

# Slim Evidence: a Review of the Faunal and Botanical Data from the Neolithic of Northern England

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## Introduction

Any examination of human life in what is now northern England during the Neolithic period needs to consider how people subsisted; in particular: what did they eat and how did they get their supplies? Although it is obvious that people must have eaten in order to stay alive, there are remarkably few excavated sites that have produced any data relevant to people's diets.

This review attempts to summarise what little knowledge we have, to suggest some reasons for our ignorance, and to recommend some potential ways in which we might learn more. It concentrates on animal bones and macrobotanical remains because these are the most common types of relevant data encountered in archaeological sites.

## What do we know?

Nationally, biological data for the Neolithic are very sparse, so the north of England is not atypical. Pollen evidence suggests that the main areas in which woodland clearance was undertaken before 3,500 calendar years BP tended to be on light calcareous soils, and that they included the chalkland of Wessex, the East Anglian Breckland, the Cumbrian coastal plain, the magnesian limestone of County Durham, and parts of Ireland (Bell and Walker 1992). The north of England, therefore, was not 'backward' in terms of Neolithic agriculture, despite the high public profile of some monumental sites in southern England. Pollen samples have also indicated that much woodland still remained, even in the Later Neolithic, although some of this may have regenerated after small clearances in the Earlier Neolithic period.

Excavations at a few unusually large sites in southern England (such as Windmill Hill: Smith 1965, and Durrington Walls: Wainwright and Longworth 1971) have tended to produce most of the Neolithic plant and animal remains known in Britain. The bone assemblages

show that the meat supply was dominated by domestic rather than wild mammals, and that cattle and pigs were more common than sheep. This suite of fauna is compatible with a good cover of woodland, since pigs are particularly good at exploiting woodland (which is their natural habitat in north-west Europe) and cattle can both browse and graze, whereas sheep are grazers and prefer open habitats to woodland. The degree of concentration on domestic rather than wild fauna, even in the Earlier Neolithic (as at Windmill Hill) is, perhaps, quite surprising. The botanical remains show a mixture of utilisation of wild resources, particularly hazelnuts and crab apples, and domestic plants such as emmer wheat and barley. Such a mixture is found on almost all sites that have had material retrieved by sieving (Moffett *et al* 1989). It is unclear how the larger sites related to 'normal' settlement sites, very few of which have been excavated. The sparse remains from these smaller sites indicate that the same suite of species was utilised, but we know very little about patterns of exploitation such as harvesting and processing activities, or husbandry and butchery practices.

Why do we know so little? The problem relates to the fact that, literally, most Neolithic sites in Britain have a low profile. We do not have any large tell sites and, apart from the monumental structures, British Neolithic sites tend to have shallow stratigraphy. Many sites have been ploughed away, leaving some stone tools and, possibly, some decomposing pottery on the soil surface. Biodegradable materials, such as plant and animal remains, do not survive the subsequent exposure to erosion and weathering processes, even if they have previously survived leaching by soil acids in shallow deposits. It is quite probable that some sites survive intact, with good preservation of biological remains, but their survival is dependent upon them remaining deeply buried by overburdens of subsequent sedimentation such as colluvium and alluvium. Some of the colluvium, ironically, has been caused by soil erosion initiated by ploughing disturbance that was begun in the Neolithic period. These very conditions that preserve the material we've been looking for, simultaneously obscure it from our eyes.

Only deep features such as ditches and pits of henges, causewayed camps and stone circles are likely to preserve both visibility and biological remains.

One or two settlement sites outside of Northumbria have produced valuable information, particularly Balbridie (Grampian Region: a large timber structure interpreted as a hall) and Lismore Fields (Buxton, Derbyshire: two timber houses thought to have been destroyed by fire). Balbridie is important not only for the quality and quantity of carbonised cereal remains recovered but also for the fact that one feature was dominated by seeds of bread wheat - a species only recorded elsewhere as occasional grains (Fairweather and Ralston 1993). It seems clear, therefore, that a range of cereals was in use during the Neolithic. At Lismore Fields (Jones, forthcoming), a large number of samples provided good evidence for the presence of glume wheat (mainly emmer) in various stages of processing. No barley or pulses were found, and it is possible that a reliance on such a narrow range of domestic food crops was buffered by the use of wild resources (Moffett *et al* 1989) and domestic livestock (Legge 1989). Both sites produced occasional concentrations of carbonised flax/linseed remains, which may be under-represented at other sites due to preservation conditions (flax would not normally be expected to come into routine contact with fire). Neither site produced any animal bones, probably due to the acidic soil conditions.

## What do we know from the north of England?

Within the north of England (defined here as the area south of the Scottish border down to, and including, parts of North Yorkshire and Lancashire) biological evidence derives from two type of source: 'stray' finds of palaeoecological significance, and excavated material from archaeological sites.

### 'Stray' finds of animal remains

The foreshore at Seaton Carew, near Hartlepool in Cleveland, is well known for the submerged peat beds that are sometimes exposed at low tides. These peat deposits and the adjacent clay layers have yielded skeletal material of cattle, red deer and humans from strata dating from the Mesolithic to the Bronze Age, including the skeleton of a red deer that is probably either Mesolithic or Neolithic in date (Stallibrass unpub.).

On the other side of the region, footprints of various species of animal, including deer, cattle (probably aurochsen), crane and human have been found in estuarine deposits on the foreshore at Formby, Lancashire (Cowell *et al* 1993). Dating of the deposits is still being refined, but the footprints were probably made in the Neolithic or Early Bronze Age between about 3200 and 1510 Cal BC. The site has also yielded occasional finds of animal bones

and contains many stakeholes, presumably relating to structures of some kind. The site clearly has the potential for exciting prehistoric finds similar to those recovered in the Severn and Gwent levels, but has not yet been excavated (Gordon Roberts, pers. comm.).

Bones of a large red deer were found eroding out of organic silts beneath a peat deposit on the foreshore at Bardsea, on the Cumbrian coast of Morecambe Bay (Middleton 1992). Some of the bones appear to have been chewed by dogs, but there are no butchery marks. The stratigraphic sequence has been interpreted as the silting and ponding up of a palaeochannel (debris from trees is also included in the silts) and a provisional date for the deposit overlying the deer bones, based on pollen analysis, is between 4,450 and 3,697 Cal BC, coinciding with a marine incursion.

Inland, a red deer skeleton was recovered from limnic sediments at Seamer Carrs in the Vale of Pickering, Yorkshire (Tooley *et al* 1982). The skeleton itself was dated to 4330 +/- 100bp by radiocarbon assay, although the enclosing sediment dates to much earlier in the Flandrian (7360 +/- 120bp). It appears to have been a whole skeleton of an animal that died in the mud: there is no indication of any interference by people prior to its discovery in 1975 during drainage activities. Several other, undated, skeletons have been recovered from the area from similar deposits during drainage activities in the 19th century, and Neolithic and Mesolithic artefacts continue to be recovered from the area.

In the uplands, horns of cattle have been found eroding out of the peat at various localities in the Upper Teesdale/Wearsdale area of County Durham and Cumbria (see Johnson and Dunham, 1963), but any bones that might have been present have been destroyed by the acidic conditions. Again, these skeletal finds are thought to date to various periods from the Mesolithic to the Bronze Age. Whilst some are thought to derive from wild cattle (aurochsen), others may be from domestic animals.

What do these 'stray' finds of animal remains tell us? None of the skeletal remains appear to relate directly to human activity although it is, of course, possible that animals wounded by hunters fled or crawled away to die out of sight or reach. The fact that the bones very rarely have any signs of damage by scavengers, plus the fact that the enclosing sediments tend to be either peat or fine, silty clays, suggests that the animals met their deaths in boggy situations, out of reach of scavengers or hunters. What they can indicate is the species of animal living in the region during (or probably during) the Neolithic period. The majority of the skeletal remains that have been recovered come from two species of large mammal: red deer and wild cattle. Both of these species like woodland habitats (many of the red deer living in Scotland now have to make do with open moorland, but they would thrive better in woodland). But why have we found no skeletons of wild pigs, which also prefer woodland to open country? They were certainly around in the Mesolithic period (their remains have been found at the site of Star Carr, in the Vale of Pickering, Yorkshire), and they did not die out in Britain until a few centuries ago. Is it simply that we have

so few remains in total that, by chance, no pigs have been found, or were they more canny than aurochs and red deer when it came to getting bogged down in the type of ground conditions that would lead to the survival of their skeletons for posterity? It is probably simply a result of their large size and easy visibility (particularly of their large horns or antlers) that skeletons of wild cattle and red deer have been noticed during drainage work. Skeletons of smaller species of mammals, birds and fish are probably also preserved, but may have been overlooked. This is one reason why the Formby footprints are important: they give us a picture of a land surface that has preserved the prints of anything heavy enough to sink in. But, until we obtain better stratigraphic and spatial control over the Formby finds, it is impossible to know whether the footprints relate to wild species utilising the estuarine conditions prevailing at the time(s) that the prints were made, or whether they were made by animals associated with an archaeological site(s).

The picture that emerges of the 'background environment' is one of benign climate with plenty of woodland and faunal resources in the landscape. There seems no *a priori* reason why a 'Mesolithic' type of subsistence based on foraging, hunting, fishing and strandlooping should not have continued in the Neolithic period, and the finding of an Obanian type harpoon-head off the County Durham coast at Whitburn (Mellars 1970) may be cultural evidence of a continuation of Mesolithic subsistence practices alongside, or integrated with, Neolithic food procurement strategies.

### **'Stratified' finds**

Some of the caves in the region have produced animal bones and Neolithic and/or Bronze Age artefactual material (Waltham 1974) but the manner of their excavation (usually in the Nineteenth century) tended to lack stratigraphic control, and we do not currently know which, if any, of the animal bones date to the Neolithic period. Absolute dating (such as accelerator radiocarbon dating) can only be applied to individual bones, and botanical remains were not recovered. The use of caves by people during the Neolithic period might be a very interesting area of study (for instance: were they occupied seasonally, used as hunting/foraging camps for wild resources, or used only for burial sites?) but the bulk of the relevant biological data may have been irretrievably lost or destroyed.

Few Neolithic archaeological sites in Britain have produced stratified faunal remains, but one of the most productive sites comes from the north of England. Excavations reported by Manby (1974) of sites and features on the Yorkshire Wolds containing Later Neolithic Grooved Ware pottery included some features that contained large quantities of animal bone (amongst other finds). The nature of the excavations, which were small scale investigations of areas that had revealed cultural material during fieldwalking, precludes a full understanding of the roles of the sites. Also, the depth of

plough damage in many cases would have destroyed any shallow features such as floor layers or drip gullies. Only pits and hollows were discovered and investigated, and only some of these contained animal bones. No soil samples were taken for botanical remains, but this is no criticism of the excavators. At the time, in the 1960s, the presence of botanical remains and their potential for providing relevant information had not been fully realised by archaeologists.

The most prolific of these sites in terms of animal bone material were North Carnaby Temple (named after the farm), Carnaby Top site 20 and Low Caythorpe. Bramwell (1974) provides an important but rather brief report on this material and he often conflates the material from the three sites, so that it is difficult to establish precisely what was found where. The descriptions of the excavated layers suggests that the material was 'domestic' rubbish, in that there is no indication of any ceremonial monuments such as rings of concentric pits or postholes, no ditches and no barrow mounds. The pottery and flintwork appear to be domestic refuse, and the animal bones themselves appear to have been well fragmented and disarticulated. There is no mention of any whole or partial skeletons (apart from two dogs), nor of any 'special' deposits such as skulls in the base of features, which might be expected from a causewayed camp. Bramwell's report concentrates on the species identified and their ages at death, together with the sizes of some of the bones (which is relevant to estimating whether the bones derive from wild or domestic animals). The collections are dominated by the bones of domestic pigs and cattle, plus some sheep (or goats) and a few red deer and wild cattle. None of the pig remains could be attributed to wild animals on the grounds of size. The cattle bones tended to be from adolescents or young adults, and the pigs bones were mostly immature, suggesting that the majority of the animals represented in the collection were raised and slaughtered for their meat. The dog remains derive from one small young individual and one large adult.

This is an exciting collection, and quite substantial: Bramwell estimated Minimum Numbers of Individuals to be 36 domestic pigs, 17 domestic cattle and 10 domestic sheep (or goats), together with three red deer and up to seven wild cattle. Why are there no wild pigs? Were they really scarce in the environs of the site(s), or were they considered too dangerous to be worth hunting when domestic pigs were at hand? The suite of faunal species is very similar to those at the large southern sites, which are sometimes considered to be ceremonial rather than domestic. The Rudston Wold material studied by the late Don Bramwell might well repay further study, in particular with regard to patterns of skeletal representation (were the bones the remains of whole carcasses or selected joints?) and seasonal indicators (were the sites occupied all the year round? Were 'ceremonial' sites, in contrast, consumer sites that were utilised on a seasonal basis?). Any chance to fully study a 'mundane' settlement site should be given a high priority, and particular care should be paid to the recovery of animal bones (using sieving to look for small

bones of wild mammals, birds and fish) and plant remains (using bulk samples of sediments).

Excavations in 1992 along the route of a gas pipeline from Caythorpe up onto the Wolds by Philip Abramson for Northern Archaeological Associates (Abramson, in press) did use modern recovery techniques in the investigation of some Neolithic pit alignments within a kilometre of Manby's sites. Again, the material recovered from the pits indicates the presence of a domestic site very close by, although the only features recovered were the pits themselves. The very small animal bone assemblage from these features (less than 300 fragments) supports the impression from Bramwell's study that the exploited fauna was dominated by domestic cattle and pigs (Stallibrass, in press) rather than wild mammals. It is interesting to note that the relative importance of species that thrive in woodlands, whether wild (red deer) or domestic (pig), declines in the Bronze Age collection from the same site, and that red deer and pig remain minority species in both the Romano-British and the Anglian collections. Stallibrass (*op cit*) suggested that this might relate to an unreversed decline in woodland habitats in the vicinity. The plant remains from the pipeline excavation were retrieved from pit fills which contained thousands of fragments of hazelnuts (Huntley, in press). It seems highly likely that this was a stored food resource. In addition, the basal layer of one of these pits consisted of more or less pure wheat grains. From their characteristic shape and embryo they are considered to have been emmer although no confirmatory chaff was recovered. Two probable barley grains were the only other cereals present. In addition, there were significant numbers of apple/pear pips and six whole fruits of crab apple suggesting that local wild fruit was also a collected and stored resource. This is the only site in the region that has produced both plant and animal remains dated to the Neolithic.

Another series of pits was uncovered during road improvement along the A1 at Marton-le-Moor, North Yorkshire (Tavener, in prep. and this volume). These pits, like those at Caythorpe, contained thousands of hazelnut fragments but also some considerable quantities of Grooved Ware, and other types of Neolithic pottery, thus allowing a reasonable dating sequence to be established. A radiocarbon dating programme has been initiated using the hazelnuts and cereal grain to provide a temporal framework against which to view the pottery typology timescale. In addition to the nuts, large numbers of crab apples have been identified and some cereal grains (although not in the concentration found at Caythorpe). With the exception of that site, however, they do form the largest assemblage of grain from this period in the north. The grains are a mixture of emmer and barley - some of the latter is clearly naked but most is poorly preserved. A few emmer glume bases were recorded. Upon morphological grounds it is suggested that these pits, although they may have operated as storage pits at some time, here reflect disposal of domestic rubbish (Huntley, n.d.). Onion couch tubers were present in small numbers but also probably reflect a local wild food resource. No

animal bones were preserved.

Although Miket has excavated various Neolithic sites in Northumberland, including the pit alignment at Ewart I and the habitation site of Thirlings (Miket 1976, 1981), soil conditions in the Milfield Basin have not permitted the preservation and recovery of faunal remains, and a lack of sediment sampling precludes any consideration of botanical remains.

The only other sites in the north of England that have produced animal and/or plant remains are all related to human burials. The Neolithic long barrow at Kilham produced some animal bones but, despite Bramwell's (1976) comment that there were 'quantities of ...sherds, flints and animal bones in the eastern terminals' of the ditches, his animal bone report is very short. The cattle bones were measured (although the measurements are not published) and showed that the cattle varied in size between 'large' ones (similar to others found at Windmill Hill and North Carnaby) and 'small' ones. Whether these measurements indicate sexual dimorphism or the presence of wild plus domestic forms is unknown. Two sizes of cattle (presumed to derive from wild and domestic cattle) are also known from Later Neolithic sites including Driffield (Manby, 1988). Other species identified at Kilham include sheep/goat, red deer (including postcranial material as well as a worked piece of antler), hare and a small (unidentified) mammal. Again, further work on the excavated material might be productive, if the bones can be related to their stratigraphic proveniences. Occasional shells of marine molluscs such as limpet and oyster indicate that people had contacts with the coast, but no fish bones were noted.

Pits beneath other barrows have produced bones of cattle, pigs, sheep/goat and deer, but it is not always possible to determine whether these relate to ceremonies associated with funerary sites, or whether they are associated with the construction period of the monuments. Nor can all of the faunal remains recovered from burial sites be regarded as food debris. Manby (1988) notes that an Earlier Neolithic pit located in the centre of the facade of the Hanging Grimston long barrow contained jaws deriving from a minimum of twenty individual pigs, and that teeth of pigs, beavers and cattle have been associated with other human burial monuments, sometimes in an altered state (*eg* perforated) sometimes intact. In the Later Neolithic period, antler picks and maceheads, and cruder antler hammers have also been associated with ritual or burial sites, indicating the continuing importance of red deer antler as a source of raw material for artefacts.

## Where does this leave us?

### The animal remains

Summarising the animal remains dating to the Neolithic period that are known from the north of England, we are left with a very sparse and bitty picture. In the woodlands were wild cattle (aurochs) and red deer. Other species present must have included wild pigs, birds *etc*, but we

have no hard evidence of them. The material from habitation sites shows that domestic species were heavily favoured over wild species as food sources, even from the Earlier Neolithic period, and that cattle and pigs were preferred to sheep (or goats). Cattle and pigs may have been preferred for logistical reasons, if there were plentiful food supplies for them in woodlands, or there may have been some resistance to the utilisation of a new, foreign species (the sheep) compared to familiar indigenes (cattle and pigs). The suite of domestic fauna is very similar to that known from large ceremonial or monumental sites in the south of England. Very few Neolithic sites have been excavated since the study of biological data became routine, and almost no Neolithic deposits have been sieved. We are, therefore, extremely ignorant of the smaller species (such as birds, fish and small mammals) that may have been exploited. We also know next to nothing regarding the husbandry and slaughter patterns associated with the domestic animals, and are totally ignorant of the seasons of occupation that are represented by the faunal remains.

### **The plant remains**

The plant remains are even more sparse through the lack of excavation using modern recovery/sampling techniques on appropriate sites. Evidence for economic taxa is clearly more likely to have been preserved on settlement sites than ritual sites. Waterlogged evidence is absent and carbonised material presents an almost certainly biased picture of plant usage. Cereals may be burnt during processing, and some fruits and nuts during storage accidents but evidence for the extent to which wild resources were used will remain elusive. However, the cereals demonstrated to be in use - emmer with barley and bread wheat - are remarkably constant throughout Britain, not just in the north of England and this must lead us to address questions of communication and interchange. Local resources were used as evidenced from the hazelnuts and crab apples amongst others but the extent to which people relied upon these foods, as opposed to deliberately cultivated crops, remains unknown.

Both plant and animal remains indicate the importance of woodland resources regarding food procurement. Woodland plants were exploited directly as food sources but, in the case of animals, the woods appear to have been utilised to feed domestic livestock rather than as a direct source of wild fauna.

### **What would we like to know?**

The Neolithic period is tremendously interesting from an environmentalist's point of view. The change over to the use of domestic rather than wild species of plants and animals is one of the major changes in peoples' lifestyles through time, and is unique to the current interglacial period. Why and how did it happen? Ironically, we cannot

even extrapolate from the preceding Mesolithic and subsequent Bronze Age periods since we are woefully ignorant of people's subsistence and diet for these periods, too. Although the term 'Neolithic revolution' has become politically incorrect since studies have shown that social, cultural and political changes between the Earlier and Later Neolithic may have been greater than those between the Later Mesolithic and the Earlier Neolithic, and despite current beliefs in the ethnic continuity of Mesolithic and Neolithic peoples, the fact remains that there was a major shift of emphasis in the mode of subsistence during the Neolithic period in Britain.

Most of the questions that we should like to ask concern the whole country, not just the north of England. Where did the new domesticates come from? In the case of wheat and domestic sheep and goats, the island lacks the wild progenitors, and these must have been introduced in domestic forms. But others, such as cattle, pigs and, possibly, barley could have been domesticated in situ from native stock, or at least supplemented by interbreeding with indigenes. Current work on DNA typologies may help to elucidate this question.

In the case of domestic animals, were these being kept for their meat and other one-off 'dead' products (as an extension of hunted resources), or were they kept for dairy, traction or wool supplies (*ie* renewable 'live' resources, unfortunately termed 'secondary' products by Sherratt, 1981)? Here, age and sex analyses may shed some light, although there are some problems. Firstly, the collection of animal bones needs to be quite large for the techniques to be applicable. Secondly, the site should be a producer site (such as North Carnaby Temple) rather than a special case such as a causewayed camp where only selected age and sex groups (or even joints of meat) may have been brought for consumption. Thirdly, in the case of cattle, it is not always obvious whether the animals were domestic or wild, since domestic bulls and wild females may overlap in size (see, for example, Grigson 1989), and we still do not know whether or not castration led to a third size group of domestic cattle bones in the Neolithic period. In addition, of course, populations of wild and domestic cattle may not have been discrete. Given the possibility, therefore, of recovering bones of male and female wild cattle; male, castrated and female domestic cattle, and hybrids of many generations, the assessment of an individual's sex by the size of a bone can be difficult! However, given a large enough sample, size distributions often are quite clear, and these might be calibrated by sex determinations using DNA tests on modal sized bones. The question of husbandry practice is an important one, since it could mark a change in the roles of animals, not just a shift in the management strategy, or an addition to the list of species exploited.

The refinement of techniques relating to seasonal indicators should permit investigations of seasons of exploitation. There has tended to be an assumption that hunter-gatherers move around whilst farmers are sedentary. But were Neolithic settlements occupied all the year round and, if so, were there particularly important times of year for the exploitation or management of particular

species, and were certain seasons associated with processing activities?

Evidence for cultivation, exclusively of cereals at the moment, is only available for the east of the region. From the general evidence from Britain we could assume that emmer and naked barley were also grown in the west of the region. However, there are, for example, differences in cereal crops during the Roman period between east and west as well as hints of differences in animal husbandry and this could refer back several millennia to primeval clearance and cultivation. Sites need finding, excavating and sampling before any hypotheses relating specifically to different topography, soil types *etc.* can be generated.

In the case of what can the north of England offer in particular, there are two aspects of special relevance. One relates to the landscape and environment generally: what impact did people have on the landscape, and were there regional differences relating to climatic and ecological changes? For instance, some areas may never have become densely wooded due to local conditions of topography and soil types, and this may have led to the persistence of some species, such as the wild horse, that are thought to have died out in the rest of the country (Clutton-Brock 1986). Similarly, the effect of woodland clearance may have led to longterm change in some regions, but have been short-lived elsewhere.

The other relates to people's patterns of subsistence. Overall, the Neolithic period is known as the time in which domestic forms of both plants and animals were established as fundamental parts of the subsistence economy, but did domestic plants and domestic animals become established simultaneously in all parts of the country, or were there differences in the rates of uptake? Some of the modern forms of cereals are more productive in the southern part of England, and there is currently a greater tendency towards pastoralism in the northern and western regions. But, during the Neolithic period, were the early forms of domestic cereals similarly disadvantaged, or were they equally (or more) successful in the north? Here, several lines of evidence need to be integrated, including data relating to pollen, to field systems and ploughing mechanisms, to boundaries and enclosures, to house and structure forms and to biochemical analyses of human bones, as well as the macroscopic remains of the plants and animals themselves. For the Earlier Neolithic, the possibility that a 'Mesolithic' type of subsistence (in, or similar to, the style of the Obanian culture) persisted alongside or integrated with a 'Neolithic' strategy needs to be investigated.

## What other lines of evidence might we use?

Because of the vagaries of preservation of biological materials, we are unlikely ever to be able to use the remains of plants and animals themselves to quantify the relevant roles of vegetables and meat in peoples' past

diets. For this type of analysis, biochemical assays of the bones of the people themselves are far more relevant (see, for instance, Price 1989). Similar types of analysis might indicate the relative roles of marine and terrestrial resources as food for humans, and some of the actual food residues may remain for analysis on associated artefacts (see, for example, Needham and Evans, 1987; Garton, forthcoming).

Scaling up from the micro to the macro level, the new domestic plants and animals had to live (and die) somewhere, and their products were presumably stored, at least in the short term. This has implications both for fieldwork (literally) and the study of structures. In continental Europe house plans dating to the Neolithic have been used to suggest arrangements of living quarters for people and for livestock, mainly presumed to be cattle (see, for instance, Whittle 1985). British houseplans tend to be scarce and rather smaller than those of the Linearbandkeramik, but such considerations are very pertinent to studies of livestock management, and evidence may exist at more sites than retain preserved animal bones. Crops must have been stored somewhere, whether processed or 'raw', and containers or structures must have existed for this purpose. Ferrell's (1992) doctoral work highlights the need to consider the layout of sites and their environs. She uses site forms, such as enclosed yards, causeways *etc.* together with phosphate analysis to suggest areas that might have been used for livestock or for gardens, crop processing or storage.

The changeover from hunting large wild animals such as red deer, roe deer, pigs and aurochs, to restraining large domestic animals such as cattle, pigs and sheep, whilst ensuring that they were adequately fed and watered and protected from predators (including humans) must have entailed major changes in lifestyle for people in the Earlier Neolithic compared to the Mesolithic period. Do field systems indicate some of the ways in which this was done, or were people used to restrict animals' movements during daylight hours, and the animals housed at night? What sort of numbers of animals should we be thinking about? Whilst the bones of the animals themselves are essential for studies of which species were kept, what products they were exploited for, and which progenitors they were bred from, their study needs to be integrated with those of management related aspects such as field systems, byres and yokes *etc.*, as well as environmental considerations such as land clearance, fodder crops and storage systems.

## Where do we go next?

It is clear from the descriptions of what we know, and what we should like to know, that the evidence for Neolithic subsistence in the north of England is slim. In many ways, this picture is no different to that from the rest of Britain. But, with a bit of forethought and planning, we can be proactive and search for relevant data. The use of modern recovery techniques along the line of the A1 trunk

road has considerably increased the known quantity of Neolithic crop remains in the country, and many more sites might enhance this sample. The preservation of animal bones on sites on the Wolds shows that animal remains can be recovered in sufficient quantities for modern types of analysis to be undertaken, and that these bones can derive from domestic sites, not just from ceremonial or burial monuments. We have to live with the difficulties of finding sites that (a) are Neolithic in date, and (b) have biological remains preserved but, once such remains have been located, strenuous efforts should be made for their recovery, assessment, analysis and publication. Precisely because we know so little about this important archaeological period, any new finds are likely to shock us into revising our theories, and that cannot be bad!

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