the hole had the rough texture observed by Grigson (1976) on skulls of old animals. The jugal border of the orbit was rough, and pointed in cross-section, which is a characteristic of older bulls (*ibid.*). The opening probably caused no ill effects.

The only cattle bone with signs of disease was a first phalanx affected by osteoarthritis. The proximal lateral joint surface showed eburnation and slight grooving, the result of breakdown of cartilage and the rubbing of bone against bone. There was an extension of the joint surface and swelling of the bone on the proximal/dorsal border and also some extra growth of bone on the distal medial part. It was quite a small bone (GLpe 55, Bp—excluding the swelling—27 mm, measuring points defined on fiche p. 28–29 (E2–3)). Cases of osteoarthritis are mentioned by Baker and Brothwell (1980) from several archaeological sites.

Sheep/Goat

Goats were present, though they were probably kept in small numbers. Of eighteen horn cores found, one was from a goat, the others from sheep. No other bones were certainly caprine.

Part of the skull of a polled sheep was found in the phase 4, i.e. very late pre-Roman Iron Age, ditch 0610. The frontal bone was smooth with no horn core or scar. The skull was identified as sheep and not goat with some confidence, from the presence of the crista lacrimalis, the absence of the fontanella nasolacrimalis and the form of the frontal bones and the frontal/lacrimal suture (Boessneck *et al.* 1964 and comparative material in Oxford University Museum).

The anatomical analysis in Table 1 shows all parts of the skeleton to be present, the most durable parts being the most numerous. The finding of a moderately large sample of lower jaws is of interest and throws some light on the question of change in the observed age patterns from Iron Age to Roman sites.

Table 4. Sheep/goat age data from long bones.

	U	Y	F
Distal humerus, proximal radius	1	6	23
distal tibia, metacarpal	11	3	6
d radius, p femur, calcaneum, p humerus	12	0	6

For legend, see Table 3. In addition, six bones of very young lambs were found.

Fig. 19 and Table 4 show age data from the mandibles and long bones. The former were studied using Grant's method (1975). In two cases where two jaws from the same feature looked to be from one individual, one was excluded. One jaw was from a young lamb; jaws from young, immature, sub-adult and adult sheep were found in fairly even proportions. 71 per cent had died before reaching full maturity.

A summary of bone measurements is given on fiche (fiche p. 28, E2). Maltby's (1981) study of the distal width of sheep tibiae from various sites shows a gradual increase in size through the Iron Age, Roman and Anglo-Saxon periods. The Bierton sample has a mean greater

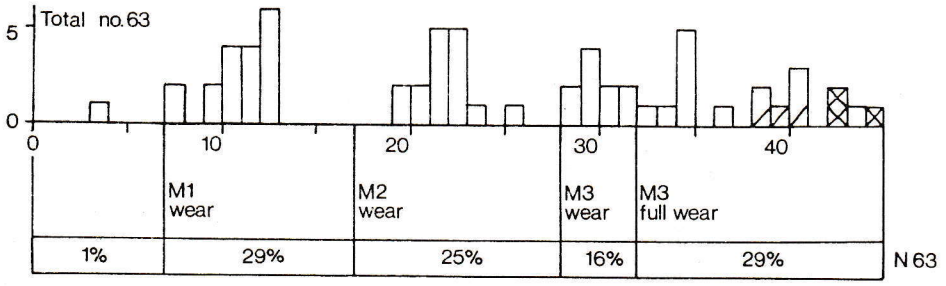

Fig. 19. Sheep/goat age data from mandibles. M_1 – first molar; wr – coming into wear; / – slight periodontal disease (Pl. XIa); x – considerable periodontal disease (Pl. XIb).

than most of the Iron Age sites quoted and smaller than most of the Roman ones. The metapodials are within the range of size found at Ashville (Wilson 1978) and the mean of the distal humerus is greater than that from the third to first-century B.C. phases at Old Down Farm, Winnall Down and Balksbury (BT:N-35; R-23.9–29.9; M 24.7; Maltby personal communication). There is some evidence, then, of a gradual increase in size in the first century A.D. before the Roman conquest.

Marks on the bones were fairly uncommon; 3 per cent bore chopmarks and 3 per cent finer marks. Parts of four skulls were chopped roughly through the midline.

Variation and Pathology:

The incidence of periodontal disease, 10 per cent, is shown in Fig. 19. It is clearly age-related. In all cases it has affected the area between the fourth premolar and the first molar. The oral health of the sheep was not as good as at Gussage All Saints, where only one jaw exhibited considerable periodontal disease in a sample of 394 jaws (Harcourt 1979).

In one jaw a small part of the third deciduous premolar was retained above the posterior half of the fourth premolar.

There was variation in the number of teeth present in only one jaw, where the second molar and the fifth cusp of the third molar were absent.

Another example of variation occurred in a jaw with two mental foramina instead of the usual one. Baker and Brothwell (1980, 35) record similar cases in cattle from archaeological sites.

Pig

Table 5 shows rather fewer jaws in the two youngest age stages than one might expect. The sample size is small and there may be an influence from poorer survival of young pig jaws, but the recovered sample suggests that pigs were generally allowed to reach an age of two or three years before slaughter. More than a third of jaws were from pigs that were old enough to have bred, which does not suggest high prolificacy.

Two cases of overcrowding of teeth were observed.

As is usual with pigs, few bones were measurable; these are within the range for Iron Age sites quoted by Wilson (1978; fiche p. 29, E3).

Horse

Horse bones formed only 2 per cent of the identified bone sample, which is less than on most Iron Age sites (King 1978, Table 4). One complete metacarpal (lateral length 133 mm) gives a height estimate of twelve hands (1.24 m). No bones definitely from young horses were present and only one bone was marked; it was a metacarpal bearing two knife cuts, which could have been caused by skinning rather than butchery. The bones were less broken than those from cattle, but the twenty-three bones came from eight different features and were found associated with beef, mutton and pork bones. Horse meat was eaten at some Iron Age sites, e.g. Ashville (Wilson 1978).

Dog

Two partial skulls were from large dogs, comparable with the larger ones described by Harcourt (1974) for the Iron Age (skull snout width (XII) / nasion to alveolare (III): 39/95; XII:*c.*45; measuring points defined by Harcourt, *ibid.*).

Gnawmarks on bones of other species are probably attributable to dogs in most cases. They were observed on 4 per cent of the sample.

Deer

All four pieces of red deer were antler, three of them having been sawn or decorated (see p. 32). The roe deer bone was a scapula.

Bird

Fowl bones were present in small numbers (0.5 per cent of the identified total). Most of the bird bones were found in the large phase 4 ditch 0460/0510/0610, where it may be that conditions for preservation were unusually good.

Table 5. Pig age data.

Jaws		Long bones	N	Y	F
1 birth – M_1 in wear	0	d humerus, p radius (fuse at *c.*1 y, modern)	3	4	5
2 – M_2 in wear	3				
3 – M_3 in wear (*c.*2 y, nodern)	8(+3)	d tibia, metapodial III/IV, calcaneum (1–1½ y)	18	10	9
4 M_3 in partial wear	3(+2)	ulna (olecranon), d femur, p tibia (*c.*3½ y)	7	0	0
5 M_3 in full wear	4				
6 M_3 in heavy wear	0				

For legend see Table 3. In addition, two bones from very young pigs were found.

Fowl formed 1.4 per cent of the bones from this ditch.

The one complete bone (a femur, GL 69.2 mm) is near the lower end of measurements of Saxon fowl from Hamwih, Southampton (Bourdillon and Coy 1980). It is of similar size to the Wild Jungle Fowl (*Gallus gallus*), ancestor of the domestic bird.

Chopmarks on the distal end of an immature tibiotarsus, mostly posteriorly, suggest that the feet have been removed.

Two goose bones were found, one of *Anser anser*, the greylag/domestic species, the other of *A. anser* or *A. albifrons*, the White-fronted Goose (carpometacarpus GL 78.2 mm).

The duck bones were all of similar size to bones of mallard (*Anas platyrhynchos*) in the collections at the British Museum (Natural History) at Tring. The question of whether they were hunted, trapped or reared domestically remains open.

Three raven bones from the large phase 4 ditch could be from one individual although they were not found together.

Other Species

The cat bone was part of a lower jaw, of domestic cat size.

Two hare bones and two bones of frog or toad were found. Also, rodent gnawmarks were observed on three sheep and pig bones.

The find of the centrum of a plesiosaur vertebra, encrusted with the marine worm Serpula, found in ditch 0510, is worth noting. It is, however, a fossil which occurs naturally in the area. (Identified by J. Royston, Buckinghamshire County Museum.)

Discussion of the Faunal Evidence

The most numerous species at Bierton, if the bone sample accurately reflects the livestock kept, was the sheep (Table 1). This is common to many Iron Age sites. Cattle formed a third of the sample and, given the greater carcass size, would have provided most meat. The number of pig bones found in excavations is more variable than that of either cattle or sheep and the high proportion found here (20 per cent) is exceeded at few Iron Age sites. This may well reflect the use of the surrounding clay land, evidenced by the plant remains, which may have provided ideal pasturage for these animals.

The age at death of the cattle is consistent with a self-sustaining herd, with some deaths of calves, some slaughtered young for meat and hide, etc., and the majority living five years and more. A case of osteoarthritis, a disease which is age and/or work-related, was observed. If one is right in seeing the mature cattle as plough, draught, milk and breeding stock, dying only after a working life, it seems to follow that although beef was the commonest meat, it would not have been available very often.

The age structure is comparable to that

found at Balksbury (Maltby 1981) and Gussage All Saints (Harcourt 1979), but contrasts with the Upper Thames sites at Ashville and Barton Court Farm (Wilson 1978), where only 28 per cent and 50 per cent, respectively, of the jaws had the third molar erupted, compared with 65 per cent at Bierton. There may have been differences in the use of cattle, for example a need for more draught cattle or even movement of cattle between settlements. Roman sites also vary in the ages of cattle found, although adult cattle generally predominate, as at Bierton (Maltby 1981).

The Bierton sample of sheep jaws shows an age structure which is intermediate between the Iron Age and Roman samples quoted by Maltby. In comparison to the Early and Middle Iron Age phases at Balksbury and Winnall Down, there are fewer young lambs (M_1 not in wear), rather fewer in the young group (M_2 not in wear), but far more in the immature (*c.*2–4 years) group. The Roman sample from Portchester (Grant 1975), which is typical of several Roman sites, has a greater proportion in the last-mentioned group and still fewer sheep slaughtered at an earlier age. Ashville and Barton Court Farm (Wilson 1978) show an age distribution between Balksbury/Winnall Down and Bierton.

The age pattern suggests that while many lambs died before their second winter, a good number were successfully kept another year or two, thus providing more wool and a better carcass. Additionally, it may be that there was a lower mortality of first-year lambs. This does seem to indicate a real change in husbandry. Possibly it was in response to a greater demand for wool and meat. It must have involved providing more winter pasturage than would have been the case had surplus sheep been culled young, as at the Iron Age sites discussed above.

Other evidence that changes in sheep husbandry seen on Roman sites were present to some extent in the very late pre-Roman Iron Age comes from the somewhat greater size of the Bierton sheep and the presence of a hornless sheep. Increase in size can be the result of better feeding, but the find of the polled skull lends some support to the suggestion that new blood had been introduced. Wild (1970) discusses the possibility that white, fine-woolled sheep were introduced by the Belgae. Polled sheep have not been found on recently-excavated Iron Age Upper Thames Valley sites (Wilson, personal communication) nor were they present in the very large sample from Gussage All Saints (Harcourt 1979). They have been found on Roman sites, e.g. Frocester (Noddle 1979).

Bones from species other than cattle, sheep and pigs were few. Red and roe deer were taken, although the numbers are small and all the red deer specimens were antler. Roe deer was found at Chinnor in Iron Age deposits (Harding 1972) but was absent from the Upper Thames Valley sites studied by Wilson.

Two bones of hare were found, a species only occasionally found on Iron Age sites. The hare was of significance in Celtic tradition; for example Boudicca, Queen of the Iceni, released a hare before setting out on her campaign, while invoking her goddess, Andraste (Ross 1967, 350).

Fowl and geese were kept in small numbers. Chopmarks on a fowl bone are of some interest, suggesting, though by no means proving, that the bird was eaten. Caesar's observation that the Britons abstained from eating chickens (as also from geese and hares), keeping them for pleasure and amusement (Toynbee 1973, 263), perhaps does not apply to the people at Bierton.

Bones of hare, fowl and raven, although present occasionally on earlier sites, are more commonly found on sites of the Roman period, and this and a number of other characteristics outlined here and below (p. 47) suggest that changes which were believed to occur only on Roman sites were beginning to take place before the Conquest. However, information from this one excavation, and not a particularly large one at that, can only suggest new possibilities, which may or may not be confirmed by future work.

Bieton fiche.

IRON AGE ANIMAL BONE: SUMMARY OF MEASUREMENTS

Cattle		N	Range	Mean
horn core	44/45/46/47*		141/55/34/-	
	44/45/46/47		131/51/35/-	
	44/45/46/47		120/47/29/92	
	44/45/46/47		124/47/32/-	
radius	GL/Bp/SD		253/73/37	
	Bp	6	70.9 - 84.4	75.4
calcaneum	G length		114,114,135	
astragalus	GL lateral	4	58.2 - 66.6	60.7
	GL medial	7	52.7 - 60.7	55.3
metacarpal	GL/Bp/SD/Bd		183/50/27/53	
	GL/Bp/SD/Bd		160/ - /23/50	
metatarsal	GL/Bp/SD/Bd		216/48/28/55	
1st. phal.	GL peripheral	12	50.5 - 58.2	54.9
Sheep/goat				
scapula	index	8	1.01 - 1.19	1.10
humerus	B Trochlea	9	24.4 - 28.7	26.5
tibia	B distal	7	21.4 - 26.0	23.2
metacarpal	GL/Bp/SD/Bd		119/20/11/23	
	B proximal	8	18.4 - 21.1	20.1
metatarsal	GL/Bp/SD/Bd		130/19/11/22	
	B proximal	6	16.9 - 20.2	18.7

IRON AGE ANIMAL BONE: SUMMARY OF MEASUREMENTS

Pig		N	Range	Mean
M_3	Length		30,31,31,37	
	Breadth		16,13,14,15	
humerus	B Trochlea		28,29,29.	
metatarsal IV	G length	5	84.7 - 88.7	86.2

Measurements are defined in von den Driesch 1976.

*44 - basal circumference; 45 - max. basal diameter;
46 - min. basal diameter; 47 - length of outer curve.
The first three lines are measurements of skull 1, 2 and 3 respectively.

B - breadth; d - distal; G - greatest; L - length; p - proximal;
SD - shaft diameter (=width).

Scapula index: $\frac{\text{L glenoid cavity to base of spine}}{\text{min. neck width}}$ (Noddle 1980)