## Additional Information

This section presents some figures and tables not included in the published report, plus some figures presented at a talk given 19th March 2003 at the Gateway Theatre, Stafford. It presents two new methods, one for summarising age at death from pig mandibles, and another which uses defined size categories for studying the important collection of 259 complete bird bones which could not be identified to species level, but which probably represent table remains. As mentioned in the published report (p179) high status sites tend to have a large range of wild birds in the bone assemblage and Dyer (1989, 61) says, 'Game birds, from swans, herons, pheasants, partridges and plover, down to larks, thrushes and even smaller species, appeared regularly on aristocratic tables'. Including them in the identified bone as, for example, birdvlg, also allowed a more accurate examination of the parts of the birds recovered.

The dramatic decline of pig remains and the rise of cattle over the periods 1-6 are shown in Figure 69. The size of the cattle was not shown in detail in the published report so Figure 70 and 71 are added here, with some additional text. See Table 17 for a useful look at the zone method and its adequacy in demonstrating the fragmentation of the cattle bones. Three charts from the Stafford Castle talk (Figures 80-82) include a summary of the pig mandibles and an additional table and text defining the codes. The section of the published report on the possible identification of wild pig has been expanded here, giving the bone identification number so that the database can be used to see the measurements of these bones. The change in the proportion of deer species over time is seen in Figure 73 and their size is discussed.

The section of birds shows the changing size of domestic fowl (Figure 78), and the wild/domestic ratio and comparisons between species (Tables 18-20). Table 21 presents the method devised for studying the large number of bird bones which were identifiable to size group but not to species level.

Figure 69 shows how the proportions of the main domestic species and deer altered during the period under study.

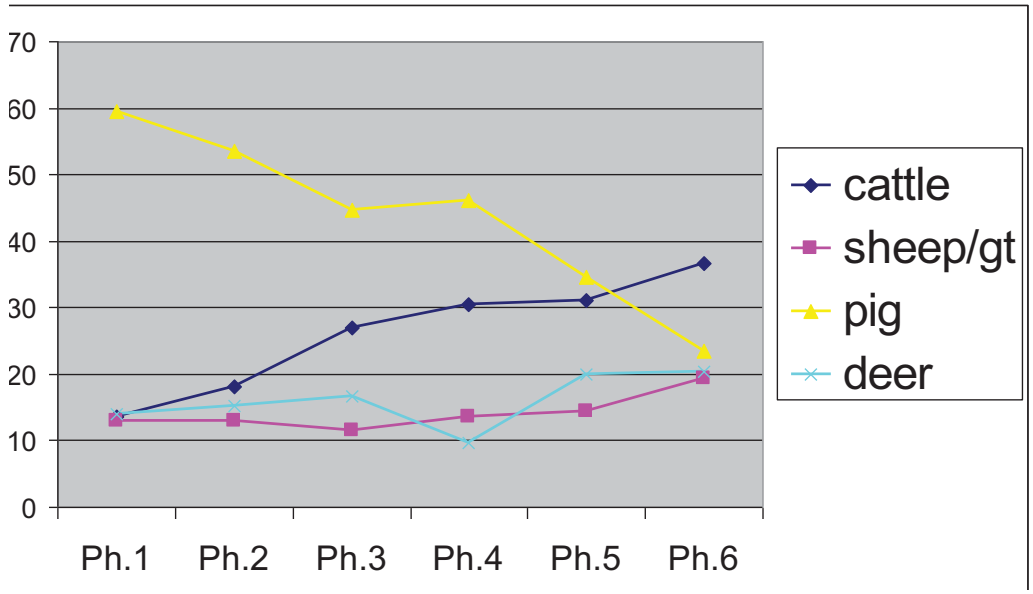



Figure 69. Phase 1 Pre-Castle deposits (up to c.1070) Phase 2 The Norman Castle (c.1070-1348) Phase 3 The 1348 keep and other buildings (1348-c.1425) Phase 4 Later medieval occupation (c.1425-1500) Phase 5 New Building (c.1500-1600) Phase 6 The demise of the castle and Civil War destruction (c.1600-1650)

For much of the time remains of sheep are fewer than remains from deer, whilst pig, which was by far the most frequently found species, starts to reverse its position with cattle in Phase 5.

Matschke (1967) both quoted in Bull & Payne (1982). M1 eruption Sisson & Grossman 4-6 months: Matschke's wild pigs 5-6 months. M2 eruption Sisson & Grossman 8-12 months: Matschke 12-14 months. M3 Sisson & Grossman 18-20 months: Matschke 23-26 months. The other ages have been added using the illustration of wild boar in the same Bull & Payne paper, page 62. It must be understood that even though the ages which have been added cover broad age ranges, the stages will overlap and they are only given as an indication of possible age.

## Cattle

There are far more measurements of bone widths than lengths, and these were combined and compared to a standard based on the cattle from Launceston Castle in Cornwall (Thomas, 2005), the zero value in Figure 70 (The size of the cattle, using bone width measurements). The grouping of widths-only measurements follows work done on sheep (Davis, 2000), which showed that widths of different bones are closely correlated. The Phase 2 (medieval) cattle were similar to the Launceston cattle. The Phase 3 (mainly 14th century) material included a wider range, that is small cattle were still found, but many were larger. The problems of residuality in the Phase 2 and 3 material is discussed elsewhere, and makes interpretation tentative, but evidence of an increase in size in the fourteenth century is of interest in relation to wider economic and population changes. The size increase in the Phase 5, 16th century, cattle is striking, with half the measurements falling above the range of the medieval bones. Stafford shared in the increase in cattle size seen at other sites. At Launceston there is evidence using metapodials that, after the 15th century, cattle of a different type were introduced, but too few complete metapodials were found at Stafford to test this (Albarella, 1997). The comparison of astragalus size, Figure 71 (Cattle astragalus size, by phase), shows the 16th century size increase clearly, with the Phase 5 measurements falling at the lower end of the postmedieval data from Launceston (Albarella, 1997, Fig.2.)

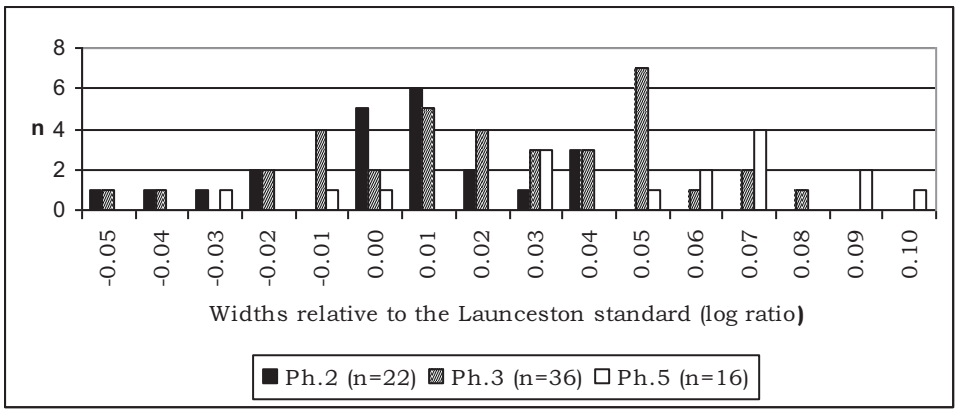



Figure 70 The size of the cattle, using bone width measurements.
Measurements of the distal width of the tibia, astragalus and metapodials, combined and compared with the Launceston standard (Thomas, 2005). Mean log ratio values for Phases 2, 3 and 5 were 0.005, 0.022 and 0.049, or 1%, 5% and 12% larger than the standard.

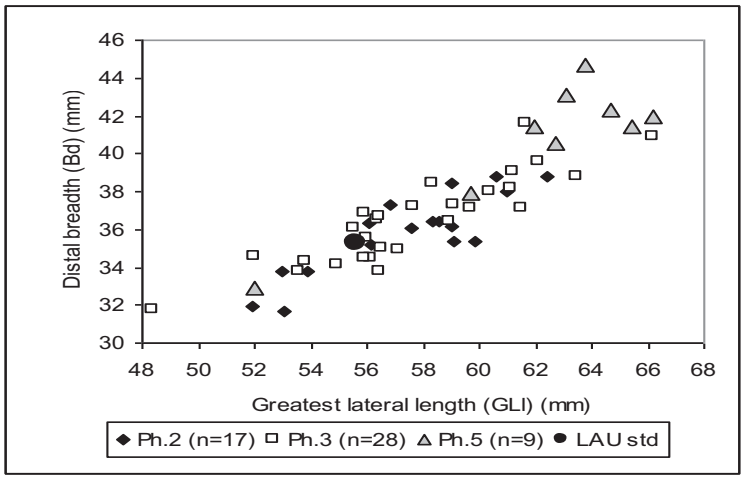



Figure 71 Cattle astragalus size by phase.

Table 17 [Fragmentation of cattle femur bones, from Phase 3] shows how many more bones from the shaft were found than from the ends, with a minimum number of 13 from zone 7 (the distal lateral part of the shaft including the nutrient foramen and vascular groove), and only one from the distal end zones.

Table 17 Fragmentation of cattle femur bones, from Phase 3

| | N | proximal end zones | | | | ---- shaft zones --- | | | | | distal end zones | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Zone | | Z1 | Z4 | Z5 | Z3p | Z2 | Z3 | Z6 | Z7 | Z8 | Z7d | Z8d | Z9 | Zx | Zy |
| MNI | 13 | 0 | 2 | 3 | 2 | 11 | 5 | 9 | 13 | 10 | 0 | 1 | 1 | 1 | 1 |
| >½ | 51 | 0 | 5 | 4 | 3 | 19 | 8 | 14 | 23 | 19 | 0 | 1 | 1 | 1 | 1 |
| all bones | 74 | 3 | 5 | 10 | 5 | 25 | 16 | 30 | 46 | 33 | 0 | 1 | 1 | 1 | 2 |

MNI – minimum number of individuals; >½ - bones with at least one zone more-than-half complete.

Useful and detailed as the Dobney and Reilly (1988) zones are, three of the femur zones (3, 7 and 8) are areas of bone which include both the compact shaft bone and the cancellous bone end, thus making comparison of shafts and ends less than straightforward. Zone 3 includes the proximal lateral shaft up to the epiphysial junction of the trochanter major, and zones 7 and 8 include the lateral and medial lower shaft and distal end down to the epiphysial junction. For bones with these three zones, it was clear that the bone end was present if there was fusion information (i.e., the epiphysial junction was present) and/or if any of the other end-of-bone zones was present. Results, labelled Z3p, Z7d and Z7d in Table 17 [Fragmentation of cattle femur bones, from Phase 3], confirm the evidence from other zones that bone-ends, especially distal ends, are rare (above).

**Pig**

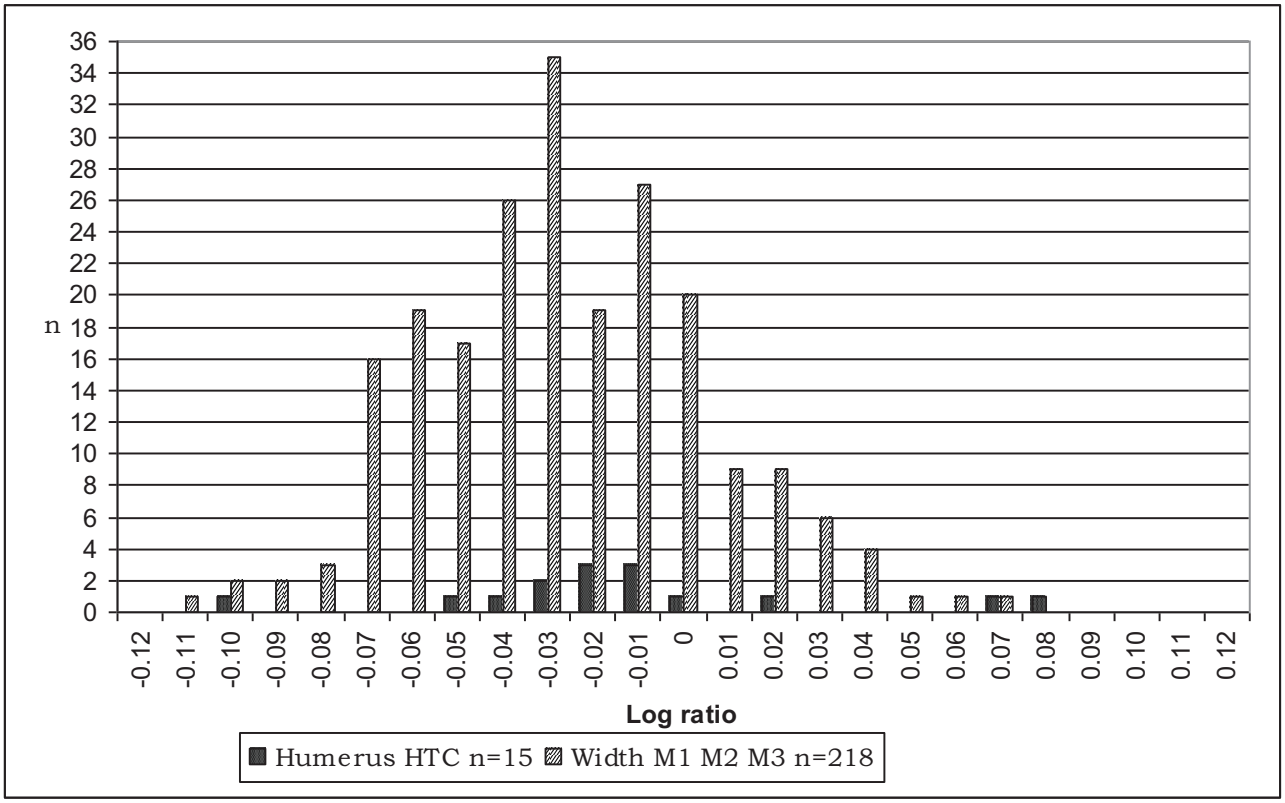



Figure 72. The size of the pigs. Pig standards based on a Neolithic archaeological population from Durrington Walls (Albarella and Payne 2005).

Wild or domestic?

Of the 3,583 pig bones identified, 24 are much larger than the rest of the material. Three, a scapula (bone id 12388), a radius (bone id 13777) and a distal femur (bone id 12305) are immature and still stand out as unusually large. From Phase 1 there is a large male lower canine (bone id 10086), a 4th metacarpal (bone id 10184), a femur (bone id 10209) and a first phalanx (bone id

10285). Only two possibly wild bones are from Phase 2, a second and a fifth metacarpal(bone id 12596 and 10917). A left mandible (bone id 1040), two lower teeth (bone id 3691 a female canine and 6135, two incisors) and one upper tooth (bone id 1729 female canine), a humerus (bone id 1811), third metacarpal (bone id 1811), femur (bone id 469) and two first phalanges (bone id 2043 and 2044) are from Phase 3. Phase 4 produced a humerus (bone id 885), and first phanlanx (bone id 970). From Phase 5 an atlas vertebra (bone id 368), scapula (bone id 143), third metacarpal (bone id 13372) and a femur (bone id 11202)were recovered. A search of other bone reports, records of measurements from modern wild pig, and comparison with comparative collections suggest that these bones and teeth may be identified as wild pig.

**Deer**

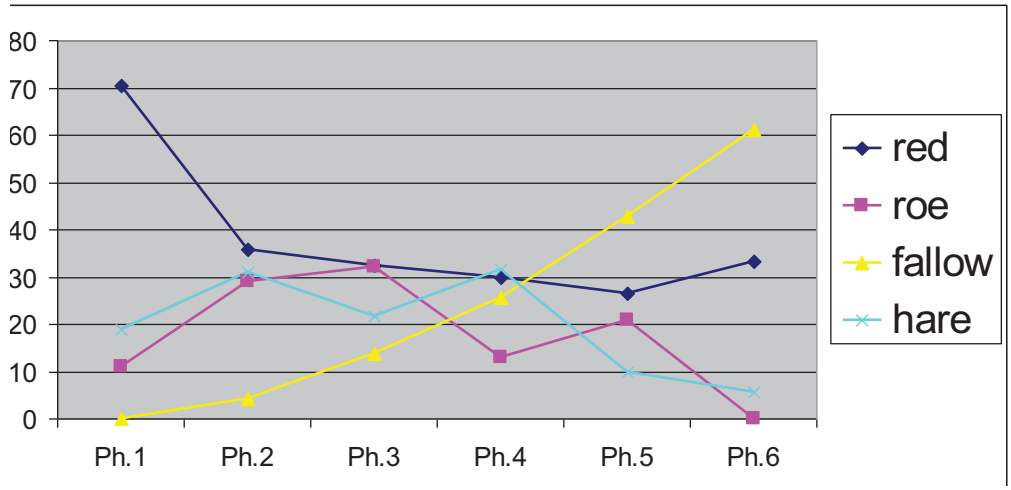
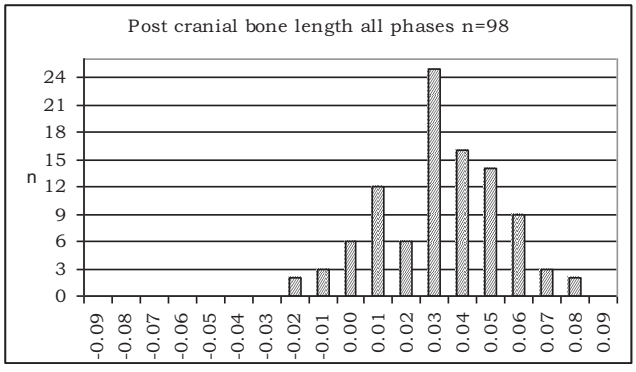



Figure 73. The changing proportions of deer and hare during the period under study.
As expected, the red deer were more common in the early period, but fallow gradually become the dominant species. Finds of both, are of some interest, as they may have been in different areas, fallow enclosed, red more widely spread and needing a different form of hunting. Forest law extended over large tracts of Staffordshire by late 12th century.

During the 14th/15th centuries money was spent on palings and winter feed for the deer. In 1521 there were 400 deer in the parks; and the fence was nearly 3 miles long, but in 1610, the deer were culled.

Size of red deer.

Because of the small sample size of red deer bones, the log ratios of all long bone lengths, which are closely correlated (Davis 1996, 607) have been combined (Fig.74), as have those for width measurements (Fig.75),and compared to the log ratio of a standard used by Thomas (2005) in his study of the animal bones from Dudley Castle. This standard is based on a male aged five years and three months held at the Birmingham Zooarchaeology Laboratory (BZL 109).



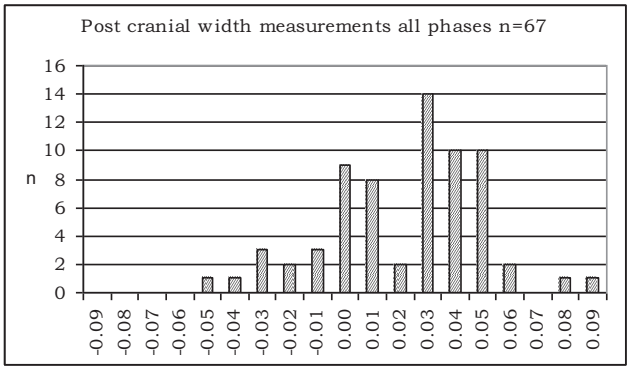




Figure 74 Size of the red deer using bone length. Figure 75 Size of red deer using bone width.

Most of the measurements are larger than the modern deer (log ratio 0), the length more so than the width. There is a slight suggestion of a bimodal distribution in the length measurements, and a rather clearer one in the widths, reflecting the fact that male red deer are larger than female. It appears that the greater number of bones found are from males, which are the first choice in the hunt. Doubtless the hinds were also used for venison, but have not appeared so frequently in these deposits.

Size of fallow deer

The fallow deer measurements are compared with a mature male park deer (PS collection) and show a large percentage below the standard for length, but spread in a bi-modal pattern for the width measurements. This implies both male and female remains, with more females, and that the males are more robustly built than the modern comparative animal. This suggests that the animals were killed as much for their meat contribution as for the status of hunting them.

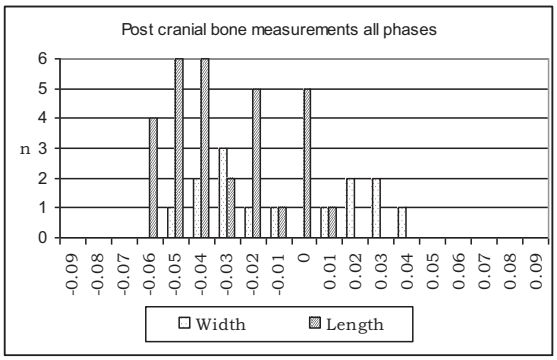



Figure 76 Size of fallow deer using combined L (n=14) and combined W (n=30) measurements.

Size of the roe deer

The roe deer measurements were compared to a modern female roe (PS collection) and all the measurements grouped around the standard with little sign of a bi-modal distribution. Most of the bones were shorter but all were just as robust. This may be an indication that there is little size difference between the sexes.

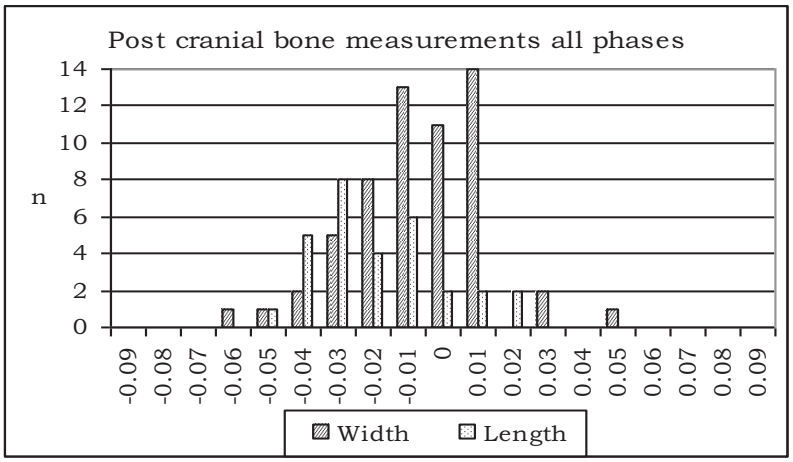



Figure 77 Size of the roe deer using combined L (n=30) and combined W (n=40) measurements.

**Birds. Domestic Fowl**

Size

There is some evidence for an increase in size in Phase 5. Phase 2 and 3 both have some quite small birds, possibly bantam, and then have a bimodal distribution for the remainder that may be male and female. Unfortunately the number of complete adult tarsometatarsi in Phase 4 and 5 make it difficult to see sex differences.

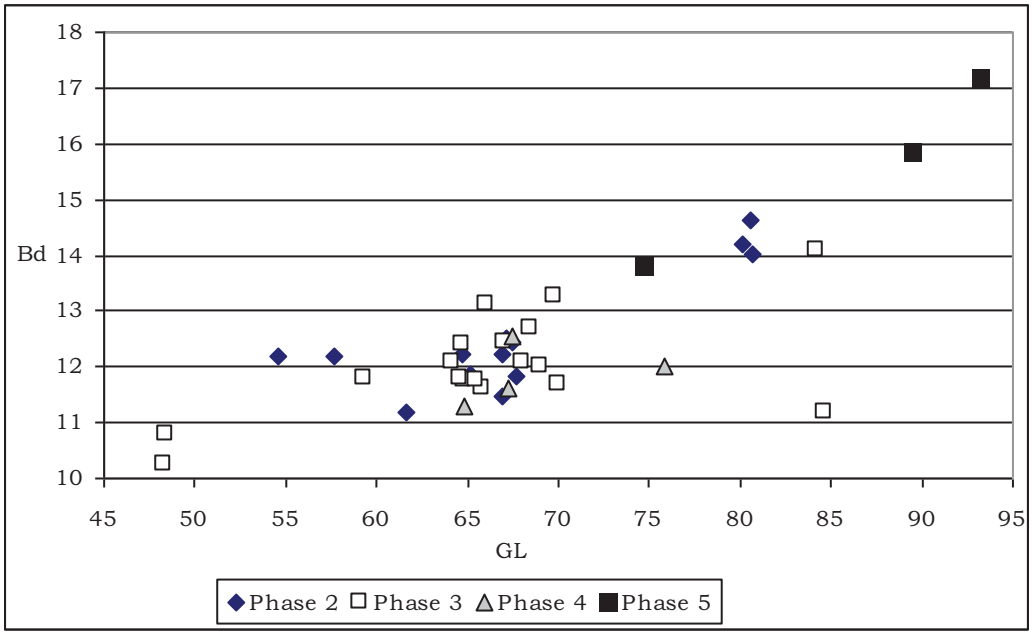



Figure 78. Domestic fowl size using tarsometatarsi measurements in mm.

**Other species**

The figure for wild bird bones as a percentage of the total bird bone identified for each phase declines after phase 1 and 2, as shown below.

Table 18 Wild bird as a percentage of identified bird bone for each phase.

| | Domestic | Wild | Total | % wild |
|---|---|---|---|---|
| Phase 1 c.1070-? | 24 | 54 | 78 | *69* |
| Phase 2 c.1070-c.1347 | 699 | 546 | 1245 | *44* |
| Phase 3 c.1348-c.1425 | 675 | 394 | 1069 | *37* |
| Phase 4 c.1425-c.1500 | 103 | 48 | 151 | *32* |
| Phase 5 c.1500-c.1600 | 209 | 103 | 312 | *33* |

Phase 6 is not included as no sieving was done in the contexts from this phase.

The majority of the bird bones, 1563 (54%), are domestic fowl (see section on Domestic Fowl). Only 5.5% are domestic goose. There is a sharp increase in the relative number of goose bones found after Phase 2. As an adult goose would have weighed more than four times as much as a fowl (Ayres *et al* 2003, 25), the quantity of goose flesh eaten may have nearly equalled that of domestic fowl in Phases 4 and 5.

Table 19 The ratio of fowl bones to goose bones found in each phase.

| | Phase 1 | Phase 2 | Phase 3 | Phase 4 | Phase 5 | Phase 6 |
|---|---|---|---|---|---|---|
| ratio fowl to goose | 24 : 0 | 21:1 | 9 :1 | 3 :1 | 5 :1 | 12 : 1 |
| goose & fowl frgs | 24 | 699 | 675 | 103 | 209 | 13 |

It is interesting to note how the proportion of duck to woodcock changes considerably from Phase 1 to Phase 2 although they are almost equally represented in Phases 3, 4 and 5. This is unlikely to be due to a difference in recovery as the bones will be similar in size and fragility.

Table 20 Comparison of numbers of duck and woodcock remains in each phase.

| | Phase 1 | % | Phase 2 | % | Phase 3 | % | Phase 4 | % | Phase 5 | % |
|---|---|---|---|---|---|---|---|---|---|---|
| Identified bird bone | *78 | | 1245 | | 1069 | | 151 | | 312 | |
| Woodcock | 9 | ***12*** | 217 | ***17*** | 127 | *10* | 9 | *6* | 21 | 7 |
| Duck | 34 | ***44*** | 115 | ***9*** | 95 | *9* | 11 | *7* | 21 | 7 |

Identification of bird remains can be difficult. Birds are the most diverse group of terrestrial vertebrates, and in many large groups of birds anatomical features tend to be rather homogeneous (Morales 1993, 2). A group of 259 bird bones from this excavation are complete but could not be identified to species. These, however, are thought to be part of the animal resources for consumption and as such need to be quantified in some way. By using Dunning (1993) CRC Handbook of Avian Body Masses it has been possible to loosely group them as the examples below show. This is discussed on page 178-9 in the published report, but the important information in Table 21 was not included.

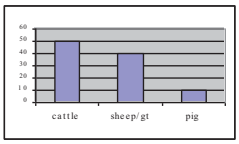
Table 21 Bird size groups, based on body weight

| | | |
|---|---|---|
| very large<br>over 1200g | birdvlg | shag, cormorant, geese, grey heron, swan, golden eagle, crane. |
| large<br>600 – 1200g | birdlg | fowl, mallard/domestic duck, bittern, tufted duck, goshawk, buzzard, pheasant, curlew, coot, razorbill, guillemot, raven. |
| medium<br>300 – 600g | birdmed | woodcock, teal, partridge, moorhen, oystercatcher, black-tailed godwit, bar-tailed godwit, puffin, rock/stock dove, woodpigeon, rook, crow. |
| small<br>50 – 300g | birdsmall | little grebe, water rail, corncrake, golden plover, lapwing, jack snipe, common snipe, black-headed gull, blackbird, song thrush, fieldfare, redwing, mistle thrush, Turdidae, starling, jay, jackdaw. |
| very small<br><50g | birdvsmall | small Passeriformes, skylark, swallow, meadow pipit, pied wagtail, hedge sparrow, garden warbler, blackcap, chiffchaff, wood warbler, goldcrest, robin, great tit, chaffinch, greenfinch, house sparrow. |

**Additional figures from a PowerPoint presentation on Stafford Castle mammal and bird bones. 19th March 2003 at the Gateway Theatre, Stafford.**

## The domestic mammals c.1070 - c.1425

| | |
|---|---|
| cattle | 1371 |
| sheep | 51 |
| goat | 1 |
| sh/gt | 658 |
| pig | 2865 |
| horse | 39 |
| dog | 39 |
| cat | 31 |
| | 5055 |




Typical medieval town

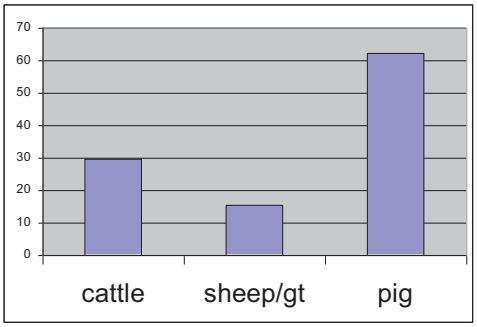
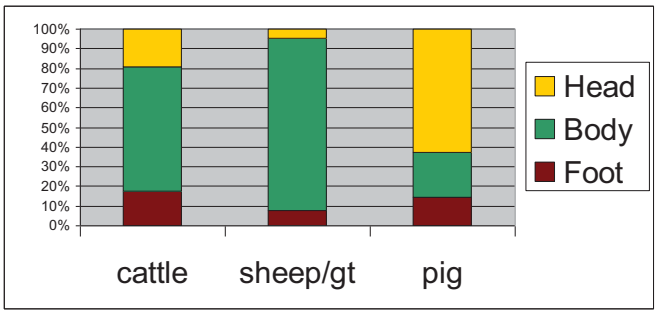



Figure 79. Proportions of main domestic animals from Stafford compared to a typical town site.

This shows a strikingly high proportion of pig and few sheep which is typical of high status sites.

Figure 80. Comparison of body proportions of main domestic animals.

## Proportions from the Head, Body and Feet




*Ist Course [from the Forme of Cury, c.1390]*
*Boar's head enarmed [larded]*
*Bruet of Almayne to pottage [rabbit or kids…]*
*Teals baked and woodcocks*
*Pheasants and curlews*

There are an exceptional number of bones from the head of pig compared to other main domestic animals. This may indicate the popular boar's head was served as a 'subtlety' to admire at feasts, or that brawn, a favourite medieval dish, was made from the head.

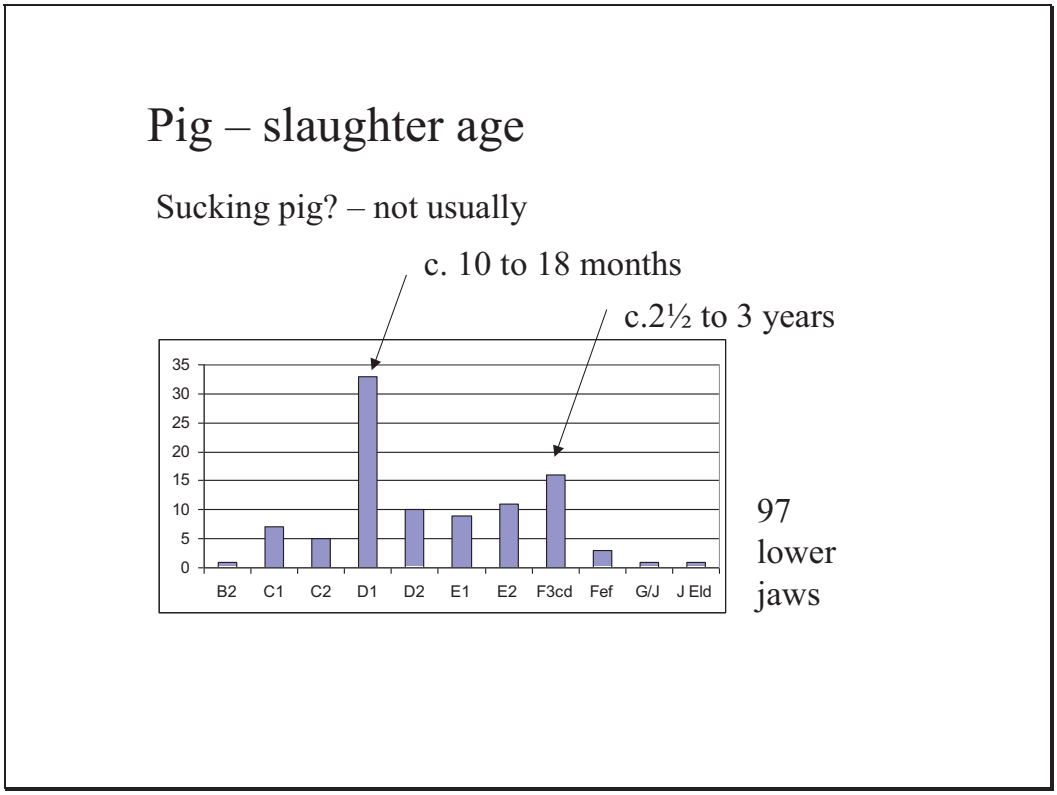


Figure 81. Age at death of the pigs. (see Fig. 82 for explanation of stages used.)

Pig mandible stages showing that they were generally 1 to 3 years old when slaughtered – most are not sucking pig. (Also there were more boars than sows, 30 to 20 on mandibles; 75 to 30 on lower canines, although the larger size may have influenced the survival and retrieval of male jaws and teeth).

| Pig | | 'in wear' means 'in enamel wear or more' | Age estimate |
|---|---|---|---|
| A | A Neo | decid teeth unworn | |
| B1 | B Juv1 | decid in wear (a or more), M1 not yet erupted | 0 - (4-6 months) |
| B2 | B Juv2 | decid in wear (a or more), M1 E, H or U (E/U) | **4 - 6 months** |
| C1 | C Imm1 | M1 in wear (a or more), M2 not yet erupted | |
| C2 | C Imm2 | M1 in wear (a or more), M2 E/U | **8 - 14 months** |
| D1 | D Sub1 | M2 in wear (a or more), M3 nye* | |
| D2 | D Sub2 | M2 in wear (a or more), M3 E/U | **18 - 26 months** |
| E1 | E Ad1 | M3 in wear on 1st element only | 26-31 months |
| E2 | E Ad2 | M3 in wear on 1st and 2nd element only | 31-35 months |
| F3cd | F Ad3cd | M3 in wear 3rd element, c, d, (1st element, dentine not confluent) | |
| Fef | F Ad3ef | M3 in wear, e,f (1st element dentine confluent, 2nd not confluent) | |
| Ggh | G Ad3gh | M3 in wear, g, h (2nd element confluent) | |
| J Eld | J Eld | M3 j and beyond (dentine confluent between first two elements) | |

Table 22. Pig mandible stages.

Table 22 explains the stages used to divide the pig mandibles to better understand the stage of maturity at death and in some cases add an indication of a possible age group. The stages are similar to those used by O'Connor (1991 p250) but with the adult stages extended to five instead of three as the adult stages probably cover a longer period of time than the earlier stages. The possible ages in bold have been added using the information in Sisson & Grossman (1966) and