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MAMMAL AND BIRD BONES FROM EXCAVATIONS AT LITTLE PICKLE, BLETCHINGLEY, SURREY 1988-9 (LP89)

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Summary

This report covers a large assemblage of material from a Tudor country house. One context was exceptional for the large numbers of its bones of wild bird, which were from inland waders, ducks, and a range of other species, and for more than 2,000 bones of rabbit. Its other material included much domestic fowl (with many immature bones) and goose, and bones from at least twelve calves. A programme of sieving took advantage of the excellent preservation in this context. From the pattern of distribution over the body it is clear that this material was wastage from the preparation of the carcases, which are likely then to have been cooked whole; little table waste was found, either in this context or elsewhere on the site. There was a certain amount of deer found from this context, but of greater interest were seven whole skeletons of fallow deer from a nearby context of demolition. A further paper by Andrea Bullock discusses the rich remains of fish.

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THE MAMMAL and BIRD BONES from EXCAVATIONS at LITTLE PICKLE, BLETCHINGLEY, SURREY (1988/9)

I. THE EXCAVATION BACKGROUND

Excavations were carried out in 1988/9 at Little Pickle, Bletchingley, by Mr. R. Poulton on behalf of the Countryside and Heritage Section of the Planning Department of the Surrey County Council, with financial assistance both from English Heritage and from the developers, Hepworth Chemicals and Minerals.

The name 'Little Pickle' strictly refers to a small square earthwork which is thought to have been a medieval deer pound; the main excavations took place in an adjoining field. The earthwork lies on a small strip of gault clay immediately to the south of the chalk of the North Downs; in the excavated area the surface geology included both Folkestone Beds sand and head deposits, with clays again further to the south. There are traces of repeated phases of occupation on the rich mixed soils nearby, but the structures revealed by the excavations were all medieval or immediately post-medieval: there were three successive hall-houses, from the 13th, 14th and 15th centuries, and then an early Tudor country house. As well as the earthworks of the deer pound, a long earthen feature lay in close association with the Tudor house and this is thought to have been a fishpond.

Documentary reseach by Mary Saaler has been summarised in Poulton's (1989) interim report, and it has shown that the successive structures were each in turn the principal house of a substantial landholding known first as 'Venars', with the family name given as 'Venator', the huntsman. This suggests that it was from Little Pickle that the hunting was organised in the known North deer park which surrounded the site at least from the 13th century, and perhaps in the further South park as well. One kilometre to the west and just within the boundaries of the North park lay the site of the associated manor house, Place Farm.

The property of Little Pickle was bought early in the 16th century by the Duke of Buckingham, and after his execution for treason in 1521 it was taken into royal control. It was administered by royal officers - at one time by the King's provisioner Sir Thomas Cawardine - and for a few years in the 1540s Place Farm became the home of Anne of Cleves. These royal associations may prove important for the analysis of present finds.

The house at Little Pickle was demolished between 1550 and 1559.

II. THE IMPORTANCE OF THE MATERIAL AND THE STRATEGY FOR THE STUDY

Such good documentary evidence and clear dating add greatly to the scope of the present study: the bulk of the recovered animal bone is from the early 16th century, and must represent the last years of high status occupation on the site. There is also clear stratigraphy for the closely-dated phase of demolition.

From the earlier phases of medieval occupation the sample of animal bones was fairly small and the material tended to be scrappy. From the 16th century layers, however, the standard of bone preservation was good and in one rubbish pit (F1226, dated to about 1540) it was outstanding: even by normal recovery there were 13 large boxes of material from this feature, with a great many bones from the smaller species. This pit lay at the back of the house, some 20 m from the kitchen. With such obvious richness great care was taken with the sampling and the sieving, and on advice from Jennie Coy of the Faunal Remains Unit many bulk samples from this pit were taken for coarse sieving (to a total of 65 litres through 6mm mesh), with some further subsampling.

Several other contexts from this phase produced quite large and coherent assemblages of bones which were hard and well-preserved, but no other feature was so abundant nor was there any other concentration of the very small material. One demolition layer (c.1308 in garderobe F1635), however, was of very special interest in that its three boxes of well preserved bone included several whole or near-whole skeletons of deer.

Apart from the special treatment accorded to F1226, the main contexts (especially those from the later phases) were sampled at 15 litres for sieving through 2mm mesh.

It was imperative to make some selection of the material for study: all the material has been handled by the present workers, but following the recommendations of Jennie Coy's site visit it was decided to concentrate on the last phase of occupation and on the demolition. Material from the major pit F1226 was worked first, and its rich results are at the core of this study: in the presentation of results its finds are first discussed at some length, with the data from trench clarified by the data from sieving. A range of different context-types was then selected from the most productive features of this late period, with which the rubbish pit could be compared.

For the comparison of pit material the fills from pit F1088 were chosen. This pit had two main contexts of infilling, cc.1338 and 1342, whose material was recorded separately, compared, and then amalgamated for the tables. A further layer from the same pit (c.1064) had been identified by the excavator as a midden deposit and its material was kept separate, to be compared with a midden spread from c.1061. Bones from the demolition contexts from the garderobe F1065 (c.1308 with the deer skeletons, plus a small underlying layer c.1602) offered a contrast to the pit and midden material and could in their turn be compared with the demolition material from a cellar (c.1362).

There is also a spread of demolition rubble from c.1244 and this perhaps may represent an earlier episode of destruction; otherwise, it is likely that all the material under study comes from the second quarter or from the middle years of the 16th century, with the phase of final occupation leading directly to the demolition of the 1550s.

When all these features had been analysed, the whole assemblage was scanned in the light of the questions that were arising.

THE METHODS OF STUDY

The material was studied at the Faunal Remains Unit. The fragments of wild bird were identified by Sheila Hamilton-Dyer. Andrea Bullock has made a particular study of the the fish (Bullock 1991) and also of the skeletons of fallow deer, and data for these were recorded using the ANIMALS programme (Campana 1990) on a Tandon 386 computer. All other data were recorded on a Comart CP520 computer in d-Base and Wordstar files. The major printouts are supplied to the Surrey County Council with this report; the archive of files and printouts is available at the FRU:

PICKLE.TSY - prime data file
PICKMSTS.DBF - measurements of mammal bones except for deer
PICKBIRD.DBF - measurements of bird bones
PICKJAWS.DBF - mandible data for cattle, sheep/goat and pig

The material has been returned to the care of Surrey County Council.

THE PRESENTATION OF THE TABLES AND RESULTS

First (in Table A) there is the key to the species abbreviations which are used throughout the tables. The results are then given for the rich context c.1220 in pit 1226, since this is at the centre of the discussion: data are compared from trench recovery and from sieving (to 6mm, which provided the great bulk of sieved material). Since the material from the other features that were studied is seen as important above all for the light which it may shed on c.1220, the data have been tabled with this in mind. The assemblages are first described separately and tables are then drawn up for comparisons across the study as a whole.

III. RESULTS: THE MATERIAL FROM CONTEXT 1220 IN F1226

This pit was not especially large (1.9 m x 1.7m in plan, and 0.7m deep) and its two upper layers gave only desultory fragments of the larger mammals, mostly from cattle. The great pit-assemblage which dominates the present study came overwhelmingly from a single rich organic context (1220). This filled the lower part of the pit, reaching the excavated surface at the eastern edge and slumping quite deeply to the west.

THE STATE OF THE MATERIAL

Over 1300 fragments from normal recovery from c.1220 could not be identified but nearly all of this unidentified material consisted of very small fragments from the larger species and there were generally crisp and well preserved. The excellent preservation of the identified fragments, too, is shown by a wealth of tiny bones. The material must have been fresh at deposition, for of the many thousands of fragments few bones showed signs of chewing (one third phalanx of cattle, some sheep/goat ulnae, a few carpometacarpals of goose, and a proximal femur of dog), and only one bone was notably eroded (a sheep metapodial). Confirmation that the assemblage had been little disturbed came from the sieved material, where many matching small bones were recovered in groups - small passerine wing bones, for example, still neatly pairing left and right.

The results from the soil samples gave a further indication of the pristine state of the material in that in spite of a great deal of sieving no small mammal or amphibian bones were found. One has to suggest that the material was deposited quickly, in a pit which had only just been made available and which most likely, in fact, was freshly dug.

THE REPRESENTATION OF THE SPECIES

Table 1 shows the identified fragments from this context which were recovered both from the trench and from the 6mm sieving, and the balance of the species may be seen. The ribs are listed on their own in Table 2, from which it may be seen how far their species identifications are secure; but the results for the heads of ribs make it likely that most if not all of the 'large artiodactyl' rib bodies came from cattle and that nearly all the 'small artiodactyl' ones came from sheep or goat, and these attributions are presented as alternatives - clearly stated - in those tables where they are relevant. It may seem strange that there was only one rib-head from pig; but there were many strange findings from this pit.

By fragment count it was bones of cattle and of rabbit which dominated trench recovery. The sheep/goat bones were most likely from sheep in that there were forty-one sure fragments of sheep and no sure fragments of goat, and if one included the rib attributions these sheep/goat bones were numerous. Pig was moderately represented. For deer, fallow bones were the most common, and there was little red deer or roe deer. Bones of cat and dog were minimal, and horse was repre-sented only by a loose upper molar - none of these species are likely to have been eaten by the Tudor period.

The likely rib attributions alter the balance for the larger mammals in the sieved results as well, and in these calculations sheep/goat are preponderant. It is the bones of rabbit, however, that are by far the most numerous, with a high representation also of bird.

Bird bones were plentiful. Those listed as "?probable domestic fowl" are all acceptable for domestic fowl but many of them are too unformed for the identification to be certain, and since - as will be seen below - there were some secure identifications of the bones of immature pigeon it may be that a few more such bones have been included in the present table with those of likely fowl. As an order of magnitude, however, the results seem sound. Bones listed as of "other species" are likely to have been largely from the wild. They included several bones which were either of mallard or of domestic duck but these were a very good match both in size and in texture for wild material in the FRU's modern collection. It was clear from trench recovery, then, that birds as a whole were well represented, that domestic fowl and goose were important, and that a great many birds were from the wild. Sieved recovery gave further insight into the wealth of these remains.

The many remains from fish are discussed by Andrea Bullock in her separate report. The great mass of her material came from sieving.

DISTRIBUTION OVER THE BODY IN MAMMALS (Tables 3 and 4)

Data are given in Table 3 for the distribution over the body in the mammal fragments from c.1220; these are then percentaged by the main body groups in Table 4. There was evidence of a great deal of selection, and of very different selection within the different species. For the larger mammals the sample is so much greater from normal trench recovery that these data are important here, but there is nothing in the sieved results that challenges their broad interpretation. Pigs showed a bias to bones of the head and to teeth; cattle gave few such fragments. Sheep/goat gave head bones or teeth at all, and very few foot bones: even without the attributions of rib fragments their bones come very largely from the area of the trunk. The only head material from deer was one fragment of antler from fallow.

There had been selection among the vertebrae of cattle, with a concentration at the back of the body, and with no atlases or axes at all.

Bones of the pelvis and back legs were the most common for all three species of deer.

Rabbits gave many loose teeth and many head bones, but it was bones of their feet that proliferated. By normal recovery there were the larger footbones, the metatarsals, and there were also good numbers of calcanea; there were only four metacarpals. Sieving with 6mm mesh also gave a fair number of astragali, and by recovering far more of the metacarpals showed that the bones of many front feet had indeed been present in the pit. There were many head bones and loose teeth. The main limb bones and girdles were quite low except for the tibia - and nearly all the tibia fragments were distal ones. There were some rabbit ribs but only six vertebrae in total (two thoracic from normal recovery and four sacral from sieving); these could all have come from a single individual.

DISTRIBUTION OVER THE BODY IN DOMESTIC (OR LIKELY DOMESTIC) BIRDS

For the domestic poultry as for the mammals, clear patterns emerged for distribution over the body (Tables 5 and 6), and again there was contrast by species. The bias in goose was quite startling, with the lower wing bones (carpometacarpals and wing phalanges) found out of all proportion to their incidence in the skeleton; goose head bones were wholly absent, and bones from the legs were very scarce. These results were similar from trench recovery and from sieving.

Domestic fowl gave few bones from the lower wing, but what was most surprising was the dearth of upper leg bones from the sieving.

SPECIES OF WILD BIRD

The abundance of wild bird fragments was shown by normal recovery; sieving greatly extended the sample size (Tables 7a and 7b). It also gave a somewhat wider range of species - though what is most impressive about the two lists is the consistency of choice by species, and of distribution over the body within the different species groups. The bones are listed in the table in zoological order, but are discussed in their order of abundance.

Most common were the inland waders, those whose preferred habitat is somewhat marshy ground - woodcock (Scolopax rusticola) and lapwing (Vanellus vanellus) most notably, with plover and common snipe (Gallinago gallinago). The plover bones were a good match for those of golden plover (Pluvialis apricaria) in the FRU's collection, and on modern distribution this species is more likely in this country than the grey (P. squatarola). With a marked concentration on the wing bones, these many fragments must represent a great many individuals. There were also bones of curlew (Numenius arquata), with at least two individuals of different sizes.

Somewhat less important were the ducks. The larger duck bones fit well in size, morphology and texture with those of mallard (Anas platyrhynchos) in the FRU's modern collection, and they are tentatively taken as from wild species. One tibiotarsus is a good match for scoter (Melanitta nigra), though mallard is not excluded here. Even from normal recovery, however, the balance was to the smaller species of duck (cf. Anas crecca), and this size distribution is confirmed by results from sieving.

There were few game birds - just partridge (Perdix perdix) and quail (Coturnix coturnix) - and these were found only from the sieving.

Pigeons (Columba sp.) were quite common. It is hard to distinguish the bones of domestic pigeon from the wild material and all were grouped together; but some of the bones were immature and these at least are likely to have been from domestic birds. A few bones, too, were particularly small, too small for the common wild species; they have been excluded for turtle dove (Streptopelia turtur) at the British Museum collection at Tring and it is suggested that like the immature pigeon bones they too may be evidence of birds kept on the estate. Similar problems with pigeons have recently been discussed by Sadler (1990) for her large collection from a medieval hunting lodge at Faccombe Netherton.

Passerines were numerous. Several of these were of a good size for Turdus sp, probably thrush or redstart, but others were smaller and it seems likely that many species were represented. Many small bones of the bunting-size and wren-size species of passerine (cf. Emberizidae and Troglodytidae) are likely to have been lost even from the 6mm sieving, for they were found in greater numbers in the few samples processed through finer meshes: such very small birds may have been the most numerous of all the birds repsented in the pit.

There was a single occurrence of magpie (Pica pica) - a tibiotarsal from trench recovery. There were also three bones of grey heron (Ardea cinerea) from the sieving: a humerus and carpometacarpal, and also a tarsometarsal with small sharp distal cuts. These bones could well have been from the same individual.

Yet from this rich concentration of bird remains two prime feast birds were missing: in spite of a careful search neither swan (Cygnus sp.) nor peacock (Pavo cristatus) was found.

The distribution over the body of the wild bird material is shown as a broad generalisation in Table 8. The change revealed by sieving comes from the numbers of small passerine vertebrae, increasing the incidence of the main body parts; but the overall picture is of a great preponderance of wing bones, a dearth of bones of the leg and the head. Quail gave only head bones (one beak and three mandibles), and there were fourteen mandibles and four skulls among the 75 fragments of duck; but otherwise the pattern is similar throughout. Such consistency shows a serious pattern of selection.

Sieving through the finest meshes gave proportionately more of the very small radii and ulnae, and it produced for the first time some of their accompanying carpometacarpi. It seems fair to infer that a great many more of these tiny bones had been lost by the other methods of recovery.

One wonders about the method of catching so many birds for what seems likely to have been a short episode of deposition. One may suggest the netting of birds from large flocks, and if so perhaps in the winter when lapwing and snipe, at any rate, are most likely to be in flocks - and when golden plover is most likely a visitor, often flocking with lapwing. Ducks, too, might well be caught in winter from the fields.

BUTCHERY

a) in cattle

Clear patterns of butchery were seen for the cattle. Their head fragments were all quite small. Their vertebrae showed much trimming but no central sagittal division of the carcase. The fragments of cervical vertebrae were mostly small dorsal trimmings; the thoracics gave 32 fragments of spine against 13 body fragments, and for the lumbar vertebrae the imbalance was still more marked - 110 process fragments against 5 bodies and 4 oddments of dorsal trimmings. A seventh cervical vertebra had been cut smoothly in the horizontal-vertical plane, and a thoracic vertebra showed a smooth oblique body cut; otherwise the vertebral cutting was quite rough.

Several cattle ribs were cut obliquely at the head, and cut through also on the body, often with a preliminary surface cut or cuts, either medial or lateral.

The scapula showed distal cutting and hard smooth upward scraping, often into the lower spine, but most of these bones were at least one quarter whole and nine of them were near-whole.

Two cattle humeri were split vertically, but the rest were cut roughly and horizontally across the shaft; two had smooth oblique throughcuts at the distal lateral joint. All the radii had been cut, again mostly horizontally, and mostly with the proximal and distal ends removed. There were many large fragments of shaft. Most cuts were rough, but again there were some smooth oblique cuts for disjointing (3 proximal, 4 distal). The ulnae were cut into small pieces.

Bone of the cattle pelvis were much cut, often vertically on the upper ilium; the ischium fragments were very small.

There were only five fragments of cattle femur; all had been cut, one of them very smoothly and obliquely at the distal joint.

The tibiae too showed much cutting: as with the radii, both ends were commonly separated from the shafts - only 8 ends were present, but there were 49 shaft fragments. The cutting of the shafts was rough, but again there was smooth oblique separation at the joints (1 proximal joint out of 3, and 3 distal joints out of 5).

Two astragali were whole; the third showed a smooth oblique cut into the medial edge.

Many cattle metapodials were whole (17 metacarpals, 15 metatarsals). There was no metapodial splitting. There were rare light marks on the proximal joint surface (two metacarpals, one metatarsal), and none on the distal. Six metacarpals had deep cuts into the shaft (two front, two back, one lateral, and one both medial and lateral); and ten metatarsals had been roughly cut or broken across proximal shaft. In addition, four out of 24 cattle neonatal metapodials had been cut (2 metacarpals on the shaft, one metatarsal medially and one on the back).

All the cattle phalanges were whole, but there were a few light cuts on various surfaces.

b) in sheep and sheep/goat

For sheep/goat too the butchery was consistent bone by bone. Several sheep/goat ribs were cut obliquely at the head, and medial surface. Most vertebrae had had their processes removed. The scapulae showed many distal cuts.

One sheep humerus was whole, though this bone had many light horizontal cuts on the lateral shaft; all other humeri had been halved, with small sharp horizontal cuts round near the midpoint. The radii on the other hand were mostly whole bones.

The sheep/goat pelves mostly had oblique cuts through the ilium shaft - two of them smoothly and repeatedly.

One sheep femur was near-whole, otherwise these were mostly shaft fragments. All the sheep/goat tibiae were cut, generally into three parts - proximal, distal and shaft.

c) in pig

Butchery in pig was most obvious on the mandibles, where there was a clear pattern of cutting at the upper back - there was no hinge remaining on any of the 13 cheek-teeth rows; and there was only one hinge on its own.

d) in dog

A bone of dog had been cut - a right proximal medial fragment of femur showed a clean cut across the caput.

e) in domestic poultry

For goose, some of the many carpometacarpals were whole, plus all 3 coracoids and 3 of the 4 femora; several carpometacarpals had been smoothly cut at the proximal end. The other bones of goose were all small fragments, probably broken or cut but without any visible marks.

Of the many bones of domestic fowl, few had certainly been cut: one proximal humerus and two femora, all lightly, and one tibiotarsus with several small cuts at the distal end.

AGEING

With few mandibles in this context, the ageing information had to be based mainly on the data for epiphysial fusion and on the porous condition of some of the bones; but it proved to be of great interest. There were many very young, very porous cattle bones, of animals perhaps a few weeks old (Table 9): these gave a strong bias to the metapodials (23 metatarsals, plus one more from the sieving, and 21 metacarpals). There were also a few very porous limb bones and a first phalanx - and there were three very young cattle mandibles, two left and a right, all with the deciduous fourth premolar in early wear (Grant's wear-stage C) and with the first molar breaking through the bone. The bias to the metapodials showed that there had been selection over the body and not just the disposal of young casualties, and indeed these bones had often been butchered - four of the metapodials quite roughly, two mandibles smoothly on the diastema, and a proximal radius smoothly and obliquely on the shaft.

The figures for epiphysial fusion show tender eating ages for many of the cattle: in addition to the young calf bones, 8 bones from the early-fusing groups were still not fused. For the middle-fusing group of bones, numbers of fused and unfused epiphyses were close (25:23 - plus the many calf bones), and of the late-fusing group some two-thirds were fused (7:12 - again without counting the calf bones).

The data for epiphysial fusion for sheep and sheep/goat (Table 10) showed older animals. From the early- and middle-fusing groups all bones were fused, and most of the late-fusing ones (28 ex 39). No feotal or neonatal bones of sheep or goat were found, even from the sieving.

The bias in pig towards the bones of the head gave a good chance of ageing from the mandibles: the results may be seen in Figure 2 below, where the mandible data for the study as a whole are considered and compared. There were young animals for tender eating - two very young individuals, one slightly older, nine with the second molar in wear but not yet the third one, and just one individual where this tooth was coming into wear. From the other bones there were several very young animals, newborn or not much older, and there were no fused epiphyses at all (Table 11).

There was a fair sample of bones from fallow deer, but except from one calcaneum all the epiphyses were fused (Table 12).

There were no bones of very young rabbit. Even from the massive sample recovered from the sieving, all the bones were of adult or young adult size. About one third of the most numerous group, the metapodials and the tibiae, were unfused (Table 13).

The immaturity of many bones of domestic fowl has already been discussed, since this posed problems of identification. In this present section it should again be stressed that a great many of the fowl were very young.

PATHOLOGY

There were various instances of pathological conditions on the bones from this pit, and these showed some consistency. Two ribs, one cattle-size and the other sheep-size, were lumpy as from fractures which had incompletely healed. Otherwise cattle problems were at the shoulder or the feet. Two scapulae, both fused and both left, showed lesions on the joint surface of the glenoid, and one of them also showed irregularities on the lateral surface just above the joint. A whole left metacarpus, fused, was splayed at the distal end with puffiness on the distal front shaft, an unfused left metatarsus showed light exostosis round the proximal joint, and a fused first phalanx showed medial scraping on the proximal joint surface, with swelling on medial shaft and with distal lateral exostosis.

Apart from the damaged sheep-size rib, sheep/goat showed problems only at the elbow, with lateral exostosis on two distal humeri and on two proximal radii, all of them right ones.

An unfused distal fibula of pig showed medial puffiness as from an infection.

Several bones of domestic fowl showed exostosis, and all were from the leg. Three tibiotarsi from a total of eleven were affected by exostosis at the distal end, one of them heavily and the others more mildly; and of twenty tarsometatari, a whole left one had a heavy mis-shapen spur and also proximal lateral exostosis, and on a left distal fragment the spur was short and rough.

In summary, context 1220 was conspicuous both from trench recovery and from sampling - first for its abundance; second, for a marked bias of the species with a wealth of rabbit and wild bird; third, for biassed distribution over the body, the bias changing from species to species but with evidence of pattern and selection throughout; fourth, linked with this, the regular repeated butchery; and lastly, for the bones of many young chickens and calves.

The other large assemblages were then studied, both in their own right and to see if similar patterns could be found.

(c) PIG

stage	1	2	3	4	5	6
c.1064				x		
c.1220	xx	x	xxx xxx xxx	x		
c.1244				x		
c.1362		x				

stage 1: M1 not yet in wear
stage 2: M2 not yet in wear
stage 3: M3 not yet in wear
stage 4: M3 coming into wear (Grant stages B - C)
stage 5: M3 all cusps in wear (Grant stages D - F)
stage 6: molars in heavy wear (Grant stages from J for M1 or M2, from G for M3)

IV. COMPARATIVE MATERIAL FROM OTHER LATE FEATURES

PIT 1088

F 1088 was chosen for comparison as giving the most abundant assemblage of the various alternative pits. It was a broad and fairly shallow feature, with two main layers of filling producing good assemblages of bone (cc.1338 and 1342). Above these an upper layer (c.1064) was taken by the excavator to be midden deposition within the pit, and higher still lay a midden spread (c.1061).

The pitfill assemblages 1338 and 1342 were very similar to each other in condition and quite different from the pristine material from pit 1226. Both showed much chewing, and on similar bones - on several ribs, on cattle vertebrae generally and in particular on the thoracics, on cattle humeri, and on many radius shafts of sheep. In addition, several bones in each context were burnt black: in c.1338 three bones of cattle front leg, a side metapodial of pig and dog distal humerus and axis, and in 1342 a distal humerus of sheep and a tibia of dog. From the state of the bones, then, disposal seemed more desultory and over a longer period of time, and it may be relevant that c.1338 gave (by trench recovery) two femora which were a good match for black rat (Rattus rattus): the left was fully fused and the right had fused only partly, with the caput epiphysis missing, but apart from this the two bones matched exactly for size and for texture and they should be taken as a pair. There were no small mammal fragments by sieved recovery from this pit.

The species representation showed a mixture of good food fragments and of other bone waste (Table 14). There were nearly two hundred fragments of the main domestic food mammals, mostly cattle and sheep/goat. Pig was notably scarce; fallow deer on the other hand was richly represented, with meat bones and also with head fragments, and there were two fragments (a tibia and mandible) of red deer. There was far less rabbit in proportion to the whole assemblage than there had been had been in F1226 (19 fragments from normal recovery, plus a tibia, two metapodials, a calcaneum and a cheek-tooth from the sieving). Context 1342, however, gave a humerus of hare, the only hare bone from the present study, and this finding drew attention to the absence of this rich food species from c.1220. There were several fragments of dog, with at least two individuals, one medium-sized and the other small, and there were four fragments of cat. Horse gave two lumbar vertebrae and a rib.

The fragments of bird recovered from this pit are listed in Table 15. There was a moderate amount of fowl and goose, with a further goose bone (a femur) from the sieving, and as in pit 1226 some of the fowl (or likely fowl) was immature. In addition, trench recovery gave some fragments of wild bird - a tibiotarsus of snipe (Gallinago gallinago), two femora of partridge (Perdix perdix), a humerus of teal-size duck and a broken proximal humerus which may have been from rook or crow (Corvus sp.). All these were from c.1338. Sieving from c.1342 gave two furculae, one of teal-size duck and the other probably from curlew (Numenius arquata).

Species by species, the patterns of distribution over the body were more varied than in pit F1226. Though footbones from sheep/goat still were minimal, there was a wider range of other body parts and also some fragments from the head . Again there were many cattle vertebrae; but this time many were thoracic.

The style of butchery cuts, however, was like that seen in F 1226. Many cattle-size ribs were cut, often repeatedly, with throughcuts and with lateral surface cuts. Most cattle longbones had been quite roughly cut. Cattle vertebrae had been trimmed as before, though in F1088 the vertebral bodies were present and not just the trimmings. Two cattle ilia, left and right, showed deep smooth ventral cutting, but most cattle girdles were more roughly chopped, and a left proximal metacarpus from c.1342 had repeated vertical cuts.

For sheep/goat, both atlas and axis had been cut through very neatly, the atlas sagittally near the centre, the axis smoothly and obliquely at the caudal end. Both bones had also been trimmed. One sacral vertebra had a rough paramedian cut, and the many tibia shafts of sheep/goat were cut into quite small pieces. Two bones of domestic fowl had been cut: a whole right coracoid showed small sharp cuts at the cranial end, and the trochanter of a left humerus had been sharply trimmed.

For ageing information, there were four very porous calf bones (which were all of the back leg and could have come from a single individual); in addition there was a very young cattle mandible with the first molar not yet in wear. The mandibles of sheep/goat gave two young animals - one with the first molar not in wear, the other with the first in wear but the second still unworn; there was one unfused epiphysis, from the middle-fusing group (a tibia). From the few bones of pig, one (a humerus) was foetal or neonatal. No ageing data was given from the sieving.

To some extent the pattern of pathology repeated that of pit 1226. There was exostosis on cattle foot bones (first and second phalanges), at an elbow of sheep (right distal humerus), and heavily on a distal tibiotarsus of domestic fowl. In addition, a whole right femur of dog showed serious distal exostosis all round the joint; and a right femur shaft of cattle, a bone which was still quite porous but too large to be neonatal, was lumpy and uneven in the fossa.

MIDDEN CONTEXTS 1064 and 1061

Two midden contexts gave material for comparison. Context 1064 lay within pit 1088 but is interpreted by the excavator as of midden origin and has been tabled separately; c.1061 overlay the pit and stretched beyond it.

The condition of the material in c.1064 was poor. Many cattle bones had been chewed, several of them badly (mostly longbones and ribs). Two sheep/goat tibiae and two pig bones (a distal humerus and a proximal radius) were chewed, and two pig bones were heavily eroded (tibia and thoracic vertebra). In addition three bones were burnt black - a right ilium fragment of cattle and a sheep/goat mandible fragment and a tibia shaft. There was also a high rate of unidentified material (222 out of 426 fragments, 52%). Context 1061 lay higher and may have been more exposed, yet its bones were better preserved and only one of them gave signs of chewing (the distal end of a femur shaft of cattle). Twenty-eight out of 105 fragments could not be identified (quite a modest rate of 26.7%), and there was no heavy erosion. This is not like a typical midden that gathers slowly and roughly over time.

Context 1064 gave a cross-section of species - good numbers of cattle, sheep/goat and 12 fragments of pig (Table 16). There were 34 bones of fallow deer (half of these from the head). There were the more usual midden species, fragments of dog and horse - but five of the horse fragments were loose teeth and could have come from a single individual. There were 14 bones of rabbit (mainly longbones), plus a rabbit incisor from sieving; there were also 22 fragments of poultry, including some immature bones that were probably from fowl. Sieved recovery gave a small humerus from a passerine of blackbird-size.

Context 1061 gave a smaller assemblage (Table 17). There was cattle and sheep/goat, but only one fragment of pig (a loose upper incisor). There were nine bones of fallow deer, five of them from the head and also some meat bones; in addition there was a humerus of red deer and also one of roe deer. There were two horse bones - a right humerus and a first phalanx. There was little small material: one bone of rabbit, three of goose and fowl, and a shaft fragment which was probably from a wild bird species. The only find of interest from sieving in this context was a bone of amphibian, which on size was probably of frog.

For cattle and sheep/goat the distribution over the body in these contexts was much like that in the pits - with many ribs, moderate head representation, and with a dearth of foot and ankle bones of sheep/goat. Butchery on the cattle bones was also similar - most of their longbones had been chopped to about one-third size with rough horizontal cuts. The girdles were in small pieces and there were cuts on many of the ribs. In addition, the tip of a jugular process of cattle had been carefully cut away - it was the tip itself that was found, the only cattle fragment from the skull.

A thoracic vertebra and two sacra of sheep/goat showed neat sagittal cutting, and the processes of a lumbar vertebra had been carefully removed. A left mandible of pig had been cut obliquely several times behind the third molar; there was a small sharp cut on a right humerus shaft of rabbit, and a left humerus of domestic fowl showed three neat horizontal cuts on the lateral side of the shaft.

Bones of the horse and dog had also been butchered. From c.1064 an unfused distal tibia of horse had three rough and heavy cuts on the medial shaft, and a fused lumbar vertebra of dog had had the processes trimmed and also showed sharp horizontal cuts on the ventral body. The two horse bones in c.1061 had also been butchered - a humerus had been laterally trimmed, and a first phalanx had small sharp oblique cuts on the back. A cattle humerus from this context showed throughcuts at the distal end, and several pelves had been roughly chopped at the ilium; an atlas of sheep/goat had a sharp oblique cut on the caudal articular surface, and an axis had been chopped medio-laterally.

For cattle ageing, the two midden contexts produced only one neonatal cattle bone (a metatarsal in c.1064); there was no mandible information for cattle. Unusally, there was a neonatal bone (a humerus) of sheep/goat in c.1061, but there were no other unfused shafts. The two sheep mandibles were from good eating ages (one with the third molar unworn and the other with this molar just coming into wear). The horse distal tibia was unfused.

There were some signs of pathological conditions. A second phalanx of cattle from c.1064 showed exostosis above the joint on the distal lateral side, and there were two further cases of exostosis at the sheep elbow from c.1061 (distal humerus and proximal radius, both right and perhaps from a single individual). Less common was a sheep maxilla from c.1064 which was swollen and receding at the gumline round a loose second molar. From the same context a right fused tibia of dog - a short bone with Greatest Length of 106.2mm, Shaft Breadth of 9.8mm and Distal Breadth of 16.4mm - had heavy exostosis around the proximal joint. A right os coxae of cattle from c.1061 showed mild exostosis around the acetabulum.

DEMOLITION FEATURES

Demolition spread c.1244

This context produced a smallish assemblage from the main food mammals: 62 bones of cattle (with many ribs, plus vertebrae, girdles and legbones), 19 of sheep/goat and 10 of pig (Table 18). There were also 49 fragments of fallow deer, of which 8 were antler and a great many were bones of the lower back leg. There were no bones of rabbit, none of horse, dog or cat, and just a single bird bone - a humerus of domestic fowl. Three bones were heavily chewed, most likely by dogs, and in addition there were several radius and tibae shafts of sheep/goat with signs of rodent gnawing. Butchery marks included rough cuts on ribs and on two cattle ischia, but there was also a fair proportion of smooth, more careful cutting on some of the cattle bones - on a left distal scapula mediolaterally by the glenoid, vertically down the front of a right humerus, and clean through the fused condyles of a femur. Particularly smooth was a sagittal cut just right of centre of a sacrum.

There was exostosis on the front of a fused first phalanx of cattle.

DEMOLITION FILL OF GARDEROBE F1635

The great interest of the main fill (c.1308) of this garderobe lay in its skeletons of fallow deer, and as a unique occurrence these are discussed separately below. Otherwise there was the usual pattern of cattle, sheep/goat and pig bones. There was only one bird fragment (a shaft of tibiotarsus which could well have been from fowl) and no material from the smaller species (Table 19).

The cattle bones were interesting for the number of young calf fragments (five metapodials, four of which were whole though badly chewed, plus a femur, a fragment of skull and a mandible). There was also a young sheep scapula which was unfused, though not neonatal.

A sheep radius had been heavily chewed both proximally and distally.

Many cattle bones showed butchery. There were miscellaneous throughcuts on all three cervical vertebrae; the spine had been trimmed from a right distal scapula, and there were cuts on several others; there was a clean oblique cut on a left distal humerus as from disjointing; and two femur shafts, left and right, one large and the other much smaller, had been halved with strong horizontal cuts from the back. Several sheep/goat long-bone shafts showed surface cuts in various directions, and there were also several light cuts from front to back on a distal pig femur.

Apart from some pathology on the fallow deer, there was only one sign of disease from the bones in this feature: a distal pig femur showed a bad swelling on its front/lateral edge and light exostosis on the back/medial edge. This fragment was unfused but was probably approaching its full size.

CELLAR c.1362

The remaining demolition context (1362) came from a cellar. Here again many bones had been heavily chewed - most of the cattle vertebrae and longbones, and a scapula and radius of sheep.

The bones in the cellar were mainly from the larger mammals (Table 20). There were 59 certain cattle fragments and 54 likely cattle ribs - a marked concentration of cattle, and not only of their ribs but also of thoracic vertebrae and scapulae, with no foot or ankle bones and with few bones from the head. There were 15 bones from sheep/goat, two of dog and only one (a mandible) of pig. Fallow deer, on the other hand, gave 32 fragments of which half were jaws. There were two bones of dog and two fragments of horse scapula. The four fragments of goose were all leg-bones, and there was a radius of domestic fowl. There was no wild bird or rabbit.

The fragments of cattle were generally large ones, and they had been roughly chopped. A left mandible had been laterally cut at the hinge. One distal scapula had light medial cuts; several others had rough cuts on the spine. One left radius was chopped heavily and laterally; another, also left, heavily and medially. A left ulna had been roughly chopped to remove the proximal end. The fragments of pelvis all showed rough chopping, and so did the fenur shafts. There were no signs of the smooth careful butchery seen on a few fragments from other features. Only a goose tibio-tarsus showed small sharp cutting (on its distal articulation).

There were bones of calf (two very porous humeri and a femur of neonatal size, and an unfused but rather larger tibia from another individual). Rare for the study, the cellar gave a neonatal bone (a femur) of sheep/goat. The pig mandible had an unworn second molar. The two dog bones (a tibia and an ulna) were still unfused and may have been from a single individual.

V. ANALYSIS AND DISCUSSION - c.1220

With material so abundant from the one rich context 1220, one must ask how far its material differed from the rest at Little Pickle - in quantity simply, or also in kind? Are there clues from the neighbouring assemblages as to what that context represents? The rest of the tables, and the figures, were drawn up to show contrasts and comparisons; and as point of interest emerged in the course of the analysis it was important to check that the choice of contexts for full study had not left out any relevant material. A bone-by-bone scan was therefore carried out on all the remaining assemblages, both from the trench and from sieving, and the following discussion may be read in the assurance that nothing of moment had been missed.

Differences in the representation of small material?

No other context showed the wealth of small unidentifiable fragments - little more than crisp crumbs of bone - that had been found from c.1220 (Table 21). Still more dramatic was the rich recovery from c.1220 of bones of the smaller species, above all of rabbit but also of birds both domestic and wild (Tables 22 and 23). There were several fragments of these in pit 1088 and in the likely midden context 1064; in any other study one might see these as a fair representation of food waste, but as compared with c.1220 they came in no great numbers. There were no finds from any of the smaller food species in the demolition contexts.

Context 1220 gave no small mammal or amphibian. By contrast there were two finds of rat from the trench from pit 1088. Sieved recovery from other contexts gave a rodent maxilla fragment and an upper incisor of rat, both from c.1064, and an amphibian shaft from c.1061.

Differences in the representation of deer?

Red deer and roe deer were very minor species in c.1220, and were minimal elsewhere on the site. Compared with them, fallow deer was well represented; but in terms of the site as a whole - disregarding for this purpose the concentration of fallow skeletons in c.1338 - the tally of 41 fragments in so large an assemblage is quite low. If deer is to be seen as a sign of rich eating, like rabbit and like wild bird, then this is strange.

Differences in representation of the domestic food mammals?

Table 24 gives the relative representation of cattle, sheep/goat and pig. The percentages from the sieving of c.1220 give an indication of the scale of correction which might need to be made to the data if all contexts had been sieved; but much of the extra material gained from c.1220 was made up of very small fragments which may mean little in terms of human usage. It may be seen that c.1220 was not far from the overall rates on both methods of counting the ribs, and this is not surprising in that it gave the bulk of the material - though relatively it gave slightly less cattle and slightly more pig and sheep/goat. Such weighting is quite common for a pit. Pit 1088 is the highest in sheep/goat and the lowest in cattle; but it is strangely low in pig. The demolition and the midden contexts were generally high in cattle and lower in sheep/goat; the demolition assemblage from c.1362 in the cellar was very low indeed in pig, but the other demolition contexts were quite high in it.

Differences in animal sizes?

Metrical data for cattle, sheep/goat and domestic fowl are recorded in the archive to an accuracy of 0.1mm; in addition, the larger samples of measurements have been plotted on histograms to an accuracy of 1mm (Figures 1 - 5). Calculations of withers heights have been made by Fock's factors for cattle and Teichert's factors for sheep, as recommended by von den Driesch and Boessneck (1974).

Material from c.1220 gave most of the metrical data, and in the figures these measurements (x) are distinguished from those of other contexts (o). The few cattle measurements which are not from c.1220 do not diverge in any particular way: they include a few of the largest ones, but they also include some of the smallest and several from the middle of the range.

As a whole, the cattle fit well for measurements of breadth with the means and ranges of those from 16th-century Southampton (Figure 1). Their calculated withers heights are somewhat lower on average (Figure 2), and since it happens that for both groups these heights could be calulated only from the metapodials the comparison is fair. The length of the lower leg does nothing to enhance an animal's usefulness for food, and one may not claim superiority for the 16th-century Southampton cattle on grounds of measurement and size - it seems more to be a question of animals of different conformation, with both groups having good development in the body region but with those represented at Little Pickle having somewhat shorter legs.

Most of the sheep/goat measurements on which Figures 3 and 4 are based come from bones that could be identified to sheep. Within the group as a whole there was relatively less material from c.1220; but again there was reason to see that assemblage as distinctive in its measurements. The Southampton sample was much the larger and its range was the greater, but there is no reason on bone breadth to take the two groups as different. For withers heights, the unusual selection over the body left no whole metapodials of sheep at Little Pickle, and it was only results calculated from the radii (and from a solitary humerus) which could be compared. On these, however, the sheep from Little Pickle were notably taller: every individual came above the mean figure for 16th century Southampton.

For domestic fowl, again the measurements from c.1220 tallied well with those from other contexts (Figure 5). For the group as a whole, it would seem that the fowl at Little Pickle were both larger and sturdier than were those from Southampton, and particularly so in their wing bones.

Differences in Ageing?

The pattern of ageing as based on the mandibles is shown in Figure 6 for cattle, sheep/goat and pig; data from epiphysial fusion are given in tables 25 - 27, together with the numbers of very porous bones. For cattle more than half of the mandibles (5 ex 9) were from very young animals, with the first molar not yet in wear: three of these came from c.1220, but there was also one from pit 1088 and one from demolition context 1308 in the garderobe, which seems a fair spread of this material. Context 1220 also gave many very porous bones, but such material was also found in pit 1088, in various demolition contexts, and also (a single fragment) in the midden context c.1061. The mandibles of other age-groups were distributed sporadically. Evidence of epiphysial fusion shows some fully mature individuals in the various context-types, and a fair number of sub-adults. There were also bones of young calf in all contexts except for c.1061 (Table 25).

The few mandibles of sheep/goat spanned the various age-groups: the two youngest both came from pit 1088 (which also gave one that was very old), and there were none at all from c.1220. The evidence from fusion, on the other hand, is for generally older individuals: there were only two very porous bones from the whole assemblage, the one from a midden context and the other from demolition material in the cellar (Table 26). The contrast of sheep/goat with cattle is still clear; but as between the context-types the pattern is largely the same.

Most of the ageing evidence for pig comes from c.1220, where there is a strong bias to the good eating age of animals with the second molar wearing but the third molar still unworn, and there were two jaws of very young animals. The same context gave 12 other very young bones (Table 27). There was only one such pig bone from elsewhere (from pit 1088). A midden context and a demolition context each gave one slightly older mandible (with the third molar coming into wear), but there were not enough pig bones from contexts other than c.1220 to afford a fair basis for comparison.

For rabbit, the few bones recovered from the other contexts gave a similar pattern of ageing to those from the vast sample in c.1220. No very young material from rabbit was found anywhere on the site (Table 28).

For domestic fowl, a few of the very young and immature bones were found from pit 1088 and from midden context 1064.

Differences in butchery?

Butchery cuts have been described above, context by context. The styles of cutting seen first on the material from c.1220 were found repeatedly on other material from the site: there was no suggestion that its butchery showed new techniques, new tools, or different standards of precision.

Differences in Distribution over the Body?

Different patterns in distribution over the body have already been noted for the bones of different species in c.1220. The significance of these patterns may be explored by contrast and comparison with other contexts from the site. In Tables 29 - 36 distribution is percentaged for species and context where the sample size is reasonable; where this is too small the material is tabled by body-group on a presence/absence basis (*/-). For the sake of full interpretation the results are included for 6mm sieving from c.1220; but this was the only context to be sampled sufficiently to give a fair sample for these tables, and where other contexts are concerned one must compare like with like.

For distribution over the body in cattle (Table 29) the midden context 1061 stands out as distinct, with more bones of the feet, ankles and back legs, and fewer from the ribs. The cellar demolition context 1362 gave no foot or ankle bones. Otherwise the various contexts compare quite well with trench recovery from c.1220.

For sheep and sheep/goat (Table 30) the wider spread of material over the body in the other contexts contrasts with the concentration of ribs in c.1220. Bones of the foot and ankle are low throughout, but the other contexts all include bones from the head. Indeed it is strange that the large assemblages from c.1220, both from the trench and from sieving, should have no sheep/goat headbones at all.

The sample for pig (Table 31) is small, and all contexts bar

1220 are tabled for presence/absence only. Material from the head, however, was represented throughout, by bone or loose teeth or by both.

For fallow deer, the pattern for distribution over the body in 1308 gave a fair approximation to skeletal representation (Table 32): if fragments from the head were few, this was because the skulls were whole. Other contexts were quite different. There was a prevalence of head fragments in the demolition context 1362. In c.1220, by contrast, the only head bone was from antler; but there was a wealth of material from the feet. Such divergences seem to be far more than random patterning.

Selection was evident most of all in the rabbit bones from c.1220. The wastage here was overwhelmingly from butchery or from early preparation of the carcase. There were many head bones and loose teeth, and there was a high rate for feet and ankles from normal trench recovery and a still higher one from the sieving, where many more ankle bones and small metacarpal bones were recovered. Even the fair rate for the back legs is largely from wastage, from fragments of distal tibia cut low in the shaft and then discarded with the ankle. The disparities were enormous - on trench and sieved recovery together there was a total of 869 metatarsal bones, a minimum number of well over one hundred individuals, yet the vertebrae (2 thoracic and 4 sacral) would barely have started on the spinal column for a single rabbit.

One sought the missing rabbit bones in other contexts, but very few were found: none at all from demolition, and a total of 34 from pit 1088 and the middens (Table 33). Scanning the whole site assemblage gave fewer than a dozen more. In view of disparities in c.1220, it seemed worth while to quantify even the small samples from pit 1088 and from the middens: the particular bias of c.1220 was not repeated here, for rabbit front legs were more in evidence in relation to their other body parts. Clearly c.1220 had been unusual in the selection of its rabbit bones, and not just in the vast amount of rabbit thrown away.

The goose bones found in c.1220 had shown a great bias to those of the lower wing, carpometacarpals and wing phalanges, and this too may be taken as from early preparation. The pattern was not repeated in the few goose bones from other contexts (Table 34). Unusually for c.1220, the domestic fowl bones there were largely those of food, from the body and from the upper wings and legs. Such a distribution was repeated in the pit and midden contexts (Table 35). In the demolition contexts fowl was scarce.

The overall summary for wild bird fragments (Table 36) hides some differences over the species, and the grouping by "upper wing bones" hides a general bias to the ulna and radius as against the humerus. Full details, however, were given in Table 7 above; and there were clear consistencies in what was found, in that most of the wild birds were quite small, and that most small wings would be the waste from preparation. Meat bones from the upper leg were rare. The few bones of wild bird from pit 1088 came by contrast from good meat areas of the body.

It seems, then, that the assemblage from c.1220 consists overwhelmingly of wastage trimmed from the carcases in the preparation of great quantities of food. For the larger mammals some parts of the body had been trimmed before arrival - in particular, the heads and feet of cattle and sheep. For the smaller mammals and the birds it was the whole carcases that were trimmed. There were many wild birds for rich eating, with plentiful woodcock and lapwing, good numbers of ducks, and a range of other species for variety; rabbits were abundant; and from the main domestic species there were numbers of tender calves and fowls. It must be said that there was less deer than might have been expected from its good representation elsewhere on the site and from the known tradition of the estate; and some exotics were absent, with neither peacock nor swan.

The quantities were great, but the pristine preservation, the undisturbed state of the pit, and the regularity of what was found perhaps suggest a single episode of preparation - on timing, if so, late in the autumn or early in the winter. Perhaps there were several major meals in quick succession. Perhaps it was a question of one single mighty feast.

Where, though, are the waste bones from the table? What is clear is that these have not been excavated from the present site. Perhaps it was thrown away outside the excavated area - though the scale of the excavations makes this unlikely. Or could one remember the nearby Place Farm, which was then in royal hands, and speculate that so many carcases had been trimmed at Little Pickle only to be eaten somewhere else?

VI. ANALYSIS AND DISCUSSION - the skeletons of fallow deer

A great many bones of fallow deer were found from c.1308 in the garderobe F1635. From post-excavation study it became clear that these represented whole or largely-whole skeletons which would have been articulated on disposal and probably remained so to the point of recovery, but articulated groups had not been recorded separately and the material was presented for study as a whole.

Distribution over the Body

The pattern of distribution over the body in fallow deer was given in Table 32 in summary form for the site as a whole, to examine differences of representation in various contexts. For c.1308 itself, fuller data were given in Table 19 when the context assemblage was first described, and from these data the pattern of loss may be seen. The fallow deer skulls from c.1308 were near-whole and gave a minimum figure of seven individuals. There were some broken fragments of antler, but no separate maxillae were recovered - all were still joined to the skulls. Nor were there any loose teeth. It was clear that the preservation of the fragile head bones had been good and that they had been lifted with care. Most of the main limb bones were recovered whole: the back longbones were fully represented (though several patellae had been lost) but there was a small rate of loss on those of the front leg and on the metapodials. There was a greater loss of bones of wrist and ankle, and a serious shortage of phalanges. From an excavation team which recovered so much fine material from c.1220, it is quite possible that many of the missing smaller bones had been lost before excavation and had not been missed in the soil.

Ageing

Andrea Bullock produced a diagramatic archive for the mandibular toothrows of the whole deer skeletons on the lines of Deniz and Payne (1982, 162) for Turkish Angora goats. She then calculated a score for each tooth, giving a point for each cusp that showed wear and a further point for wear at each intersection between the various cusps. Her results are given in Table 38, and what is of greatest interest here is the general homogeneity of the material. In two mandibles (left and right, and almost certainly a pair) the first molars are several points in advance of the same teeth in other jaws and the individual is likely therefore to have been somewhat older; but the other teeth are similar in their stages to the other material in the group.

There was no porous material of fallow deer, and epiphysial fusion was complete save for a few proximal epiphyses from late-fusing bones from the skeletons in c.1308. No more than one individual need be represented by these younger bones (Table 37). It is likely that such an individual would have been no more than marginally younger than the other fallow deer from that context, for all the recovered distal epiphyses were fully fused, including those of radius and femur which fuse quite late.

Cutmarks

There were a few marks of cutting on the bones (Table 40). Eight marks is a small tally on a total of 537 fragments, but for whole skeletons it is of interest that there should have been any cuts at all. All were superficial and the bones themselves had not been cut through, but there is little doubt that the marks were of cuttting rather than of some incidental scratching, and on a distal scapula and a tibia midshaft they had clearly been repeated. The cuts on the distal joint surface of the scapula must mean that one limb at least had been disarticulated, but from the total of eight cuts four were seen on calcanea, and such cuts might have come from the hanging of the carcases by the back leg. Or the deer might perhaps have been skinned; could it have been in the process of skinning that many phalanges had been lost?

Sizes

Since so many of these bones were whole their related measurements are of interest and they are given in full in Table

41. The generally tight ranges and the low coefficients of variation suggest a broadly homogeneous group. Where the sample sizes are greatest, histograms have also been constructed (Figure 7), and some of these refine the picture further: there is a very tight concentration at the upper end, with one or two stragglers at the lower. Only for the acetabular length of the pelvis are the groups reversed.

Sex

Five of the skulls carried the base of antlers and must have been from males. If all the deer had died at the same time of the year, as seems likely from their close juxtaposition, then the other two skulls would have been from females. This would tally with the measurement histograms save for that from the acetabular length of the pelvis. Could it be that some measurements on the pelvis are indeed sex-related but that the female deer were stronger and larger in that area of the body?

Pathology

One scapula had been affected by a pervasive outcropping of extra bone round its distal end and there were signs of similar but far more minor growths on some of the vertebrae. The scapula was taken by Andrea Bullock to the Institute of Archaeology at the University of London, for x-ray by D. R. Brothwell: there was no internal evidence to elucidate any further the external diagnosis of exostosis and serious eburnation.

Discussion

Fragments of fallow deer were found in some abundance from other contexts on the site, and the finding of what may only be seen as a dump of whole or near-whole skeletons in c.1308 fits the documentary evidence that the source of the deer was close at hand.

Why had the skeletons in c.1308 been disposed of as a group? If the deer had not died in epidemic, someone must have taken the decision that they should be killed within a short space of time. This could have been for food, though seven deer would make for lavish provisioning, on a scale far past the venison supply of c.1220. One cannot be sure if any of their meat had been eaten: perhaps some flesh had been stripped from the carcases, or perhaps not. There were a few cuts on the bones, and the deer had been handled to some purpose, but they had not been butchered in the normal way. Did they prove to be unappetising at an early stage of preparation? One animal at least had an unpleasant condition at its shoulder - yet it may be fanciful to suggest from this that the whole group was taken as tainted.

The clue may lie not in the bones but in their context. This was a layer of demolition, and one may take it that when it was laid down the role of the house in conspicuous feasting was at or near its end. The great organisation must have been disorganised, and different patterns of behaviour would apply.

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MAMMALS AND BIRDS FROM THE SITE AT LITTLE PICKLE, BLETCHINGLEY, SURREY (LP89)

TABLE A - KEY TO SPECIES LISTED IN THE TABLES

domestic species:

CTL	cattle
SHE	sheep
S/G	sheep/goat
PIG	
HR	horse
DG	dog
CT	cat
GS	goose
?G	probable goose
FW	domestic fowl
?F	probable domestic fowl

other species:

RD	red deer, *Cervus elaphus*
FA	fallow deer, *Dama dama*
RO	roe deer, *Capreolus capreolus*
RB	rabbit, *Oryctolagus cuniculus*
HA	hare, *Lepus* sp.
RT	rat, prob. black rat (*Rattus rattus*)

also:

O/B	other bird, listed by species in Table 7
LAR	large ungulate (rib body)
SML	small ungulate (rib body)

TABLE 1 - IDENTIFIED FRAGMENTS from c.1220
by normal recovery (N) and by sieving to 6mm (S)

	CTL+LAR		SHE+SML S/G		PIG	HR	DG	CT	RD	FA	RO	RB	GS	?G	FW	?F	O/B
N	852	600	397	520	170	1	3	4	4	41	4	696	86	7	171	218	153
S	50	24	90	335	35		4	4				1573	28	51	98	420	496

TABLE 2 - INCIDENCE OF MAMMAL RIBS in c.1220

(a) by normal recovery

	CTL	S/G	PIG	FA	RB	LAR	SML
body frags						600	520
head/whole frags	45	141	1	1	6		

(b) by sieving (6mm)

	CTL	S/G	PIG	RB	LAR	SML
body frags					24	335
head/whole frags	3	40	2	40		

TABLE 3 - DISTRIBUTION OVER THE BODY IN MAMMALS from c.1220

(a) normal recovery

Cat Red Deer Fallow D. Roe Rabbit

	CTL	SHE	S/G	PIG	HR	DG	CT	RD	FA	RO	RB
antler									1		
skull fragt	25			27							12
maxilla	4			14							17
mandible	12			23		1					34
upper incisor				6							
lower incisor				6			1				
incisor											25
upper canine				4							
lower canine				4							
upper premolar	3			2							
lower premolar				8			1				
upper molar	2			2	1						
lower molar	3			1							
cheektooth											110
hyoid	10			1							
atlas/axis			4	2							
other cerv.vert	34		14	1							
thoracic vert	46		30	12							2
lumbar vert	127		15	2							
sacral vert	13		6	1							
caudal vert	1		2								
rib head	45		141	1					1		6
sternum	26		1								1
scapula	139	8	10	4							17
humerus	21	11		1							23
radius	47	11	3	3			1				15
ulna	23		12	3							14
carpal	3		3								
metacarpal 3/4	50	1		2				1	4		4
os coxae	4		12					1	5	2	18
ilium	21		15	3							
ischium	22		6	1		1					
femur	8	3	14	5		1		1	3	1	15
patella	1			1							
tibia	58		54	4				1	2	1	68
fibula				7			1				
astragalus	4		6						1		
calcaneum	3	7		2					3		11
other tarsal	1		3	1							
metatarsal 3/4	49			7					8		
metatarsal											298
metapodial side				9							
phalanx 1	17		4						6		6
phalanx 2	15								5		
phalanx 3	15		1						2		
TOTAL	852	41	356	170	1	3	4	4	41	4	696
plus rib fragts	?600		?510	?10							

(attributed to species on the basis of data in Table 2)

(b) sieved recovery 6mm

	CTL	SHE	S/G	PIG	DOG	CAT	RB
skull fragt	1			4			67
maxilla				3			17
mandible				2		1	33
lower incisor	4						
incisor				3			34
upper canine				2			
lower canine				1			
lower premolar				4			
upper molar	1						
lower molar	1			1			
cheektooth				3			116
hyoid			1				
atlas/axis			1				
other cerv.vert	3		1				
thoracic vert	6		7				
lumbar vert	5		13				
sacral vert							4
caudal vert			1				
rib head	3		40	2			40
sternum	1						1
scapula	2	2		1			10
humerus	1						18
radius	1			1		1	19
ulna				1			17
metacarpal							155
carpal	2		1				56
os coxae	2			1			15
ilium			2				
ischium	1						
femur		3	4				12
patella	1		1				
tibia	4		8				128
astragalus			2	1			35
calcaneum	1	1					63
other tarsal			1				
metatarsal 3/4	3		1		1		
metatarsal side					1		
metatarsal							571
metapodial side				6			
phalanx 1	6						83
phalanx 2				1			65
phalanx 3	1						14
TOTAL	50	6	84	35	2	2	1573
plus rib fragments	24		?320	?15			

(attributed to species on the basis of data in Table 2)

TABLE 4 - DISTRIBUTION OVER THE BODY IN MAMMALS from c.1220

(a) from normal recovery, secure rib identifications only

	CTL	S/G	PIG	FA	RB
loose teeth	0.9	-	19.4	-	19.4
heads	6.0	-	38.2	2.4	9.1
vertebrae	25.9	17.9	10.6	-	0.3
sternum,ribs	8.3	35.7	0.6	2.4	0.1
girdles	21.8	12.9	4.7	12.2	5.0
front legs	10.8	9.3	4.1	-	7.6
back legs	7.9	17.9	10.0	12.2	11.9
feet/ankles	18.4	6.3	12.4	70.8	45.8

(b) from normal recovery, including rib attributions

	CTL	S/G	PIG
loose teeth	0.6	-	18.3
heads	3.5	-	36.1
vertebrae	15.2	7.8	10.0
sternum,rib	46.2	71.9	6.1
girdles	12.8	5.6	4.4
front legs	6.3	4.1	3.9
back legs	4.6	7.8	9.4
feet/ankles	10.8	2.8	11.8

(c) from sieved recovery 6mm, secure rib identifications only

	CTL	S/G	PIG	RB
loose teeth	12.0		20.0	9.5
heads	2.0		40.0	7.4
vertebrae	28.0	25.8		0.3
sternum,ribs	8.0	44.9	5.7	2.6
girdles	10.0	4.5	5.7	1.6
front legs	4.0		5.7	3.4
back legs	10.0	28.0		8.9
feet/ankles	26.0	6.8	22.9	66.3

(d) from sieved recovery 6mm, including rib attributions

	CTL	S/G	PIG
loose teeth	8.1	-	26.4
heads	1.4	-	18.9
vertebrae	18.9	5.6	-
sternum,ribs	37.7	88.0	32.0
girdles	6.8	1.0	3.8
front legs	2.7	-	3.8
back legs	6.8	3.9	-
feet/ankles	17.6	1.5	15.1

TABLE 5

IDENTIFIED FRAGMENTS OF DOMESTIC POULTRY from c.1220

(a) from normal trench recovery

	GOOSE	GOOSE -SIZE	FOWL	FOWL SIZE	IMMATURE ?FOWL
skull fragt			4		1
mandible			2		1
neck rings				18	
vertebra				4	
sternum	3		10	2	21
rib		7		23	1
furcula	3		13		1
coracoid	3		17		8
scapula	2		14		2
humerus	1		17		29
radius			15		10
ulna	2		22		17
carpometacarpal	40		7		
wing phalanx	12			6	
os coxae	13		6		1
femur	4		12		19
tibiotarsal	2		18		29
tarsometarsal	1		14		14
foot phalanx				2	
shaft fragt					9
TOTAL	86	7	171	55	163

(b) by sieved recovery

	GOOSE	GOOSE -SIZE	FOWL	FOWL -SIZE	IMMATURE ?FOWL
skull fragt			2		
beak			4		3
mandible			2		
neck rings		6		10	
vertebra		10		20	30
sternum	2		1		48
rib		11		23	
furcula	1		12		5
coracoid			12		8
scapula			10		10
humerus	4		3		30
radius			17		13
ulna	1		19		20
carpometacarpal	20		4		
wing phalanx		23		4	
os coxae			1		
femur			2		27
tibiotarsal			3		40
tarsometarsal			6		60
foot phalanx		1		19	
shaft fragt					50
TOTAL	28	51	98	76	344

TABLE 6 - DISTRIBUTION OVER THE BODY in DOMESTIC POULTRY from c.1220 (a) by normal trench recovery

	GOOSE + GOOSE -SIZE	FOWL + FOWL -SIZE	IMMATURE ?FOWL
head	-	2.7	1.2
neck	-	8.0	-
body	31.2	33.1	19.6
upper wing	5.4	30.1	35.7
lower wing	55.8	5.8	-
upper leg	6.5	13.2	29.4
lower leg	1.1	7.1	8.6
misc. shaft			5.5

(b) sieving 6mm

	GOOSE + GOOSE -SIZE	FOWL + FOWL -SIZE	IMMATURE ?FOWL
head	-	4.6	0.9
neck	7.6	5.7	-
body	29.1	39.6	26.5
upper wing	7.6	28.2	21.2
lower wing	54.4	4.6	-
upper leg	-	2.9	13.5
lower leg	1.3	14.4	17.4
misc. shaft			14.5

TABLE 7 - FRAGMENTS OF WILD AND POSSIBLY WILD BIRDS from c.1220
(a) by normal trench recovery

	1	2	3	4	5	6	7	8	9	10	11
skull fragt	2		3								
mandible	4		2								
sternum						1					
coracoid			2								
scapula			3			1					
humerus			1	2		1			1		
radius	4		2	7	2	5		1			
ulna	5		6	19	1	23	1		1		13
c'metacarpal				3	1	9		1	6		
femur			1			3			1		
tibiotarsal		1				2		1		1	
t'metatarsal	1		1	2		6					
TOTAL	16	1	21	33	4	51	1	3	8	1	13

1 duck, mallard (*Anas platyrhynchos*) or domestic
2 duck, mallard or scoter (*Melanitta nigra*)
3 duck, size of teal (*Anas crecca*)
4 lapwing, *Vanellus vanellus*
5 plover, golden (*Pluvialis apricaria*) or grey (*P.squatarola*)
6 woodcock (*Scolopax rusticola*)
7 common snipe (*Gallinago gallinago*)
8 curlew (*Numenius arquata*)
9 pigeon, *Columba sp.* or domestic
10 magpie, *Pica pica*
11 small passerine

(b) from sieved recovery (6mm)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
skull fragt		2	2			1		1					1			
beak					1	2				3	2					
mandible		4	10		3	2				3	2		1			
vertebra																93
coracoid			1									3				
scapula																
humerus	1		2						1	5		3	3			
radius		7	13	1		9	7	4	2	14	2		5	2		
ulna		5	13			17	12	10	7	27	4	1	53	2		
c'metacarpal	1	6				22	7	8	4		1	23	9			
wing phalanx																4
os coxae										1		1				
femur			3						1	1		1	1			
tibiotarsal		1	2						1	1			1	2		
t'metatarsal	1	4				2		1	1	1	2			1	1	
foot phalanx																10
TOTAL	3	29	46	1	4	55	26	24	17	56	11	33	74	7	1	107

1 grey heron (<u>Ardea cinerea</u>)
2 duck, mallard (<u>Anas platyrhynchos</u>) or domestic
3 duck, size of teal (<u>Anas crecca</u>)
4 partridge (<u>Perdix perdix</u>)
5 quail sp, probably <u>Coturnix coturnix</u>
6 lapwing (<u>Vanellus vanellus</u>)
7 lapwing or woodcock (fragmentary)
8 plover, probably golden (<u>Pluvialis apricaria</u>)
9 woodcock (<u>Scolopax rusticola</u>)
10 common snipe (<u>Gallinago gallinago</u>)
11 curlew (<u>Numenius arquata</u>)
12 pigeon, <u>Columba sp</u>, or domestic
13 passerine, <u>Turdus</u> sp.
14 small passerine, bunting-size
15 small passerine, wren-size
16 probable passerine, various sizes

TABLE 8 - DISTRIBUTION OVER THE BODY in FRAGMENTS of WILD BIRD and of POSSIBLE WILD BIRD from c.1220

	from the trench	from 6mm sieving
head	7.2	8.1
body	4.6	20.0
upper wing	62.1	46.9
lower wing	13.1	17.2
upper leg	6.5	3.0
lower leg	6.5	4.8
(n)	(152)	(494)

TABLE 9 - AGEING DATA FROM POROSITY AND FROM EPIPHYSIAL FUSION in CATTLE BONES from c.1220

	V.POROUS V.YOUNG*	PROXIMAL fused	PROXIMAL unf'd"	DISTAL fused	DISTAL unf'd"
	n	n	n	n	n
(a) from normal recovery					
scapula				27	1
humerus		-	2	10	-
radius	4	9	1	2	3
ulna	1	1	1		
metacarpal	21	15	-	12	13
femur	2	1	1	2	1
tibia	-	1	2	3	2
calcaneum		-	2		
metatarsal	23	12	-	10	8
phalanx 1		13	4	2	
phalanx 2		13	2	1	
(b) from sieved recovery					
humerus	1				
radius	1				1
femur				1	
tibia				1	
metatarsal	1				1
phalanx 1	1	3	1		

*bones listed as V.YOUNG,V.POROUS are in addition to the material recorded in the other columns

"fusion data relate to the shafts except where a loose unfused epiphysis is the only evidence of young material

TABLE 10 - AGEING DATA FROM POROSITY AND FROM EPIPHYSIAL FUSION in BONES of SHEEP and SHEEP/GOAT from c.1220

	V.POROUS V.YOUNG	PROXIMAL fused	PROXIMAL unf'd	DISTAL fused	DISTAL unf'd
(a) normal recovery					
scapula	-			9	-
humerus	-	1	1	10	-
radius	-	11	-	7	1
ulna	-	6	2		
metacarpal	-			1	-
femur	-	3	-	1	2
tibia	-	5	5	12	-
calcaneum	-	5	-		
(b) sieved recovery					
scapula	-			2	-
femur	-	3	-	1	-
tibia	-			2	-
calcaneum	-	1	-		

TABLE 11 - AGEING DATA FROM POROSITY AND FROM EPIPHYSIAL FUSION in BONES of PIG from c.1220

	V.POROUS V.YOUNG*	PROXIMAL fused	PROXIMAL unf'd	DISTAL fused	DISTAL unf'd
(a) normal recovery					
scapula	3				
humerus				-	1
radius	2				
metacarpal				-	2
femur	4				
tibia	2			-	1
calcaneum	1			-	1
metatarsal				-	6
(b) from sieved recovery					
scapula	1				
radius	1				

*bones listed as V.YOUNG,V.POROUS are in addition to the material recorded in the other columns

TABLE 12 - AGEING DATA FROM POROSITY AND FROM EPIPHYSIAL FUSION in BONES of FALLOW DEER from c.1220

	V.POROUS V.YOUNG	PROXIMAL fused	PROXIMAL unf'd	DISTAL fused	DISTAL unf'd
metacarpal	-	3	-	4	-
femur	-	1	-		
tibia	-	1	-	2	-
calcaneum	-	1	1		
metatarsal	-	6	-	8	-
phalanx 1	-	6	-		
phalanx 2	-	5	-		

TABLE 13 - AGEING DATA FROM POROSITY AND FROM EPIPHYSIAL FUSION in BONES of RABBIT from c.1220

	V.POROUS V.YOUNG*	PROXIMAL fused	PROXIMAL unf'd	DISTAL fused	DISTAL unf'd
(a) normal recovery					
scapula	-			17	-
humerus	-	4	13	22	-
radius	-	11	-	6	1
ulna	-	11	-	4	3
femur	-	7	7	7	4
tibia	-	5	4	31	18
calcaneum	-	11	-		
3/4 m'podials	-	163	-	111	35
(b) from sieved recovery					
scapula	-			11	-
humerus	-	7	5	16	-
radius	-	11	-	8	2
ulna	-	15	2		
femur	-	6	3	2	1
tibia	-	4	2	88	31
calcaneum	-	49	2		
metacarpals	-			109	5
metatarsals	-			414	133
phalanx 1	-	72	-		
phalanx 2	-	60	-		

TABLE 14 - IDENTIFIED FRAGMENTS OF MAMMALS from PIT 1088

(a) ribs

	CTL	S/G	PIG	HOR	FA	LAR	SML
body frags						71	79
head frags	10	12		1	1		

(b) all identified fragments

	CTL	SHE	S/G	PIG	HO	DG	CT	RD	FA	HA	RB	RT
antler									6			
skull fragt	3		2			1	2		6			
maxilla	1			2					3			
mandible	3		7					1	8		1	
lower incisor	1											
lower premolar			1			1						
upper premolar	1											
upper molar	1								1			
hyoid	1		1									
atlas/axis	1		2			3			2			
other cerv.vert	4		1			1			3			
thoracic vert	18		7				1					
lumbar vert	7		2		2	7			2			
sacral vert	1		1									
rib head	10		12		1				1			
scapula	8	1	10						4		5	
humerus	4	3	3	1		5			1	1	2	
radius	5	1	7						5		1	
ulna	2		4			2			2		2	
carpal	1											
metacarpal 3/4	3								2			
os coxae	1		1			1			2		4	
ilium	4		4									
ischium	5											
femur	5		2			3	1		1		3	2
patella	1											
tibia	3		18			3		1	6		1	
fibula			1	2								
astragalus	1		1						1			
calcaneum	1			1								
other tarsal	1											
metatarsal 3/4	2			1					4			
metapodial 3/4				1								
metapodial side				1								
phalanx 1	4											
phalanx 2	3											
phalanx 3	2											
TOTAL	108	5	87	9	3	27	4	2	60	1	19	2
rib attributions	71		79									

TABLE 15 - DISTRIBUTION OVER THE BODY IN BIRDS from PIT 1088

	GOOSE	GOOSE -SIZE	FOWL	FOWL SIZE	IMM ?FOWL	WILD BIRDS* ?T	P	R/C	S	?C
furcula			1			1				1
coracoid			1					1		
scapula			5							
humerus	1		4		1	1		1		
radius			3							
ulna			2		1					
carpometacarpal	2		1							
wing phalanx	1									
femur	4		3				2			
tibiotarsal	2		1		1				1	
tarsometarsal			2		1					
shaft fragt		1		4						
rib				3						
TOTAL	10	1	23	7	4					

wild bird species:

?T duck sp, of teal (*Anas crecca*)
P partridge, *Perdix perdix*
R/C rook or crow, *Corvus* sp.
S common snipe, *Gallinago gallinago*
C curlew, *Numenius arquata*

TABLE 16 - IDENTIFIED FRAGMENTS OF MAMMAL from c.1064

(a) ribs:

	CTL	S/G	LAR	SML
body frags			69	25
head frags	6	4		

(b) other identified fragments and rib heads:

	CTL	SHE	S/G	PIG	HO	DG	FA	RAB
skull fragt	1						1	
antler							4	
maxilla			1	1			2	
mandible	3		4	4			8	
upper incisor					1			
lower canine						1		
upper premolar					1			
lower premolar							1	
upper molar					3		2	
atlas/axis	2							
other cerv.vert	2						2	
thoracic vert	15		6				2	
lumbar vert	4		2	1		1	1	
sacral vert	2		2					
rib head	6		4					
scapula	14	2	3					
humerus	4	1		1			1	3
radius	5	2	2	1			1	2
ulna	5					1		2
metacarpal 3/4	1						3	
os coxae	4							2
ilium	7		1					
ischium	5							
femur	6						1	2
patella				1				
tibia	6		8	1	1	1	1	
fibula				1				
astragalus	2							
calcaneum			1				1	
other tarsal	1							
metatarsal 3/4	3		1				2	3
metapodial side				1				
phalanx 1	4							
phalanx 2	2							
TOTAL	104	5	35	12	6	4	34	14
rib attributions	69		25					

TABLE 17 - IDENTIFIED FRAGMENTS OF MAMMAL from c.1061

(a) ribs:

	CTL	S/G	FA	SML	LAR
body frags				6	14
head frags	-	1	3		

(b) all other fragments, and rib heads:

	CTL	SHE	S/G	PIG	HO	RD	FA	RO	RB
skull fragment			1						
antler							1		
mandible	1						4		
upper incisor				1					
hyoid	1								
atlas/axis			2						
other cerv.vert	1						1		
thoracic vert	2		1						
lumbar vert	2								
sacral vert	2								
rib head			1				3		
scapula	2	4	1						
humerus	1	2			1	1	1	1	
radius		5					1		
ulna	1	1							
metacarpal 3/4	4								
os coxae	8								
femur	2								1
tibia	5		3				1		
tarsal	1								
metatarsal 3/4	1								
phalanx 1	5				1				
phalanx 2	2								
phalanx 3	1								
TOTAL	42	12	9	1	2	1	12	1	1
rib attributions	14		6						

TABLE 18 - IDENTIFIED FRAGMENTS OF MAMMAL from c.1244

(a) ribs:

	CTL	S/G	LAR	SML
body frags			23	4
head frags	1	-		

(b) all other fragments, and rib heads:

	CTL	SHE	S/G	PIG	FA
skull fragt	3			1	1
antler					8
maxilla				1	
mandible	3		4	3	1
lower canine				2	
atlas/axis	2			1	
other cerv.vert	1				1
thoracic vert	3		1		
sacral vert	1				
rib head	1				
scapula	4		1		1
humerus	4			1	1
radius			4	1	5
ulna					1
metacarpal 3/4	3	1			4
os coxae	2				
ischium	2				
femur	4				3
tibia	2		3		9
astragalus	1				
calcaneum	1				
metatarsal 3/4		1			14
phalanx 1	2				
TOTAL	39	2	13	10	49
rib attributions	23		4		

TABLE 19 - IDENTIFIED FRAGMENTS OF MAMMAL from c.1308

(a) ribs:

	CTL	FA	SML	LAR
body frags		74	2	41
head frags	4	*		

*head/body fragments counted together for fallow deer

(b) all other fragments, and rib heads:

	CTL	SHE	S/G	PIG	FA
antler					10
skull fragt	1				7
mandible			2		15
upper incisor				1	
lower premolar	1				
upper molar			2		
hyoid	1				
atlas/axis					13
other cerv.vert	4				30
thoracic vert	4		2		90
lumbar vert	1				49
sacral vert	2				7
caudal vert					6
rib head	4				74
sternum					16
scapula	7	1			12
humerus	4	1	1		12
radius		3	2		11
ulna	1				11
carpal					11
metacarpal 3/4	4	1			12
os coxae	5				14
femur	4			3	14
patella					6
tibia			2	1	18
fibula				1	
malleolus					2
astragalus					9
calcaneum					10
centro-quartal					7
metatarsal 3/4	6		1		13
metapodial side				9	
phalanx 1	2				33
phalanx 2	1				15
phalanx 3					10
TOTAL	52	6	12	15	537
rib attributions	41	2			

TABLE 20 - IDENTIFIED FRAGMENTS OF MAMMAL from c.1362

(a) ribs:

	CTL	LAR	SML
body frags		51	8
head frags	3		

(b) other identified fragments, and rib heads:

	CTL	SHE	S/G	PIG	HO	DG	FA
horn core	1						
skull fragt	1	1					3
antler							5
maxilla							2
mandible	2			1			14
upper premolar	1						
upper molar	1						1
lower molar							1
atlas/axis	2						
thoracic vert	12						
lumbar vert	3						
rib head	3						
scapula	10		1		2		1
humerus	3						2
radius	4	1					1
ulna	1					1	
os coxae	3						
ilium	2						
ischium	2						
femur	6		1				
patella	1						
tibia	4		3			1	1
metatarsal 3/4							1
TOTAL	62	2	5	1	2	2	32
rib attributions	51		8				

TABLE 21 - UNIDENTIFIED FRAGMENTS
all contexts

c.1220	1363
PIT 1088	258
MIDDEN c.1064	222
MIDDEN SPREAD c.1061	28
DEMOLITION c.1244	60
DEMOLITION c.1308	68
DEMOLITION c.1362	70
TOTAL	2069

TABLE 22 - IDENTIFIED FRAGMENTS OF MAMMALS, all contexts

	CTL	SHE	S/G	PIG	HO	DG	CT	RD	FA	RO	HA	RB	RT	LAR	SML
c.1220	852	41	356	170	1	3	4	4	41	4		696		600	520
PIT 1088	108	5	87	9	3	27	4	2	60		1	19	2	71	79
MIDDEN c.1064	104	5	35	12	6	4			34			14		69	25
MIDDEN c.1061	42	12	9	1	2			1	12	1		1		14	6
DEMOLITION c.1244	39	2	13	10					49					23	4
DEMOLITION c.1308	52	6	12	15					537					41	2
DEMOLITION c.1362	62	2	5	1	2	2			32					51	8
TOTAL	1259	73	517	218	14	36	8	7	765	5	1	730	2	869	644
c.1220 sieved 6mm	50	6	84	35	2	4	4					1573			c.2500

TABLE 23 - IDENTIFIED FRAGMENTS OF BIRDS, all contexts

	GOOSE	FOWL	IMM ?FOWL	GOOSE -SIZE	FOWL SIZE	WILD BIRD
c.1220	86	171	162	7	55	152
PIT 1088	10	27	4	1	7	7
MIDDEN c.1064	2	13	5	2	2	1
MIDDEN c.1061	1	2				1
DEMOLITION c.1244		1				
DEMOLITION c.1308						
DEMOLITION c.1362	4	1				
TOTAL	103	213	172	10	64	161
c.1220 sieved 6mm	28	98	344	51	76	494

TABLE 24 - RELATIVE REPRESENTATION OF THE DOMESTIC FOOD MAMMALS, all contexts, (a) with rib heads only

	COW	S/G	PIG
c.1220	60.0	28.0	12.0
PT 1088	51.7	44.0	4.3
MIDDEN c.1064	66.7	25.6	7.7
MIDDEN c.1061	65.6	32.8	1.6
DEMOLITION c.1244	60.9	23.5	15.6
DEMOLITION c.1308	61.2	21.2	17.6
DEMOLITION c.1362	88.6	10.0	1.4
c.1220 sieved 6mm	28.6	51.4	20.0

(b) with rib heads and also rib attributions

	COW	S/G	PIG
c.1220	57.2	35.7	7.1
PIT 1088	49.9	47.6	2.5
MIDDEN c.1064	69.2	26.0	4.8
MIDDEN c.1061	66.7	32.1	1.2
DEMOLITION c.1244	68.1	20.9	11.0
DEMOLITION c.1308+	72.7	15.6	11.7
DEMOLITION C.1362	87.6	11.6	0.8
c.1220 sieved 6mm	13.9	76.7	9.4

TABLE 25 - EPIPHYSIAL FUSION DATA FOR CATTLE, all contexts with incidence of very young material

	EARLY-FUSING		MIDDLE-FUSING		LATE-FUSING		PLUS
	unf'd	fused	unf'd	fused	unf'd	fused	VERY
	n	n	n	n	n	n	POROUS
c.1220	8	72	23	25	12	7	51
PIT 1088		12		3	1	2	4
MIDDEN c.1064		9	2	1	1	4	1
MIDDEN c.1061		8	1	3			
DEMOLITION c.1244		3				2	1
DEMOLITION c.1308		4	5		1	1	6
DEMOLITION c.1362		6	1	1	1	1	3
TOTAL	8	114	32	33	16	17	66

TABLE 26 - EPIPHYSIAL FUSION IN SHEEP and SHEEP/GOAT, all contexts
with incidence of very young material

	EARLY-FUSING unf'd n	EARLY-FUSING fused n	MIDDLE-FUSING unf'd n	MIDDLE-FUSING fused n	LATE-FUSING unf'd n	LATE-FUSING fused n	PLUS VERY POROUS
c.1220		30		13	11	28	
PIT 1088		6	1	2			
MIDDEN c.1064		4		2		2	
MIDDEN c.1061		10		2		4	1
DEMOLITION c.1244				1		1	
DEMOLITION c.1308		6				2	
DEMOLITION c.1362		2			1		1
TOTAL	-	58	1	20	12	37	2

TABLE 27 - EPIPHYSIAL FUSION IN PIG, all contexts
with incidence of very young material

	EARLY-FUSING unf'd n	EARLY-FUSING fused n	MIDDLE-FUSING unf'd n	MIDDLE-FUSING fused n	LATE-FUSING unf'd n	LATE-FUSING fused n	PLUS VERY POROUS
c.1220	1		10				12
PIT 1088			1				1
MIDDEN c.1064		1			1		
DEMOLITION c.1244		1			1		
DEMOLITION c.1308					4		
TOTAL	1	2	11	-	6	-	13

TABLE 28- EPIPHYSIAL FUSION IN RABBIT, all contexts
with incidence of very young material

	EARLY-FUSING unf	EARLY-FUSING fsd	MIDDLE-FUSING unf	MIDDLE-FUSING fsd	LATE-FUSING unf	LATE-FUSING fsd	PLUS NEONAT
BONEPIT c.1220		50	51	142	29	55	-
PIT 1088		8			3	3	-
MIDDEN c.1064		4		2	1	2	-
MIDDEN c.1061					1	1	-
TOTAL	-	62	51	144	34	61	-

TABLE 29 - DISTRIBUTION OVER THE BODY IN CATTLE, all contexts including rib attributions

	1220	6mm	1088	1064	1061	1244	1308	1362
loose teeth	0.6	8.1	1.7	-	-	-	1.1	1.8
heads	3.5	1.4	4.5	2.3	3.6	9.7	2.1	3.5
vertebrae	15.2	18.9	17.3	14.5	12.5	11.3	11.8	15.0
sternum,rib	46.2	37.7	45.3	43.4	25.0	38.6	48.4	47.9
girdles	12.8	6.8	10.1	17.3	17.8	12.9	12.9	15.0
front legs	6.3	2.7	6.0	8.1	3.6	6.5	5.4	7.1
back legs	4.6	6.8	5.0	6.9	12.5	9.7	4.3	9.7
feet/ankles	10.8	17.6	10.1	7.5	25.0	11.3	14.0	-
(n)	(1452)	(74)	(179)	(173)	(56)	(62)	(93)	(113)

TABLE 30 - DISTRIBUTION OVER THE BODY IN SHEEP AND SHEEP/GOAT, all contexts including rib attributions

	1220	6mm	1088	1064	1061	1244	1308	1362
loose teeth	-	-	0.6	-	-	-	*	-
heads	-	-	5.9	7.7	*	*	*	*
vertebrae	7.8	5.6	7.6	15.4	*	*	*	-
sternum,rib	71.9	88.0	53.1	44.6	*	*	*	*
girdles	5.6	1.0	-	9.2	*	*	*	*
front legs	4.1	-	10.5	7.7	*	*	*	*
back legs	7.8	3.9	12.3	12.3	*	*	*	*
feet/ankles	2.8	1.5	0.6	3.1	-	*	*	-
(n)	(917)	(410)	(171)	(65)	(27)	(19)	(20)	(15)

TABLE 31 - DISTRIBUTION OVER THE BODY IN PIG, all contexts including rib attributions

	1220	6mm	1088	1064	1061	1244	1308	1362
loose teeth	18.3	26.4	-	-	*	*	*	-
heads	36.1	18.9	*	*	-	*	-	*
vertebrae	10.0	-	-	*	-	-	-	-
sternum,rib	6.1	32.0	-	-	-	-	-	-
girdles	4.4	3.8	-	-	-	-	-	-
front legs	3.9	3.8	-	*	-	*	-	-
back legs	9.4	-	*	*	-	-	*	-
feet/ankles	11.8	15.1	*	*	-	-	*	-
(n)	(171)	(45)	(9)	(12)	(1)	(10)	(15)	(1)

TABLE 32 - DISTRIBUTION OVER THE BODY IN FALLOW DEER, all contexts

	1220	1088	1064	1061	1244	1308	1362
loose teeth	-	1,7	-	-	-	-	6,3
heads	2,4	38,3	*	*	20,4	6,0	75,0
vertebrae	-	11,7	*	-	2,0	36,3	-
sternum,rib	2,4	1,7	-	*	-	16,8	9,4
girdles	12,2	10,0	-	-	2,0	4,8	3,1
front legs	-	13,2	*	*	14,3	6,3	3,1
back legs	12,2	11,7	*	*	24,5	7,1	3,1
feet/ankles	70,8	11,7	-	-	36,7	22,7	-
(n)	(41)	(60)	(34)	(12)	(49)	(537)	(32)

TABLE 33 - DISTRIBUTION OVER THE BODY IN RABBIT, all contexts

	c,1220 trench	c,1220 sieved	PIT 1088	1064 +1061
loose teeth	19,4	9,5	-	-
heads	9,1	7,4	5,3	-
vertebrae	0,3	0,3	-	-
sternum,ribs	0,9	2,6	-	-
girdles	5,0	1,6	14,3	13,3
front legs	7,6	3,4	50,0	46,7
back legs	11,9	8,9	14,3	20,0
feet/ankles	45,8	66,3	21,4	20,0
(n)	(696)	(1573)	(19)	(15)

TABLE 34 - DISTRIBUTION OVER THE BODY in GOOSE and GOOSE-SIZE FRAGMENTS, all contexts

	c,1220 trench	c,1220 sieved	pit 1088	MIDDEN	DEMOL-ITION
head	-	-	-	-	-
neck	-	7,6	-	-	-
body	31,2	29,1	-	*	-
upper wing	5,4	7,6	10,0	*	-
lower wing	55,8	54,4	30,0	*	-
upper leg	6,5	-	60,0	*	*
lower leg	1,1	1,3	-	-	*
(n)	(93)	(79)	(10)	(5)	(4)

TABLE 35 - DISTRIBUTION OVER THE BODY in DOMESTIC FOWL and FOWL-SIZE FRAGMENTS, all contexts

	c.1220 trench	c.1220 sieved	pit 1088	MIDDEN	DEMOLITION
head	2.7	4.6	-	-	-
neck	8.0	5.7	-	-	-
body	33.1	39.6	38.4	35.3	-
upper wing	30.1	28.2	34.6	29.4	*
lower wing	5.8	4.6	3.9	-	-
upper leg	13.2	2.9	15.4	35.3	*
lower leg	7.1	14.4	7.7	-	-
(n)	(226)	(174)	(26)	(17)	(3)

TABLE 36 - DISTRIBUTION OVER THE BODY IN BIRDS OF WILD and possibly wild SPECIES, all contexts

	c.1220 trench	c.1220 sieved	PIT 1088	MIDDEN 1061
head	7.2	8.1	-	-
body	4.6	20.0	*	-
upper wing	62.1	46.9	*	*
lower wing	13.1	17.2	-	-
upper leg	6.5	3.0	*	-
lower leg	6.5	4.8	-	-
(n)	(152)	(494)	(6)	(1)

TABLE 37 - IDENTIFIED FRAGMENTS OF FALLOW DEER, by contexts compared

	1220	1088	1064	1061	1244	1308	1362
antler	1	6	4	1	8	10	5
skull fragt		6	1		1	7	3
maxilla		3	2				2
mandible		8	8	4	1	15	14
upper premolar							
lower premolar			1				
upper molar		1	2				1
lower molar							1
atlas/axis		2				13	
other cerv.vert		3	2	1	1	30	
thoracic vert			2			90	
lumbar vert		2	1			49	
sacral vert						7	
caudal vert						6	
rib head	1	2		3		74*	
sternum						16	
scapula		4			1	12	1
humerus		1	1	1	1	12	2
radius		5	1	1	5	11	1
ulna		2	1		1	11	
carpal						11	
metacarpal 3/4	4		3		4	12	
os coxae	5	3				14	
femur	3	1	1		3	14	
patella						6	
tibia	2	6	1	1	9	18	1
astragalus	1	1				9	
calcaneum	3		1			10	
other tarsal						9	
metatarsal 3/4	8	4	2		14	13	1
phalanx 1	6					33	
phalanx 2	5					15	
phalanx 3	2					10	
TOTAL	41	60	34	12	49	537	32

*rib fragments securely identified from c.1308

TABLE 38 - TOOTH STAGES OF MANDIBLES OF FALLOW DEER from c.1308

	PM2	PM3	PM4	M1	M2	M3
left	2	2	5	16	10	12
l	2	3		10	8	8
l		2	4	10	10	9
l	2	2	3	10	6	9
l			3	10	7	9
l	2		3		6	8
l			4	10	7	9
right	2	3	4	16	10	10
r	2	2	4	10	9	9
r	2	2	3	10	7	9
r	2	2	3	10	6	9
r		2	3	10	8	10
r					10	9
r		2	4	10	10	9
plus loose LM3						10

details of scoring are discussed in the text

TABLE 39 - AGEING DATA FROM POROSITY AND FROM EPIPHYSIAL FUSION IN BONES OF FALLOW DEER from c.1308

	V.POROUS V.YOUNG	PROXIMAL fused	PROXIMAL unf'd	DISTAL fused	DISTAL unf'd
humerus	-	9	2	11	-
radius	-	11	-	8	-
ulna	-	5	2		
metacarpal	-	11	-	9	-
femur	-	12	1	12	
tibia	-	12	1	13	-
calcaneum	-	8	2		
metatarsal	-	12	-	11	-
phalanx 1	-	33	-		
phalanx 2	-	15	-		

TABLE 40 - CUTS ON BONES OF FALLOW DEER from c.1308

Mandible	midshaft medial	knifecut	
Scapula	distal joint surface	knifecut	repeated
Tibia	proximal midshaft	knifecut	repeated
Calcaneum	distal midshaft anterior	knifecut	
3 x Calcaneum	midshaft anterior	knifecut	
Metatarsal	proximal medial	knifecut	

TABLE 41 - MEASUREMENTS OF BONES OF FALLOW DEER from c.1308

SCAPULA

	BG	GLP	LG	SLC
	29,5	42,1	33,5	25,1
	30,8	43,4	33,9	26,1
	29,3	43,6	33,5	24,8
		42,8	35,3	25,0
				26,4
	24,1	38,7	30,3	22,0
	31,3	43,9	35,2	25,9
	29,3	42,3	34,5	25,7
	30,7	43,5	35,0	26,6
				24,2
				26,1
x	29,3	42,5	33,9	25,3
S	2,2	1,6	1,5	1,2
C V	7,6	3,7	4,5	4,9
min	24,1	38,7	30,3	22,0
max	31,3	43,9	32,3	26,6
n	7	8	8	11

HUMERUS

	GL	GLC	Bd	BT	SD
			43,2	38,2	20,0
	196,1	172,3	41,3	37,3	20,2
	191,2	171,8	42,3	37,5	19,2
	191,9	171,6	39,8	37,2	19,6
			40,1	38,3	21,1
	192,2	172,2	38,0	37,6	20,5
		173,4	39,9	38,0	20,5
			40,1	38,0	20,3
	191,2	172,2	39,8	38,0	19,0
			39,6	38,4	21,0
			34,1	33,2	
x	192,5	172,3	39,9	37,4	20,1
S	1,8	0,6	2,3	1,4	0,7
C V	1,0	0,3	5,6	3,7	3,2
min	191,2	171,6	34,1	33,2	19,0
max	196,1	173,4	43,2	38,4	21,1
n	5	6	11	11	10

RADIUS

	GL	Bp	Bd	SD
		39,8		22,1
	177,7	35,0	31,4	19,6
	207,1	40,7	36,6	21,5
		39,5		22,3
	208,3	40,9	34,5	21,7
	199,5	39,6	36,0	21,8
	203,2	40,3	36,5	22,3
	205,1		36,6	23,0
		41,1		23,1
	201,8	40,0	34,8	22,1
	200,0	40,0	36,8	22,2
x	200,3	39,7	35,4	22,0
S	9,1	1,6	1,7	0,9
C V	4,5	4,1	4,9	4,0
min	177,7	35,0	31,4	19,6
max	208,3	41,1	36,8	23,1
n	8	10	8	11

METACARPAL

	GL	Bp	Dp	SD	Bd	Dd
					30,0	19,4
	196,7	29,3	20,7	17,1	29,9	19,0
	191,1	28,8	20,4	16,6	29,5	18,7
	189,2	28,7	20,1		29,3	18,7
	193,3	29,0	20,9	16,7	29,9	19,5
	195,2	30,0	19,4	18,2	30,1	19,7
				15,3		
		30,2	20,8	17,3		
	195,1		24,1	18,0	29,6	19,5
	192,0	28,1	20,6		28,7	18,9
	195,7	29,0	20,3	17,3	29,6	19,1
x	193,5	29,1	20,8	17,0	29,6	19,2
S	2,4	0,6	1,2	0,8	0,4	0,4
C V	1,3	2,2	5,9	4,9	1,3	1,9
min	189,2	28,1	19,4	15,3	28,7	18,7
max	196,7	30,2	24,1	18,2	30,1	19,7
n	8	8	9	8	9	9

FEMUR

	Bd	Bp	DC	GL	GLC	SD
	49,2	60,4	26,2		230,0	21,5
	50,0	62,6	27,2	238,0	230,9	20,9
	51,1	63,4	26,8	240,7	231,7	21,1
	50,6		27,2		232,5	22,7
	49,9	63,0	26,5	242,5	234,5	21,1
						21,3
	48,2	59,3	26,3		230,2	21,2
	50,4		26,8		233,0	21,4
	50,2	62,9	26,6	243,1	235,0	21,0
	50,1	63,5	27,6	242,1	232,2	22,1
						19,2
	43,5		24,5		203,6	18,4
	42,9		24,2		204,0	18,5
x	43,5	62,1	26,4	241,3	227,1	20,8
S	2,7	1,5	1,0	1,8	11,1	1,3
C V	5,6	2,4	3,9	0,7	4,9	6,1
min	42,9	59,3	24,2	238,2	203,5	18,4
max	51,1	63,5	27,6	243,1	235,0	22,7
n	11	7	11	5	11	13

TIBIA

	GL	Bp	Bd	SD
			33,9	21,9
			31,6	18,9
			37,0	22,0
		55,5		
		56,0		
			35,4	22,2
			35,6	21,9
			30,2	19,2
			34,0	22,2
	241,5	51,3	30,7	20,8
	272,8	56,5	35,1	22,2
		56,5		
	270,8	55,9	33,3	22,4
	272,7	55,6	34,5	22,3
	271,5	54,2	34,9	22,7
	271,2	55,9		22,1
x	266,7	55,3	33,9	21,6
S	11,3	1,6	2,0	1,2
C V	4,2	2,8	5,8	5,4
min	241,5	51,3	30,2	18,9
max	272,8	56,5	37,0	22,7
n	6	9	12	13

METATARSAL

	GL	Bp	Dp	SD	Bd	Dd
	214.5	27.0	28.4	16.5	31.1	19.5
	215.6	26.3	28.4	16.6	30.7	19.1
	223.1	27.5	28.6	17.3	31.0	19.8
	220.5	29.3		16.4	31.1	19.7
	222.0	26.7	28.1	17.0	30.5	19.9
	204.4	24.9	25.9	15.4	28.8	18.4
					31.1	19.7
	214.1	26.8	28.4	16.6	30.5	19.2
	215.7	27.2	28.3	16.3	31.1	19.6
		27.4	28.6	16.3		
	200.0	23.9	25.7	14.8	27.5	17.5
		23.7	25.8	14.8		
x	214.4	26.4	27.6	16.2	30.3	19.2
S	7.3	1.6	1.2	0.8	1.2	0.7
C V	3.4	6.0	4.4	4.8	3.8	3.7
min	200.0	23.7	25.7	14.8	27.5	17.5
max	223.1	29.3	28.6	17.3	31.1	19.9
n	9	11	10	11	10	10

	ASTRAGALUS		CALCANEUM	PELVIS
	GL	GLm	GL	LAR
	37.9	36.5	82.0	45.7
	36.0	34.8	83.5	45.1
	38.3	36.8	84.7	38.8
	37.2	36.3	84.0	46.4
		36.4	82.1	39.4
	37.8		82.5	42.0
	38.5	36.6	81.5	38.5
	37.4	36.1		43.5
	36.4	34.9		38.8
				43.5
				41.9
				44.6
x	37.4	36.0	82.9	42.3
S	0.8	0.7	1.1	2.8
C V	2.2	2.0	1.3	6.5
min	36.0	34.8	81.5	38.5
max	38.5	36.8	84.7	46.4
n	8	8	7	12

MAMMALS AND BIRDS FROM THE SITE AT LITTLE PICKLE,
BLETCHINGLEY, SURREY (LP89)

FIGURE 1 - SELECTED MEASUREMENTS OF CATTLE (in mm)

- each + represents one measurement from context 1220
- each o represents one measurement from other contexts;

- comparisons are for means and ranges of 16th century material from Southampton (Bourdillon 1980 appendix and 1985 archive);

- abbreviations are from von den Driesch (1976).

CATTLE SCAPULA MINIMUM LENGTH OF NECK (SLC)

```
             o
             +  +
             +  +  +
   +        ++  +  +
   +        ++  ++ +
   + + + ++ +++ ++++     +
-,----,----,----,----,----,-
45   50   55   60   65   70
============================
Southampton   .......x..........
  (n=5)
```

CATTLE SCAPULA GLENOID LENGTH (LG)

```
                o
              + +  +
       +      + + ++ + ++
       +   ++++++ ++ +++++
---,----,----,----,----,----,----
  45   50   55   60   65   70
==================================
S'tn (n=5) .......x..........
```

CATTLE HUMERUS DISTAL BREADTH (Bd)

```
            +   +   ooo o+     +
------,----,----,----,----,----,----,----,---
     65   70   75   80   85   90   95  100
=============================================
S'tn  ..............x......................
(n=17)
```

CATTLE RADIUS PROXIMAL BREADTH (Bp)

```
                            +
                           ++ o
                           ++o+ o    +oo
-----------,----,----,----,----,----,----,-
          65   70   75   80   85   90   95
===========================================
S'tn (n=11)  ................x..............
```

```
CATTLE METACARPUS PROXIMAL BREADTH (Bp)
---------------------------------------
                      o
                      o
                      +
                      +o
            o      ++o+o
            ++  +  +++++ +
--------,----,----,----,----,--------
       45   50   55   60   65
=====================================
S'tn    .............X...........
(n=9)
```

```
CATTLE METACARPUS DISTAL BREADTH (Bd)
----------------------------------
                     +
            o       o++o
        o++ +     + +++++o
----,----,----,----,----,----,----
   45   50   55   60   65   70
==================================
S'tn       .........X...........
(n=25)
```

```
CATTLE TIBIA DISTAL BREADTH (Bd)
-------------------------------
             + +   +  o
---,----,----,----,----,----,---
  50   55   60   65   70   75
================================
S'tn        ........X.......
(n=16)
```

```
CATTLE METATARSUS PROXIMAL BREADTH (Bp)
---------------------------------------
                   o
                  ++
             +  o ++
         o+  +  ++++ +o     oo
-----,----,----,----,----,----,------
    35   40   45   50   55   60
=====================================
S'tn (n=6)  .......X....
```

```
CATTLE METATARSUS DISTAL BREADTH (Bd)
-------------------------------------
                          + o
                          +++
                o++       ++++
---------------,----,----,----,----,-
              45   50   55   60   65
=====================================
S'tn (n=10)    ........X...........
```

FIGURE 2 - CALCULATED WITHERS HEIGHTS OF CATTLE (in cm)
by Fock's factors for the metapodials
with conventions as for Figure 1

```
-------------------------------------------
                 +          o
       +  + o  o +  + +  +  o
-,---------,---------,---------,---------,-
100       110       120       130       140
===========================================
S'tn (n=9),,,,,,,,,,,,,,x,,,,,,,,,,,,,,,,,
```

FIGURE 3 - SELECTED MEASUREMENTS OF SHEEP and SHEEP/GOAT (in mm)
with conventions as for Figure 1

SHEEP SCAPULA MINIMUM LENGTH OF NECK (SLC)

```
------------------------------------------
                  o o
                  o +
                  + +   o
                + + + + +
----------,---------,---------,-----------
         15        20        25
==========================================
S'tn      ........X......
(n=54)
```

SHEEP SCAPULA GLENOID LENGTH (LG)

```
---------------------------------
                 o
                 + o   o
                 + + o +
               + + + o +
-----------,---------,---------,-
          20        25        30
=================================
S'tn       ........X..........
(n=54)
```

SHEEP HUMERUS DISTAL BREADTH (Bd)

```
--------------------------------
                  o
                  +   +
            o o   +   +
            o o + + + +
------,---------,---------,-----
     25        30        35
================================
S'n ..........X......
(n=55)
```

SHEEP RADIUS PROXIMAL BREADTH (Bp)

```
---------------------------------
                  o
                  o
                  o o
              + o + +
        o o o + + + +
------,---------,---------,------
     25        30        35
=================================
S'tn  ........X........
(n=77)
```

```
SHEEP/GOAT TIBIA DISTAL BREADTH (Bd)
------------------------------------
                 o
               o + +
               o + +
               o + + o
               + + + o +
-------,---------,---------,--------
      20        25        30
====================================
S'tn      ,,,,,,,,X,,,,,,,
(n=32)
```

FIGURE 4 - CALCULATED WITHERS HEIGHTS OF SHEEP (in cm)
by Teichert's factors for historic and protohistoric sheep,
on Humerus (H), and Radius (R)
with other conventions as for Figure 1

```
(a) by bone
----------------------------------------------
                       R R
                       R R R R R R R   H
-,---------,---------,---------,---------,-----
45        50        55        60        65
==============================================
S'tn ,,,,,,,,,,,,,,,,X,,,,,,,,,,,,
(n=48, all radii)

(b) by context-group
----------------------------------------------
                       o +
                       o + + + o + +   +
-,---------,---------,---------,---------,-----
45        50        55        60        65
==============================================
```

FIGURE 5 - SELECTED MEASUREMENTS OF DOMESTIC FOWL (in mm)
with conventions as for Figure 1

```
DOMESTIC FOWL CORACOID, GREATEST LENGTH (GL)
-----------------------------

                   +
                   + o
              + + ++++
------,----,----,----,----,--
     50   55   60   65   70
=============================
S'tn    .....X....
(n=9)
```

```
DOMESTIC FOWL HUMERUS, GREATEST LENGTH (GL)
---------------------------------------

                    o  +  +
                    +  +  +       o
------,----,----,----,----,----,----,--
     65   70   75   80   85   90   95
=======================================
S'tn  ........X.........
(n=22)
```

```
DOMESTIC FOWL HUMERUS, PROXIMAL BREADTH (Bp)
-----------------------------

                    o
                    +
                    +
                    +
                    +
                    + o
                + o + +   o
------,---------,---------,--
     15        20        25
=============================
S'tn    ........X......
(n=20)
```

```
DOMESTIC FOWL HUMERUS, DISTAL BREADTH (Bd)
--------------------------

                   +
                   +
                 o +
                 + + o
                 + + + o
---,---------,---------,--
  10        15        20
==========================
S'tn     ......X......
(n=23)
```

DOMESTIC FOWL ULNA, GREATEST LENGTH (GL)

```
                            +
                   ++       +
              o +++++ + +++ +
---,----,----,----,----,----,--
  65   70   75   80   85   90
===============================
S'tn  ,,x,,,,,,,
(n=5)
```

DOMESTIC FOWL ULNA, PROXIMAL BREADTH (Bp)

```
               +
               +
               +
               +
               +
               +
               +
             + +
           + + +
           + + +
---,---------,---------,-
   5        10        15
=========================
S'tn    ,,,,,
(n=4)
```

DOMESTIC FOWL FEMUR, GREATEST LENGTH (GL)

```
                                   +
                            +   +  ++  ++
----,----,----,----,----,----,----,----,----,-
   60   65   70   75   80   85   90   95  100
==============================================
S'tn   ,,,,,,,,,,,,,,,,,,x,,,,,,,,,,,,,,,,,,,
(n=18)
```

DOMESTIC FOWL FEMUR, DISTAL BREADTH (Bd)

```
                   +
                 + +
               + + +   + +
               + + + + + +
-,---------,---------,---------,--
10        15        20        25
==================================
S'tn ,,,,,,,,x,,,,,,,,
(n=19)
```

```
DOMESTIC FOWL TARSOMETATARSUS, GREATEST LENGTH (GL)
---------------------------------------------------
                 +                            +
      +          +             +             ++
--,---------,---------,---------,---------,-------
 60        70        80        90       100
===================================================
S'tn          ···········X·······················
(n=23)
```

FIGURE 6

WEAR STAGES OF MANDIBLES OF CATTLE, SHEEP/GOAT AND PIG

(each cross represents one mandible)

(a) CATTLE

stage	1	2	3	4	5	6
c.1220	xxx			x		
c.1244						x
c.1308	x					
c.1338			x			
c.1342	x					
c.1344					x	

stage 1: M1 not yet in wear
stage 2: M2 not yet in wear
stage 3: M3 not yet in wear
stage 4: M3 coming into wear (Grant stages B - E)
stage 5: M3 all cusps in wear (Grant stages F - J)
stage 6: molars in heavy wear (Grant stages from L for M1 or M2, from K for M3)

(b) SHEEP/GOAT

stage	1	2	3	4	5	6
c.1064			x	x		
c.1244					x	
c.1308				x		
c.1338		x				x
c.1342	x					

stage 1: M1 not yet in wear
stage 2: M2 not yet in wear
stage 3: M3 not yet in wear
stage 4: M3 coming into wear (Grant stages B - E)
stage 5: M3 all cusps in wear (Grant stages F - J)
stage 6: molars in heavy wear (Grant stages from L for M1 or M2, from K for M3)

FIGURE 7 - SELECTED MEASUREMENTS OF FALLOW DEER (in mm)
each x represents one measurement
from data in Table 40

FALLOW DEER SCAPULA MINIMUM LENGTH OF NECK (LG)

```
-----------------------------
                      x
                      x
                 x    x
                 x    x
  x         x    x    x    x
--+----+----+----+----+----+-
  22   23   24   25   26   27
=============================
```

FALLOW DEER HUMERUS DISTAL BREADTH (Bd)

```
-------------------------------------------------
                                x
                                x
                                x
                                x
                                x
  x                   x         x    x    x    x
--+----+----+----+----+----+----+----+----+----+-
  34   35   36   37   38   39   40   41   42   43
=================================================
```

FALLOW DEER RADIUS PROXIMAL BREADTH (Bp)

```
----------------------------------
                           x
                           x
                           x
                           x    x
                           x    x
  x                        x    x
--+----+----+----+----+----+----+-
  35   36   37   38   39   40   41
==================================
```

FALLOW DEER METACARPUS GREATEST LENGTH (GL)

```
---------------------------------------------
                                 x
   x         x    x    x         x    x    x
---+----+----+----+----+----+----+----+----+-
  189  190  191  192  193  194  195  196  197
=============================================
```

```
FALLOW DEER METACARPUS DISTAL BREADTH (Bd)
           ----------
                 x
                 x
                 x
                 x
                 x
            x    x
            x    x
           --,----,--
            29   30
           ==========
```

```
FALLOW DEER PELVIS ACETABULAR LENGTH (Bd)
 ---------------------------------------
   x
   x
   x              x         x    x    x
   x              x         x    x    x
 --,----,----,----,----,----,----,----,-
  39   40   41   42   43   44   45   46
 =======================================
```

```
FALLOW DEER FEMUR LENGTH FROM CAPUT (GLC)
 ----------------------------------------
      x                              xx
      x                            xxxx x
 ---,----,----,----,----,----,----,----,-
  200  205  210  215  220  225  230  235
 ========================================
```

```
   FALLOW DEER FEMUR DISTAL BREADTH (Bd)
--------------------------------------------
                                        x
                                        x
                                        x
                                        x    x
  x    x                   x    x       x    x
--,----,----,----,----,----,----,----,----,-
 43   44   45   46   47   48   49   50   51
============================================
```

```
FALLOW DEER TIBIA DISTAL BREADTH (Bd)
---------------------------------------
                      x    x
                      x    x
  x    x    x    x    x    x    x    x
--,----,----,----,----,----,----,----,-
 30   31   32   33   34   35   36   37
=======================================
```