Report on the faunal remains from Vestra Long Cairn

Ellen Hambleton
School of Conservation Sciences
Bournemouth University

Introduction

Excavations of a long cairn at Vestra Fiold in 2003 yielded a small, hand-recovered assemblage of 423 fragments of animal and bird remains. Sieved samples produced additional fragmentary remains (c. 350 fragments). Detailed recording and analysis focussed on the hand-recovered assemblage. The construction of the cairn suggests a Neolithic date and the report on the structures indicates that the skeletal material was deposited as part of the cairn makeup and is therefore likely to be contemporary with its construction. Radiocarbon dating of faunal remains will help confirm the date of the monument. Careful recording of locations of groups of faunal remains as small-finds during excavation has enabled some investigation of the spatial distribution and composition of the faunal assemblage within the broad spread of context 88. However, for the purpose of examining broad patterns of species and element representation and ageing information, the hand-recovered faunal assemblage from the Vestra long cairn is best discussed as a single unit.

Methods

All hand-recovered bones and teeth were examined and, where possible, identified to species and skeletal element using reference material from the comparative skeletal collection housed in the School of Conservation Sciences, Bournemouth University. Where appropriate, the following information was recorded for each fragment: context; species (or other taxonomic classification); element; side; anatomical zone; % completeness; fragmentation; surface condition; gnawing; fusion data; porosity; tooth ageing data; butchery marks; metrical data; other comments such as pathologies or association/articulation with other recorded fragments. Groups of four or more bones that belonged to the same skeleton (i.e. articulating bones or elements closely matched by size and age) were assigned an 'Associated Bone Group number'. In some instances several separate bone groups might be recorded for the same individual, for example where there were several articulating element groups from different body areas but with no clear proof that they came from the same carcass.
Remains from sieved samples were recorded in less detail. Each sample was scanned and the number of unidentifed fragments and the number of identifiable fragments recorded for each taxon along with other relevant information such as the availability of ageing and metrical data. All information was recorded onto a relational database (Microsoft Access) and cross-referenced with relevant contextual information such as Small-find (SF) number and location. This database, together with supporting charts, tables and photographs, forms part of the site archive.

Fragment counts of all identified specimens (NISP) include dorsal ends of ribs, vertebral bodies, and un-zoned fragments of long bone shaft and skull provided they could be securely identified to species. Specimens represented by several shards that could be rejoined were recorded as a single unit and the fragmentation was noted. Minimum number of individual counts (MNI) were derived from the most common zone of a bone and the frequency of each bone in the skeleton, also taking side of the body and age of the specimen into account. Tooth eruption and wear for cattle, sheep/goat and pig mandibular teeth were recorded and analysed using the system devised by Grant (1982). Standard measurements (in mm) were taken following von den Driesch (1976). Withers heights were calculated using the conversion factors recommended by von den Driesch & Boessneck (1974).

Preservation

Overall the hand-recovered assemblage is only moderately well preserved. Over 68% of identified large mammal and bird specimens showed signs of significant damage to the outer surface of the bone. A high proportion of remains displayed erosion of the outer surface of the bone and damage by plant roots was also common throughout the assemblage (Appendix 1). Even the least heavily damaged bones often showed surface flaking and cracking of the bone (weathering), most probably resulting from exposure to the elements. Erosion of the bone surface may be due to extreme physical weathering, root damage, chemical weathering within the soil or water movement. In the Vestra long cairn, bone erosion is most likely the result of a combination of several of these taphonomic factors, where surface damage from roots or exposure may have left bones more vulnerable to subsequent additional physical and chemical destruction. There is little evidence to suggest that bones were left exposed for any length of time prior to their incorporation within the mound. There is no evidence of canid gnawing on any of the bones. One bone showed signs of having been gnawed by a rodent, which most likely occurred after its incorporation within the cairn as bones within the loose packed stone structure would have been easily accessible by rodents.

Fragmentation of bones, some recent and some ancient, was evident throughout the assemblage. However, although most bones showed some degree of damage, at least half of the large mammal and bird specimens recorded were at least 50% complete and many shards of bone could be refitted, suggesting breakage of the bones occurred *in situ* subsequent to their incorporation in the deposit. Several Associated Bone Groups (ABGs) of elements belonging to the same individuals were also identified among the remains. The presence of associated, largely intact or refitting bones is a good indication that the assemblage represents the primary deposition of unmodified bones. Had bones been damaged prior to deposition, or if the faunal remains had been subsequently redeposited, skeletal elements would have become disassociated and damaged and the smaller refitting shards from ancient breaks would have been lost.

Preservation of bone varied across the context in terms of degree of fragmentation and surface condition. In several instances very different levels of preservation were apparent on different areas of the same bone (e.g. Figure 1). Localised differences in the post-deposition burial environment can account for preservation patterns observed. The structure of the cairn afforded different levels of protection from the elements depending on where within the voids between slabs the faunal remains were located, some surfaces of bones having been protected while others were exposed to conditions such as physical weathering by wind, water, parching, frost and plant-root damage. Furthermore, shifting and settling of slabs would have would have crushed some bones, while others remained undamaged and intact.

Species Present

A total of 423 bone and teeth fragments were recovered by hand, of which 200 (47%) were identified to species or family. Mammal and bird species identified include sheep/goat, cattle, fox, red deer, pine marten, orkney vole, duck, gull and fulmar. The number of identified fragments (NISP) and relative abundance of all taxa and, the minimum number of individuals (MNI) for each species are given in Table 1. Additional faunal material (c.350 fragments) was recovered from sieved samples, of which only 10% was identifiable to species or family (Table 2). Most of the identified remains from the sieved samples belonged to small mammals or were loose teeth or small bones of sheep and fox, many of which belonged to the same individuals represented in the hand recovered assemblage. One rabbit bone was also recovered. By far the majority of the hand-recovered assemblage (421 fragments) came from the cairn make-up (context 88) where bones were recovered from amongst the loose shillet material found within the voids between the angled flagstones that formed part of the long mound structure. A further two bones were also recovered from context 112 (rubble in-fill), located towards the southern end of the structure. Spatially the two contexts are adjacent, and there are animal bone elements within both C88 and C112 that belong to the same individual and clearly form part of the same depositional event.

Among the large mammals, the remains of domestic species predominate. Sheep/goat (54%) are the most abundant species in terms of NISP, followed by cattle (31%). Wild species, including fox (11%), red deer (3%) and pine marten (1%), are also represented in small numbers. The relative abundance of fox may be somewhat over-stated in the NISP count, due to the presence of several bones from the same partial skeleton. Fox and red deer are more evenly represented in the MNI count (two individuals of each). Each of the main species are discussed below.

Domestic Mammals

Sheep

A minimum number of 5 sheep/goat were represented by a total of 98 fragments of bone and teeth. Three specimens were positively identified as sheep, and no goats (using the criteria of Payne (1985) and Prummel and Frisch (1986)). There is, so far, no evidence for the presence of goat on Neolithic Orkney, and for the purposes of this report all sheep/goat remains recorded are referred to as sheep. The assemblage was too small and poorly preserved to provide many measurable bones (Appendix 2). The small sample makes it difficult to draw reliable conclusions concerning the size and shape of the sheep from Vestra long cairn, although the single available maximum astragalus length measurement (26mm) does fall within the range 24-31mm observed for Neolithic sheep at Knap of Howar and Skara Brae (Noddle 1983, and unpublished). Only one possible pathological sheep specimen was observed; the distal epiphysis of a femur had a circular hole c.5mm diameter in the posterior surface between the lateral and medial condyles (Figure 2) the surrounding bone shows some sign of remodelling, suggesting a possible sinus from an infection, but there are no other obvious signs of serious infection/inflammation anywhere else on the bone

Four mandibles were sufficiently complete for estimation of age based on Grant (1982) mandible wear stage (MWS). The assemblage included mandibles of one adult (MWS 37, approximately 4 years old) and three young, porous mandibles, all closely aged. Two of these young specimens were a probable matched pair (Left and Right side) at MWS 4, and the third mandible was at MWS 2. Age estimates based on tooth eruption and wear (Payne 1973, Hambleton 1999, Greenfield and Arnold 2008) indicate an age of c.2months for the youngest specimen and c.2-5 months for the other two mandibles. A further three porous maxillae from context 88 may belong to the same individuals but given their spread across different small find locations this is hard to confirm, although the left maxilla and mandible form SF51 are a convincing match. A minimum number of two 2-5 month old lambs and one 4 year old adult are represented by the tooth wear data. The post-cranial remains reflect a broadly similar age profile. Just over half of the sheep specimens (52%) were classified as porous or very porous, indicating a high proportion of very young perinatal/infant sheep. Of the remaining non-porous bones, a high proportion were unfused, indicating the presence of older juveniles and sub-adults. The epiphyseal fusion data (Appendix 3) suggest very few sheep survived to adulthood and a high proportion died during their first year.

Only one ABG was positively identified; the left scapula and ulna and right radius and metacarpal (centrally unfused) belonging to a foetal sheep were recovered from SF67 & SF68. From the combined element and ageing data it can be concluded that at least one foetal sheep, two young infants, one juvenile (<2.5 years old) and one young adult (c. 4 years old) are represented within the long cairn assemblage. Fragments count by element indicates all the main areas of the body were represented within the sheep assemblage, which is consistent with the deposition of complete carcasses within or around the long cairn (Appendix 4).

Cattle

A minimum number of 4 individuals were represented by 56 fragments of cattle bone and teeth. Only two complete or undamaged bones provided measurements (Appendix 2), and no direct comparisons could be made with the limited metrical data available from other Neolithic Orkney sites. The general impression of the Vestra adult cattle bones is that they are too small to be wild aurochs and belong to large domestic specimens of a similar type to those previously described from Skara Brae, Knap of Howar and Quanterness (Noddle 1983, Clutton-Brock 1979).

Cattle ageing data are limited due to the small sample size. No mandibles or cheek teeth were recovered from which to estimate age at death. The presence of one incisor tooth with enamel wear indicates a subadult or very young adult individual and the presence of very porous mandible fragments and an unworn maxillary 3rd deciduous premolar tooth attest to the presence of very young infants or perinates. Within the cattle assemblage there is a high incidence of the remains of very young individuals. 32% of cattle specimens are either unworn deciduous teeth or porous bones, many of which belong to very young calves probably peri/neonatal and almost certainly <6 months of age. Epiphyseal fusion data also indicate a high proportion of juvenile deaths (Appendix 3). Element and ageing data indicate at least two very young calves, and the remains of at least one sub adult and one adult cattle in the assemblage.

The only cattle ABG recorded was the left hind foot (Centroquartal, calcaneus, metatarsal and 1st phalange). The metatarsal bone displays slight pathological abnormalities, probably age-related changes, such as extra bony growth at muscle attachment sites. This group was spread throughout the structure in several different small find locations (SF54, SF58 and SF59). Possible bias towards the selection or survival of feet is evident from the high proportion of metapodials and phalanges in the cattle sample (Appendix 4), but only among the sub-adult and adult remains. Among the porous elements most major body areas are represented, suggesting complete carcasses of calves were deposited, in or around the long cairn, but perhaps only the lower limbs and feet of older cattle. Two adult 1st phalanges exhibited minor pathologies. One displayed slight lipping of the proximal articular surface (stage 2, after Bartosiewicz *et al.* 1997: 47-48) (Figure 3). The other specimen displayed a similar degree of lipping of the proximal articular surface, as well as small ‘Type 1’ lesions (as described by Baker and Brothwell 1980: 109) on the proximal and distal articular sufaces (Figure 4). Although such pathologies have been associated with the weight-bearing stresses of draught animals, these are not exclusively draught pathologies and in such early stages these slight pathological abnormalities are likely to have been asymptomatic and probably represent age-related changes (Telldahl 2005).

Wild Mammals

Fox

In total, 20 fragments of fox bone and teeth were present in the hand-recovered assemblage, representing the remains of a minimum number of two individuals. Two proximal tibiae (one fused and one unfused) indicate at least one adult and one sub-adult fox was present. Two ABGs were recorded. ABG 1 comprised at least six bones from the right hindlimb of a sub-adult fox recovered from two locations (SF45 and SF49) over a meter apart. Several of the bones clearly articulated with each other, and the presence of refitting fragments of the same fibula from each location further confirmed that the remains belonged to a single individual. The second fox bone group (ABG4), comprising the fragmented remains of an adult fox skull, right and left mandibles and right and left maxillae, was also spread over a wide area (SF61-67) and loose teeth from the same individual were also recovered from among the sieved samples. Fox remains found within the chambered tomb at Quanterness have been interpreted as later intrusions (Clutton-Brock 1979). It is possible that the fox remains at Vestra may also be intrusive, but unlike at Quanterness, where foxes were thought to have denned in the chamber, the fox remains at Vestra are incorporated within the physical structure of the cairn makeup itself, which is less suggestive of den activity Most of the limb bones are fairly complete and the ABGs were probably deposited and incorporated into the long cairn structure as articulated and fleshed remains at the same time as the cattle and sheep remains, before subsequently becoming dispersed throughout the structure by natural taphonomic processes, such as settling of the stone slabs and bones slipping down through voids or being disturbed by the actions of small mammals.

Red deer

A total of 6 red deer bones were identified, representing a minimum number of two individuals. In addition, a fragmented and eroded piece of antler probably also belongs to red deer although it could not be firmly identified to species. The red deer bones are all those of very young individuals, including several very porous (neonatal) elements. Although no ABGs were confirmed, it is likely that at least three of the foot bones recovered belong to the same neonatal individual.

Pine marten

Two bones were identified as those of a sub-adult pine marten. This species is extremely rare on Orkney and a search of faunal reports from other comparable sites revealed that prior to the identification of the remains from the Vestra long cairn, the 'first and only instance of this species so far identified on Orkney' was from the Neolithic chambered tomb at Pierowall Quarry (MacCormick 1984: 110). Although more usually associated with arboreal habitat, MacCormick points out that pine marten are also suited to survival in treeless environments, and that the island habitat would have afforded a suitable diet. The pine marten remains may be later intrusions, but they were found in small find location SF59 along with the remains of several other species including neonatal cattle and red deer, young sheep, gull and small mammal, all of which exhibited a similar state of preservation and appear to have been deposited together at the same time.

Rabbit

A single tibia bone of a juvenile rabbit was recovered from the sieved samples, the presence of which indicates a degree of later intrusion and potential disturbance of the original deposits within the long cairn. Despite this find, there is little sign of any substantial rabbit burrowing in the structure, nor anything to suggest the presence of recent intrusive or earlier residual material amongst the remains of the large mammals discussed above.

Small mammals

A total of 23 bones and teeth of small mammals were recorded from the hand-recovered assemblage and a further 57 noted from the sieved samples. Taxonomic identification to species and/or family was attempted for mandibles, maxillae and loose molar teeth. Post cranial remains of small mammals were not further identified, but their size and general morphology were consistent with those of voles. All identifiable cranial fragments belonged to voles of genus *Microtus.* All observable intact upper M2 teeth exhibited the simplex form typical of the Orkney Vole, *Microtus arvalis orcadensi.* This species probably hales originally from southern Europe and appears to have been well established on Orkney during the Neolithic, having been introduced by human agency, possibly by the earliest Neolithic farmers or by early seafarers, although the exact origins and date of introduction of the Orkney Vole remain unclear (Corbet 1979, Berry 1996, Yalden 1999:230). Previous studies have indicated a decrease in size in Orkney Voles from the neolithic to present (Corbet 1979), and further study of the small sample of voles from Vestra has the potential to add to the metrical dataset. No measurements were recorded for this report.

Some of the small mammal remains may have been introduced as pellets by birds of prey, but there are no conclusive signs of digestion on any of the vole teeth or bones which could help confirm their origin as predator deposits. Vole remains in the identified faunal assemblage are most likely to represent post-depositional (but not necessarily recent) intrusions of these creatures into the long cairn structure, where they may have been living. The presence of one rodent-gnawed bone suggests small mammals were active in the vicinity of the long cairn, although there is no evidence of any significant destruction or modification of the large mammal assemblage by rodents.

Birds

Bird remains contribute only a small proportion of the assemblage from the Vestra long cairn. Only 10 fragments of bird were present in the hand recovered assemblage and none from the sieved samples. Identified bird remains include duck (5 fragments of mallard size), a large gull (1 fragment, not identifiable to species), and fulmar (1 fragment). All species have been previously identified at other Neolithic Orkney sites, including the fulmar which according to Bramwell (1983) were previously not thought to have been breeding on Orkney until just over 100 years ago.

Discussion

The predominance of domestic species (sheep and cattle) over wild species, such as red deer, is a pattern observed in several other Neolithic assemblages from Orkney sites, including chambered cairns such as Quanterness (Clutton-Brock 1979), Pierowall (MacCormick 1984), where sheep are by far the most abundant species, and settlements such as Skara Brae (Noddle unpublished, cited in MacCormick 1984) and Knap of Howar (Noddle 1983) where cattle remains are either more abundant than sheep or present in similar numbers. Pig, although present at these other sites, is seldom found in large numbers and its total absence from the very small assemblage recovered from Vestra therefore comes as no surprise. The greater abundance of sheep relative to cattle (and pig) observed at Vestra is not apparent on all comparable sites from Orkney, but sheep do appear to have become increasingly important during the later Neolithic at the nearby settlement of Skara Brae, perhaps reflecting the greater suitability of sheep to the exposed Orkney landscape and absence of woodland in the local environment (MacCormick 1984: 108). There is, however, by no means a consistent pattern of species abundance from Neolithic Orkney sites: the faunal assemblages from stalled cairns at the Knowe of Yarso (Platt 1935) and Knowe of Ramsay (Platt 1936) were both dominated by the remains of red deer, while famously within the chambered tomb at Isbister the bones of sea eagles predominate (although outside the Isbister tomb cattle were by far the most abundant species) (Barker 1983).

The faunal assemblage from the Vestra long cairn is limited in the information it can provide concerning the day-to-day activities, economy and depositional practices of the people who constructed it. This is in part due to the small sample size, but also due to the nature of the monument itself. MacCormick (1984: D13) rightly highlights the problem that animal remains associated with funerary monuments or other similar commemorative structures cannot necessarily be assumed to derive from the normal domestic and dietary activities of the local community. The predominance of red deer at the Knowe of Yarso and sea eagles a Isbister, for example, is seen not as an indication of the economic and dietary exploitation of these species, but an expression of their symbolic importance to the community or locale (Jones 1998; Morris 2005). Nevertheless, the Vestra long cairn assemblage does exhibit a range and relative abundance of species broadly in keeping with later Neolithic settlement sites, and the incorporation of domestic sheep and cattle within the structure supports the assumption that these species were of importance to the community and prevalent within the local landscape.

No butchery marks were evident on any of the bones, and while the widespread surface erosion and root damage may have obscured butchery marks, but the absence of any marks, even on the better preserved bones, suggests there was little, if any, processing of the carcases incorporated into the long cairn. Sheep remains of all age groups are represented by broad and relatively even coverage of the major body areas. The same is true for young cattle, although older cattle are mainly represented by foot bones. The apparent emphasis on feet of adult cattle may be down to deliberate selection of these elements, or perhaps reflect the presence of primary carcass processing waste in the area while the long cairn was under construction. At the Stones of Stennes henge monument (Clutton-Brock 1976) the pattern of cattle element representation among old and young individuals was similar to that observed from Vestra, although since both assemblages are very small any apparent patterns in element representation may be the result of small sample bias.

There is a clear emphasis on the remains of very young animals in the assemblage. All the large ungulate remains include a high proportion of juveniles, including at least two very young neonatal/infant red deer, two neonatal/infant cattle, two neonatal/infant lambs and one foetal sheep. Older juveniles and adult cattle and sheep are represented in smaller numbers. A similar emphasis on very young individuals has been reported from Neolithic cairns and tombs at Quanterness (Clutton-Brock 1979), Midhowe (Platt 1934) and Pierowall Quarry (MacCormick 1984). MacCormick suggests the high proportion of neonatal sheep could be regarded as the product of a sheep-dairying economy, and a similar dairying model could also account for the cattle age profile. Alternatively, MacCormick points out that the rubble structure may have afforded some shelter to animals and thus accumulated the remains of young weak individuals who sheltered and died there. While either explanation could account for the age profile at Vestra, the apparent incorporation of animal remains throughout the rubble makeup of the cairn structure would tend to suggest deliberate inclusion of most of the large animal remains during construction rather than their subsequent incorporation into the cairn by natural agencies. Clutton-Brock (1979: 113) interprets the perinatal remains of sheep, cattle and red deer found at Quanterness as ‘offerings’, and suggests a possible ritual association with foetal or newborn animals. Such ritual selection cannot be ruled out for the Vestra long cairn assemblage, although high percentages of neonatal and infant cattle and sheep individuals have been reported from settlement sites such as Knap of Howar and Skara Brae (Noddle 1983: 94), indicating the emphasis on very young individuals was a feature of the preferred husbandry strategy and a possible emphasis on dairying. Ritual and functional explanations need not be mutually exclusive; as MacCormick (1984: D13) argues, the ritual selection of young animals may be influenced by economic pragmatism.

The available aging data does provide some useful information concerning possible seasonal activity. In a study of modern shetland sheep population from Orkney, the herd had a restricted lambing season from late March to early May (Davis 1996:596). A similar lambing season for the Vestra sheep would suggest death/killing of the young lambs occurred in early/mid summer although the birthing season may well have been more spread out during the Neolithic, which could account for the presence of foetal and older neonatal/infant individuals together in the same deposit. An equivalent birthing season for cattle would also suggest summer deaths for the young calves present. Assuming Neolithic red deer shared the May-June birthing season seen in modern Scottish populations, the neonatal individual from the Vestra long cairn also represents an early/mid summer death. Despite being a very small sample, the age information is compatible with the suggestion that the faunal remains were incorporated in the long cairn structure in a single short-term event (i.e. the construction of the mound) that took place during the summer months.

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Tables

Table 1: Total fragments count (NISP) and minimum number of individuals (MNI) (hand recovered assemblage)

Species	No. frags	%	MNI
sheep/goat	98	53.6	5
cattle	56	30.6	4
fox	20	10.9	2
red deer	6	3.3	2
cf. pine marten	2	1.1	1
deer (antler - species indeterminate)	1	0.5	
identified large mammal total	183		14
Microtus sp. cf. Microtus arvalis orcadensi (Orkney Vole)	10		4
identified small mammal total	10		4
duck cf. mallard	5		1
gull (Larus sp.)	1		1
cf. fulmar	1		1
identified bird total	7		3
unidentified mammal	174		
unidentified medium mammal (sheep/pig sized)	17		
unidentified large mammal (cattle sized)	16		
unidentified small mammal (rodent sized)	13		
unidentified bird	3		
unidentified total	223		

Table 2: Total fragments count (NISP) (sieved sample)

Species	No. frags	%
sheep/goat	7	18.4
fox	12	31.6
rabbit	1	2.6
Microtus sp. Cf. Orkney Vole	18	47.4
total identified	38	
unidentified small mammal	39	
unidentified mammal	314	
total unidentified (approx)	353	

Figures

a) anterior surface

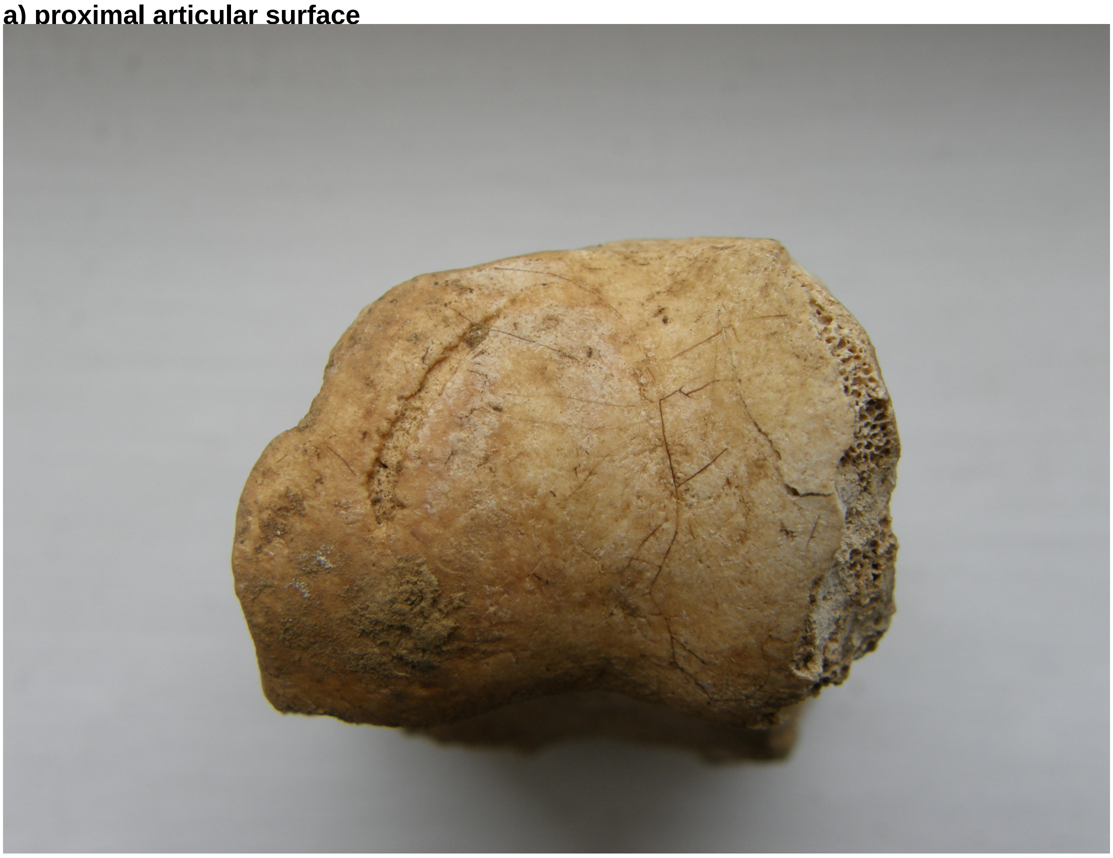
b) posterior surface

Figure 1: Cattle metacarpal displaying good preservation on anterior surface (a) and severe erosion of posterior surface (b)

Figure 2: Distal epiphysis of sheep femur exhibiting pathological lesion

Figure 3: Lipping of proximal articulation of Cattle 1st phalange

a) proximal articular surface



b) distal articular surface

Figure 4: Cattle 1st Phalange exhibiting lipping and 'Type 1' lesions (Baker & Brothwell 1980) of

proximal (a) and distal (b) articular surfaces

Appendix 1

Quantification of Taphonomic Indicators among identified large mammals and birds

Large mammals and birds	Total NISP	Total Eroded	Total Refitted	Total Weathered	Total Root-marked
sheep/goat	98	41	19	18	45
cattle	56	28	11	13	21
fox (vulpes vulpes)	20	4	6	2	11
red deer	6	5	2	2	5
cf. pine marten	2	0	0	0	1
deer (species indeterminate)	1	1	1	0	0
mallard	5	2	0	0	2
gull (Larus sp.)	1	0	1	0	0
cf. fulmar	1	0	0	0	1
total	190	81	40	35	86

Appendix 2

Measurements (after von den Driesch 1976). All measurements in mm.

Birds	Element	Did	SC
cf. fulmar	ulna	9.9	4.8
duck cf mallard	radius	6.4	

Wild mammals	Element	BPC	Bd	Dd	GL	SD	SDO	DPA
fox	tibia		15.4	11.5	136.6	8.2		
cf. pine marten	ulna	7.8					8.9	9.6

Domestic mammals	Element	Bp	Dp	Bd	BFd	DFd	GL	GLl	GLm	SD
cattle	calcaneus						140.8			
cattle	metacarpal			70.6	64	33.8	217			39.1
sheep	astragalus							26		
sheep	astragalus								25.1	
sheep	metacarpal	21.7	16.8	24.2	24	13.3				
sheep	metatarsal (porous)	17.8								

Appendix 3

Epiphyseal fusion data for large mammal species

F = Fused

J = Just Fusing

U = Unfused

	SHEEP/GOAT		CATTLE	FOX		RED DEER
ELEMENT	F	J	U		F	J
antler					1	
mandible	5	1	2			
maxilla	3		2			
skull	7	1	4			
loose tooth		1				
mandibular	1	1				
tooth						
maxillary tooth		1				
tooth fragment	1					
humerus	11	3				
radius	6	2		1		
ulna	6	3				1
pelvis	3					
scapula	2					
femur	7	2	2	1		
fibula			1			
tibia	6	1	2			
astragalus	3		1			
calcaneum	1	2	1			
carpal	3	2				
centroquartal	1	2				
metacarpal 5						1
metacarpal	8	6		2		
metapodial	1					
metatarsal	6	5				
phalanx 1	7	14		2		
phalanx 2	1	4				
phalanx 3		3				
proximal		2				
sesmoid						
tarsal			3			
atlas	1					
cervical	5					
vertebra						
lumbar vertebra			1			
thoracic	1		1			
vertebra						
rib	2					
Total	98	56	20	6	1	2

Appendix 5

Use of Small Find locations in faunal database

During excavation, clusters of bones were assigned small find (SF) numbers and the co-ordinates of each small find was noted in relation to the site grid. During post-excavation recording of the faunal assemblage the SF number was noted for each individual bone record within the faunal database. All bones from the site archive remain bagged up according to their SF number. Normally when recording bone assemblages the level of spatial information assigned to each bone fragment is that assigned to the whole context. In the case of the Vestra assemblage an attempt was made to link bone records to the spatial information associated with the relevant SF number, effectively managing each SF group as a separate context. Problems arose with this approach when it became apparent that many of the bones from different SF locations belonged to the same individuals and even contained refitting fragments from the same bones, which required refitted fragments from several different SF groups to be recorded together as a single bone record. In response to this, several SF groups were lumped together for the purposes of recording and the general area location noted (although the relevant SF number continued to be recorded for each specimen).