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Technical report: vertebrate remains from excavations at Belton, North Lincolnshire

by

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Summary

Archaeological excavations were undertaken to the south of Belton, North Lincolnshire (SE785058) in 1999 prior to the insertion of a gas pipeline. A number of features, including two sunken-featured buildings and a group of pits and ditches, together produced a moderate-sized assemblage of vertebrate remains of mainly middle Saxon date.

Although detailed analysis of the vertebrate data was limited by of the size of the assemblage, a number of general points could be drawn. A fairly restricted range of species was represented at the site, with the common domesticates forming the bulk of the hand-collected assemblage. Cattle remains were prevalent, but pig and caprovid bones were also present in some numbers. The utilisation of wild resources is indicated by the presence of both roe and red deer, and barnacle goose. Analysis of the data suggested that the cattle and caprovid bones mainly represent primary butchery waste, with a predominance of non-meat-bearing elements, such as mandibles and metapodials. Pigs, on the other hand, appear to have been slaughtered whilst quite young and meat-bearing elements formed a larger proportion of their remains. Horse remains included a number of butchered elements, most of which represented adult individuals.

A single sample from Context 354 (a fill of one of the sunken-featured buildings) produced a small fish assemblage, the identified fragments being dominated by the remains of eel and members of the carp family (Cyprinidae). No marine species were identified.

KEYWORDS: BELTON; NORTH LINCOLNSHIRE; HATFIELD GAS PIPELINE; MID SAXON; SUNKEN FEATURED BUILDINGS; VERTEBRATE REMAINS; FISH BONE

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Introduction

Archaeological investigations along the route of the 'Hatfield gas pipeline' were undertaken by Northern Archaeological Associates in July 1999. The remains of several structures and a series of pits and ditches, possibly denoting an industrial area, were located within the pipeline corridor, to the south of Belton, North Lincolnshire (SE785058). A small assemblage of hand-collected vertebrate remains (approximately 2000 fragments) was recovered from these excavations, the vast majority of which (approx. 1500 fragments) were recovered from deposits associated with two so-called sunken-featured buildings (SFB) or 'grubenhauser.' Analysis of the pottery indicated a middle Saxon (late 7/8th to early 9th century) date for the material recovered from within the SFBs and from pits 403 and 405, and 'spread' 408. A 'ditch' and a 'gully' fill (Contexts 417 and 413 respectively) could only be broadly assigned to the Roman or Roman-medieval periods (see Table 1). Material from the remaining context types (several other pit and ditch deposits) were either of very recent origin (i.e. post-medieval) or could not be confidently assigned to any date. A single context (328) had no spot date but was described as a fill of SFB A. Material from this deposit has been assumed to be middle Saxon in date because of its association with Context 321.

All the material from tightly dated deposits was recorded as recommended in the assessment report (Jaques and Dobney 1999). Additionally, vertebrate remains from the undated pit and ditch fills associated with the 'industrial' area were also recorded for comparative and archival purposes. Table 2 shows the numbers of identifiable specimens (NISP) which could be identified to species (or broader category) by period. It is clear that as much as 80% of the assemblage can be securely dated (by association with pottery) to the Middle Saxon period.

In addition to the hand-collected material, 825 fragments were recovered from the residues of five sediment samples. The bulk of the remains were from Context 354, which yielded 628 fragments (427 fish bones), with a further 111 fragments (mostly unidentified) from a more broadly dated ditch fill, Context 417 (Table 3).

Methods

Data concerning the vertebrate remains were recorded electronically directly into a series of tables using a purpose-built graphical input system and *Paradox* software. Semi-subjective, non-quantitative data were recorded for the material from each context regarding the state of preservation, colour, and the appearance of broken surfaces ('angularity'). Additionally, semi-quantitative information was recorded for the bone from each context, concerning fragment size, dog gnawing, burning, butchery and fresh breakage.

Identification was carried out using the reference collections of the Environmental Archaeology Unit. Detailed recording of the assemblage followed the protocol outlined by Dobney *et al.* (1999). Selected elements ('A' bones) were recorded using the diagnostic zones method described by Dobney and Rielly (1988). Remaining elements ('B' bones), which could be identified to species, were merely counted. Other fragments, (classified as 'unidentified') were, where possible, grouped into categories: large mammal (assumed to be horse, cow or large cervid), medium-sized mammal (assumed to be

sheep, pig or small cervid), medium-sized mammal 2 (assumed to be dog, cat, hare or equivalent sized mammal), unidentified bird and totally unidentified. As well as counts of fragments, total weights were recorded for all identifiable and unidentifiable categories.

Caprovid tooth wear stages were recorded using those outlined by Payne (1973; 1987), and those for cattle and pigs followed the scheme of Grant (1982). Cattle, pig and caprovid mandibles were assigned to the general age categories outlined by O'Connor (1988) whilst, in addition, caprovid mandibles and isolated teeth were assigned to the age categories detailed by Payne (1973; 1987).

Mammal bones were described as 'juvenile' if the epiphyses were unfused and the associated shaft fragment appeared spongy and porous. They were recorded as 'neonatal' if they were also of small size. Epiphysial fusion data are presented using the categories of O'Connor (1984).

Measurements followed von den Driesch (1976) unless otherwise specified. Additional measurements, not detailed by von den Driesch, followed those described by Dobney *et al.* (forthcoming). Withers heights were estimated using calculations devised by Foch (1966), Matolsci (1970) and Kiesewalter (in von den Driesch and Boessneck 1974).

The samples were processed by staff in the Department of Archaeology at the University of Durham, whilst the resulting residues (<10mm fractions) were sorted for vertebrate remains at the EAU.

Preservation

Information regarding the preservation of the material from individual contexts was recorded for the assessment report (Jaques and Dobney 1999) in some detail and the relevant text can be found reproduced in the appendix.

Preservation of the vertebrate remains as a whole was rather variable. In general, the fragments were reasonably well preserved regardless of context type; some variations were noted, however.

The assemblage recovered from Grubenhaus A was very variably preserved, quite fragmented, and exhibiting a wide range of colour (from dark brown through to fawn). Little evidence for dog gnawing was recorded, but fresh breakage was quite extensive on the bones from Context 328. Both fills (Contexts 321 and 328) included a few 'mineralised' fragments, which had been 'leached'. Fills from Grubenhaus B produced bones that were rather better preserved and which showed much less variation within each context. However, a third of the fragments from Context 354 had very variable characteristics, which included fragments with a battered appearance and extensive dog gnawing. Colour of the bones was generally more uniform across the deposits, most fragments being dark brown.

It is possible that the bone from some of the grubenhaus fills was initially dumped elsewhere and was deposited later in the buildings as a deliberate attempt to fill in or level the area. This may account for the fragmented and battered appearance of the bones. However, dog gnawing was minimal, which suggests that incorporation into the grubenhaus fills must have taken place fairly rapidly. Surface exposure may also be indicated by the presence of leached bones within the fills of Grubenhaus A.

The assemblages recovered from the pits and ditches showed slightly better preservation than those from the sunken-featured buildings and the former also tended to be less fragmented. These assemblages are more likely to be primary deposits. Although fewer fragments were recovered from these deposits, the assemblages follow the general

trends suggested by the material from the grubenhaus fills.

In summary, the characteristics of the vertebrate remains relating to preservation suggest a period of successive dumping episodes, some of the material being redeposited from elsewhere.

Species representation and abundance

Observing the range of species present (Table 2), it is clear that both domestic and wild animals were represented in this assemblage. Of those dated as middle Saxon, approximately 99% of all well-dated fragments were from common domesticated animals (i.e. cattle, caprovid, pig, horse goose and chicken), whilst wild species were represented by solitary elements of red (*Cervus elaphus* L.) and roe deer (*Capreolus capreolus* (L.)), and barnacle goose (*Branta leucopsis* Bechstein). Bird remains represented just over 5% (21 fragments) of the total assemblage, of which 52% were identified as goose and 48% as chicken.

Looking at the relative abundance of the more common species in more detail, it is apparent that the most abundant bones were from cattle (56%), followed by pig (24%) and caprovid (20%). Bones of horse were reasonably common - representing nearly 9% of all mammal fragments recovered, whilst those of dog and cat were very infrequent.

When broken down by context group, the relative abundance of the most commonly occurring species remains practically the same (Table 4). In those features where >100 bone fragments were recovered (i.e. SFB A, SFB B and Pit 405 - all of middle Saxon date), the rank order of species was cattle, followed by pig, caprovid and horse. When all 'ditch' deposits were amalgamated (Table 5), the same pattern was also observed (although, in this case, horse fragments outnumber those of caprovid).

Skeletal element representation

It is inevitable that once such a small assemblage has been subdivided by species and then further into individual skeletal elements, that little inference can be drawn from small differences in numbers of fragments. However, some limited observations can be made from the Belton SFB assemblages.

Tables 6–8 show the range and number of elements represented for the most common domestic animals. For cattle, the most common elements recorded from SFB B were head (mainly mandible fragments) and terminal limb elements (namely metatarsals and phalanges). Other elements such as scapulae and radii were also well represented, whereas the major meat bearing longbones (i.e. humerus and femur) were fewer in number. A similar pattern was observed in SFB A (although the assemblage was even smaller); however, fewer mandibles and more isolated teeth were present. This may indicate that the material from SFB A had perhaps been subject to more fragmentation than that from SFB B. This is corroborated by comparisons of unidentified large mammal fragments from both SFBs (Table 9) where it can be seen that much higher proportions of large mammal cranial and longbone shaft fragments were present in SFB A compared to SFB B. In addition, ribs, isolated maxillary teeth and vertebrae (particularly those of the thoracic region of the spine) were also well represented.

The limited caprovid assemblage (Table 7) was similar to that of cattle, where heads and feet (mandibles and metapodials) were most common compared to other postcranial elements. Table 8 shows pig skeletal element representation, where once again mandible fragments were the most frequently recorded element. However, in contrast to cattle and caprovid remains, other major meat bearing elements (e.g. humerus, pelvis, femur) were relatively well

represented, whilst terminal limb elements (i.e. metapodials and phalanges) were not.

Such patterns in the data may be explained as either direct evidence of human selectivity in carcass utilisation and/or waste disposal or as a result of taphonomic factors such as preservation and recovery. It could certainly be argued that the absence of small phalanges and carpal/tarsal bones might have more to do with the absence of systematic recovery procedures than ancient human carcass utilisation. The greater resistance of more robust elements may also equally explain an abundance of certain bones within an assemblage. However, high frequencies of heads and feet are often taken to indicate the presence of primary butchery waste, i.e. parts removed in the initial preparation/dressing of a carcass. In truth, both human influence and subsequent taphonomic processes are likely to have played a part and that certainly could be argued for the Belton assemblage.

Age at death

The small numbers of mandibles with teeth *in situ*, or individual isolated teeth of cattle, caprovid or pig precludes any detailed analysis of age-at-death profiles as reconstructed from mandibular teeth wear. However, from limited evidence it appears that a range of ages (i.e. juvenile, sub-adult and adult) are represented for all common domestic mammals (i.e. cattle, sheep and pigs). Limited evidence from longbone fusion data, however, provides an interesting contrast with the much larger dataset from contemporaneous and later material from the site of Flixborough, North Lincolnshire.

Figures 1 and 2 show reconstructed kill-off profiles for cattle and pig remains from both sites. For cattle (Figure 1), the Belton profile is most similar to that from Phase 2-3a (also Middle Saxon) from Flixborough. In both these cases, around 70% of cattle were killed before skeletal maturity. Material from later 9th-11th century deposits from Flixborough shows a change in emphasis to the retention of more mature adult animals, where between 55-70% of animals survived into adulthood. It could be argued that this suggests a change in exploitation of cattle through time, with an initial emphasis on meat production turning to focus on a more multi-purpose role.

In the case of pigs, it would appear that the vast majority (>80%) of pigs from Belton were killed as young or even very young individuals. Figure 2 shows the Belton "kill-off" profile once again compared with middle and late Saxon phases from Flixborough. It is clear that the profiles for both sites are very different. The Belton data indicate that very few older animals are represented in the assemblage, whereas at Flixborough, a significant component of the assemblage (60%) is made up of higher proportions of sub-adults throughout all periods. For pigs, this may imply intensive production and a highly selective culling regime. Age-at-death profiles for sheep at Belton are virtually indistinguishable from all periods at Flixborough (Figure 3).

On the basis of epiphysial fusion data, most horses represented at this site were adult, i.e. over four years of age. Only a single proximal femur was recorded as being unfused. Further data from mandibles and isolated teeth (mainly incisors) from SFB B and pit fill 409 indicate that most were aged between 5 and 11 years at death. Exceptions to this were deciduous incisors recovered from Context 436, which suggested an age between 9 months and 3 years, and a mandible from Context 353, producing an age of approximately 2 years.

Biometry

Limited datasets render the analysis of the size and shape of the Belton livestock of limited interpretative value. However, once placed into context with other broadly contemporaneous assemblages some useful patterns can be viewed. Figure 4 shows the

reconstructed withers (shoulder) height of cattle from a range of Saxon sites throughout England, arranged roughly in chronological order. These show that the small assemblage from Belton falls well within the rather limited range of values for the vast majority of sites. However, in comparison with values from the nearby and contemporaneous middle Saxon site at Flixborough (Phase 2-3a), they are generally smaller. This may reflect a difference in status between the two sites, which is also apparent in other aspects of the vertebrate (Dobney *et. al.* forthcoming) and finds assemblages from Flixborough.

A bivariate plot (Figure 5) compares cattle metacarpal measurements for Belton and Flixborough. It can be seen that the Flixborough data fall into two (or perhaps three) distinct groups, which could be interpreted as reflecting the presence of cows, bulls (and perhaps steers). The few values from Belton fall almost exclusively into the smallest group, which could be taken to indicate that all were from cows. This may suggest that these animals were perhaps not prime beef animals, as previously suggested by long-bone fusion data, but surplus breeding stock from a dairy herd. Alternatively the distinctive grouping of the Flixborough values could reflect different varieties of cattle and not distinctive sexual dimorphism within the same population. Thus the data from Belton might suggest that only one variety of cattle was utilised by the inhabitants, perhaps another indication of differences in status and access to resources.

A single estimate of a horse withers height was calculated from the greatest lateral length measurement of a metacarpal (Context 430). This calculation produced a height of 1467.9 mm, which when converted to 'hands' indicates the presence of a horse of 14.2 hh. In an extensive study of material from seventeen archaeological sites, Johnstone (1996) produced a range of 13-14 hh for the height of Saxon horses. She found that larger animals from the Saxon period were generally associated with burials and may be an indication of high status. Unfortunately, the horse bone from Belton was recovered from one of the undated ditch fills, so may not be of middle Saxon date.

Butchery

Evidence for butchery was noted on cattle fragments throughout the deposits. Cattle pelves were cut and chopped around both the acetabulum and the ilium, and split shafts (mainly radii and metapodials) were particularly common. Mandibles were the most commonly butchered element for the middle Saxon period. Some were chopped through the back portion of the bone, disarticulating the mandible from the rest of the skull and thus allowing the removal of the tongue. A few cattle horncores were noted that had been deliberately chopped from the rest of the skull. These may represent waste from a specialist craft activity, such as horn working or tanning.

Butchery marks were less evident on the remains of caprovids and pigs and no consistent pattern could be recognised.
Chop and knife marks were noted on eight horse bones, including radii, pelves, mandibles and a humerus. Whether this evidence represents the exploitation of horseflesh for consumption by humans or dogs is difficult to determine. The butchery marks on the horse bones are certainly not dissimilar to those recorded on the cattle elements. However, the processing and defleshing of large carcasses would essentially produce similar evidence regardless of the recipient. Remains of adult horses predominate in the assemblages, suggesting that they were of more value for riding and transport than as a food source.

Fish remains

Of the three sediment samples producing fish bones, only that from Context 354

(middle Saxon) produced sufficient remains to provide any useful information. It can be seen from Table 10 that, the suite of species or family groups identified were very limited, but were dominated by the remains of eel and members of the carp family (Cyprinidae). Cyprinid remains are notoriously difficult to identify to species and their vertebrae are very alike, but it was noted that some of the vertebrae and three pharyngeal bones were morphologically closer to roach. All the identified species were either freshwater (pike (*Esox lucius* (L.), cyprinid and perch (*Perca fluviatilis* L.) or catadromous (eel (*Anguilla anguilla* (L.)) species, no marine fish being identified.

A range of skeletal elements was present, but vertebrae were prevalent amongst the identified fragments. This suggests that the remains are more likely to represent table waste, the heads having been removed prior to consumption. However, taphonomic processes may be responsible for the bias in favour of vertebrae. Skeletal elements associated with the head tend to be of a more fragile nature and are, therefore, less likely to survive or be recovered complete enough for identification.

A similar, restricted range of species has been recorded from 8/9 th century deposits at Fishergate. Eel and, to a lesser extent cyprinid, remains again predominate, although at Fishergate, herring also played a significant role in the diet. Deposits at Flixborough have produced a large assemblage of fish bones showing an abundance of freshwater and euryhaline taxa, with only a small proportion of marine species.

Overall, the material recovered from the SFB B at the site near Belton seems to reflect a general trend in the middle Saxon period of the exploitation of locally available resources, with a concentration on freshwater and estuarine species.

Discussion

Our current limited state of knowledge of the early and middle Saxon periods renders the prospects of future research into all aspects of the bioarchaeology of this period a priority. Data from detailed studies of vertebrate assemblages (and other biological remains) can be used to address many outstanding questions and are crucial if we are to begin to understand many of the complex aspects of economic and social organisation. Topics that can be addressed include the impact of immigrants on natives, the stimulus for re-urbanisation, the nature of relationships between rural settlements, large estate centres and later towns, social status, the nature of settlements and trading links with the continent. Unfortunately, vertebrate assemblages of post-Roman date are somewhat limited in number and distribution in England. Problems with site visibility, context integrity, scale of excavation, length of occupation and, more importantly, dating, render many Saxon vertebrate assemblages of limited interpretative value. Thus, even small assemblages such as that from Belton can provide important data for the period.

Attempts have been made to characterise sites on the basis of patterns of species representation. For example, it has been suggested that large numbers and diversity of wild species (particularly in the consumption of birds and fish) are characteristic of monastic settlements. Although this approach is worthy of further exploration, recent work (particularly at Flixborough - Dobney *et. al.* forthcoming) has shown that some of the conclusions drawn are far too simplistic and beg the question of continuity, of use of settlement through time and of the nature and status of the inhabitants. The characterisation of sites using vertebrate remains alone has been biased for the middle Saxon period by the rarity of rural sites and by a focus towards monastic centres. Assemblages such as that from Belton mean that this imbalance can

slowly be redressed. In this case it would appear that wild species are indeed severely limited in their frequency and variety. This would appear to be in keeping with the low status of this site as reflected by other archaeological evidence. However, the small size of the assemblage could well be a major factor in this apparent trend.

Also at Belton, there are tantalising clues which may suggest that elements of the animal economy were focused towards production and/or provisioning. How this small economic unit functioned within the broader framework of the middle Saxon 'estate system' is impossible to gauge. The historical evidence for hierarchies of sites, bound together on large estates around high status manorial centres, provide ideal opportunities to study their inter-relationships. During the middle Saxon period there appears to have been not only an increase in general size of these estates, but also an increasing complexity in land-holding. This development witnessed the beginnings of ecclesiastical estates under charter, whereby Kings and secular aristocrats donated large estates (or portions of them) to the church. As a result, the new monastic estates, as well as old established secular aristocratic land-holdings, incorporated both large adjacent territories, and smaller far flung holdings, with rights of access to certain resources (e.g. cetaceans, fish, cattle, woodland) some distance from them. The proximity of the Belton site to the high status manorial/monastic centre at Flixborough may have resulted in the controlled movements of animals and their products, probably in the form of taxation or renders. Thus, what may be most interesting in the Belton vertebrate assemblage is what is not represented. A large proportion of the productive surplus of the site may have been sent as taxation, renders or tithes to the manorial centre. The assemblage from Belton may represent those animals left for local utilisation.

Further research (e.g. investigating numbers and range of animals - both wild and domestic, evidence for selective breeding/importation of animals, cull patterns etc.) on these and other vertebrate assemblages may throw further light on these inter-relationships.

Archive

All material is currently stored in the Environmental Archaeology Unit, University of York, along with paper and electronic records pertaining to the work described here.

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Table 1. List of contexts at Belton, North Lincolnshire (Hatfield Gas Pipeline) producing bone. Key: nd = not dated; N = not recorded; Y= recorded; Y/S = sample only recorded.

Context	*date*	*date group*	*context type*	*?recorded*
201	M-L18C	M-L18C	unknown	N
301	late 7/8th - early 9th C	middle Saxon	final fill of grubenhaus B	Y
303	nd	nd	fill of furrow	N
309	M16-18C	M16-18C	fill of ditch 310	N
313	nd	nd	fill of pit 314	N
321	late 7/8th - early 9th C	middle Saxon	fill of grubenhaus A	Y
323	late 7/8th - early 9th C	middle Saxon	fill of grubenhaus B	Y
326	5th to late 8th C	middle Saxon	fill of grubenhaus B	Y
327	late 7/8th - early 9th C	middle Saxon	fill of grubenhaus B	Y
328	nd	nd/?mid Saxon	fill of grubenhaus A	Y
329	nd	nd	fill of pit 330 adjacent to grubenhaus A	Y
353	late 7/8th - early 9th C	middle Saxon	fill of grubenhaus B	Y
354	late 7/8th - early 9th C	middle Saxon	fill of grubenhaus B	Y
359	nd	nd	fill of pit 360	Y/S
401	late 7/8th - early 9th C	middle Saxon	fill of Pit 403	Y
402	nd	nd	fill of Pit 403	N
404	late 7/8th - early 9th C	middle Saxon	fill of Pit 405	Y
408	late 7/8th - early 9th C	middle Saxon	spread south of pit 410	Y
409	nd	nd	fill of Pit 410	Y
411	nd	nd	fill of linear feature 412	Y
413	Roman	Roman	fill of gully 414	Y
417	Roman to medieval	Rom to med	fill of ditch 418	Y
419	nd	nd	fill of beam-slot 420	N
430	nd	nd	lower fill of ditch 418	N
432	nd	nd	fill of pit 433	N
434	nd	nd	fill of post-hole 435	N
436	nd	nd	fill of ditch 437	Y

Table 2. Total number of recorded fragments from Belton, North Lincolnshire (Hatfield Gas Pipeline) by date. Key: nd = not dated.

Species		**Roman**	**Mid Saxon**	**nd/mid Saxon**	**Roman/ medieval**	**nd**	**Total**
Canis f. domestic	dog	-	1	-	1	-	2
Felis f. domestic	cat	-	2	-	-		2
Equus f. domestic	horse	3	32	3	-	10	48
Sus f. domestic	pig	4	80	5	2	10	101
cf. *Sus* f. domestic	?pig	-	1	-	-	-	1
Cervid	deer	-	-	-	-	1	1
cf. *Cervus elaphus* L.	?red deer	-	1	-	-	-	1
Capreolus capreolus (L.)	roe deer	-	2	-	-	-	2
Bos f. domestic	cattle	3	189	18	5	41	256
Caprovid	sheep/goat	-	45	-	1	-	46
Capra f. domestic	goat	-	2	-	-	-	2
cf. *Capra* f. domestic	?goat	-	1	-	-	-	1
Ovis f. domestic	sheep	-	21	-	-	2	23
		-	-	-	-	-	
Anser sp.	goose	-	11	-	-	-	11
cf. *Branta leucopsis* Bechstein	?barnacle goose	-	1	-	-	-	1
Gallus f. domestic	chicken	-	9	-	-	-	9
Sub-total		*10*	*398*	*26*	*9*	*64*	*507*
unidentified bird		-	8	-	-	-	8
large mammal		11	720	44	10	124	909
medium mammal 1		2	330	6	4	18	360
medium mammal 2		-	2	-	-	-	2
unidentified		3	123	4	1	8	139
Sub-total		*16*	*1183*	*54*	*15*	*150*	*1418*
Total		**26**	**1581**	**80**	**24**	**214**	**1925**

Table 3. Total number of fragments recovered from the samples from Belton, North Lincolnshire (Hatfield Gas Pipeline) by context.

Species		***321***	***354***	***355***	***359***	***417***	***Total***
Mus/Apodemus sp.	mouse	-	-	-	-	1	1
Felis f. domestic	cat	-	-	-	-	1	1
Sus f. domestic	pig	1	2	-	-	1	4
Gallus f. domestic	chicken	-	1	-	-	-	1
Corvus corone L./*Corvus frugilegus* L.	crow/rook	-	-	-	1	-	1
Fish		3	427	-	-	12	490
Sub-total		*4*	*430*	*0*	*1*	*15*	*498*
Unidentified		16	198	10	7	96	327
Sub-total		*16*	*198*	*10*	*7*	*96*	*327*
Total		**20**	**628**	**10**	**8**	**111**	**825**

Table 4. Total number of recorded fragments from different context types at Belton, North Lincolnshire (Hatfield Gas Pipeline). Key: A = sunken-featured building A; adj A = Context 329, fill of pit associated with SFB A; DF = ditch fill; GF = gully fill; PF = pit fill; SP = spread deposit.

Species		**A**	**adj A**	**B**	**DF 411**	**DF 417**	**DF 436**	**GF 413**	**PF 401**	**PF 404**	**PF 409**	**SP**	**Total**
Canis f. domestic	dog	-	-	1	0	1	-	-	-	-	-	-	2
Felis f. domestic	cat	-	-	-	-	-	-	-	-	2	-	-	2
Equus f. domestic	horse	10	1	22	3	-	3	3	1	1	3	1	48
Sus f. domestic	pig	13	2	63	3	2	3	4	-	7	2	2	101
cf. *Sus* f. domestic	?pig	-	-	1	-	-	-	-	-	-	-	-	1
Cervid	deer	-	-	-	1	-	-	-	-	-	-	-	1
cf. *Cervus elaphus* L.	?red deer	1	-	-	-	-	-	-	-	-	-	-	1
Capreolus capreolus (L.)	roe deer	-	-	1	-	-	-	-	1	-	-	-	2
Bos f. domestic	cattle	55	15	123	11	5	3	3	10	15	12	4	256
Caprovid	sheep/goat	3	-	36	-	1	-	-	3	3	-	-	46
Capra f. domestic	goat	-	-	1	-	-	-	-	1	-	-	-	2
cf. *Capra* f. domestic	?goat	-	-	1	-	-	-	-	-	-	-	-	1
Ovis f. domestic	sheep	5	-	12	1	-	-	-	2	2	1	-	23
Anser sp.	goose	1	-	10	-	-	-	-	-	-	-	-	11
cf. *Branta leucopsis* Bechstein	?barnacle goose	-	-	1	-	-	-	-	-	-	-	-	1
Gallus f. domestic	chicken	-	-	9	-	-	-	-	-	-	-	-	9
Sub-total		*88*	*18*	*281*	*19*	*9*	*9*	*10*	*18*	*30*	*18*	*7*	*507*
Unidentified bird		1	-	7	-	-	-	-	-	-	-	-	8
large mammal		188	31	493	43	10	13	11	22	50	37	11	909
medium mammal 1		35	7	275	-	4	8	2	11	14	3	1	360
medium mammal 2		-	-	-	-	-	-	-	-	1	-	1	2
Unidentified		16	-	94	-	1	6	3	4	13	2	-	139
Sub-total		*240*	*38*	*869*	*43*	*15*	*27*	*16*	*37*	*78*	*42*	*13*	*1418*
Total		**328**	**56**	**1150**	**62**	**24**	**36**	**26**	**55**	**108**	**60**	**20**	**1925**

Table 5. Total number of recorded fragments from different context groups, at Belton, North Lincolnshire (Hatfield Gas Pipeline). Key: A = fills of grubenhaus A, plus material recovered from Context 329; B = fills of grubenhaus B.

Species		**A**	**B**	**Ditch**	**Gully**	**Pit**	**Spread**	**Total**
Canis f. domestic	dog	-	1	1	-	-	-	2
Felis f. domestic	cat	-	-	-	-	2	-	2
Equus f. domestic	horse	11	22	6	3	5	1	48
Sus f. domestic	pig	15	63	8	4	9	2	101
cf. *Sus* f. domestic	?pig	-	1	-	-	-	-	1
Cervid	deer	-	-	1	-	-	-	1
cf. *Cervus elaphus* L.	?red deer	1	-	-	-	-	-	1
Capreolus capreolus (L.)	roe deer	-	1	-	-	1	-	2
Bos f. domestic	cattle	70	123	19	3	37	4	256
Caprovid	sheep/goat	3	36	1	-	6	-	46
Capra f. domestic	goat	-	1	-	-	1	-	2
cf. *Capra* f. domestic	?goat	-	1	-	-	-	-	1
Ovis f. domestic	sheep	5	12	1	-	5	-	23
Anser sp.	goose	1	10	-	-	-	-	11
cf. *Branta leucopsis* Bechstein	?barnacle goose	-	1	-	-	-	-	1
Gallus f. domestic	chicken	-	9	-	-	-	-	9
Sub-total		*106*	*281*	*37*	*10*	*66*	*7*	*507*
Unidentified bird		1	7	-	-	-	-	8
Large mammal		219	493	66	11	109	11	909
Medium mammal 1		42	275	12	2	28	1	360
Medium mammal 2		-	-	-	-	1	1	2
Unidentified		16	94	7	3	19	-	139
Sub-total		*278*	*869*	*85*	*16*	*157*	*13*	*1418*
Total		**384**	**1150**	**122**	**26**	**223**	**20**	**1925**

Table 6. Skeletal element representation for cattle from the fills of the 2 sunken-featured buildings at Belton, North Lincolnshire (Hatfield Gas Pipeline).

Element	**A**	**B**
horncore	3	4
mandible	3	19
isolated teeth	2	-
DP4	1	-
P4	-	1
M1/M2	6	2
M3	5	1
scapula	1	11
humerus	3	5
radius	4	11
ulna	-	1
metacarpal	4	11
pelvis	4	6
femur	-	4
tibia	1	6
astragalus	3	4
calcaneum	1	7
metatarsal	4	16
metapodial	1	2
phalanx 1	6	10
phalanx 2	2	2
phalanx 3	1	-

Table 7. Skeletal element representation for caprovids from the fills of the 2 sunken-featured buildings at Belton, North Lincolnshire (Hatfield Gas Pipeline).

Element	**A**	**B**
horncore	-	3
mandible	1	15
isolated teeth	-	1
DP4	-	-
P4	-	-
M1/M2	-	2
M3	-	1
scapula	-	3
humerus	1	1
radius	1	3
ulna	-	1
metacarpal	-	4
pelvis	2	1
femur	1	2
tibia	2	3
astragalus	-	1
calcaneum	-	-
metatarsal	-	8
phalanx 1	-	1
phalanx 2	-	-
phalanx 3	-	-

Table 8. Skeletal element representation for pigs from the fills of the 2 sunken-featured buildings at Belton, North Lincolnshire (Hatfield Gas Pipeline).

Element	**A**	**B**
mandible	1	11
isolated teeth	1	5
M1	-	-
M3	-	-
scapula	1	8
humerus	2	6
radius	3	2
ulna	2	2
metacarpal 3	-	2
metacarpal 4	-	1
pelvis	1	4
femur	-	4
tibia	1	6
astragalus	-	1
calcaneum	-	5
metatarsal 2	-	3
metatarsal 3	-	1
metatarsal 4	1	1
metatarsal 5	-	1
phalanx 1	-	1
phalanx 2	-	-
phalanx 3	-	-

Table 9. Bone elements represented in the 'unidentified' groups from the two sunken-featured buildings at Belton, North Lincolnshire (Hatfield Gas Pipeline).

Group	**Element**	**A**	**B**
large mammal	atlas	3	5
	axis	1	5
	cervical vertebrae	3	4
	cranial	39	64
	cuboid	1	2
	horncore	-	2
	hyoid	-	1
	isolated maxillary teeth	11	31
	lumbar vertebrae	-	3
	metapodial	1	-
	mandible	10	33
	maxilla + teeth	2	3
	pelvis	5	11
	rib	13	125
	sacrum	2	4
	scapula	2	13
	shaft	87	152
	thoracic vertebrae	2	16
	misc vertebrae	6	19
medium mammal 1	axis	-	1
	cervical vertebrae	-	3
	cranial	1	9
	femur	-	2
	fibula	-	5
	isolated maxillary teeth	1	2
	lumbar vertebrae	2	4
	mandible	2	6
	maxilla + teeth	-	3
	pelvis	1	5
	rib	6	118
	scapula	-	13
	shaft	21	98
	thoracic vertebrae	1	5
	misc vertebrae	-	1
Unidentified	unidentified	16	94
Total		**239**	**862**

Table 10. Fish remains from Context 354 at Belton, North Lincolnshire (Hatfield Gas Pipeline).

Species		**No. of fragments**	**Elements represented**
Esox lucius L.	pike	3	Vertebra x 1, supracleithrum x1, dentary x 1
Cyprinidae	carp family	66	Vertebra x 63, pharyngeal x 3
Anguilla anguilla (L.)	eel	98	Vertebra x 89, articular x 1, dentary x 3, vomer x 1, hyomandibular x 2, bassioccipital x 1, cleithrum x 1
Perca fluviatilis L.	perch	10	Vertebra x 5, post-temporal x 1, preopercular x 1, quadrate x 3
Unidentified fish		250 (approximate)	Small and fragmented pieces of bone representing skull, broken and unidentified vertebrae, rib, ray and spine fragments
Total		**427**	

Figure 1. Cattle epiphysial fusion data for Belton, North Lincolnshire (Hatfield Gas Pipeline).

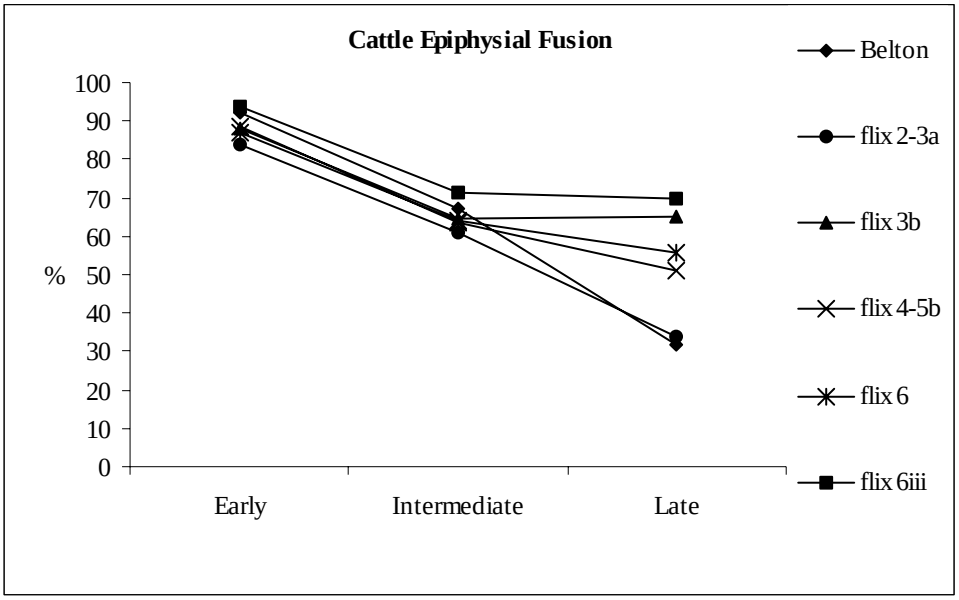


Figure 2. Pig epiphysial fusion data for Belton, North Lincolnshire (Hatfield Gas Pipeline).

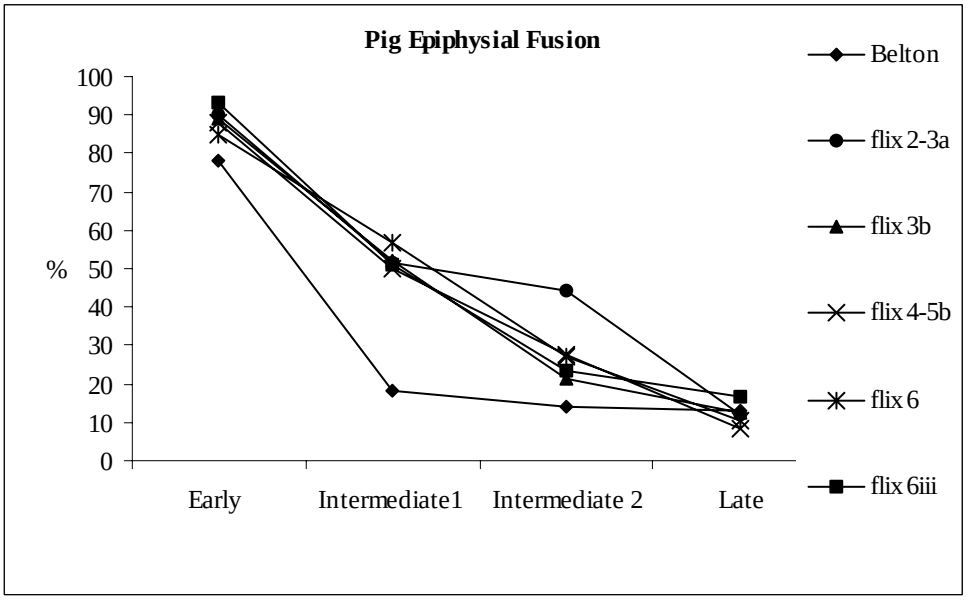


Figure 3. *Caprovid epiphysial fusion data for Belton, North Lincolnshire (Hatfield Gas Pipeline).*

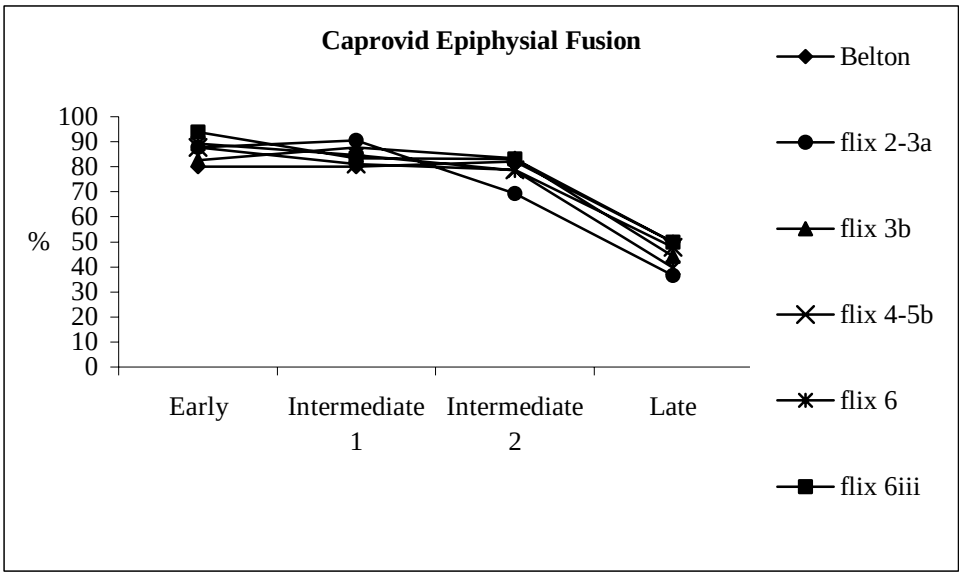


Figure 4. Box plot for estimated cattle withers heights (mm) for bone assemblages from various Saxon sites. Key: LINC4THC = late 4th century; WESTSTOW = Weststow, Suffolk - early Saxon settlement site; FLIX2_3A, FLIX3B, FLIX4-5A, FLIX6 = different phases from Flixborough, North Lincolnshire; SIXDIAL1, 2 and 3 = different phases from Six Dials, Southampton; SUSSEXST = Sussex Street, Hampshire

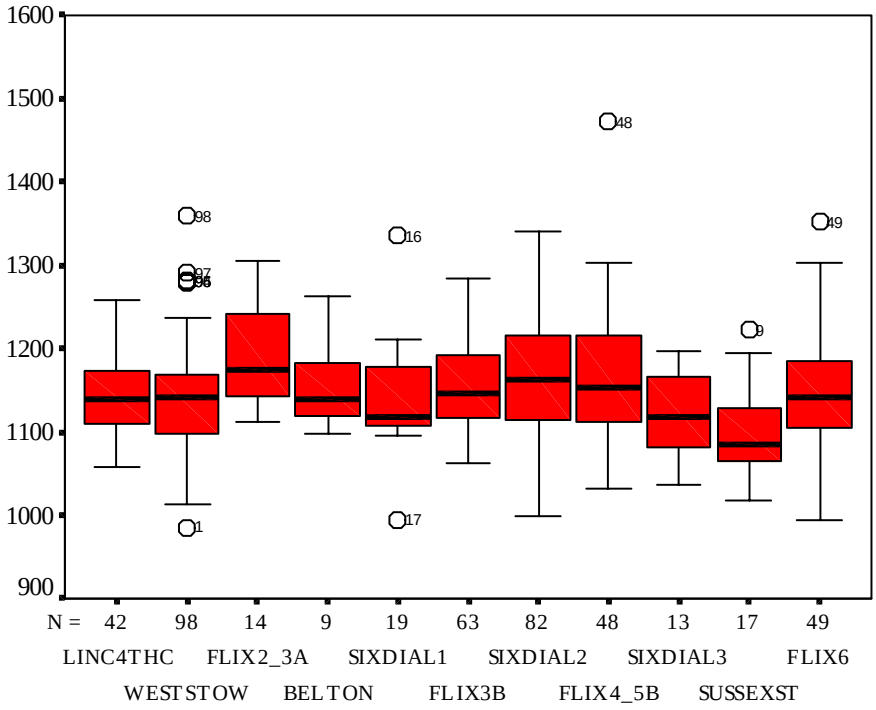
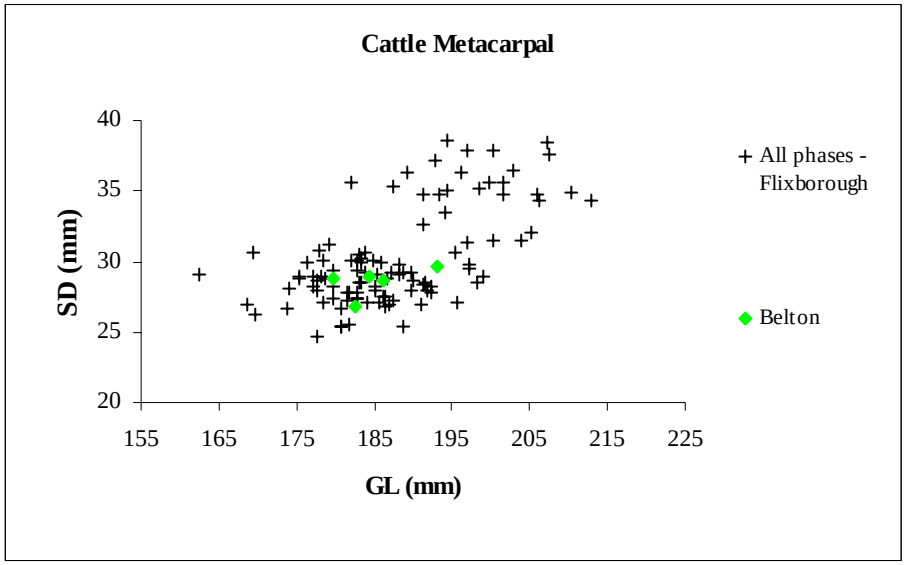


Figure 5. Size of cattle metacarpals from all phases at Flixborough and from Belton, North Lincolnshire (Hatfield Gas Pipeline). Key: SD - maximum shaft diameter: GL - greatest length.



Appendix

Records of bone preservation (from assessment report)

Material associated with structure A

Contexts 321 and 328 - fills of grubenhaus

Preservation of the vertebrate remains was rather variable, although most fragments were recorded as 'good' or 'fair'. A small component that was rather poorly preserved was apparent within the material from both deposits. A number of the fragments exhibited a battered appearance, whilst a few had rounded edges or were very eroded. Colour varied from dark brown to brown to fawn (the same was noted for both contexts). Bones from Context 321 (267 fragments) formed a moderate-sized assemblage, but preservation suggests that the material probably came from different sources or included a redeposited component. Context 328 (94 fragments) was similar and both contexts included a few fragments which may have been mineralised. These fragments had been leached and had a 'porcelain-like' appearance. In general, the assemblage was moderately fragmented, although bones from Context 328 showed extensive fresh breakage (20-50% of all bones within the deposit), as opposed to damage caused in antiquity.

Contexts associated with Structure A

Context 329 - fill of pit 330

The material from this pit was mainly well-preserved, although rather battered in appearance. Colour was recorded as mostly dark brown. Fresh breakage was noted on 10-20% of the assemblage, whilst evidence for dog gnawing was negligible.

Context 355 - fill of pit or post-hole 356

There was no hand-collected material. Ten rather battered unidentified fragments were recovered from the sediment sample.

Context 359 - fill of pit 360 (pit cuts grubenhaus)

Only 9 fragments, freshly broken and probably representing a single large mammal rib, were recovered by hand-collection. Seven rather battered shaft fragments (large- and medium-sized mammal) were noted from the sediment sample.

Material associated with structure B

Context 301 - final fill of grubenhaus 302
Preservation of this assemblage was recorded as 'good', with most fragments having sharp edges, although the overall appearance of the bones was somewhat battered. Mostly dark brown or brown in colour, the fragments showed some fresh breakage and 10-20% of all fragments were <5mm in any dimension. A large proportion (74% or 114 fragments) of the assemblage was not identified to species, which is probably a consequence of the fragmented nature of the material. It was apparent that the bones had been broken in antiquity as well as during excavation.

Contexts 323, 326, 327, 353 and 354 - fills of grubenhaus 302.

On the whole, most of the fragments from these deposits were reasonably well preserved, although they were rather battered in appearance. However, 90 bones from Context 354 (labelled SE quad) were very variable in preservation, and included battered and eroded fragments. Material from Context 353 (labelled NW quad), on the other hand, was better preserved and less fragmented than the rest of the bones from these deposits. Colour was described as dark brown, or brown, although Context 323 contained a few fawn fragments. Material from Context 323 was also rather fragmented and dog gnawing was extensive on some of these bones. Much of the material from this context was unidentified, with many large and medium-sized mammal shaft and rib fragments.

Material from deposits in the 'pit and ditch' group associated with the industrial area.

Pit fills - Contexts 401, 402, 404 and 409
A total of 246 fragments was recovered from these deposits (114 from Context 404). This assemblage was mostly well preserved, although Context 404 yielded a few slightly battered fragments. Additionally, material from this context showed a moderately high degree of fragmentation, modern as well as ancient damage. Bones from other contexts in this group were noted as being less fragmented than the material from the sunken featured buildings. Dog gnawing and butchery were recorded, but only at low frequencies. Colour was recorded as variable for fragments both within and between contexts, ranging from dark brown to brown to gingery-brown to fawn.

Context 408 - spread south of pit 409/410 - may consist of plough drag and not be securely dated

This deposit produced 21 fragments, of which eight were identified to species. Preservation was mainly recorded as good, although as with other contexts, there was a small component of 'battered' fragments. This suggests the presence of a small amount of residual or reworked material.

Ditch/gully fills - Contexts 411, 413, 417, 430 and 436

Overall, the assemblages recovered from the ditch/gully fills were well preserved and were, generally, less fragmented than those recovered from the sunken-featured buildings.