bones were recorded between 78–0 and 79–6. Only domestic fowl was identified. Five bones of dog were burnt between 78–0 and 78–2. These too could all have been from the same animal. A calcined cat calcaneus was found at 78–6. All the remaining burnt fragments were either from sheep/goat (five cases) or were unidentifiable fragments from sheep-sized mammals (20 cases). These were all located below 78–0 and mostly below 80–0, from where burnt bones formed a slightly higher proportion of the total assemblage (Figure 3). If the incidence of burnt bones in any way reflects the presence of domestic rubbish (eg bones burnt on hearths during cooking, or thrown away onto a fire), it can be inferred that there was very little dumping of domestic refuse in this well. What little there was tended to be deposited during the earlier infilling of the shaft.

The general preservation of the bones in the well therefore, was excellent. The assemblages have suffered little damage from scavengers or burning and almost none from weathering. On the other hand, there was severe fragmentation of the bones in the lower fills. The effects of this will be discussed in subsequent sections. The vast majority of the assemblage of the larger species was dumped directly into the well.

THE CATTLE ASSEMBLAGE

Porous and Very Porous Bones

5,066 fragments of cattle were recorded from the well. These included 801 very porous bones and associated teeth which belonged either to neonatal mortalities or foetal skeletons. A further 420 bones were recorded as porous and belonged to juvenile animals probably under six months old and considerably younger in most cases. A minimum of 10 foetal, neonatal and juvenile calves were represented.

Very porous bones were only found at depths of 56–3 and lower. Their main distribution lay between there and 63–6. Smaller groups were found between 66–11 and 67–9 and near the bottom of the shaft between 84–4 and 85–1. The major concentration lay at the depth of 59–6, from where 309 bones and teeth were recorded (Table 5; Figure 4).

The two groups of very porous bones between 63–0 and 63–6 and between 66–11 and 67–9 each belonged to one animal. In both cases the bones were of such a small size and porosity that they could only have belonged to relatively undeveloped foetal skeletons. 41 of the bones from 62–0 also belonged to one foetal skeleton and it is possible that the 15 bones from 61–4 could have belonged to that skeleton. Nearly all the very porous cattle bones from 60–9 belonged to another individual at about the same stage of foetal development. A few bones of the same animal may be represented amongst the bones from 60–6 but most bones from that depth belonged to a more developed calf skeleton, although this too may still have been part of a foetus. Because of the admixing and fragmentation of the calf bones from 59–6, it was impossible to assign all 309 bones to different individuals, although at least five animals were represented. Two skeletons were more developed than the others and bones from the larger of these were also found at 59–3. This animal, at least, may have been a neonatal mortality rather than a foetus. The groups of very porous bones from 58–10 and 57–6 together with other bones scattered between and above these depths could all have belonged to two individuals.

The main distribution of porous cattle bones was situated between 56–3 and 57–9, a little higher up the shaft than the main concentrations of very porous bones (Table 5; Figure 4). Most of the bones from 57–6 and 57–9 belonged to the same individual but unfortunately no tooth ageing evidence was obtained. 200 porous bones and associated teeth were recorded from 57–0. These were from the skeletons of at least four animals. Two mandible fragments bore tooth eruption data. These belonged to one or more juvenile animals, possibly up to six months old. Most of the other bones from this depth appear to have belonged to animals at a similar stage of development. At least one of these skeletons had been butchered.

The porous bones from 56–3 included several associated bones, which could have belonged to the same individual. Five of these bones bore evidence of butchery as did two of the porous bones amongst those scattered above 56–3.

The porous and very porous cattle bones recorded between 54–0 and 62–0 provide an interesting sequence. The least developed foetal skeletons were confined mainly to the lower levels of the sequence and the skeletons tended to become larger and less porous higher up the well and some juvenile animals butchered for their skins and meat appear at the top of the group. Given the density of deposition of cattle carcases in this part of the shaft, it is probable that these bones were deposited over a short period of time. If the cows to which the foetal skeletons belonged had conceived at about the same time of year, it is possible that the sequence covers a period extending through the later stages of their pregnancies to a time when their calves were a few months old. If this is correct, this episode of dumping may have taken place within a year. Cows can be put to the bull after any previous lactation period has ended. The oestrous cycle, at least in modern breeds, is such that they could produce calves at any time of year. However, it is possible that bulls may have been only allowed to run with the cows for a limited period of the year with the result that most calves were born at about the same time after the 9.5 month gestation period. The association of the concentration of newborn cattle at the same depths as well-developed foetal or neonatal skeletons of sheep (see below) may suggest that the calving period was timed for the spring or early summer.

The porous cattle bones from the lower levels of the well (below 77–6) all belonged to juvenile or neonatal mortalities rather than foetuses. The sample was biased towards bones of the head and limb extremities.

Other Cattle Bones

Non-porous cattle bones and loose teeth provided 3,845 fragments, (Tables 7–8). The distribution was similar to that of the non-porous cattle bones. 61% of the fragments were found between 55–0 and 64–10. There were also relatively large numbers between 50–0 and 54–9, 65–0 and 67–3, and 77–7 and 86–0. Apart from one group of bones around 37–0, cattle fragments were rarely encountered in the top 50 feet of the well. They were also found only in small numbers between 67–6 and 77–6. Simple counts of bones can be misleading. The cattle bones below 77–6 tended to include a greater proportion of fragmentary specimens, which has tended to inflate their importance.

The relative abundance of different types of cattle bone represented varied in different parts of the well. In general, there was a bias towards bones of the head and limb extremities (Table 8). At depths below 77–6 there was a relatively even distribution of the major limb bones, skull and mandibles, although there were some indications that the upper limb bones were often dumped separately. The bones were more fragmentary than higher up the shaft and smaller bones tended to be under-represented.

The major distribution of cattle bones lay between 54–0 and 68–0. In the lower part of this zone, there was a heavy bias towards bones of the limb extremities, head and tail. These represent the deposition of bones surplus to food requirements removed during the initial skinning and butchery of cattle. The relatively few good quality meat bones represented bore abundant butchery evidence which indicated that meat had been filleted from them before they were dumped.

Between 54–0 and 59–6, in addition to further primary butchery waste from cattle of all ages, at least three relatively complete adult cattle carcases were represented. There is little evidence for butchery on these bones, although the carcases seem to have been disarticulated to enable them to be deposited down the shaft. The animals were probably too large to have been victims of falls.

Above 54–0 cattle bones were found only occasionally apart from a group around 37–0 that consisted of the bones of the tail and feet of one animal.

Calculations of the minimum number of individuals represented by each anatomical type (excluding porous bones) also reflected the uneven representation of different parts of the skeleton (Table 8). Calculations for the skull, mandible and metapodials all fell between 33 and 36 individuals. Figures for the upper limb bones ranged from only 11 (tibia) to 22 (humerus).

Further details of the bones represented in the cattle assemblage can be found in the microfiche report.

Butchery Data

The incidence of observed butchery marks on each type of cattle element is given in Table 10. The figures demonstrate that the bones found between 60–0 and 64–10 were more heavily butchered than those found in other parts of the well. The greatest concentration of butchered bones stretched from 59–0 to 67–4. The comparatively small percentage of butchered bones found in the zone immediately above this supports the view that several largely complete and unbutchered carcases were dumped here. Knife cuts and chop marks were also rarely encountered below 77–6, despite the greater degree of fragmentation.

The study of butchery marks lends insights into how cattle carcases were processed at Oakridge. Recent research has demonstrated marked variability in butchery techniques on cattle skeletons in the Romano-British period in Hampshire (Maltby 1989). Generally, cattle carcases on urban sites appear to have been more intensively processed for their meat and marrow, mainly through the use of heavy implements such as the cleaver and saw. Samples from rural settlements have displayed more variable techniques of butchery, with knife cuts more common than on urban sites.

Detailed discussion of the butchery evidence from Oakridge can be found in the microfiche report.

Ageing Data

Table 11 gives details of the tooth ageing evidence from cattle mandibles in the well, using Grant's (1982) system of recording. At least 12 of these mandibles formed pairs. Taking these into account, the mandibles of at least 16 (57%) of the 28 animals represented had fully developed cheek tooth rows and belonged to cattle probably over four years old. This figure is comparable to the late Roman samples at Owslebury (65%) but is significantly lower than in the later Roman deposits at Winchester (77% – Maltby nd 1). At both Oakridge and Owslebury a significant proportion of the animals represented by the ageable mandibles belonged to almost full grown but still immature animals. These presumably were not required as working or breeding stock. The greater emphasis on older cattle in Winchester (and at other Roman urban sites) may reflect the marketing patterns of cattle, in which animals of particular age groups were slaughtered for consumption in the towns. The cattle mortality pattern represented at Oakridge is similar to other rural Romano-British samples from Hampshire, in which, although the majority of the cattle were allowed to reach maturity, a significant proportion of immature animals were also culled. However, the results from Oakridge must be treated with caution since there is no way of determining whether the animals in the well represent a typical pattern of slaughter. In addition, the foetal and neonatal skeletons were poorly represented in the tooth eruption data.

Metrical Data

The excellent preservation of the cattle bones and the lack of damage inflicted by scavengers meant that a much higher proportion of cattle bones were measurable than is usually the case in archaeological samples. Analysis of the bones from below 77–6 was handicapped by their more fragmentary nature but the major dumps of cattle bones between 52–0 and 67–6 contained many complete bones suitable for metrical study.

The complete state of many of the limb bones meant that it was possible to estimate the withers heights of these animals. The results showed that most of the cattle had withers heights of less than 125 cm. The figures from the upper limb bones indicate that the complete carcases of cattle represented between 52–6 and 57–6 were all from animals with withers heights of about 110 cm, at the lowest end of the size range. Three radii from below 77–6 all belonged to substantially taller animals of 128, 130 and 143 cm.

The distribution of withers height estimates is similar to that encountered in 3rd–4th century AD contexts at Owslebury (Maltby nd 1), although the samples from Oakridge had relatively fewer animals of over 120 cm (21%) than at Owslebury (35%) or in the sample from the Winchester Northern Suburbs (39% – Maltby nd 2).

The presence of large numbers of complete metapodials allowed comparisons to be made between length and breadth measurements. The relationship between these displays a marked degree of sexual dimorphism in modern breeds and a number of attempts have been made to discover these divisions in archaeological material (see Grigson 1982 for discussion of the problems of these measurements).

Analysis of complete metapodials clearly divided the bones into two main groups. The larger group consisted of more slender bones which are likely to have belonged to cows. Most of the measurements were tightly clustered and represented at least nine animals. The uniformity in size might indicate that the cows were closely related, possibly even from the same herd. As all but one of these specimens was found between 53–0 and 63–6 – the zone where major concentrations of cattle bones were dumped probably over a short period of time – this explanation seems plausible.

Stouter bones probably belonged to steers or bulls. These were slightly outnumbered by the more slender bones assigned to cows (Table 12). The results do not take into account bones with unfused epiphyses which belonged to immature cattle.

Analysis of the measurements of the upper limb bones was designed to test further whether there was a significant difference in the ratio of male and female cattle in different parts of the well. It is known that the breadth of the bones of bulls are often substantially larger than those of cows in the same population. Although little work has been done on the effects of castration, it is assumed that the bones of steers would also tend to be broader than those of cows. Breadth measurements on different limb bones (Figure 16) showed consistent results, although samples in each case were small. More broader specimens were recorded from below 77–6. It is suggested that most of these specimens belonged to steers or bulls, which seem to be better represented in the earlier fills.

Pathological Bones

The concentration of cattle bones between 52–6 and 68–0 included the remains of several unbutchered carcases and evidence for the slaughter (or natural deaths) of pregnant cows provided by the presence of foetal skeletons. In both cases this appears to run contrary to sensible exploitation practices. Valuable sources of meat were not utilised whereas breeding stock were apparently slaughtered and butchered. This may suggest that some of the cattle died of disease. Unfortunately only a minority of diseases produce skeletal abnormalities and observations of pathological conditions did not produce clear patterns. It is true that 52 cattle bones between 54–0 and 62–0 did have some abnormalities compared to only four observations from below 77–6. However, 36 of these were found on carpals, tarsals and phalanges, which were poorly represented below 77–6. Consequently the contrast may largely be a result of assemblage variability. Most of the pathology on phalanges consisted of abnormal extension of the articular surfaces and exostoses around the periphery of the bones. Several specimens also had grooving of the articular surface. These traits are diagnostic of osteoarthritis. At least three of the cattle in this group suffered from this. The distal articular surfaces of three metacarpals and three metatarsals were also affected by this condition and probably belonged to the same animals. Another metatarsus bore evidence of osteoarthritic deformation on its proximal articular surface. Osteoarthritis is a degenerative disease commonly resulting from constant trauma to the joint which speeds up the normal ageing process. This may suggest that these cattle were working animals but other explanations are possible (Baker & Brothwell 1980: 115). Two possible cases of osteoarthritis were noted in the assemblage from below 77–6; the first was on the distal articular surface of a metacarpus (83–4) and the second on the distal articular surface of a humerus (83–8). The bones may have belonged to the same animal.

There were three cases where one or more of the tarsals had fused with each other and/or the proximal articular surface of the metatarsus (at 37–0, 54–9 and 59–6). No evidence for the degeneration of the joint surfaces was noted and the fusion was the result of the growth of bone around the articulation. The condition is typical of spavin (Baker & Brothwell 1980, 117–20), which principally affects the tarsus of horses but has also been observed in draught cattle. Again the presence of this condition suggests that some of the mature cattle in this group were working animals. Perhaps significantly, of the nine metapodials displaying signs of osteoarthritis or spavin, six had dimensions that suggested that they belonged to steers or bulls and only three fell into the female size range.

THE SHEEP AND GOAT ASSEMBLAGE

5,899 fragments of sheep and goat were recorded. The skeletons of these species are quite similar and it was impossible to assign all bones to species. Distinction between sheep and goat is easier to assess on some bones and it was possible, at least on most of the non-porous bones, to differentiate between sheep and goat on the skull, metapodials, scapula, humerus, radius, ulna, femur, calcaneus and third phalanx, provided that the fragments included the parts of the bone where morphological distinctions are apparent (see Prummel & Frisch 1986 for a recent discussion of sheep and goat distinctions). In certain cases ovicaprid bones belonged to clearly defined complete or partial skeletons and this enabled the identification to species of elements usually difficult to differentiate.

Porous bones are considered separately from other bones. Some of these were very porous and may have belonged to foetal skeletons but most of them probably represent neonatal mortalities, judging by their size and the development of the mandibular teeth. Most of the porous bones belonged to animals under six months old. The distribution of all sheep and goat bones is shown in Table 13.

Goat

A minimum of 363 fragments belonged to goat. The distribution of bones positively identified as those of goat is shown in Figure 17. Most of the bones were associated with clearly defined skeletons. The first of these was scattered between 29–0 and 34–0 and consisted of 82 fragments. This goat was probably about 4–7 months of age at death. Butchery marks were found on six bones of its skeleton and it seems to have been at least partially processed for meat. Futher details of this butchery can be found in the microfiche report.

Apart from a humerus at 38–6, which was from an unusually robust animal and may have been intrusive or mislabelled, no goat bones were identified until 51–9. Between there and 57–0, 33 bones were recorded. Several of these were clearly associated and could all have been from the same carcase. Other ovicaprid bones in the vicinity could have belonged to this immature goat, which may have originally entered the shaft as a complete carcase. No evidence of butchery was noted on any of its bones. A pair of very porous goat metacarpals probably from a neonatal mortality were also found at 56–3. The metatarsal of another kid was recorded at 57–0.

The next set of goat bones was found between 64–5 and 65–2 amongst quite a large group of ovicaprid bones. The 29 elements identified as goat (Table 14) were all from the limbs of one animal. Several of the ovicaprid carpals and phalanges in the vicinity probably also belonged to this carcase. No mandibles, however, were recovered and so estimates of age had to rely on the much less reliable epiphysial fusion data. These indicated that the skeleton was from an immature goat probably aged between one and three years old.

Another 23 goat bones were identified between 65–6 and 68–0. Nearly all these bones were from the head or feet. These included the metacarpals from at least two individuals. A complete skull, mandibles and hyoids were recovered from 68–0. Toothwear data indicated that this animal was probably a little under a year old. The presence of butchered bones amongst this group and a bias towards the head and limb extremities (Table 14) is consistent with the rest of the ovicaprid assemblage in this part of the well.

The most complete skeleton of a goat was found between 68–8 and 69–3 and consisted of 123 fragments (Table 14). The animal was probably slightly older than the one represented at 68–0 and may have been 12–15 months old. There was no evidence that this carcase had been butchered. The horn cores indicated that the animal was female and it may have been associated with the foetal skeletons discussed below.

Another partial goat skeleton was represented by 65 fragments between 72–0 and 73–2. All parts of the body were represented but smaller elements were comparatively scarce (Table 14). This goat died under three months old. There was no evidence of butchery.

Only five bones of goat were identified between 75–9 and 78–0 out of a total of over 1,500 ovicaprid fragments. None at all were identified below that (Table 13; Figure 17). Goat carcases were therefore not included in the largescale dumping episodes evident in that part of the shaft. In the well as a whole, a minimum of seven goats were represented by the assemblage, excluding porous bones (Table 16). Because of the immaturity of most of the goats represented, little metrical analysis could be undertaken. No evidence of pathology was noted.

Sheep / Goat Porous Bones

488 fragments were recorded as porous or very porous. Usually, it was impossible to identify these to species, particularly in cases where the bones were very porous. The large majority of the bones probably belonged to sheep, particularly below 74–0.

The distribution of porous bones was relatively restricted and fell into four main groups (Figure

18). The highest of these was at 42–6, where 19 bones from at least two lambs or kids were recorded. The second group was located between 54–2 and 60–6 and consisted of 116 fragments, including four of goat already discussed. Of the remainder, 18 bones were identified as sheep. 41 fragments were classified as very porous and probably belonged to neonatal (or possibly foetal) mortalities. Most of these were found at 57–0, 57–9 and 60–6. Very porous bones were less common at 56–3 and above. Five porous mandibles bore tooth eruption evidence. The lambs represented by three of them (located at 55–0 and 55–9) were possibly about three months old. The other two (located at 57–0 and 57–9) were at most no more than a few weeks old. Morphology of the deciduous teeth (Payne 1985) indicated that all the mandibles belonged to sheep. The evidence suggests that these animals may have been deposited over a short period of time. The sequence matches that of the cattle porous and very porous bones and suggests that most of the bones now located between 54–0 and 60–0 were originally deposited during the spring and early summer.

Apart from a skull fragment at 67–9, the next record of porous bones was not found until 68–8, where 38 bones were recorded. These bones were very small and porous indeed and may well have been the bones of two foetal skeletons associated with the immature goat skeleton located at the same depth. The metapodials of these bones displayed the characteristically stocky build of goats.

Most of the porous sheep/goat fragments were found below 74–0 in the zone where ovicaprid fragments in general were most abundant. The porous bones between 74–0 and 74–6 may all have belonged to the head and feet of one lamb (Table 15). The bones represented suggest that this animal had been butchered and these bones separated from the main meat-bearing parts of the carcase. Mandibular tooth eruption data indicated that the animal was a lamb probably under three months old (Table 20). Eight bones from 75–9 belonged to another juvenile. Two very porous bones from 76–8 belonged to a neonatal or possibly a foetal skeleton.

It was impossible to assign porous bones to individual skeletons amongst the mass of sheep/goat fragments below 77–6. There was a fairly even distribution of the major elements (Table 15). Smaller bones were under-represented, probably due to a combination of retrieval and preservation bias. There was, however, no major bias towards bones of the head and feet, which was characteristic of the non-porous assemblage. This implies that usually whole carcases of neonatal and juvenile animals were deposited. A minimum of nine animals were represented by porous and very porous bones in the well.

Other Non-Porous Sheep and Goat Bones

The remainder of the sheep/goat assemblage consisted of 5,056 fragments. This total includes all bones identified as sheep and bones that could not be identified to species. It excludes bones positively identified as goat (Table 14) but it is probable that some goat bones are also included in this assemblage. However, the vast majority probably belonged to sheep, particularly in deposits below 75–0, from where very few positive identifications of goat were made (Table 13; Figure 17).

Bones of sheep were, however, rarely identified in the top 48 feet of the well. A few sheep/goat fragments, mostly loose teeth, were encountered in the cone of the collapsed shaft at the top of the well. The first major group of sheep bones consisted of 69 fragments of a skeleton of an immature animal located between 49–3 and 51–9. Most parts of the body were represented and no evidence of butchery was found. The animal was probably a little under a year old. 29 bones from two of the feet of an older sheep were represented between 49–3 and 51–9. This assemblage was fairly typical of the rest of the sheep/goat sample. There was, on the one hand, a bias towards bones of the feet and head (Table 18). These were the remains of primary skinning and butchery waste and, as in the case of cattle, many of these heads and feet probably belonged to the same animals. In addition, there were a number of more complete skeletons, mostly of younger animals. Relatively few of the bones of the trunk and upper limbs were found in isolation. However, because of the admixing of the bones, it was often impossible to assign bones to specific individuals.

Detailed analysis of the distribution of different elements and butchery data is contained in the microfiche report. The results showed that the heads and feet of sheep were deposited in large numbers below 75–0. The major concentrations of these bones lay at 77–7 and 78–0. They represent the waste from primary butchery or skinning activities, which must have been carried out either on a large scale or over a relatively long period of time in the vicinity. On occasions, more complete sheep carcases were deposited but there is little evidence that these had been butchered prior to disposal.

Most of the sheep represented between 60–0 and 67–9 consisted of the remains of heavily butchered carcases, including vertebrae and upper limb bones deposited after processing for meat. There was, however, a continuing bias towards head and foot bones.

Ageing Data

Tooth eruption and wear data were obtained from 83 mandibles, which included at least 10 pairs (Table 20). These were divided into seven stages of eruption and wear, the results of which are summarised in Table 21.

No ageable mandibles of neonatal or juvenile mortalities were recovered from below 75–0 (Stages 1–3). This may partly be due to poor preservation as porous bones were found in these fills, albeit in relatively small numbers. Old animals (Stage 7) were only found below 75–0.

Throughout the fills, mandibles at Stage 4, probably belonging to animals mainly aged between 18 and 24 months, were the most commonly recorded. These were at an age and size suitable for culling for meat. The sample from above 75–0 had relatively more mandibles at Stage 5 (*c* 24–36 months), whereas the sample from below 75–0 had more specimens at Stage 3. Again, it is not certain whether this is indicative of longterm changes in sheep mortality patterns because the sample from above 75–0, in particular, may be atypical because of the probable short period of deposition.

This discussion has assumed that all the mandibles belonged to sheep. Goat mandibles are listed separately (Table 21) and most were at Stage 3. It is possible, however, that one or two of the older mandibles could have belonged to goats.

Metrical Analysis

A relatively large number of metapodials were available for metrical analysis. As an introduction to this study, it is probably best to first summarise the results obtained from recent studies of samples from Winchester and Owslebury, in order to set the sample from Oakridge in a regional and chronological context. At Owslebury, nearly all the sheep represented prior to the 3rd–4th century AD were of a small, horned variety. Although the average size of 1st–2nd century AD specimens was larger than in the Iron Age samples from the site, it was not until the later Romano-British period that a number of sheep of a larger type were found. These were hornless and possessed metapodials that had measurements that formed a separate group from other contemporary and earlier specimens from the site (Maltby nd 1). In Winchester, however, various studies have indicated that hornless sheep were present from the early Roman period. Metrical analysis of the late Roman samples from the Northern Suburbs showed that the average size of the sheep was greater than at Owslebury (Maltby nd 2). The results were consistent with earlier study of sheep sizes in Winchester by O'Connor (nd). Consequently the evidence from Southern Hampshire has suggested that there were both chronological and inter-settlement variations in the size and type of sheep represented. This may in some way have been related to the role of Winchester as a market centre. Although Oakridge is nearer to Silchester than Winchester, making comparisons with samples from the former town more relevant, the metrical data are valuable additions to the investigation of sheep sizes of the period in Hampshire in general.

Initially, the metapodials were split into two groups, using the 75–0 mark as the dividing line. Observations showed that most specimens below 80–0 had a different distribution, and so these were analysed separately.

Specimens from below 80–0 tended to be amongst the smallest represented but one specimen did produce a proximal breadth measurement of over 23 mm. The small size of most of the specimens in this group may reflect the earlier origin of the material. The major group above 80–0 contained a few specimens as small or smaller than in the former sample but most had breadths of over 21 mm. There was a suggestion of bimodality in the distribution with a dip in the number of specimens with breadths between 22 and 22.4 mm. This contrasted with the group of bones from above 75–0, which had a narrow distribution ranging only from 21.5 to 22.7 mm. This suggests that the last group may have been obtained from a more limited population of sheep, possibly even from the same flock. This would support the evidence that the deposition of many of the bones occurred over a short period. It parallels the results from the metrical analysis of cattle metapodials.

The distribution in sizes of the main group of metacarpals between 75–0 and 79–9 has similarities with the distribution of 3rd–4th century AD specimens from Owslebury (Figure 24). There, the largest specimens were clearly associated with hornless skulls. At Oakridge, skull fragments from nine horned and 12 naturally polled sheep were recorded between 75–0 and 79–9. It is tempting to suggest that the indication of bimodality in the metacarpus measurements reflects the presence of two varieties of sheep. However, this interpretation may be oversimplistic as it does not take into account possible sexual dimorphism (both in horncore presence and in metacarpal size). It is interesting to note that all 23 sheep skull fragments from above 67–0 that possessed the relevant part of the frontal bone had horncores. No polled skulls were found above 74–6. Most of the fully-developed horncores in this group bore characteristics of ewes, although at least one male was also represented. A horned skull probably of a ram was found at 85–1 and, in all, four horned and four polled specimens were recorded below 80–0.

O'Connor (nd) has demonstrated the wide range of variability in Romano-British sheep. The Oakridge sample spans most of this range but some of the analyses did indicate that there was a pattern to this variability. More studies need to be undertaken to find explanations for this variability. It is likely that both sexual dimorphism and the presence of sheep of different genotypes were factors. The Oakridge material will provide a valuable collection of data for comparison with other Roman sites in Hampshire when they become available.

Pathology

Apart from the overcrowding and malocclusion of cheek teeth in a number of jaws, the incidence of pathological abnormalities in the skeletons of sheep and goat was low. One case of an abscessed tooth was noted but no observations of periodontal disease were made and only a few of the limb bones bore evidence of minor trauma.

THE PIG ASSEMBLAGE

2,610 fragments of pig bones and loose teeth were recorded. Most of these formed relatively complete skeletons of immature and neonatal or possibly foetal animals. In this case the very porous bones of the foetal and neonatal skeletons will be considered separately from the other bones.

Foetal or Newborn Skeletons

The 916 very porous fragments and associated teeth were mainly concentrated between 55–0 and 62–0, with large numbers at 59–6 and 60–6. At least 10 animals were represented at both depths (Table 23). Judging from their size and porosity, most of these probably belonged to neonatal mortalities as opposed to foetuses. In each case most or all of the pigs could have been from the same litter. A small number of very porous bones were recorded below 77–6 but no more than one animal was represented in those levels. The bones represented (Table 24) show a bias towards the larger limb bones because of factors of differential retrieval, survival and ossification. A minimum number of 20 animals were represented by humeri fragments.

Other Pig Bones

The remaining 1,694 pig bones belonged mainly to the skeletons of juvenile and immature animals. They were clustered in several groups. The largest of these was found between 37–0 and 41–0 and represents the remains of five pigs (Table 23; Figure 27). It was not possible to separate all the bones of the different skeletons but at least five animals were represented by skull fragments, mandibles and all the major limb bones. Smaller bones and more fragile elements were less well represented but were present in sufficient numbers to suggest that the carcases were complete.

Tooth eruption data were obtained from the mandibles of all five pigs (Table 26). In two cases they belonged to animals no more than a few weeks old; the next youngest animal was represented by mandibles that belonged to a pig probably aged 4–6 months old; another pair of mandibles probably belonged to an animal aged 7–11 months old; finally, a pair of mandibles were from an animal slightly older than the last.

No evidence for carcase processing was found on any of the bones. Several explanations for the presence of such skeletons can be suggested. One possibility is that the animals were simply victims of falls down the shaft after the well had been abandoned and the contents had settled. The group was located at levels which included the densest concentrations of small mammals and amphibians, which were undoubtedly victims of falls.

The next concentration of pig bones was more scattered and stretched from 47–0 to 63–6. Most of the bones lay between 54–0 and 55–3 (Figure 27) and the relatively complete skeletons of three animals were represented by them (Table 25). A pair of mandibles from 54–0 probably belonged to an animal of about 7–11 months old and the other pigs probably died at about the same age. A pair of maxillae and an associated mandible from 54–2 belonged to an older pig aged between one and two years old.

The practice of separating the head and feet of pigs from the rest of the carcase was particularly apparent between 55–6 and 63–6. Vertebrae, ribs and upper limb bones were poorly represented (Table 25). Heads and trotters had been discarded after initial processing. Two pairs of mandibles in this zone provided tooth eruption evidence which showed that these animals may have been about 18–24 months old at death (Bull & Payne 1982). They were at an age and size that pigs were commonly culled on other Romano-British sites in Hampshire (Maltby nd 1).

A relatively complete skeleton of a young pig was found between 73–0 and 74–6 (Table 25). There was no evidence of butchery and, although some of the bones were fragmentary, such breakage could have occurred after deposition. The animal was probably 7–11 months old.

Between 75–6 and 78–6, 239 pig bones and loose teeth were recorded, mainly at 77–7 (Table 23). Most of these belonged to the skeletons of two animals, both of whose carcases had been processed. Butchery marks were found on eight bones (details in Microfiche report). Foot bones were under-represented, although fragments of their skulls and mandibles were found (Table 25). The animals were again probably under a year old at death.

Most of the pig bones from the lowest fills of the well were found at 79–6 (Table 23) and consisted mainly of lower limb bones (Table 25). It is likely that many of these bones belonged to the same individuals. It is indeed possible that some of them could have been the foot bones removed from the carcases represented between 75–6 and 78–6. However, at least one older pig was represented in these layers. A maxilla from 84–4 and a mandible of a sow from 85–1 both possessed fully erupted toothrows and had heavy wear on some of the teeth. These belonged to adult animals.

A minimum of 12 individuals were represented by the non-porous and porous pig bones (Table 25). The high proportion of relatively complete skeletons amongst the pig remains is reflected by the similarities in the minimum number calculations obtained from the major skeletal elements. However, probably no more than five of the pigs bore any evidence of carcase processing. Most of the skeletons were situated at levels where little evidence for the disposal of butchery waste of any species was found. It can be concluded that relatively few pigs were slaughtered during the periods when the shaft was used for the disposal of butchery waste. However, the presence of newborn animals does suggest that at least some pigs were kept in the vicinity. Metrical analysis produced little information because so few bones had attained their full size.

THE DOG ASSEMBLAGE

Dog bones formed a major part of the faunal assemblage from the Oakridge II well. Altogether, 4,919 bones and teeth were identified. Dogs of all ages were represented. Newborn skeletons represented by very porous bones will be treated separately from the other remains.

The Neonatal or Foetal Skeletons

1,781 very porous bones were recorded. Once again we are faced with the problem of whether these belonged to neonatal or foetal skeletons. Most of the bones had developed as much as those of the skeletons of newborn dogs in the Faunal Remains Unit collections and it is therefore considered that they were neonatal mortalities. These were distributed in clearly defined groups in the shaft (Table 27; Figure 28). An isolated group of 187 bones from at least ten puppies was found at 42–6. These may all have belonged to animals of the same litter. The major concentrations, however, were found between 51–9 and 60–9, from where 1,349 bones were identified. The peak of this distribution lay between 57–0 and 58–0. At least 22 animals were represented at 57–9 and 18 at 57–0. This concentration must represent the deliberate disposal of several litters. A smaller group of very porous bones was centred around 65–6. Again all of these bones may have belonged to animals from the same litter. Below this, although very porous bones were found at several depths, they were not recovered in great numbers, although at least ten individuals were represented at 78–0 and seven more at 79–6 (Figure 28).

There is of course no guarantee that all of even the best represented elements were recovered. Consequently the estimation that at least 87 neonatal puppies were present in the shaft should be regarded as the absolute minimum.

The disposal of so many newborn dogs suggests that their numbers were controlled. This sometimes resulted in the destruction of complete or substantial parts of litters. Parallels for this have been found on other sites in Hampshire. At Owslebury, for example, several late Roman cess pits were used for the dumping of newborn puppies along with other carcases (Maltby nd 1). Several newborn puppies were also found in one of the later Roman wells discovered during excavations of the Northern Suburbs of Winchester (Maltby nd 2). Well shafts and deep pits were clearly favoured for the disposal of unwanted puppies.

Other Dog Bones

3,138 other fragments of dog were identified. These were derived from at least 29 animals of varying age and size. The distribution of these bones is shown in Table 27 and Figure 29. It is clear that most, if not all, of these dogs entered the well as complete animals (dead or alive) and it was possible to assign most bones to individual skeletons in the upper part of the shaft. However, the dense concentration of bones below 77–6 meant that it was impossible to assign many of the bones to individuals, although there were several instances where substantial parts of skeletons could be reconstructed.

Details of all the dog partial and complete skeletons can be found in the Microfiche report. Epiphysial fusion data indicated that although most of the dogs represented in the well were skeletally mature, at least 10 had died before all their limb bone epiphyses had fused (in addition to the neonatal mortalities – Table 31). At least 19 skeletally mature dogs were represented. Whether these figures represent an accurate picture of the life expectancy of dogs around Oakridge remains uncertain. The picture may be biased by the presence of pitfall victims.

Metrical analysis of the Oakridge dogs again confirms the great variability in sizes of dogs in Roman Britain (Harcourt 1974, 163–6). Estimates of shoulder height ranged between 23 and 61 cm.

Comparisons of the sizes of dogs at Oakridge are possible with a few contemporary sites. Animals the size of the largest specimens at Oakridge were not found at Owslebury where the largest had shoulder heights of *c* 50 cm and the size variability was less marked (Maltby nd 1). In the later Roman deposits from Winchester Northern Suburbs, estimates of shoulder height ranged between 22 and 55 cm but included a greater proportion of small dogs than at either of the rural sites (Maltby nd 2).

OTHER MAMMALS AND AMPHIBIANS

Horse

Horse was represented by 262 fragments. No bones of foetal or newborn animals were found. Table 32 shows that most of the fragments were recovered from the bottom ten feet of the well, with a peak around 78–0. Over half the bones were recovered from depths between 77–7 and 78–1, coinciding with the densest concentration of fragments of other domestic species in the well. A minimum of six horses were represented, mostly in these lower fills. The only other concentration of horse bones was found between 32–0 and 34–0. This group included 50 bones from the feet and tail of one animal. The group is unusual in that it provides one of the few clear examples of the disposal of carcase processing waste in the upper fills of the well. The bones represented are similar to the group of cattle bones found around 37–0. One of the caudal vertebrae bore superficial chop marks and the group represents the waste from the skinning and initial segmentation of a horse's carcase.

Ageing information was limited but a maxilla from 77–7 did possess very heavily worn cheek teeth, suggesting that it belonged to an old animal, probably over 15 years of age. Most horses represented on archaeological sites of this date were mature animals. The horse's main value was as a work animal and consequently many animals could expect to lead relatively long lives. However, the epiphysial fusion evidence from Oakridge did show that not all horses were fully mature, although most had completed their fusion sequence (Table 34).

Metrical analysis showed that the horses had withers heights ranging from 116 to 150 cm (Table 35). This range in size was similar to that encountered at Owslebury, where larger horses (over 135 cm) became more commonly represented during the later Roman period (Maltby nd 1). The smaller horses represented at Oakridge were, however, no larger than many of those found on Iron Age sites in Hampshire.

Cat

175 bones of cat were recovered, of which 83 were found between 77–7 and 79–9. At least one adult and two immature animals were represented by bones from these lower fills. 28 bones probably all from the same immature cat were recorded between 55–0 and 58–10 and 46 bones of another immature animal were recorded at 51–9 and 52–6. Finally, yet another immature cat was represented by 18 bones at 42–6. Tables 36–7 list the depths at which cat bones were recorded and the elements represented. Although the highest minimum number of individuals estimated from any bone was five (femur), the distribution of the bones in the well suggests that at least one adult and five immature cats were represented. Both fall victims and deliberately deposited carcases could be represented.

Red Deer (Cervus elaphus)

141 fragments from a skeleton of a red deer calf were found between 43–0 and 45–4 (Tables 38–9). The skeleton belonged to an animal probably under four months old. No evidence of butchery of skinning was found and it again seems that either the complete carcase was deposited down the well or the calf simply fell in.

The only other occurrence of red deer consisted of part of the stem of an antler found at 17–0.

Roe Deer (Capreolus capreolus)

466 fragments from the skeletons of four individuals were recovered (Tables 38–9). The first consisted of 72 bones between 57–9 and 58–10. This belonged to an immature animal,

probably under two years old. Nearly all the roe deer bones between 47–0 and 57–0 could have belonged to a second immature animal. Most parts of the skeleton were represented by 109 fragments (Table 39). The animal was younger than the first and was probably under a year old. Two of its bones had suffered slight gnawing damage, presumably prior to disposal. If so, the bones represent the dumping of a carcase rather than the fall of a live animal.

Two further immature roe deer were represented by 142 bones between 37–0 and 40–9. The first, which lay mainly between 38–6 and 40–9 was probably of a similar age to the roe deer found between 57–9 and 58–10; the second skeleton (mainly lying between 37–0 and 38–6) belonged to a calf of under six months.

None of the roe deer bones bore butchery marks and there is no evidence that the carcases had been disarticulated.

Hare (Lepus capensis)

301 bones were recorded from at least seven individuals. Most bones fell into clearly defined groups representing skeletons in varying states of completeness (Table 40). The highest group was located at 60–6 and consisted of 71 bones from a subadult animal. Two individuals were represented between 67–9 and 69–3. The more complete skeleton (82 bones) belonged to an adult; the other skeleton belonged to a leveret. Another leveret skeleton was recovered from 73–2.

As was the case for several other species, hare bones were found in their greatest densities between 78–0 and 81–0. At least two adults were represented between 78–0 and 79–8 by 92 bones. Another adult was represented by 36 bones between 80–9 and 82–0 (Tables 40–1).

Fox (Vulpes vulpes)

Two fox skeletons were identified. The first was represented by 86 fragments between 53–0 and 54–9. This was an immature animal possessing several unfused limb bone epiphyses. This animal was, however, older than the fox represented by 90 bones between 55–8 and 56–3. This was the skeleton of a juvenile, whose first molars had not erupted. There is no indication that these animals were anything other than victims of falls, although they occur just above the major concentration of cattle carcases. The distribution of fox bones and the elements represented are given in Tables 42–3.

Polecat (Mustela putorius)

527 bones of this species were retrieved between 41–0 and 60–0. Their bones were found quite consistently in this zone, although numbers tailed off below 55–0 (Table 44). It was not possible to assign all bones to individual skeletons but at least 13 individuals were represented (Table 45). All the major limb bones, mandibles, skulls and larger vertebrae were well represented but smaller bones were often overlooked, resulting in the virtual absence of tarsals, carpals and phalanges in this assemblage. Despite careful examination of the bones, there was no evidence that the animals had been skinned or butchered.

Most of the polecats represented were skeletally mature but two skeletons were from immature animals. The fact that most bones were unbroken and fully developed meant that measurements could be taken on a large proportion of the bones. Metrical analysis on the skull was designed to establish whether they belonged to the wild polecat or its domesticated form – the ferret. Modern domestic ferrets have a greater post-orbital constriction than polecats. Measurements were possible on six skulls and these all fell within the range of polecat. Metrical analysis of the lengths of the scapula, os coxae and upper limb bone bones revealed clear bimodal distributions (Figure 31). The larger specimens are likely to have belonged to males which usually are considerably larger than the females in polecat populations (Corbet & Southern 1977, 347). The results reveal that more adult males were present than females.

The presence of polecats in the area of the shaft which also contained a high proportion of small mammals and amphibians and other wild mammals suggests that they may all have been victims of falls down the disused well. Presumably these accidents must have occurred over a number of years. Polecats nowadays occupy a variety of habitats in Wales, including woodland, farmland, marsh, river banks and forest plantations. They are often associated with farm buildings and houses at the edge of settlements (Corbet & Southern 1977, 349). If these were indeed natural mortalities rather than animals trapped and killed as predators of poultry or for their skins, it would suggest that the focus of settlement at Oakridge had moved away from the area around the well by this time.

Pine Marten (Martes martes)

A single skeleton of a pine marten was represented between 47–0 and 51–9. 39 bones were recorded. Again the most likely reason for its presence at this depth is that it fell down the shaft.

Other Small Mammals

1,736 bones from at least 11 other species of small mammal were recorded. Minimum number estimates and the number of bones identified to each species are given in Table 46. The totals must represent only a small fraction of the bones originally represented in the fills. A large number of small mammal bones would have been overlooked since the mesh size of the sieves was probably too large to retain many of the bones. In addition, many of these fragile bones may not have survived in an identifiable state.

Despite these retrieval problems, the distribution of small mammal bones shows clear patterning (Figure 32). They were found in most parts of the shaft but were mainly concentrated between 39–0 and 57–9. Very high numbers were recorded between 40–0 and 45–0. Below that numbers gradually declined. Most of the small mammal bones therefore lay above the zone of largescale dumping of carcases of domestic mammals. It is likely that most, if not all, of the small mammals represented were victims of falls down the well. Even if the shaft had been filled to capacity, its contents undoubtedly would have slumped substantially once the carcases had rotted down. This would have created a chasm, down which many small mammals were likely to be trapped. The overlap between the relatively large numbers of small mammal bones and the skeletons of domestic mammals between 54–0 and 58–0 may be explained by the fact that small mammal carcases or bones are likely to have slipped down through gaps within the loosely packed fills.

The low numbers of small mammal bones between 58–0 and 69–0 supports the theory that the bones in that zone were deposited over a relatively short space of time. On the other hand, there were relatively large numbers of small mammals represented at certain depths between 69–0 and 75–0, in a zone where the dumping of animal bones appears to have been less intensive. This again may represent a time lapse between the two major episodes of dumping of carcases, during which period a number of small mammals fell into the well. The small mammals represented at 77–7 and 78–0 may again have been animals that fell in just subsequent to a major dumping episode but their bones were eventually incorporated amongst them. The possible displacement of small mammal carcases or their bones in this waterlogged zone may also have been a factor in their distribution. Generally, however, few small mammal bones were retrieved from below 78–0. Most of them were found at 83–8 (Table 47).

Other Mustelids

51 bones of weasel (*Mustela nivalis*) and stoat (*Mustela erminea*) were recovered. There is a small overlap in size in present populations of these species in Britain (Corbet & Southern 1977, 331–8). Consequently it was not possible to assign all these bones to species. Most of them, however, were too small to have belonged to stoat. The only exceptions were two bones from 83–8 and one from 84–4, which were large enough to fall within the female stoat range but could possibly have belonged to a large male weasel. It seems, however, that most if not all these bones belonged to weasel. At least nine animals were represented by mandibles. 22 of the bones lay between 42–6 and 57–0 (Table 47). This is a very similar distribution to that of the polecat. The remaining bones were located below 77–6. Weasels have a

wide tolerance of habitat. Since mice and voles are an important part of their diet, it is not surprising that they were present in this area.

Rodents

Usually, only skulls and mandibles of the smaller rodents were identified to species. Postcranial elements were simply categorised as "rodent" in the archive. Such elements totalled 925 bones, including 341 tibiae. Consequently a minimum of 171 small rodents were represented in the well. Identification of the cranial elements revealed that short-tailed vole (*Microtus agrestis*) was consistently the most commonly represented species, with a minimum of at least 98 animals recovered from the shaft. At least 36 wood mice or yellow-necked mice (*Apodemus* sp.) were also present. The skeletons of these species are very similar and it was not possible to distinguish between them. The relative abundance of mice and short-tailed voles did vary in different parts of the shaft. Below 60–0, mice provided only 11% of the 122 mandibles and jaws of these species. This figure increased to 19% (in a sample of 79 mandibles and skulls) between 50–0 and 59–9 and to 30% (in a sample of 125) between 40–0 and 49–9. Only bones of short-tailed vole were identified above 40–0 (19 skulls and mandibles). These significant changes in the relative abundance of these species in the well may reflect changes in their relative frequencies in the vicinity during the period of infilling of the shaft. This may in turn be related to developments in the local environmental conditions. Both short-tailed voles and wood mice have a wide range of habitats. The former are more abundant in grassland and other open field habitats, although they are also found in low density populations in marginal habitats such as woodlands and hedgerows (Corbet & Southern 1977, 189). The wood mouse (*Apodemus sylvaticus*) can also be found in a wide variety of habitats provided there is some cover. Although, as its name implies, it is usually associated with woodland, the species can also be common in hedgerows and fields. Yellow-necked mice (*Apodemus flavicollis*) occur mainly in woods but also in hedgerows and field margins but are less likely than wood mice to be found in the middle of field crops (Corbet & Southern 1977, 212, 218). The increase in the proportion of *Apodemus* in the part of the shaft above the zone of deliberate infilling may suggest that local conditions changed to some extent and attracted relatively more mice to the area. This therefore could indicate an increase in woodland or scrubland, possibly associated with a decrease in the amount of cultivation in the area.

Such an explanation would also account for the discovery of a few skulls and mandibles of bank vole (*Clethrionomys glareolus*) between 39–0 and 55–9 (Table 47). This species has a greater preference for thick cover than any of the rodents previously discussed and its presence therefore may indicate that more woodland or scrub had developed or fields had become overgrown.

Water vole (*Arvicola terrestris*) bones were found in small numbers in certain parts of the shaft. The eight bones from 78–0 belonged to the same skeleton. Unlike the other rodent species, most of the 34 water vole bones were found below 60–0. Only four bones were identified amongst the large number of small mammal bones above 50–0 (Table 47). The modern aquatic distribution of the water vole is probably more pronounced than in the past in this country. In Europe, the species is often found colonising pasture (Corbet & Southern, 199–200).

Shrews

Three species of shrew were identified. The most commonly recovered was the common shrew (*Sorex araneus*), which was represented by the bones of at least 50 individuals. Pygmy shrew (*Sorex minutus*) was represented by at least seven individuals and a single skull of a water shrew (*Neomys foediens*) was found at 38–6. Both the pygmy and common shrew inhabit a wide range of habitats including woodland, wood edge and pasture. The major concentration of common shrew bones lay around 42–0 and 42–6 but their bones occurred regularly at depths above 60–0, although none were found above 37–8 and only a few were recorded below 60–0. Most of the pygmy shrew bones belonged to one skeleton found at 74–6 but they also occurred at more depths above 60–0 than they did below that depth (Table 47).

Mole and Bat

52 bones of mole (*Talpa europaea*) were recovered representing at least eight individuals. The distribution of the bones in the shaft formed two main groups. The larger of these was found between 38–6 and 43–0 and the smaller between 78–0 and 79–8. No mole bones were found between 54–6 and 79–6. The species is most abundant in areas of permanent pasture and deciduous woodland.

Three bones from the wings of a bat or bats were found between 44–0 and 47–0. These were not identified to species. Bats may have used the well shaft as a place of hibernation or as a roost.

Amphibians

The other major victims of falls into the well shaft were frogs and toads. 1,655 bones were recorded, again presumably representing only a small proportion of the bones originally present in the shaft fills. Species identification was restricted to bones of the hindlimbs, which are easier to distinguish because frogs possess much more slender bones than toads. Minimum number estimates showed that at least 152 frogs and 72 toads were represented (Table 46). The distribution of frog and toad bones is shown in Table 48 and Figures 34–5. This distribution was similar to that of the small mammals (Figure 33) with large concentrations between 37–0 and 42–6 and numbers increasing in general above 60–0, subsequent to the period of intensive deliberate infilling of the well. Frog and toad bones were, however, even less well represented than small mammals below 60–0. Frogs (*Rana* sp.) were identified at 20 depths below 60–0 but toads (*Bufo* sp.) were identified at only four (Table 48; Figure 34). They were identified at roughly the same number of depths above 60–0 but frogs tended to be more common apart from the zone between 51–0 and 57–9. The reasons for the fluctuations in the relative abundance of frogs and toads are unclear. Both species can be found at fair distances from water.

THE BIRD ASSEMBLAGE

A total of 547 bird bones were recorded. The numbers of bones identified to each species or group at the depths they were found are given in Table 49. The nature of the avian assemblage varied markedly in different parts of the shaft, reflecting the changes in the use, infilling, abandonment and slumping of the contents of the well.

The major species represented in the lower fills of the well was domestic fowl. 56 bones of this species were identified but none was found higher than 57–9 and most were located below 80–0 (Table 49; Figure 35). All 13 bones from 83–8 may have belonged to the same bird. At least four birds were represented (Table 50). Two of the femora contained deposits of medullary bone within their shafts, indicating that these belonged to hens in lay (Driver 1982). All nine fragments of domestic fowl identified between 77–7 and 78–2 were burnt and a further seven bird bones unidentified to species but of domestic fowl size were also burnt in these fills. This perhaps indicates that their remains had been thrown away into a fire. The distribution of domestic fowl bones coincides with the major concentrations of butchery waste. Therefore, although no butchery observations were made, it is reasonable to suppose that their presence indicates that they were a source of meat.

Apart from domestic fowl, few of the bird bones were from species regularly exploited for food. Quail (*Coturnix coturnix*) was represented by a partial skeleton at 65–11 and 66–4 and by an isolated bone at 40–0. The presence of bones of this summer visitor is unusual for sites of Roman date in Hampshire. None were found at Owslebury or in samples from several other rural settlements examined by the author. They were not identified amongst the samples from Portchester Castle (Eastham 1975) and have not been encountered in the samples investigated to date from Roman Winchester (Maltby nd 2; nd 3; Coy & Bradfield nd). Quail was, however, identified in Iron Age contexts at Danebury (Coy 1984: 529–30). It is not certain, unfortunately, whether the quail represented at Oakridge was eaten since no butchery marks were observed.

All 19 bones of raven (*Corvus corax*) belonged to a skeleton recovered mainly from 78–1. 79–6 produced a few bones from the skeleton of a rook or crow (*Corvus frugilegus/corone corone*). Both birds may have been killed as potential threats to livestock or they may have been attracted to the area as scavengers of butchery waste. A third species of corvid was represented by a single bone of a jackdaw (*Corvus monedula*) from 37–0.

The most commonly identified species of bird in the assemblage was the swallow (*Hirundo rustica*). 224 bones were recorded between 42–6 and 57–9 (Table 49; Figure 35). At least 30 individuals were represented (Table 50).

The concentration of swallows in this part of the well requires explanation. The bones lie mainly above the major dumps of the carcases of domestic animals and mainly below the major concentrations of small mammals and amphibians. The most immature bones were of fledglings which would not have flown the nest. Generally, swallows nowadays prefer to nest above ground in, for example, eaves of buildings or chimneys. Consequently their presence is at first sight difficult to explain. However, it is interesting to relate Gilbert White's observations on the behaviour of swallows:

> The swallow, though called the chimney swallow, by no means builds altogether in chimneys, but often within barns and outhouses, against the rafters . . .
>
> Here and there a bird may affect some odd, peculiar place; as we have known a swallow build down the shaft of an old well, through which chalk had been formerly drawn up for the purpose of manure . . . (Gilbert White History of Selborne 1774).

Consequently it was known that swallows would nest in disused wells in the late eighteenth century in Hampshire. It seems that the most likely explanation for the presence of the large number of swallows in this shaft is that they were the remains of casualties of a population of swallows that were nesting near the top of the shaft after the last of the major infilling of the well had taken place and it had been abandoned. Presumably these remains represent several years if not decades of such nesting activity.

The nests of swallows must have been abandoned by the time the bones that now lie above 40–0 were deposited. Between 33–3 and 43–9, bones of species of the thrush family (*Turdidae*) were the most commonly identified. They were also scattered in small numbers between 54–0 and 65–0 but were rarely found in the lowest fills (Table 49; Figure 35). 121 bones were recorded from at least ten individuals (Table 50). Birds of the thrush family are very difficult to assign to species. Fully developed bones were measured but there is a need for more morphological and metrical studies of modern specimens before confident assertions can be made about species identification. Probably more than one species was represented. The presence of bones of immature birds suggests that some of the skeletons belonged to British breeding species (blackbird or song thrush). The presence of a winter migrant species (redwing or fieldfare) amongst the adult bones cannot, however, be ruled out.

Bones of robins (*Erithacus rubecula*) were identified in small numbers throughout the shaft (Table 49) and more bones of this species and other passerines are likely to be represented amongst the unidentified bird bones. Most of these bones found above 60–0 were from passerines of various sizes. Most of them were immature. Two bones probably from a wading bird the size of a moorhen were found at 46–6. The only other species identified, however, were woodcock (*Scolopax rusticola*) and skylark (*Alauda arvensis*).

CONCLUSIONS

Over 212 kg of animal bones were recovered during the excavation of the well shaft at Oakridge II. These included over 24,000 identifiable fragments weighing over 168 kg. The analysis of this material was carried out in order to answer three main questions.

The first of these concerned the history of the infilling of the well. The analysis demonstrated that there were distinct variations in the abundance and nature of the faunal assemblage at different depths in the shaft. The deposits of animal bones reflect both directly and indirectly upon events that took place in the vicinity of the well. Interpretation of the sequence of events will be discussed in detail below.

Secondly, although it is recognised that the animal bones deposited in this feature are unlikely to provide a representative picture of the pastoral economy of the associated settlement, the sample does provide some insights into exploitation practices. In particular, information was obtained concerning the ages of slaughter of the domestic stock and butchery techniques.

Thirdly, it was possible to take measurements on a far greater proportion of the material than is usual in archaeological assemblages. Direct deposition of carcases into the well meant that only a small proportion of the bones had been damaged by scavengers or by weathering. On the other hand, material from the lower fills was quite fragmentary which did hinder metrical analysis.

Nevertheless it is possible to compare the butchery, ageing and metrical data with samples obtained from contemporary sites elsewhere in Hampshire. Consequently, it is hoped that the animal bones from this site can be considered within the broader context of the pastoral economy in Hampshire during the Romano-British period.

History of the Deposition of Animal Bones in the Shaft

Interpretations of the series of episodes that produced the faunal assemblage that was eventually recovered must bear a number of points in mind. The finds from the shaft could only be analysed by depth. It is important to recognise that the ultimate resting place of the bones was largely determined by the substantial post-depositional slumping of the fills. It is even conceivable that the final phase of largescale deliberate dumping may have originally filled up the shaft. If so, much of the material may have sunk by up to 50 feet. Such slumping would have been caused, amongst other things, by the decomposition of organic material such as the flesh, offal and other soft tissue of the animals involved. During such slumping, it is likely that there was some displacement and admixing of the carcases and other groups of bones. Small bones may sometimes have fallen down through gaps in the fills as the material settled. Bones of carcases dumped in articulation may also have become separated. The weight of the overburden combined with waterlogging must also have accounted for the greater fragmentation of material in the lower fills. This further hindered reconstruction of groups of bones originally deposited as whole units.

Another problem of interpretation lies in determining which of the more complete skeletons should be regarded as deliberate deposition of carcases (or live animals) into the shaft and which were animals that were simply victims of falls down the well. It is assumed that all the small mammals and amphibians were casualties of falls but in the case of larger animals, there was rarely evidence that would prove which explanation was correct.

75–0 to 87–6

The bottom fills of the shaft produced a dense concentration of bones (Figures 1–2), which seem to represent mainly a series of deliberate dumping episodes. The pottery from these fills spans a considerable period of time. Pottery of late 3rd/early 4th century date was found between 77–4 and 81–0. This was the zone from which the greatest density of animal bones was collected. The ceramics between 81–4 and 85–0 were mainly of 2nd century date. The characteristics of the faunal assemblage at these depths were, however, little different from those encountered between 75–0 and 81–0. In both zones bones from the head and feet of sheep were the most frequently deposited. Excluding very porous bones, at least 44 sheep were represented by metacarpals, 33 by metatarsals and 39 by mandible fragments. Correspondingly high numbers of skull fragments and other bones of the limb extremities were found at these depths (Table 17). Relatively few major meat-bearing bones were represented. It is possible that the slaughter and primary butchery of sheep was carried out nearby resulting in the disposal of poor quality meat bones down the disused well. Another possibility is that the heads and feet had been brought to the vicinity attached to their skins and the assemblage represents the disposal of these bones as waste when these skins were processed.

Dumping of other butchery and/or skinning waste was also encountered quite commonly below 75–0. Bones of the head and feet of at least four juvenile cattle were found, possibly indicating that calfskin processing also took place occasionally nearby. Butchered bones of the upper limbs of at least two pigs were found between 75–6 and 78–6, whereas bones from pigs' trotters, possibly from the same carcases, were found at 79–9 and at adjacent depths.

Other butchery waste was represented by the presence of both good and poor quality meat bones of adult and immature cattle. Excluding porous bones, a minimum of 12 cattle were represented by both mandible and humerus fragments at depths below 75–0. There was quite an even representation of the larger skeletal elements of cattle in this zone but smaller bones such as the phalanges were identified less commonly than higher up the shaft (Figures 5–10). Although a few of the cattle bones were found in association, it seems that most of them were dumped in a disarticulated state. Although much of their fragmentation may have been the result of post-depositional attrition, it seems likely that many of the cattle bones had been broken prior to disposal.

In contrast, most of the dogs represented in the lowest fills clearly entered the shaft in an articulated state. Although the density of material and the admixing of bones from several skeletons made it impossible to assign all the bones to individuals, there were large numbers of bones that were clearly associated. At least 20 adult or immature dogs were represented in addition to a minimum of 17 neonatal puppies (Figures 28–9). Several relatively complete carcases of (mainly immature or juvenile) sheep also appear to have been dumped.

Remains of other domestic animals were also found in some numbers in these fills. Bones from at least four horses were represented below 75–0 (Tables 22–3). These, like most of the cattle bones, were mainly fragmentary but some paired elements and some small groups of associated bones were also encountered suggesting that on occasions more substantial portions of the carcases were dumped. Horse bones bore more evidence of damage by carnivore scavenging than any of the other species (Table 4), indicating that it was quite common for their bones to be accessible to dogs prior to disposal.

Domestic fowl bones bore more evidence of burning than any of the other species, although most of this damage may have been confined to the skeleton of one bird. At least four domestic fowl were represented below 77–6 and most of their bones were found below 81–0 and were presumably mainly of second century date (Figure 35). The partial skeletons of at least one adult and two immature cats were represented between 77–7 and 79–9 (Tables 36–7).

Bones of wild species were relatively uncommon in the lower fills. No bones of roe or red deer, polecat, pine marten or fox were identified in these fills, whereas each of these species was represented higher up the shaft. Bones of at least three partial hare skeletons were found below 78–0 (Table 45). There is no evidence that these animals had been butchered or skinned and it is therefore not clear whether these were victims of falls or deliberate depositions. However, bones of small mammals and amphibians were found only in small numbers (Figures 32–3). Partial skeletons of a raven and a rook or crow were also found. These birds are likely to have been attracted as scavengers, particularly if carcase processing was taking place in the vicinity.

The faunal assemblage from below 75–0 did not consist of a typical cross-section of material one might expect from a rural settlement. There was comparatively little material that can be regarded as domestic food or cooking waste. The disused well appears to have been used mainly as a depository for primary butchery and/or skinning waste or for the carcases of animals not destined for human consumption. This may imply that the focus of domestic activity and any associated disposal of rubbish was not located close to the well after it fell into disuse. Conversely, activities such as the slaughtering and the initial processing of carcases of domestic stock are more likely to have taken place towards the periphery of a settlement. It is not absolutely clear whether the disposal of this waste was regular or spasmodic. On the one hand, the lengthy timespan represented by the pottery dumps may suggest that the bones were deposited in relatively small numbers throughout that time. On the other hand, the density and restricted nature of the accumulations would suggest that the deposits included several episodes of largescale dumping of material. If the heads and feet of sheep and calves represent skinning rather than initial butchery waste, for example, it is possible to postulate that a number of skins may have been processed at the same time.

68–0 to 75–0

This zone represents a hiatus in the largescale dumping episodes. The density of bones fell dramatically. No groups of sheep head and foot bones were found between 68–0 and 74–0. Only eight cattle, five horse and three domestic fowl bones were identified in this zone. Most of the faunal assemblage consisted of skeletons of a number of domestic mammals and hares. These survived in various states of completeness. They included partial skeletons of two immature goats (one of which was perhaps associated with foetal skeletons – Figures 17–8), a young pig (Figure 27), two juvenile dogs (Figure 29), at least two neonatal puppies (Figure 28) and three hares (Tables 40–1). There was no evidence of butchery on any of these bones. It seems that these animals were deposited (or some were possibly victims of falls) during a period when little or no processing of carcases or skins was being carried out in the vicinity – or at least the waste material from such activities was not deposited in the well. A higher proportion of bones of small mammals and amphibians was recovered in this zone (Figures 32–3).

65–0 to 67–6

The densest concentrations of bone lay between about 54–0 and 67–6. There are some reasons to suggest that the bones represented at these depths were deposited over a short period of time. There were, however, distinct variations in the nature of the assemblage within this group, which reflect different episodes of disposal activity.

The fills between 65–0 and 67–6 reflect a phase in the late 4th century when butchery waste (or perhaps skinning waste in some cases) began to be deposited again. Three sets of bones from the feet, heads and tails of cattle were found. Metrical analysis of the metapodials and comparisons of the epiphysial fusion and toothwear data suggested that it was most likely that these sets belonged to the same three individuals. No upper limb bones were found apart from a pair of scapulae and another substantially complete scapula. A group of seven thoracic vertebrae and eight associated rib heads may have belonged to one of the three cattle represented by the head and foot bones. However, most of the major meat-bearing bones were absent and were presumably processed elsewhere (Figures 5–10). One of the cattle may have been in calf since a group of very porous bones belonging to a foetal skeleton were also recovered (Figure 4). The foetus may have been deposited with offal and other waste after initial butchery.

Bones from butchered carcases of both sheep and goat were also deposited around the same time as the cattle bones. Between 65–0 and 67–6, at least eight sheep/goat were represented by skull fragments, seven by metatarsals and six each by centroquartals, mandibles and metacarpals. At least five sheep and two goats were represented by the metapodials. Upper limb bones and vertebrae were deposited less frequently (Figures 19–22). Most of these elements produced minimum number estimates of only three or four individuals. Many of the vertebrae bore evidence of butchery involving the removal of the flanks from the vertebral column. Much of this material therefore can be regarded as primary butchery waste. However, the upper forelimbs of one immature goat and of at least two of the sheep were also deposited, apparently without butchery. It is probable that these animals had entered the shaft as relatively complete carcases.

The only other bones of domestic animals represented between 65–0 and 67–6 belonged to the skeletons of two adult dogs and at least seven newborn or foetal puppies, possibly from the same litter (Figures 28–9). Bones of small mammals, amphibians and birds were still encountered relatively frequently at these depths.

There was, however, a complete absence of the types of bone fragments usually associated with domestic rubbish or cooking waste.

58–10 to 64–9

There were a large number of depositions of cattle carcase waste in this zone. Once again, bones of the head, feet and tail were dominant. At least 16 cattle were represented by metacarpals and 15 by metatarsals (excluding bones from foetal or neonatal skeletons). The frequency of paired elements, similarities in withers height estimates and other metrical attributes suggested that many of the metapodials were from the same animals (Figures 11–15). Most, if not all, of the skulls and mandibles also probably belonged to the same cattle as the foot bones. At least 13 cattle were represented by mandibles and 12 by skulls. The only other elements well represented were the scapula and centroquartal (each from a minimum of 11 cattle), lateral metacarpals, phalanges, sesamoids and caudal vertebrae. Bones from the trunk and upper limbs were less common. No more than three animals were represented by any of these elements. The vertebrae, ribs and upper limb bones that were deposited displayed abundant evidence of butchery associated with the segmentation of the carcases and filleting. Filleting marks were found on most of the scapulae as well.

The presence of bones from at least nine foetal calf skeletons (Figure 4) implies that several of the cattle may have been in calf when they were slaughtered or died. Measurements of the metapodials indicated that most of the cattle represented were female. The small amount of variation in their size may further suggest that the cows were closely related, possibly even members of the same herd(s) (Figures 12–15). The size of the foetal skeletons increased the higher they were located in the shaft, leading to the suggestion that bones in this zone may have been deposited during the gestation period of the cows involved. This assumes that the animals conceived at about the same time of year.

Nearly all the sheep bones were found in the upper part of this zone (between 58–10 and 62–2). Apart from two cervical vertebrae, all the bones came from the head and feet of sheep. At least eight animals were represented by mandible fragments, six by metatarsals and four each by metacarpals and skull fragments. It is again probable that the different sets of head and foot bones belonged to the same animals. Discrepancies in the number of individuals represented by the different bones are probably the result of destruction by canid scavenging, since this group contained a high proportion of gnawed bones.

In addition to the foetal cattle skeletons, this part of the shaft also contained large numbers of foetal or neonatal skeletons of other species. A minimum of two sheep were represented at 60–9 but it was the bones of pigs and dogs that were found in large numbers. At least 20 newborn or foetal pigs (Table 24) and 15 dogs were represented (Figure 28). The carcases of at least three older dogs were deposited in the same zone. Other partial skeletons included those of a hare and a roe deer. A handful of bones of older pigs were recovered. These mainly consisted of head and foot elements. A few bones of domestic fowl and a single fragment of horse were also found. Although bones of small mammals and amphibians were represented, their numbers were very low in comparison with many other parts of the shaft (Figures 32–3). This may again indicate that the bones here were deposited over a short period of time.

54–0 to 58–6

The density of animal bones continued at high levels in this zone. Excluding bones from neonatal or juvenile mortalities, the remains from at least another eight cattle were found here. Although elements from the head, feet and tail were still the most frequently encountered, bones from the trunk and upper limbs were better represented (Figures 5–10). This more even distribution reflects the fact that at least three (and possibly as many as five) complete cattle carcases were dumped. These were partially disarticulated to enable them to fit down the shaft but no further butchery appears to have been carried out. Butchery marks on vertebrae and limb bones decreased markedly in this zone from the high levels encountered between 60–0 and 64–6 (Table 10).

Two foetal or neonatal skeletons and the bones from at least four juvenile animals were recorded between 54–0 and 58–6 (Figure 4). Evidence of butchery was found on the bones of at least two of the calves, none of which are likely to have been over six months old. The degrees of development in the calf skeletons continued the sequence observed in the zone below with the more developed skeletons being found at higher levels.

A parallel sequence in the development of some young sheep skeletons was noted. The mandibles from two animals at 57–0 and 57–9 were from lambs that were no more than a few weeks old. These mandibles were associated with other very porous bones from these skeletons. Two mandibles from 54–9 and 55–9 belonged to sheep of about three months of age (Table 20). The density of the bone accumulations and the sequence in the development of the young skeletons suggests that the deposit may have been formed during the spring and summer months of one year. The rarity of bones of small mammals and amphibians below 55–0 also supports the theory that this accumulation was dumped over a short period.

In addition to the bones from young lambs, at least nine older sheep or goats were represented by skull fragments. At least five sheep were represented by metapodials and other foot bones, indicating that butchery and skinning waste continued to be deposited. Upper limb bones, vertebrae and ribs were not found in large numbers. Most of these bones may have belonged to a single immature goat skeleton. Metacarpals of a neonatal goat were also identified.

Bones from the head and feet of at least one immature pig were recovered between 55–0 and 58–6. These again can be regarded as butchery waste but the concentration of immature pig bones centred around the depths of 54–0 and 55–3 represent at least three largely complete skeletons of animals probably under a year old. A pair of mandibles and a maxilla of an older pig were also found here. There were also a few very porous pig bones at 57–0 and 57–9. These were probably associated with the large number of neonatal pig skeletons found at 58–10 and below (Table 24).

Major concentrations of very porous dog bones were found at 57–0 and 57–9. Between 54–0 and 58–6, at least 42 neonatal or foetal puppies were represented. Presumably many of these were from the same litters (Figure 28). The skeletons of at least one adult and one immature dog and a cat were also found. More of the immature roe deer skeleton also located at 58–10 was found at 57–0 and 57–9. Gnawing marks on one of the metatarsals indicates that this carcase was slightly scavenged and was therefore likely to be a deliberate deposition rather than a victim of a fall. A second roe deer skeleton was found scattered between 47–0 and 54–9. This animal is best considered with material from the zone above. So too are the bones of polecat and foxes.

The butchery waste deposited between 54–0 and 64–9 reflects the processing of large amounts of meat. Excluding bones that are likely to have been from unbutchered carcases, the waste from at least 19 adult or immature cattle, 16 sheep or goats and two pigs was found. Allowing for estimated dressed carcase weights of 300 lbs (136 kg) for adult cattle, 25 lbs (11 kg) for sheep and 50 lbs (23 kg) for pigs (Barnetson & Chaplin 1980, 152), possibly as much as 6,200 lbs (2,818 kg) of meat may have been processed. This excludes the weight of meat from at least two young calves. If one accepts the arguments that these deposits were formed over a short period of time, this meat yield may have been destined for consumption over a period of possibly no more than a year. Some of this meat may have been stored by salting or perhaps smoking. Even so, the amount of meat processed was substantial. Estimates of meat requirements can be no more than guesswork, since we have no clear idea of the composition of the average diet in Roman Britain. However, if we allow, for argument's sake, an average consumption of ½ lb (0.23 kg) of meat per person per day and assume that these animals were all butchered during one year, their meat would cater for about 34 people.

Assuming that all the meat was destined for local consumption, a population of at least that number could have been supported by the animals whose butchery waste was deposited in the well. However, there are a number of factors that suggest that the deposits were not typical of an average year's culling. A large number of pregnant cows appear to have been killed. Such a slaughtering policy may have put stock levels at risk. The proportion of cattle represented is high compared not only with the numbers found in the lower fills of the well but also with the relative numbers of cattle represented on other Romano-British rural sites in Hampshire (Maltby nd 1; nd 4). Finally, at least three fully grown cattle were not butchered for meat. Whether they were surplus to food requirements is not clear. They may have been animals that died of disease and were not considered fit for human consumption. The apparent crisis in the cattle herds is seemingly mirrored by problems in the human population. The deposition of a number of bodies during the same period must also imply that some sort of disaster struck the inhabitants of Oakridge at that time.

49–0 to 53–9

This zone can be regarded as the main interface between the zone of largescale deliberate dumping below and the more gradual deposition of material above. Unlike the lower fills, the upper parts of the shaft contained few deposits of butchery waste and most of the faunal remains consisted of skeletons of wild species.

In fact, the interface probably began a little lower than 54–0, since one could include the skeletons of the foxes, one of the roe deer and possibly the pig skeletons found below 54–0 amongst the material not necessarily deliberately dumped into the shaft. Because of the slumping and settling of material, it is to be expected that some post-depositional admixing of the bones could have taken place.

Between 49–0 and 53–9, finds representing carcase processing were limited to the feet of one sheep. Most of the 37 cattle fragments recorded consisted mainly of ribs, vertebrae and upper limb bone elements probably from one or more of the cattle carcases also represented below 54–0. No neonatal mortalities of cattle, sheep/goat or pig were found and only seven bones from neonatal puppies were recorded. Most of the remaining bones of domestic animals belonged to the skeletons of immature mortalities. In addition to the remainder of the three pig skeletons already discussed, there were the remains of a sheep and a cat.

Bones from wild species were more common. In addition to further bones from the roe deer skeleton also found below 54–0, there were over 100 bones of polecats in this zone (Table 44) plus the remains of a pine marten (parts of this skeleton were also found above 49–0). These may all have been pitfall victims. The number of bones of swallows also increased significantly (Figure 35). These are likely to have belonged to birds from a colony that built nests near the top of the disused shaft. The numbers of bones of small mammals and amphibians also began to increase significantly above 55–0 (Figures 32–3).

29–0 to 48–6

These fills were largely devoid of bones deposited after processing of carcases. Indeed, there was little evidence to indicate that most of the animals were anything other than victims of falls down the shaft. There were, however, exceptions to this. Bones from the feet and tail of an immature cow were located around 37–0. These remains must represent butchery or skinning waste. So too do the bones from the tail and feet of a horse from between 32–0 and 34–0 (Table 32). A partial skeleton of a goat, whose remains lay between 29–0 and 34–0 (Figure 17), included six bones with knife cuts. These indicate that a certain amount of butchery had been performed on this carcase. No other definite examples of butchery waste were discovered. There was therefore a complete absence of such material between 37–0 and 49–0.

A litter (or litters) of at least ten puppies was found at 42–6 (Figure 28). These may have been deliberately dumped. However, there is no evidence to prove that any of the other skeletons of domestic animals had been thrown down the shaft. These included the remains of at least two lambs or kids at 42–6 (Figure 18); five largely complete skeletons of immature pigs between 32–0 and 42–6 (Figure 27); an adult dog between 38–6 and 41–0; an immature dog at 46–3 (Figure 29); and an immature cat at 42–6 (Table 36).

Bones of wild species dominated the assemblage. They included the largely complete skeletons of two immature roe deer between 37–0 and 40–9 and a red deer calf between 43–0 and 45–4 (Tables 38–9). There were a large number of polecats at depths below 41–0 and at least 13 individuals were represented in the shaft (Tables 44–5). Large numbers of small mammals and amphibians fell into the shaft during this period, which may have lasted for a considerable time. Bones of swallows continued to be recovered in some numbers but as their bones were not found above 42–6 (Figure 35), it is assumed that the material above that level was deposited subsequent to the abandonment of the shaft as a nesting site.

There is some evidence from the faunal remains to suggest that the environmental conditions near the well changed slightly after the final period of largescale dumping. Animals whose preferred habitats included scrub and woodland were found with increasing frequency. The proportion of mice (*Apodemus* sp.) increased in relation to short-tailed voles, although bones of the latter were still identified more commonly. The presence of red and roe deer, polecats, pine marten, bank vole and the greater number of pig skeletons may also suggest that conditions were less open than previously. There is little evidence that the site was permanently occupied by humans at that time and so an increase in the vegetation levels may well have taken place.

0–0 to 29–0

No bones at all were found between 21–0 and 29–0. Thereafter there were only scattered remains. The bones from the top few feet are likely to consist entirely of material which collapsed into the top of the well from an adjoining earlier ditch.

Summary

The animal bone deposits in the Oakridge II well therefore reflect a number of distinct phases. First, there was a relatively long period of regular dumping of butchery and skinning waste, mainly from sheep, but also from other domestic animals together with the disposal of complete carcases of animals not destined for consumption. This was followed by a period when butchery waste was not deposited, although more complete carcases not destined for butchery continued to be found. This was followed by a short period when a large amount of butchery waste, mainly of cattle and sheep was deposited. Large numbers of foetal and neonatal animals were also dumped at this time, along with the carcases of some older animals. Very few bones derived from domestic or kitchen waste were represented here or indeed in any part of the shaft. Thereafter, processing of animals appears to have taken place only spasmodically in the vicinity of the well and the abandoned shaft was inhabited by nesting swallows and was a trap for a large number of animals, particularly small mammals, frogs and toads.

There are few parallels for the investigation of animal bones from wells on rural settlements of this date. The only site where detailed information has been published is the well from the Roman villa at Rudston, Yorkshire (Chaplin & Barnetson 1980). The faunal remains from there have some similarities to those at Oakridge. The zones of deliberate deposition were dominated by bones from the limb extremities of sheep and, to a lesser extent, cattle and pig. About 180 sheep were represented. However, skull and mandibles were poorly represented, although a large number of loose teeth was found. The upper fills of the well at Rudston also included skeletons of wild species such as roe and red deer, short-tailed vole, badger and toad. It was suggested that many of these animals were the victims of falls during the period after the well had been abandoned and the contents of the shaft had slumped creating a trap for unwary animals.

EXPLOITATION OF DOMESTIC STOCK AT OAKRIDGE

This discussion should again be prefaced by the admission that the bones deposited in the well need not reflect the usual exploitation practices of the inhabitants of the site. Indeed, it has already been argued that the material from 54–0 to 65–0 was not typical of a normal slaughtering policy.

Even in the earlier phase, there is no guarantee that the relative numbers of the different species represented or their ages at death were typical of the settlement as a whole.

Nevertheless it is possible to make some inferences about the pastoral economy. It seems likely, for example, that sheep and cattle were the species exploited in the greatest numbers. Although butchery waste from pigs was found, only a few animals were represented. Indeed many of the pigs were found in parts of the shaft where little butchery waste was encountered. The presence of neonatal mortalities of sheep, goat, cattle, pig and dog suggests that all these species were kept. The numbers of dogs may have been deliberately controlled by disposing of whole litters at birth. A few cats and domestic fowl may also have been kept by the inhabitants.

It is more difficult to gauge the relative abundance of cattle and sheep. Taking minimum numbers estimates, sheep outnumbered cattle by a ratio of about 3:1 in the fills below 75–0. Whether this is typical of the relative numbers of these animals slaughtered by the inhabitants is open to speculation, although the ratio was similar to the Romano-British assemblages at Owslebury, where material was derived from a greater variety of features (Maltby nd 1). The increase in the proportion of cattle above 68–0 may have been the result of unusual circumstances, since the cattle included pregnant cows and eventually some animals that were not butchered for meat.

The results from the ageing and sexing analysis of cattle has been discussed in detail previously. The proportion of immature cattle represented in the well was similar to the proportion found at Owslebury but was higher than in the late Romano-British deposits at Winchester. More immature cattle appear to have been killed in the later dumping phase but ageing data from below 75–0 was quite limited (Table 11). More male cattle appear to be represented in the fills below 75–0. It is likely that many of the adult cattle would have been required for working purposes – an assertion that is supported by stress related pathology amongst a few of the cattle bones.

There was also some variation in the ages of sheep represented in different parts of the well. Above 75–0, most were immature but near full size and were thus killed at an age suitable for meat production (Table 21). Below 75–0 the mandible sample included a greater proportion of specimens from old sheep and from lambs that were killed well before they had attained full size. This latter mortality profile was more typical of the Romano-British phases at Owslebury (Maltby nd 1). Again the apparent changes in the ages of sheep mortalities may only reflect untypical circumstances that prevailed during the short period of deposition of the later material rather than any longterm changes in the exploitation of sheep.

Too few remains of other domestic species were recovered to offer much information about their exploitation.

The style of butchery carried out on the cattle carcases showed many similarities with those encountered on other contemporary rural sites in Hampshire (Maltby 1989). There were unusual examples of matching pairs of upper limb bones where the butchery marks differed greatly on the bones from the different sides of the body. There were no examples, however, of longitudinal splitting of the longbones nor the use of a heavy blade to strip meat from the shafts of these bones (although a similar technique was employed regularly on the scapulae). Such techniques appear to have been commonly employed by specialist butchers in Winchester and Silchester.

METRICAL ANALYSES

Metrical analyses of cattle and sheep demonstrated that the bones from the fills between 54–0 and 67–9 came from a more restricted size range of stock than the samples from below 75–0. Coefficients of variation decreased markedly and it can be suggested that most of the cattle and sheep may each have come from closely related herds. This supports the premise that the bones may have been deposited over a short period of time. It is further suggested from the metrical data that more male cattle were present in the sample from below 75–0. Consequently the means obtained for cattle measurements were usually greater in the lower fills. The decrease in mean size does not imply that there was a trend towards smaller cattle in the later deposits. The overall size of the cattle at Oakridge was similar to other contemporary sites in Hampshire.

There are some indications, however, that there were developments in the types of sheep kept. Both hornless and horned sheep were present below 75–0 and two genotypes may be represented in these lower fills, although variations due to sexual dimorphism cannot be ruled out entirely. There were more small, horned sheep represented in the earliest fills (below 80–0). Larger, hornless sheep, similar to the type found in some 3rd–4th century deposits at Owslebury, were more common between 75–0 and 80–0. It is even possible that the horned sheep in the fills between 54–0 and 67–9 represent types that developed from the crossing of these two types.

The sizes of dogs showed a large degree of variability typical of the Romano-British period (Harcourt 1974). However, relatively fewer very small dogs were deposited than represented in the town at Winchester. Few measurements were possible on the pig, domestic fowl and horse samples.

CONCLUSION

This extensive examination of the data from a single feature has demonstrated that it is possible to obtain a great deal of information from animal bone assemblages in circumstances where comparatively little post-depositional disturbance has taken place. By its nature, such an assemblage is atypical both of archaeological samples and probably of the disposal strategies of the inhabitants of the settlement involved. Unfortunately, too little of the rest of the settlement survived to obtain samples with which to compare the material from the well. Similarly, there are too few adequately sampled contemporary assemblages, with which to compare the results obtained from Oakridge. Nevertheless the analysis has revealed some clear patterns in carcase utilisation and disposal practices, possible developments in the types of stock exploited and possible changes in the local environment during the period of infilling of the well. It was possible to reconstruct a good deal of the history of the infilling of the well and it is believed that the results justify the efforts and time expended in the complete excavation of the well shaft.

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Author: M J Maltby, Dept of Conservation Science, University of Bournemouth