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THE EARLY NORMAN ANIMAL BONE FROM CARISBROOKE CASTLE, THE ISLE OF WIGHT

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Summary

A group of 9398 mammal bones from early Norman contexts at Carisbrooke Castle is discussed. The diet of the castle's inhabitants is studied to see whether the high status of the site was reflected by the food consumed. 'Forest' beasts are found to be rare and the assemblage is dominated by sheep or goat followed by pig. Cattle are also present but in lower numbers. Horse, dog, cat, red deer, fallow deer, hare, fox and whale were also recovered in small numbers. Comparisons are made with the contemporary assemblage from Portchester Castle, which has been interpreted as primarily a defensive site. Similarities between the two assemblages are noted although more cattle were present at Portchester. It is concluded that the diet reflected by the mammal bones at Carisbrooke Castle was more typical of a garrison than a court.

Author's address :-

Philippa Smith

Department of Archaeology
University of Southampton
Highfield
Southampton
SO9 5NH

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The Early Norman Animal Bone from Carisbrooke Castle, the Isle of Wight.

Introduction

Carisbrooke castle is situated near Newport on the Isle of Wight. William the Conqueror gave the site to his kinsman, William Fitzosbern, who established a campaign fort in one corner. The Fitzosberns lost the castle after taking part in an unsuccessful rebellion in 1078 and Carisbrooke was passed to a Norman family, the de Redvers. The de Redvers held the castle from 1100 to 1293 and were responsible for building much of the castle which can be seen today. The animal bones studied in this report come from the period of the de Redvers family occupancy.

The castle was excavated by Rigold in the 1960s and Young in the 1970s (Young 1983). The excavations were designed to explore the Norman origins and later development of the castle. Ten trenches were dug within and outside the present castle wall and some of the features from the early phases of occupation proved to contain large deposits of household rubbish with considerable samples of animal bone. The bone samples from deposits from the thirteenth century onwards, including those from the uppermost layers of the early defensive ditch, were smaller and these later contexts commonly contained redeposited pottery finds thus raising the possibility that the animal bones too were redeposited, so these samples were not studied further.

After an initial assessment by Maltby and Bourdillon in 1990 and a reassessment by Serjeantson in 1992 animal bones from three features with four major contexts from trench V in the present day courtyard were selected for detailed study. These groups were selected as they were the only features which combined adequate documentation, good sample size, good preservation and freedom from possible residual material as indicated by the pottery. The groups are: the early fill of a ditch (feature 260), a contemporary layer of occupation debris (context 687); the middle layers of ditch fill and a deep rubbish deposit interpreted as a midden (context 286). The earlier two layers date from soon after construction of the castle with the later ditch layer and the midden deposit dating from the later 12th century.

The assemblage of animal bone from Carisbrooke castle afforded the possibility of studying a very early Norman diet. One of the questions to be considered was whether the presumed status of a castle site was reflected in the diet of the inhabitants. As the features chosen for study came from one area of the castle (a yard) the opportunity to study the formation of the assemblage was also presented. It has been possible to illuminate both of these points in this report.

Retrieval

Some sieving was carried out by Young but unfortunately the bone from these samples has been lost. The loss of these samples will mean that small bones may actually have been present on site but have not been seen by the author. Fish, bird and small mammals may therefore be under represented as may small bones from larger species, for example, phalanges. However, Serjeantson (in prep) has noted exceptional recovery of bird bone from the ditch and it is obvious that hand retrieval was very good.

In this report the mammal bones are discussed. The bird bones are the subject of a separate report (Serjeantson in prep). The fish bone assemblage was very small and the lack of sieved samples will have created a heavy bias in any interpretation of fish consumption. No matter how careful the hand recovery was it would be impossible to have retrieved much fish bone from small species. There is a dearth of potentially important food fish (for example herring) in the bone studied so this is probably not a true picture. For this reason the fish bone was not studied in detail but simply listed in appendix 1. There were no unusual species noted for the area or period and all of the species represented could have been locally obtained. Cod (*Gadus morhua*) and conger eel (*Conger conger*) are particularly common on sites in the Solent region (Coy 1981). Measurements of fish bone followed Morales and Rosenlund (1979)

Methods

Mammal bones were identified to taxa where possible with reference to the comparative collection of the Faunal Remains Unit, Southampton. The bones were identified by the author and Mary Iles of the Centre for Human Ecology at the

University of Southampton. The amount of each bone present was recorded using a system of diagnostic zones devised by Serjeantson (1991). This information was used to calculate the minimum number of zones, the minimum number of elements and subsequently the minimum number of individuals for each species.

Ribs and vertebrae were not identified to species but were assigned to either "cow size" or "sheep size" classes. As very few horse bones were found, the former will generally include the cattle and deer; the latter include the sheep and pig. The ribs were counted by the head and the vertebrae by the centrum in order to ensure that the picture was not clouded by differences in fragmentation. The same size classes were used for long bone fragments which could not be assigned to species.

Sheep and goat were identified where possible following Boessneck (1969). Where it was not possible to differentiate these two species fragments were described as sheep or goat. The majority of bones which could be definitely identified came from sheep so it is likely that the sheep or goat fraction represents mostly sheep. Red deer and fallow deer were differentiated following Lister (1981, 1990).

Measurements were taken following Von den Dreisch (1976). There are insufficient measurements of any one element to allow any detailed work on metrical data and those measurements which were taken are shown in appendix 2.

The Ditch assemblage

Bones were recovered from two layers of the ditch: the basal layer (phase 61) dating from the late 11th to the early 12th centuries and the upper layer (phase 61/62) which is slightly later (table 1).

Sheep or goat are most numerous in the bottom layer of the ditch with 425 fragments (41 % of the identified bones) or a minimum of 18 individuals (32.7 %) recovered. They are second in number to pig in the upper layer if the number of fragments are looked at (57 and 116 fragments; 19.5 % and 45.3 % respectively). If the minimum number of individuals is calculated the pattern changes with pig and sheep being equally represented. All parts of the skeleton are represented but there is a marked lack of heads and feet (Figure 1). The tooth wear data for this group are inconclusive but the fusion data for the basal layer give a better idea of the age structure (table 3). It appears that most of the sheep were slaughtered before the age of 1.5-2.5 years (Sisson and Grossman 1975). A few specimens were killed earlier and it would appear that lamb was an occasional dish but that mutton was more commonly eaten.

Pig is the second most numerous species in both layers if an MNI calculation is looked at (30.7 and 21.9 %). Anatomical distribution differs from that of sheep as there is evidence that the heads were present. Feet are relatively under-represented (figure 2). Although the age data are sparse there are sufficient to gain some indication of the age structure of the population (table 4). The age at death of the pig population was varied with younger animals represented in addition to more mature specimens (Sisson and Grossman 1975). Eighteen canines could be sexed from the lower layer of which five were female and twelve male suggesting the possibility that males were favoured. This pattern continues into the upper layer as of ten canines only two were female and the remainder male.

Cattle are the third most numerous species in both assemblages. There is a marked lack of head bones but some foot bones are present (figure 3). There are no ageable mandibles or teeth and few bones with surviving fusion evidence. What evidence there is (Table 5) indicates mature animals were present. The fusion ages in table 5 are taken from Sisson and Grossman (1975).

Both red and fallow deer are present in low numbers in both layers . Hare is also represented and three hare bones had been chopped midshaft (one radius, one femur and one tibia) and one pelvis had knife marks near the acetabulum suggesting dismemberment. The large number of fragments identified to hare contrasted to the low number of individuals is a result of the recovery of virtually complete skeletons.

Very few horse bones are present in the lower layer and none in the upper layer. One fox skeleton was recovered. Most of the skeleton was present but the hind feet were missing. There are cut marks on the maxilla and on the right metacarpal V which suggests that the creature was skinned prior to disposal. The absence of the hind feet may indicate that these were removed with the skin. The specimen was probably female as no penis bone was found and the size is comparable to modern female foxes in the comparative collection. It seems likely that this skeleton represents the fortuitous slaughter of a fox rather than part of any deliberate policy of fur exploitation as only one fur bearing animal was found.

The unidentified fraction is shown in table 2. Sheep size vertebrae and ribs are present whilst cow size are under-represented. The presence of the ribs and vertebrae strengthens the argument that predominantly prime meat bearing bones are present. Skull fragments are few which reflects the general lack of head bones in the identifiable fraction. The 1167 totally unidentifiable fragments were mostly very small chips of larger bones suggesting that post-depositional damage occurred.

Occupation layer

A total of 802 fragments were recovered from context 687 of which only 184 were identifiable to species. Given this small assemblage any conclusions drawn here must be regarded as tentative. The species identified are shown in table 1. Whilst pig is the most frequent species if the number of identifiable specimens is counted (48.9 %) the pattern changes when a Minimum Numbers count is used (18.8 %). The inflated figure for pig can be explained by looking at the number of loose teeth: 36 from pig and only 1 from cattle and 5 for sheep or goat. Once this has been allowed for the species composition is similar to that found in the ditch.

Sheep or goat dominate the assemblage by MNI comprising 25 % of the total assemblage. Head bones are absent but some feet were present (figure 1). There is little ageing evidence (table 3). What evidence there is indicates that no very young animals were exploited.

Pig represents 18.8 % of the occupation layer assemblage when the MNI is considered. All parts of the body are represented although the head is mostly represented by loose teeth and this accounts for the inflated figure for pig when a fragments counts is used (figure 2). This may indicate that the head was broken up either after deposition or perhaps before in order to use the brains. The age range is somewhat more mixed than sheep or goat and some young specimens are present (table 4). Four canines could be sexed: three male and one female.

Cattle is represented by a limited range of elements: humerus, radius, tibia, calcaneum and metacarpal. This pattern is unlikely to be the result of either a survival or retrieval bias. Astragalus and calcaneum are of similar size and density and there is no obvious reason why one should survive in the archaeological record and the other be destroyed. However, given the low number of cattle bones (26) this pattern is most likely to be the result of chance rather than any deliberate pattern of utilisation or deposition. There are no age data for this species.

One red deer and two hare bones were found. One cat bone was also recovered.

There are very few ribs and vertebrae from either small or large species in this context. With such as small group this is most likely to be a function of taphonomic processes (Brain 1981 p 23). The majority of the unidentifiable group was made up of long bone and small unidentifiable fragments (table 2).

Midden: context 286

The relative importance of species can be found in table 1. The predominance of pig when the number of fragments is looked at can again be explained by a higher number of loose teeth.

Sheep or goat were again the most common species recovered (352 fragments representing a MNI of 24 41.4 % and 35 % of the assemblage respectively). Limb bones dominate the assemblage although head and foot bones are present in small numbers (figure 1). The fusion data suggest that the majority of animals were slaughtered before the age of three although a few animals survived beyond this stage (table 3).

The apparent dominance of pig when a fragments count is applied can again be explained by a large number of loose teeth. There are 506 identifiable fragments (45.2%) but an MNI of 18 (26.4 %). All parts of the skeleton are represented although feet are low in number (figure 2). The age range is more mixed than for the other species with a few young animals present (table 4). Thirty canines could be sexed: all were male.

All parts of the cattle skeleton are present although head and foot bones are least well represented (figure 3). There are little age data but what there are suggests that few young specimens were present (table 5).

Red deer, fallow deer and hare are all present in low numbers, as are horse, dog and cat. One whale vertebra was recovered which appears to have been used as a chopping board. A Parallel to this was recovered from Saxon Southampton (Morton 1992 p 56). This may have been collected from the shoreline and the presence of one vertebra does not indicate that whaling was carried out from the Isle of Wight.

Ribs and vertebrae are under represented for both large and small species (see table 2). They are slightly more common for the smaller species but compared to the ditch the trunk is poorly represented. As these parts of the skeleton are particularly prone to post depositional damage (Brain 1981) this may indicate different taphonomic biases affecting the bones from these features. This is discussed in more detail below.

Food procurement

A: Domestic species

If the age structure of cattle and sheep is observed it can be seen both species were slaughtered predominantly before the age of 2.5 to 3.5 years. Those elements which do not yield much meat were absent and it appears that butchery took place elsewhere on site or off site and prepared joints of meat were bought in to the castle. Pig differs slightly as the range of anatomical elements is greater and it may be that pigs were kept on site or, more likely, that the complete pig carcass was brought in. The butchery noted on the bones and the splintered state of much of the assemblage may also indicate exploitation of the bone for marrow. The most common chop mark was a midshaft blow (figure 4) which indicates splitting the bone for marrow extraction.

B: The wild mammals

Fallow deer, red deer and hare were found in small numbers in each feature:

	Ditch 260 base layer NISP	MNI	Ditch 260 Up. layer NISP	MNI	Occ. layer c687 NISP	MNI	Midden c286 NISP	MNI
Deer spp.	3	1	11	2	0	0	11	3
Fallow	6	1	6	2	0	0	15	2
Red	1	1	4	1	3	1	2	1
Hare	77	3	14	2	9	2	31	1

Fallow deer were introduced or reintroduced by the Normans (Rackham 1986). Rackham suggests that the early 12th century was the most likely time of introduction and that by the 13th century the fashion for fallow deer had spread to Wales, Scotland and Ireland. The presence of fallow deer in all features suggests that this is an early record of such deer. However, this is not the earliest record, for example fallow deer have been noted from earlier contexts such as the Saxo-Norman manorial settlement at Trowbridge (Bourdillon 1993). An even earlier record is claimed at the

Lincolnshire manor at Goltho where 25 fragments of post-cranial material were found in contexts dating from 1000 to 1080 (Beresford 1987).

The wild species were all subject to forest laws. Forest laws applied to the King's forests and animals could be hunted only by the King or with his permission. There were four "beasts of the forest;

"The red deer, the fallow deer, the roe and the wild boar, together called 'the venison'; lesser beasts such as hares and rabbits, wild fowl and bird used in falconry and fish in the 'forbidden rivers' were also protected." (Grant, R 1991)

There is some evidence of deer parks and forest land on the Isle of Wight. Batsford (1989) suggests that The King's Park at Watchingwell was the earliest of these on the Island as it is recorded in Domesday. The park was sited on the South-West corner of Parkhurst forest. Batsford writes that;

"Parkhurst itself was probably not technically a forest in the early Middle Ages but was the hunting ground, or chase, of the lords of the Island." (opp cit)

The rights to hunting were jealously guarded and punishment for poaching could be severe. Grant records that under the rule of the Norman kings offenders who poached deer were put to death. It seems likely that at this time few people could legitimately hunt and eat these animals and their presence implies a high status diet. The rarity of these species suggests that they were seldom eaten even by the lords of the Island and these bones may be the remains of 'important' meals. This pattern is reflected in the bird bones with a few very high status birds, such as peacock, noted (Serjeantson in prep).

The source of the assemblage

As already discussed, there is little evidence of the bones discarded after primary butchery and the most likely source for this assemblage is a mixture of kitchen and table waste. The three features are located in the same area of the site and it may be that the source of the assemblage in these features is the same. Young envisages two depositional episodes in the ditch with the bottom layer deposited swiftly shortly after the ditch had been dug. The top layer would have been deposited far more gradually, possibly falling in piecemeal (Young pers comm). This would certainly be consistent with the taphonomy noted on the bones. There was a higher degree of fragmentation in the upper layer and more of the bones had evidence of carnivore damage (figure 5). The taphonomy across the top of the ditch, the occupation layer and the midden is broadly similar. All three groups were more weathered and fragmented than the base layer of the ditch. Ribs and vertebrae which are more vulnerable to post-depositional damage than the more dense limb bones are also less well represented in these features. The bones on the occupation layer were probably thrown from the kitchen. It may be that when the yard became too cluttered with debris it was cleared into the ditch, forming the top layer, hence the similarity in assemblages. The midden is a later feature than the ditch or occupation layer and the midden may have developed after the ditch was filled with the yard cleared onto the midden rather than into the ditch.

If the variation in carnivore damage to bones is looked at (figure 5) it can be seen that the bones from the midden have the highest incidence of gnawing. Some elements from the midden had been chewed by large carnivores. It is likely that hunting dogs were kept in the castle. The splitting of bones noted earlier may have been to feed the dogs. Waste from the kitchen or table would have been thrown onto the midden. Some waste may also have been fed to dogs at this stage. Dogs would have taken bones from the midden and part of the assemblage would have been destroyed. The midden would have been an obvious concentration of bones to attract the dogs and those that were cleared onto the midden rather than becoming incorporated into the ditch would have been available to the dogs for longer hence the more obvious damage.

Status

The diet at Carisbrooke does not appear to have been a particularly high status diet. The 'forest animals' are poorly represented although their mere presence does suggest the occasional high status meal. The selection of male pigs could suggest high status diets given the liking for boars heads, but there is little to suggest that any of these pigs were wild and domesticated boars head may have been a "second best". The selection of male pigs may alternatively represent the surplus from a breeding population leaving the females to continue to breed with a small stock of stud males. Given the defensive importance of Carisbrooke at this time it is possible that what we have here is a garrison diet rather than a court diet. In order to look at this more closely the results were compared to the assemblage from Portchester castle (Grant, A 1985) a site with an assemblage from a comparable period and which was interpreted as primarily a defensive site.

Portchester Castle started as a rural manor and was mentioned as such in Domesday. The defences were built around 1120 and the castle was used as a defensive post during the rebellion of 1173 and further defensive work was undertaken in 1193 to meet the threat of invasion (Cunliffe and Munby 1985). Thus it seems that Portchester had a primarily defensive function.

The fauna from the earliest Medieval phase (pre 1320) may be comparable to that from Carisbrooke and the minimum number of individuals will be used to compare the two sites. Only the two larger groups from Carisbrooke will be used in this comparison as the other groups are too small for reliable comparison. The MNI was calculated for the three main food animals at Portchester (cattle, sheep and pig) and expressed as a percentage of this. A similar method has been used to compare the Carisbrooke bones.

species	Portchester	Carisbrooke ditch (ph 61)	Carisbrooke midden
Sheep	35 %	65 %	52 %
Pig	35 %	22.5 %	33 %
Cattle	30 %	12.5 %	15 %

The three species were obviously much more on a par at Portchester whereas cattle seem to be a relative rarity at Carisbrooke.

Of the other species, horse and cat bones were rare as were deer bones. Both red and fallow deer were represented but red deer were the more numerous of the two species in the early phase at Portchester.

The element representation at Portchester seems similar to that noted at Carisbrooke: head and foot bones were under-represented for cattle and sheep but better represented for pig. Again it seems that joints of meat were imported to Portchester as suggested for Carisbrooke.

The age structure also seems to be similar for cattle with the majority of animals killed at around 2.5 to 3.5 years. The sheep at Portchester may have been killed at a younger age than those at Carisbrooke as the fusion data shows that no animals older than 2.5 years were present. However, one mandible comes from an individual aged 3 to 4 years. The age at death of the pig assemblage was more mixed than for the other species. The majority of pigs were mature but between 20 and 30 % of the mandibles came from individuals less than a year old.

The age at death of the sheep may suggest that lamb was eaten at Portchester whereas mutton was consumed at Carisbrooke. If the inhabitants at Portchester had greater access to cattle it may be that the sheep could be killed at an earlier age as the quantity of meat would not be so critical where large species such as cattle were readily available.

There are a number of similarities between the two assemblages; Grant interprets the lack of heads and feet for cattle and sheep as evidence that primary butchery activity took place elsewhere and similar conclusions have been drawn for Carisbrooke. Pig were prepared in a slightly different manner as all skeletal parts were represented. Deer would have represented the results of the sport of nobles and the general lack of deer suggests that the diet was not usually a high status diet but that occasional high status meals were eaten.

Conclusions

The assemblage from Carisbrooke represents waste from a kitchen probably situated near the area exposed by the digging of trench V. It seems likely that the three features discussed contain bones from the same source at different stages in the depositional cycle. The diet represented by this assemblage is not what would be expected from a high status site of this date. The overall dearth of forest animals suggests that high status meals were rare although the presence of a few of these beasts does suggest the occasional important meal. Comparison with Portchester, a garrison castle on the mainland, indicates similarities in the diet. The assemblage studied here represents waste from a kitchen which was provisioning a garrison rather than providing a 'court' diet for the Lord of the Castle.

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TABLE 1. Number of Identifiable Speciemens and Minimum Number of Individual

	DITCH BASE LAYER				DITCH UPPER LAYER			
SPECIES	NISP	%	MNI	%	NISP	%	MNI	%
SH/GT	425	41.0	18	32.7	50	19.5	7	21.9
SHEEP	(27)		(8)	0.0	(7)		(4)	
GOAT	(8)		(2)	0.0				
PIG	318	30.7	9	16.4	116	45.3	7	21.9
CATTLE	87	8.4	5	9.1	46	18.0	5	15.6
HORSE	22	2.1	2	3.6	0	0.0	0	0.0
DOG	60	5.8	3	5.5	1	0.4	1	3.1
CAT	2	0.2	1	1.8	1	0.4	1	3.1
DEER SPP	3	0.3	1	1.8	11	4.3	2	6.3
RED DEER	1	0.1	1	1.8	4	1.6	1	3.1
FALLOW DEER	6	0.6	1	1.8	6	2.3	2	6.3
HARE	77	7.4	3	5.5	14	5.5	2	6.3
FOX	1	0.1	1	1.8	0	0.0	0	0.0
TOTAL	1037		55		256		32	

	OCCUPATION LAYER				MIDDEN			
SPECIES	NISP	%	MNI	%	NISP	%	MNI	%
SH/GT	55	28.4	7	43.8	352	31.4	24	34.3
SHEEP	(9)				(12)		(4)	
GOAT					(4)		(1)	
PIG	90	46.4	3	18.8	506	45.1	18	25.7
CATTLE	26	13.4	2	12.5	162	14.5	8	11.4
HORSE	1	0.5	0	0.0	2	0.2	1	1.4
DOG	0	0.0	0	0.0	2	0.2	1	1.4
CAT	1	0.5	1	6.3	21	1.9	2	2.9
DEER SPP	0	0.0	0	0.0	11	1.0	3	4.3
RED DEER	3	1.5	1	6.3	2	0.2	1	1.4
FALLOW DEER	0	0.0	0	0.0	15	1.3	2	2.9
HARE	9	4.6	2	12.5	31	2.8	4	5.7
WHALE	0	0.0	0	0.0	1	0.1	1	1.4
TOTAL	194		16		1121		70	

	TOTAL		TOTAL	
SPECIES	NISP	%	MNI	%
SH/GT	939	36.1	75	43.1
SHEEP	(55)		(19)	
GOAT	(12)		(3)	
PIG	1030	39.6	37	21.3
CATTLE	321	12.4	20	11.5
HORSE	25	1.0	3	1.7
DOG	63	2.4	5	2.9
CAT	25	1.0	5	2.9
DEER SPP	25	1.0	6	3.4
RED DEER	10	0.4	4	2.3
FALLOW DEER	27	1.0	5	2.9
HARE	131	5.0	11	6.3
FOX	2	0.1	2	1.1
WHALE	1	0.1	1	0.6
TOTAL	2599		174	

TABLE 2

THE UNIDENTIFIED FRACTION

	DITCH BASE LAYER		DITCH UPPER LAYER	
	SHEEP SIZE	CATTLE SIZE	SHEEP SIZE	CATTLE SIZE
LONG BONE	201	71	80	15
CERVICAL VERT	33	1	10	1
THORACIC VERT	70	1	4	2
LUMBAR VERT	112	0	3	0
CAUDAL VERT	7	0	0	0
VERT FRAG	74	7	6	3
SKULL FRAG	3	2	0	0
RIB	457	53	89	47
TOTAL	957	135	192	68
UNID FRAG (1)	1167		162	
TOTAL	2259		422	

	OCCUPATION LAYER		MIDDEN		TOTAL	
	SHEEP SIZE	CATTLE SIZE	SHEEP SIZE	CATTLE SIZE	SHEEP SIZE	CATTLE SIZE
LONG BONE	117	50	97	110	495	246
CERVICAL VERT	3	2	0	0	46	4
THORACIC VERT	4	0	7	4	85	7
LUMBAR VERT	2	0	10	2	127	2
CAUDAL VERT	0	0	6	4	13	4
VERT FRAG	6	3	31	5	117	18
SKULL FRAG	0	0	56	7	59	9
RIB	40	21	135	35	721	156
TOTAL	172	76	342	167	1663	446
UNID FRAG (1)	370		2991		4690	
TOTAL	618		3500		6799	

(1) UNID FRAG category is made up of fragments for which it is not possible to assign a size class

Table 4: pig fusion data

AGE	ELEMENT	DITCH BASE LAYER		DITCH UPPER LAYER	
		NUMBER FUSED	NUMBER UNFUSED	NUMBER FUSED	NUMBER UNFUSED
1YEAR	SCAP	2	1	3	0
	HUM D	0	1	1	0
	RAD P	10	2	1	0
2-2.5 YEARS	M. POD D	3	15	4	1
	TIB D	1	6	1	0
	CALC	0	7	0	0
3.5 YEARS	HUM P	0	1	0	0
	RAD D	0	3	0	2
	ULNA P	0	5	0	2
	FEMUR P	0	8	0	1
	FEMUR D	0	4	0	2
	TIBIA P	0	10	0	1

AGE	ELEMENT	OCCUPATION LAYER		MIDDEN		WHOLE SITE	
		NUMBER FUSED	NUMBER UNFUSED	NUMBER FUSED	NUMBER UNFUSED	NUMBER FUSED	NUMBER UNFUSED
1YEAR	SCAP	1	1	3	1	9	3
	HUM D	0	0	2	0	3	1
	RAD P	2	0	5	1	18	3
2-2.5 YEARS	M. POD D	0	6	1	7	8	29
	TIB D	0	1	1	4	3	11
	CALC	0	1	0	5	0	13
3.5 YEARS	HUM P	0	0	0	1	0	2
	RAD D	0	2	0	3	0	10
	ULNA P	0	1	0	5	0	13
	FEMUR P	0	0	2	1	2	10
	FEMUR D	0	0	2	0	2	6
	TIBIA P	0	0	0	2	0	13

Table 5: cattle fusion data

		DITCH BASE LAYER		DITCH UPPER LAYER		OCCUPATION LAYER		MIDDEN		WHOLE SITE	
AGE	ELEMENT	NUMBER FUSED	NUMBER UNFUSED	NUMBER FUSED	NUMBER UNFUSED	NUMBER FUSED	NUMBER UNFUSED	NUMBER FUSED	NUMBER UNFUSED	NUMBER FUSED	NUMBER UNFUSED
10 MONTHS	SCAP	5	0	1	0	0	0	5	0	11	0
1.5 YEARS	HUM D	0	3	1	0	1	0	2	1	4	4
	RAD P	6	0	1	0	1	0	6	0	14	0
2-2.5 YEARS	M. CARP D	0	0	1	0	0	0	1	0	2	0
	TIBIA D	2	0	3	0	1	0	2	1	8	1
3.5 YEARS	CALC	1	0	1	1	0	0	0	1	2	2
	FEM P	0	0	0	1	1	0	1	0	2	1
3.5-4 YEARS	RAD D	1	1	1	0	0	0	1	2	3	3
	FEM D	0	1	0	0	0	1	1	0	1	2
	TIBIA P	1	0	0	0	1	0	2	1	4	1

Figure 1

sheep:anatomical distribution

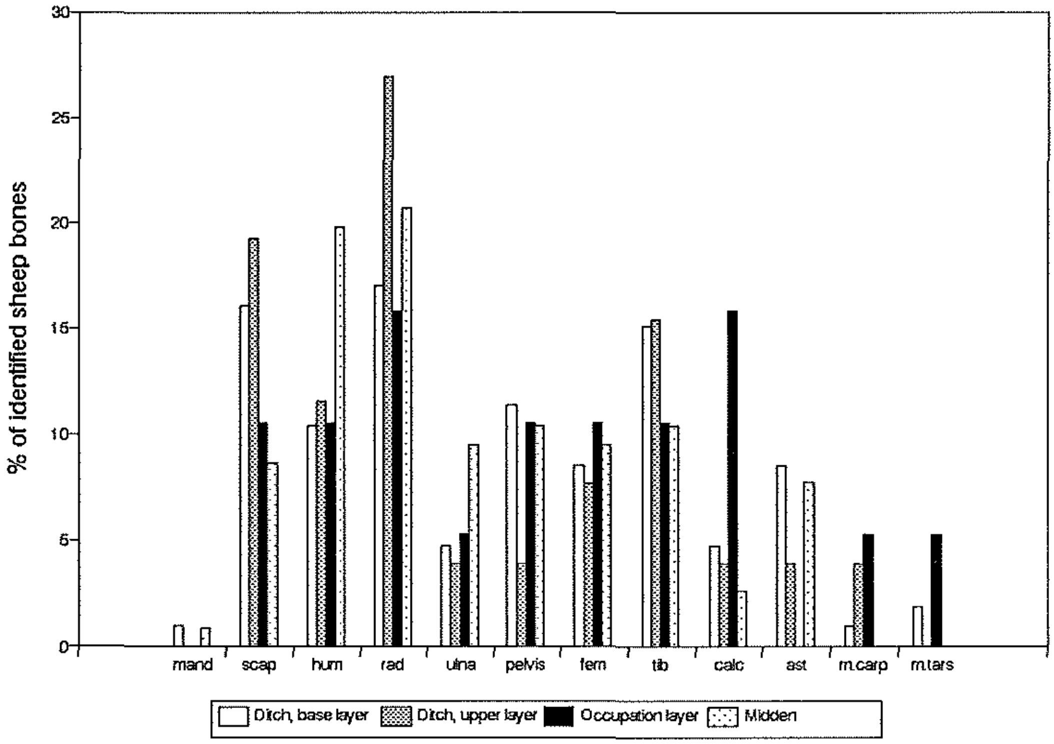


Figure 2

pig: anatomical distribution

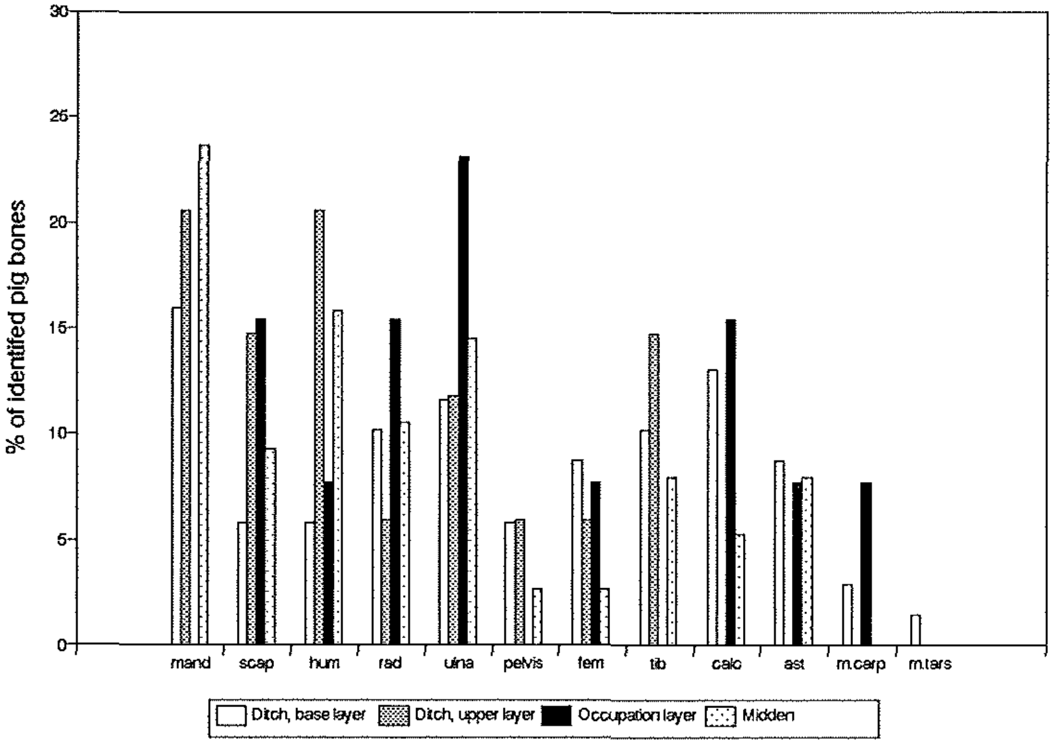


Figure 3

cattle: anatomical distribution

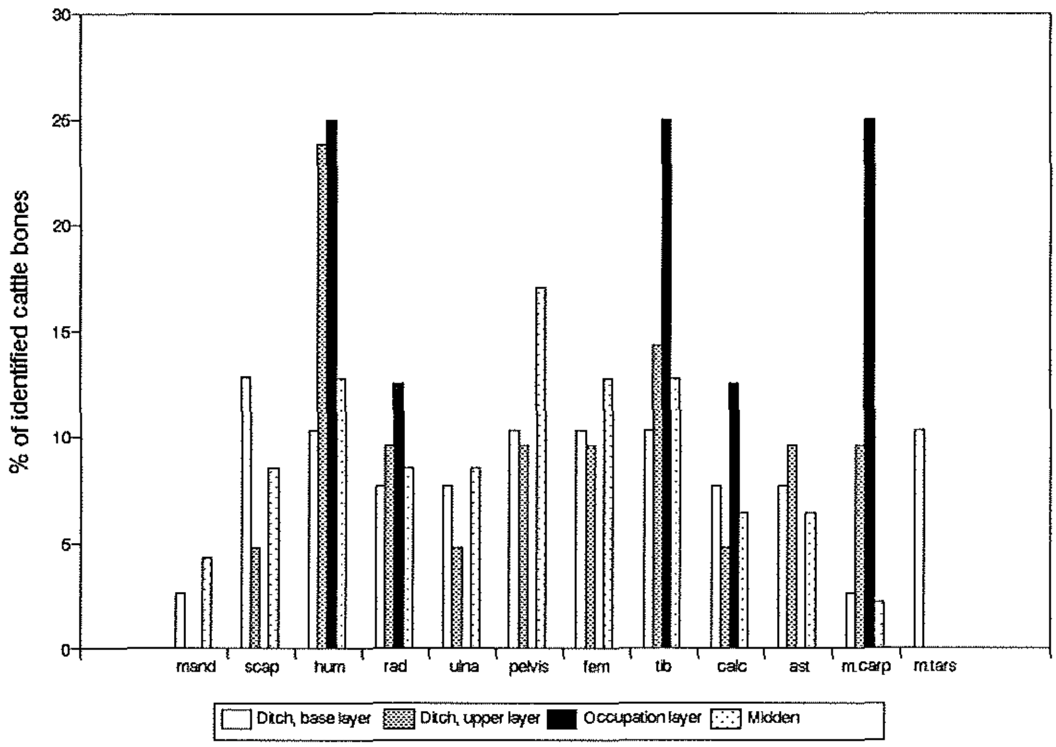


Figure 4

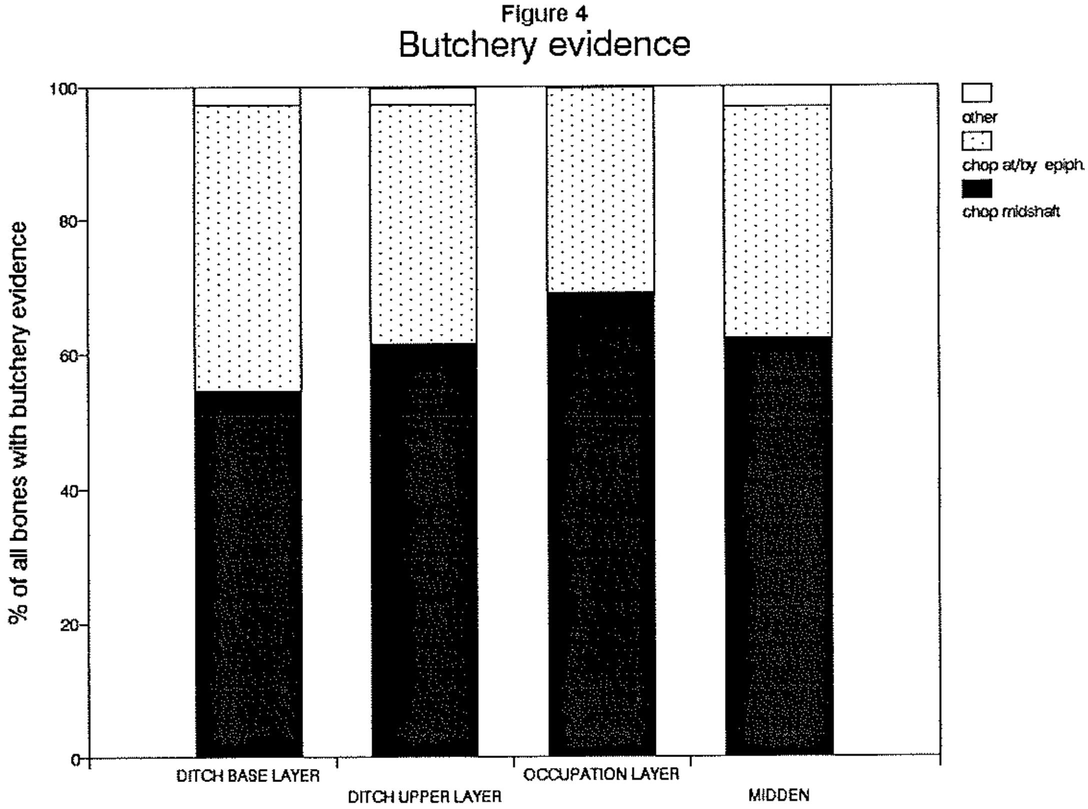
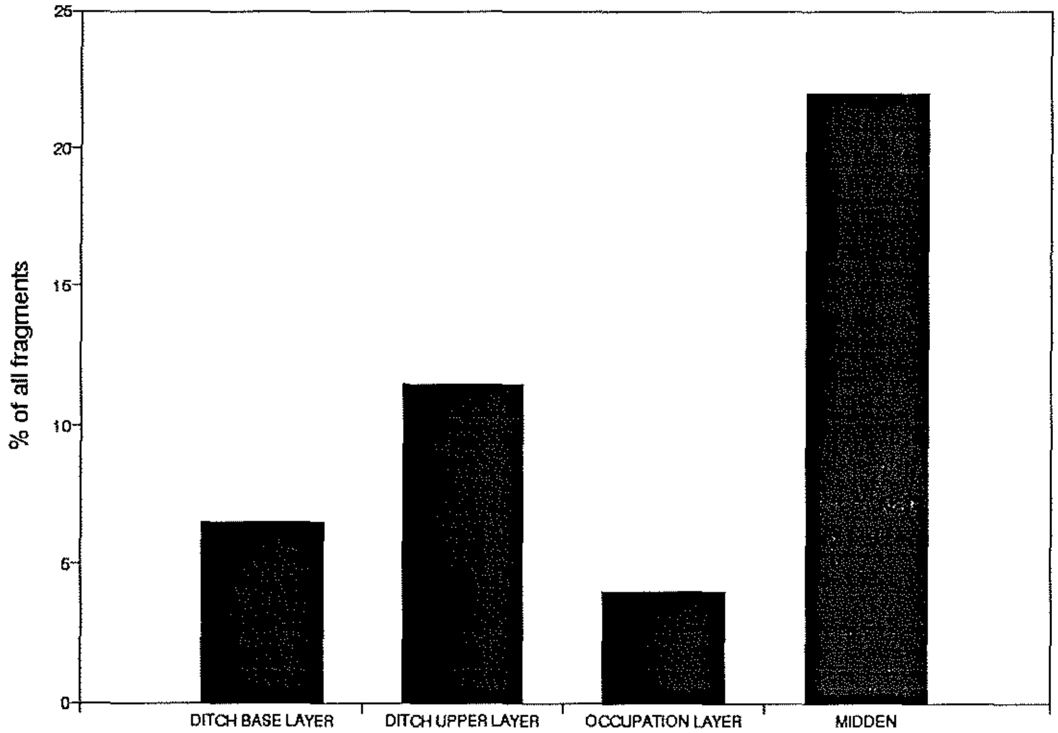

Butchery evidence
100
80
60
40
20
0
% of all bones with butchery evidence
DITCH BASE LAYER
DITCH UPPER LAYER
OCCUPATION LAYER
MIDDEN
other
chop at/by epiph.
chop midshaft

Figure 5
Proportion of gnawed bones



Appendix 1
Fish bone
MIDDEN CONTEXT 286

SPECIES		ELEMENT	SIDE	NUMBER	MEAS 1	MEAS 2
COD	*Gadus morhua*	PRECAUDAL VERT	MIDLINE	1	13.8	18
COD	*Gadus morhua*	PRECAUDAL VERT	MIDLINE	1	12.8	16.2
COD	*Gadus morhua*	CAUDAL VERT	MIDLINE	1	6.1	6.9
COD	*Gadus morhua*	CAUDAL VERT	MIDLINE	1	5	7.2
COD	*Gadus morhua*	CAUDAL VERT	MIDLINE	1	7.1	7.3
PLAICE	*Pleuronectes platessa*	CAUDAL VERT	MIDLINE	1	7.2	5.6
SAITHE OR POLLACK	*Pollachius sp*	HYOMANDIBULAR	LEFT	1		
SAITHE OR POLLACK	*Pollachius sp*	CLEITHRUM	LEFT	1		
CONGER EEL	*Conger conger*	VERT	MIDLINE	1	12.3	8.3
CONGER EEL	*Conger conger*	VERT	MIDLINE	1		
UNID		FIN	NA	19		
UNID		RIB	NA	7		
UNID		UNID	NA	5		
UNID		SCALE	NA	9 (SIEVED)		
UNID		FIN	NA	12 (SIEVED)		
UNID		RIB	NA	10 (SIEVED)		

DITCH LOWER FILL FEATURE 260

THORNBACK RAY	*Raja clavata*	BUCKLER	NA	1	
THORNBACK RAY	*Raja clavata*	BUCKLER	NA	1	
SHARK, SKATE OR RAY	*Elasmobranchii*	VERT	NA	15	ONE INDIVIDUAL
CONGER EEL	*Conger conger*	HYOMANDIBULAR	RIGHT	1	
UNID		RIB	NA	1	
UNID		RIB	NA	3	
UNID		FIN	NA	20	

OCCUPATION LAYER CONTEXT 687

HADDOCK	*Melanogrammus aeglefinus*	PARASPHENOID	MIDLINE	1	COMPARABLE TO 7.5LB FISH IN COMPARATIVE	
HADDOCK	*Melanogrammus aeglefinus*	VERT	MIDLINE	1	10.7	11.7
UNID		QUADRATE	UNKNOWN	1		
UNID		FIN	NA	5		
UNID		RIB	NA	3		

KEY TO MEASUREMENTS
MEASUREMENT 1 GREATEST HEIGHT OF THE VERTEBRA
MEASUREMENT 2 GREATEST CRANIO-CAUDAL LENGTH OF THE CENTRUM
Morales and Roselund (1979)

Concordance for measurements taken at the Faunal Remain Unit, Southampton

CATTLE

Meaurements following von den Driesch 1976

	L1	L2	TPEP	WPEP	TPA	WPA	WSM	TDEP	WDEP	WDA	S1	S2	M13	M14	M15	
scapula	HS	DHA		GLP	BG	LG	SLC									
humerus	GL	GLC		Bp			SD		Bd	BT						
radius	GL			BP		BFp	SD		Bd	BFd						
ulna	GL						SDO				DPA					
pelvis						LA										
femur	GL	GLC		Bp		DC	SD		Bd							
tibia	GL			Bp			SD	Dd	Bd							
metacarpal	GL		Dp	Bp			SD									
metatarsal	GL		Dp	Bp			SD									
astragalus	GLl	GLm								Bd						
calcaneum	GL		GB													
phalanx I	GLpe			Bp		SD		Bd								
horncore	47		46	45							44					
mandible	1	7														
Additional measurements (other authors)																
humerus											HT	HTC				Payne and Bull 1988
pelvis											SBPu	SHPu				Payne and Izard 1991
metacarpal								Ddm	B at f	BFd	BFdm	1	BFdl	Ddl	4	Davis 1992
metatarsal								Ddm	B at f	BFd	BFdm	1	BFdl	Ddl	4	Davis 1992
Phalanx I		GLm														Greatest length of the axial half

SHEEP AND GOAT

Meaurements following von den Driesch 1976

	L1	L2	TPEP	WPEP	TPA	WPA	WSM	TDEP	WDEP	WDA	S1	S2	M13	M14	M15	
scapula	HS	DHA		GLP	BG	LG	SLC									
humerus	GL	GLC		Bp			SD		Bd	BT						
radius	GL			BP		BFp	SD		Bd	BFd						
ulna	GL						SDO			LO	DPA					
pelvis	GL					LA										
femur	GL	GLC		Bp		DC	SD		Bd							
tibia	GL			Bp			SD	Dd	Bd							
metacarpal	GL		Dp	Bp			SD		Bd							
metatarsal	GL		Dp	Bp			SD		Bd							
astragalus	GLl	GLm								Bd						
calcaneum	GL			GB												
phalanx I	GLpe			Bp		SD		Bd								
horncore	43		42	41												
mandible	1	7									15a	15c				
Additional measurements (other authors)																
humerus											HT	HTC				Payne and Bull 1988
pelvis											SBPu	SHPu				Payne and Izard 1991
metacarpal								W.troch med			W.cond med	1	W.cond lat	W.troch lat	4	Payne 1969, Davis 1992
metatarsal								W.troch med			W.cond med	1	W.cond lat	W.troch lat	4	Payne 1969, Davis 1992
Phalanx I		GLm														Greatest length of the axial half

PIG

Meaurements following von den Driesch 1976

	L1	L2	TPEP	WPEP	TPA	WPA	WSM	TDEP	WDEP	WDA	S1	S2	M13	M14	M15	
scapula	HS	DHA		GLP	BG	LG	SLC									
humerus	GL	GLC		Bp	Dp		SD		Bd	BT						
radius	GL			BP			SD		Bd							
ulna	GL										DPA					
pelvis	GL					LAR										
femur	GL	GLC				DC	SD		Bd							
tibia	GL			Bp			SD	Dd	Bd							
metacarpal	GL	LeP							Bd							
metatarsal	GL	LeP							Bd							
astragalus	GLl	GLm														
calcaneum	GL															
mandible	1	7a									21					
Additional measurements (other authors)																
humerus												HTC				Payne and Bull 1988
pelvis											SBPu	SHPu				Payne and Izard 1991
canine	L		T	W												Payne and Bull 1988

Appendix 2: measurements

	Taxon	Anatomy	Side	L1	L2	TPEP	WPEP	TPA	WPA	WSM	TDEP	WDEP	WDA	S1	S2	M13	M14	M15
Ditch, base layer	Cattle	astragalus	L	57.6	52.0	-	-	-	-	-	-	-	36.1	-	-	-	-	-
	Cattle	astragalus	R	60.3	53.8	0.0	-	-	-	-	-	-	36.2	-	-	-	-	-
	Cattle	astragalus	R	63.5	57.5	-	-	-	-	-	-	-	41.0	-	-	-	-	-
	Cattle	calcaneum	L	122.0	-	-	38.0	-	-	-	-	-	-	-	-	-	-	-
	Cattle	humerus	R	-	-	-	-	-	-	-	-	64.0	58.6	-	-	-	-	-
	Cattle	ph I	R	60.7	58.4	-	29.0	-	-	23.0	-	27.0	-	-	-	-	-	-
	Cattle	radius	L	255.0	-	-	77.8	-	71.4	39.0	-	67.8	66.8	-	-	-	-	-
	Cattle	radius	L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Cattle	radius	R	274.0	-	-	82.8	-	73.2	40.7	-	67.3	62.8	-	-	-	-	-
	Cattle	tibia	R	-	-	-	-	-	-	37.3	-	61.6	-	-	-	-	-	-
	Fox	femur	L	120.9	-	-	23.3	-	-	7.7	-	18.5	-	-	-	-	-	-
	Fox	femur	R	120.2	-	-	-	-	11.2	7.8	-	19.5	-	-	-	-	-	-
	Fox	humerus	L	116.4	-	-	-	-	1.0	6.7	-	18.7	-	-	-	-	-	-
	Fox	humerus	R	116.7	-	-	-	-	15.8	6.7	-	-	19.1	-	-	-	-	-
	Fox	radius	L	-	-	-	-	-	10.7	-	-	-	13.5	-	-	-	-	-
	Fox	radius	R	107.6	-	-	-	-	10.8	7.2	-	-	13.4	-	-	-	-	-
	Goat	horncore	L	-	-	39.5	51.4	-	-	-	-	-	-	-	-	-	-	-
	Goat	horncore	R	-	-	35.8	50.6	-	-	-	-	-	-	-	-	-	-	-
	Goat	radius	L	-	-	-	28.9	-	26.7	16.2	-	-	-	-	-	-	-	-
metatarsal/	Horse	~~23~~	L	258.0	-	-	-	-	-	-	-	47.4	-	-	-	-	-	-
	Horse	~~23~~	L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Horse	ph I	0	84.0	-	-	54.3	-	-	-	-	41.8	-	-	-	-	-	-
	Horse	ph I	L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Horse	ph I	L	80.0	-	-	53.6	-	-	-	-	41.7	-	-	-	-	-	-
	Pig	astragalus	L	37.1	33.9	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pig	astragalus	R	36.0	34.0	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pig	astragalus	R	40.3	36.7	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pig	astragalus	R	37.3	33.8	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pig	calcaneum	L	40.0	37.8	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pig	calcaneum	R	38.6	36.9	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pig	calcaneum	R	34.2	33.5	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pig	radius	R	-	-	-	27.4	-	-	-	-	-	-	-	-	-	-	-
	Pig	scapula	R	-	-	-	31.2	-	-	21.7	-	-	-	-	-	-	-	-
	Sheep	calcaneum	L	54.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sheep	calcaneum	R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sheep	calcaneum	R	50.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sheep	humerus	R	-	-	-	-	-	-	-	-	27.8	25.7	17.0	13.3	-	-	-
	Sheep	humerus	R	-	-	-	-	-	-	-	-	26.7	24.8	15.4	11.6	-	-	-
	Sheep	humerus	R	-	-	-	-	-	-	-	-	32.6	31.6	18.3	14.8	-	-	-
	Sheep	humerus	R	137.6	123.6	-	-	-	-	15.5	-	28.5	27.5	17.2	13.3	-	-	-
	Sheep	humerus	R	-	-	-	-	-	-	-	-	25.8	24.0	14.3	11.6	-	-	-
	Sheep	radius	L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sheep	radius	L	-	-	-	30.6	-	28.4	-	-	-	-	-	-	-	-	-
	Sheep	radius	L	-	-	-	29.6	-	27.8	14.6	-	-	-	-	-	-	-	-
	Sheep	radius	R	-	-	-	30.3	-	270.0	-	-	-	-	-	-	-	-	-
	Sheep	radius	R	-	-	-	28.8	-	26.6	15.5	-	-	-	-	-	-	-	-
	Sheep or goat	astragalus	L	26.4	25.4	-	-	-	-	-	-	-	17.9	-	-	-	-	-
	Sheep or goat	astragalus	L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sheep or goat	astragalus	L	26.2	24.7	-	-	-	-	-	-	-	16.9	-	-	-	-	-
	Sheep or goat	astragalus	L	26.4	24.7	-	-	-	-	-	-	-	18.1	-	-	-	-	-
	Sheep or goat	astragalus	L	27.6	26.8	-	-	-	-	-	-	-	18.0	-	-	-	-	-

Appendix 2: measurements

	Taxon	Anatomy	Side	L1	L2	TPEP	WPEP	TPA	WPA	WSM	TDEP	WDEP	WDA	S1	S2	M13	M14	M15
	Sheep or goat	astragalus	L	25.3	26.4	-	-	-	-	-	-	-	17.8	-	-	-	-	-
	Sheep or goat	astragalus	L	26.9	26.6	-	-	-	-	-	-	-	18.3	-	-	-	-	-
	Sheep or goat	astragalus	R	27.2	25.2	-	-	-	-	-	-	-	17.5	-	-	-	-	-
	Sheep or goat	astragalus	R	25.2	24.1	-	-	-	-	-	-	-	16.8	-	-	-	-	-
	Sheep or goat	astragalus	R	26.7	26.1	-	-	-	-	-	-	-	16.9	-	-	-	-	-
	Sheep or goat	astragalus	R	27.0	25.0	-	-	-	-	-	-	-	17.0	-	-	-	-	-
	Sheep or goat	astragalus	R	28.4	27.3	-	-	-	-	-	-	-	18.7	-	-	-	-	-
	Sheep or goat	astragalus	R	26.1	25.0	-	-	-	-	-	-	-	17.4	-	-	-	-	-
	Sheep or goat	astragalus	R	26.2	24.4	-	-	-	-	-	-	-	17.1	-	-	-	-	-
	Sheep or goat	astragalus	R	26.3	25.2	-	-	-	-	-	-	-	17.1	-	-	-	-	-
	Sheep or goat	calcaneum	R	55.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sheep or goat	humerus	L	-	-	-	-	-	-	-	-	29.0	27.4	16.9	13.7	-	-	-
	Sheep or goat	humerus	L	-	-	-	-	-	-	-	-	26.8	25.8	16.0	12.3	-	-	-
	Sheep or goat	humerus	R	-	-	-	-	-	-	-	-	29.3	27.4	17.2	13.2	-	-	-
	Sheep or goat	humerus	R	-	-	-	-	-	-	-	-	25.5	23.5	14.7	12.2	-	-	-
	Sheep or goat	humerus	R	-	-	-	-	-	-	-	-	29.2	28.3	17.2	14.4	-	-	-
	Sheep or goat	radius	L	-	-	-	27.2	-	25.0	-	-	-	-	-	-	-	-	-
	Sheep or goat	radius	R	-	-	-	28.4	-	26.5	-	-	-	-	-	-	-	-	-
	Sheep or goat	scapula	L	-	-	-	28.4	16.3	22.0	16.3	-	-	-	-	-	-	-	-
	Sheep or goat	scapula	L	-	-	-	32.7	17.6	23.8	17.5	-	-	-	-	-	-	-	-
	Sheep or goat	scapula	L	115.0	123.0	-	29.7	19.7	22.6	17.5	-	-	-	-	-	-	-	-
	Sheep or goat	scapula	L	-	-	-	30.9	17.6	24.0	16.5	-	-	-	-	-	-	-	-
	Sheep or goat	scapula	L	-	-	-	26.2	17.5	23.6	15.7	-	-	-	-	-	-	-	-
	Sheep or goat	scapula	L	118.0	123.8	-	29.8	19.7	23.6	17.7	-	-	-	-	-	-	-	-
	Sheep or goat	scapula	L	148.0	-	-	27.9	18.5	21.4	17.3	-	-	-	-	-	-	-	-
	Sheep or goat	scapula	R	-	-	-	32.2	18.8	25.6	19.8	-	-	-	-	-	-	-	-
	Sheep or goat	scapula	R	-	-	-	27.6	17.2	22.5	15.9	-	-	-	-	-	-	-	-
	Sheep or goat	tibia	R	-	-	-	-	-	-	-	18.6	25.0	-	-	-	-	-	-
	Sheep or goat	tibia	R	-	-	-	-	-	-	-	20.2	25.1	-	-	-	-	-	-
	Sheep or goat	tibia	R	-	-	-	-	-	-	14.6	19.6	25.8	-	-	-	-	-	-
ditch, upper layer	cattle	astragalus	L	58.0	52.0	-	-	-	-	-	-	39.6	-	-	-	-	-	-
	cattle	calcaneum	L	109.8	-	-	30.4	-	-	-	-	-	-	-	-	-	-	-
	cattle	radius	L	-	-	-	-	-	-	-	-	66.6	56.2	-	-	-	-	-
	cattle	scapula	L	-	-	-	63.1	46.1	53.7	50.6	-	-	-	-	-	-	-	-
	cattle	tibia	R	-	-	-	-	-	-	35.3	41.6	56.4	-	-	-	-	-	-
	cattle	tibia	R	-	-	-	-	-	-	-	42.2	58.5	-	-	-	-	-	-
	cattle	ulna	R	-	-	-	-	-	-	39.1	-	70.5	65.8	-	-	-	-	-
	pig	tibia	R	-	-	-	-	-	-	19.0	25.5	28.3	-	-	-	-	-	-
	sheep	humerus	L	-	-	-	-	-	-	-	-	28.9	27.3	17.2	13.2	-	-	-
	sheep	humerus	L	-	-	-	-	-	-	14.8	-	29.2	26.0	17.2	14.4	-	-	-
	sheep	humerus	R	-	-	-	-	-	-	-	-	26.8	25.6	15.5	13.0	-	-	-
	sheep	humerus	R	-	-	-	-	-	-	-	-	26.3	24.6	16.1	13.1	-	-	-
	sheep or goat	astragalus	L	26.7	24.8	-	16.1	-	-	-	-	-	-	-	-	-	-	-
	sheep or goat	radius	L	-	-	-	31.2	-	26.5	-	-	-	-	-	-	-	-	-
	sheep or goat	scapula	L	-	-	-	29.7	18.3	21.2	17.3	-	-	-	-	-	-	-	-
	sheep or goat	scapula	R	-	-	-	28.9	18.2	23.8	17.7	-	-	-	-	-	-	-	-
	sheep or goat	scapula	R	-	-	-	28.8	17.5	21.3	18.3	-	-	-	-	-	-	-	-
	sheep or goat	tibia	R	-	-	-	-	-	-	15.2	20.3	25.8	-	-	-	-	-	-

Appendix 2: measurements

	Taxon	Anatomy	Side	L1	L2	TPEP	WPEP	TPA	WPA	WSM	TDEP	WDEP	WDA	S1	S2	M13	M14	M15
Occupation layer	Cattle	astragalus	L	63.0	56.8	-	-	-	-	-	-	-	39.2	-	-	-	-	-
	Cattle	astragalus	L	60.3	55.3	-	-	-	-	-	-	-	37.1	-	-	-	-	-
	Pig	astragalus	L	36.8	35.1	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sheep	humerus	R	-	-	-	-	-	-	-	-	29.5	26.3	18.3	14.6	-	-	-
	Sheep	humerus	R	-	-	-	-	-	-	-	-	28.5	26.7	17.6	13.4	-	-	-
	Sheep	radius	L	-	-	-	30.4	28.6	-	-	-	-	-	-	-	-	-	-
	Sheep	radius	R	-	-	-	28.5	-	26.7	-	-	-	-	-	-	-	-	-
	Sheep or goat	scapula	R	-	-	-	30.4	17.9	22.0	19.1	-	-	-	-	-	-	-	-
Midden	Cattle	astragalus	L	61.3	57.5	-	-	-	-	-	-	40.5	-	-	-	-	-	-
	Cattle	astragalus	R	58.3	52.0	-	-	-	-	-	-	-	35.1	-	-	-	-	-
	Cattle	astragalus	R	59.6	55.4	-	-	-	-	-	-	39.8	-	-	-	-	-	-
	Cattle	astragalus	R	61.0	57.1	-	-	-	-	-	-	40.0	-	-	-	-	-	-
	Cattle	radius	L	-	-	-	78.4	-	72.5	35.6	-	-	-	-	-	-	-	-
	Cattle	radius	R	238.3	-	-	70.3	-	63.1	36.3	-	64.1	61.5	-	-	-	-	-
	Cattle	tibia	L	-	-	-	-	-	-	-	38.8	54.6	-	-	-	-	-	-
	Cattle	tibia	R	-	-	-	-	-	-	-	43.0	59.5	-	-	-	-	-	-
	Goat	humerus	R	-	-	-	-	-	-	-	-	28.5	28.1	18.6	13.1	-	-	-
	Goat	radius	L	-	-	-	29.6	-	26.3	-	-	-	-	-	-	-	-	-
	Pig	astragalus	L	35.4	34.4	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pig	astragalus	L	35.2	34.6	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pig	astragalus	L	37.2	35.5	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pig	astragalus	L	36.5	33.7	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pig	astragalus	L	37.5	35.2	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pig	astragalus	R	37.1	35.7	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pig	astragalus	R	33.3	32.1	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pig	humerus	L	-	-	-	-	-	-	-	-	40.7	31.0	-	17.0	-	-	-
	Pig	humerus	R	-	-	-	-	-	-	-	-	32.9	25.8	-	16.0	-	-	-
	Pig	radius	L	-	-	-	26.1	-	-	17.2	-	-	-	-	-	-	-	-
	Pig	radius	L	-	-	-	25.4	-	-	-	-	-	-	-	-	-	-	-
	Pig	radius	L	-	-	-	25.8	-	-	-	-	-	-	-	-	-	-	-
	Pig	radius	R	-	-	-	26.3	-	-	-	-	-	-	-	-	-	-	-
	Pig	radius	R	-	-	-	28.0	-	-	-	-	-	-	-	-	-	-	-
	Pig	scapula	R	-	-	-	38.8	-	-	24.5	-	-	-	-	-	-	-	-
	Sheep	horncore	R	23.5	-	34.4	48.5	-	-	-	-	-	-	-	-	-	-	-
	Sheep	humerus	L	-	-	-	-	-	-	-	-	26.2	25.1	15.5	12.2	-	-	-
	Sheep	humerus	L	-	-	-	-	-	-	-	-	27.6	25.5	16.2	12.8	-	-	-
	Sheep	humerus	L	-	-	-	-	-	-	-	-	27.3	24.5	15.9	12.5	-	-	-
	Sheep	humerus	R	-	-	-	-	-	-	-	-	27.7	26.9	17.4	13.8	-	-	-
	Sheep	humerus	R	-	-	-	-	-	-	-	-	27.7	27.6	17.0	13.2	-	-	-
	Sheep or goat	astragalus	L	27.3	26.9	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sheep or goat	astragalus	R	27.4	25.6	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sheep or goat	astragalus	R	28.8	27.4	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sheep or goat	astragalus	R	27.0	25.3	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sheep or goat	astragalus	R	26.5	24.9	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sheep or goat	radius	L	-	-	-	30.1	-	27.0	-	-	-	-	-	-	-	-	-
	Sheep or goat	tibia	R	-	-	-	-	-	-	-	20.0	25.4	-	-	-	-	-	-
	Sheep or goat	tibia	R	-	-	-	-	-	-	13.7	18.6	24.7	-	-	-	-	-	-
	Sheep or goat	tibia	R	-	-	-	-	-	-	14.2	18.6	24.3	-	-	-	-	-	-