

Goose husbandry in Medieval England, and the problem of ageing goose bones

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Abstract. In the Middle Ages geese were kept for meat, eggs and feathers. The expected age at death, the sex ratio, and presence of medullary bone when birds are raised for the different products is discussed. Historically, geese were killed at 12-16 weeks as 'green geese' or were killed in the late autumn as 'stubble geese'. A small sample of modern immature birds was considered to see if the immature birds found in archaeological bone assemblages can be equated with 'green geese'. The sample suggests that the skeleton is already almost fully mature at 16 weeks, so methods of recording currently in use do not allow the distinction between birds of 16 weeks and older birds. The goose remains from two Medieval sites in England, the city of Winchester and Eynsham Abbey, Oxfordshire, are discussed. They suggest that few geese were raised within the city or the abbey, and there is indeed historical evidence that geese were raised outside the city of Winchester. One 13th-14th century assemblage from Winchester comprises mainly carpometacarpi, and the preferred explanation is that they are from distal wings collected for the primary feathers to be used as quill pens. To carry the interpretation of goose husbandry further, we need to establish fusion stages of the bones in a larger sample of immature birds.

Key words: Goose, *Anser anser*, husbandry, Middle Ages, England, zooarchaeology, feathers, quills.

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I. INTRODUCTION

Geese in the Middle Ages in Europe were raised for meat, eggs and feathers. While zooarchaeologists who have worked with Medieval goose remains (including myself) have referred rather blandly to the importance of the three main products, they have rarely explored the potential of archaeological evidence to identify the relative importance of each. In sheep, for instance, the proportions of the sexes, and the proportions in each age class, vary according to whether they are kept for wool, meat, or milk. Different regimes have been demonstrated (if not without debate) in archaeological assemblages using sex ratio and age at death of the animals. With geese, the feathers can be plucked in life, just as the wool can be sheared from sheep, so feathers as well as eggs are a secondary product. Can the methods of analysis employed to interpret sheep husbandry be used to examine the products of geese which were important at different times?

There is a particular problem with geese so far as age of slaughter is concerned. In the Middle Ages the geese bought for consumption were described at either 'green geese' or 'stubble geese'. The second group were killed in the autumn, after feeding on the stubble from the harvest, and the first were killed earlier in the year. However, the exact age to which these terms refer has not been well defined. Two age stages only have been identified in goose bone assemblages, immature and mature, and these may or may not refer to green and stubble geese. This mismatch between the historical and archaeological evidence demands an explanation. In a recent paper on changes in Medieval animal husbandry, ALBARELLA (1997), on the basis of an increase in the proportion of immature geese, proposed that geese were increasingly raised for meat rather than feathers from the 15th century onwards, just as were cattle. The change of regime for the latter is well documented historically and is supported by archaeozoological evidence, but records are more silent on the role of geese. I will consider here whether this can be confirmed, by examining the biology and lifestyle of the Greylag Goose in the wild, the changes under domestication, and the specific needs of flocks raised for meat, eggs or feathers.

The research has been hampered by the fact that agricultural and veterinary writers have tended to give the subject of goose husbandry a single paragraph, as an afterthought to a much more detailed discussion of domestic chickens. In addition, very little has been written about the development of the goose skeleton.

A c k n o w l e d g e m e n t s. I am most grateful to Gitte GOTFREDSEN for allowing me to quote the details of the goose skeletons in the Copenhagen Zoological Museum and to Marta MORENO-GARCIA who allowed me to refer to her report on the material from the Flint shaft at Castle Mall, Norwich in advance of publication. I also thank all those colleagues at Kraków and in Southampton who have given me useful ideas, information and comments.

II. GOOSE LIFE CYCLE

The Greylag Goose *Anser anser* (LINNAEUS, 1758) which is the ancestor of the European domestic goose has a rather more southerly distribution than its close relatives among the wild geese, and a greater tendency to be sedentary. Wild Greylag Geese are found in most countries of Europe, but in many areas the population has interbred with feral domestic geese. The Greylag lays the eggs in March or April (JOHNSGARD 1978) to a maximum of about 12, and begins to brood when the last egg is laid. The goslings hatch after 27-29 days. The goslings are precocial, that is able to walk and feed themselves soon after birth. They have a covering of down when they hatch, which is replaced by the juvenile plumage from about three weeks. They come into full feather between about 12-16 weeks: full feather is defined as the time when the primary wing feathers have grown to a length to reach the tail. At this stage, unlike some other birds, they have not yet reached maximum weight, which can be 4 kg. Both sexes reach sexual maturity at two years. The goose starts to lay in the second or third spring and continues to lay throughout its life, though fertility begins to decline from the age of about five years. The natural life span may be as much as 40 years, but this would not be achieved in the wild. They feed on grass, marsh plants and other green food, and cereals.

Geese moult naturally twice a year, with the flight feathers and the down being moulted together. They shed and replace their flight feathers within a short period, about 20-25 days, and during part of that time are unable to fly.

C h a n g e s u n d e r d o m e s t i c a t i o n

The earliest domestication of the goose is not known, but tame or domestic geese were kept in Egypt (BOESSNECK 1988: 88) in the second millennium BC and in prehistoric Greece. The Odyssey, speaks of a flocks of 20 white geese in the household of Penelope, wife of Odysseus. If the feathers were white, this suggests that the geese were at least partly domesticated. Certainly by the Middle Ages, flocks were kept which were fully domestic. It was Darwin who observed that, de-

spite the length of time during which geese have been domesticated, 'scarcely any other animal that has been tamed for so long a period, and bred so largely in captivity, has varied so little' (DARWIN 1890). Geese are easy to tame. One reason is that the gosling becomes imprinted on the first creature it sees, which may be a human. During the time that people have kept geese, the domestic flocks have been augmented by and crossed with wild geese which have spontaneously joined the domestic flock (KEAR 1990: 25) or have been introduced to it.

Geese have been less adaptable to the modifications of the natural behaviour which allow intensive husbandry compared with other domestic animals. Geese pair for life, so adults of both sexes must be kept. A domestic male (a gander) will service a maximum of three or four geese and it is not possible to keep flocks with a ratio of males to females which is lower than 1:3 or 1:4. The time of laying can be advanced by a few weeks, but geese continue to lay only in the spring. In Britain in the Middle Ages this was traditionally the beginning of February (KEAR 1990). A domestic goose will lay up to a maximum of about 40 eggs in a year, but geese are never as prolific as chickens and ducks. The natural tendency of geese to gain weight (including fat) early in life in advance of the season of migration means that they fatten readily for the table. This selection for the table 'has led to an increase in the size and depth of the body, and this, added to compulsory inactivity, has brought with it increasing inability to fly and the exaggerated waddling walk of a creature whose weight has outgrown the intention of its limbs' (RITCHIE 1920). As a consequence of the increase in weight, the weight-bearing bones, the femur, tibiotarsus and tarsometatarsus, tend to be more robust in domestic than wild geese. This has been confirmed by REICHSTEIN & PIEPER (1986) who compared log-log plots of the length and width measurements of the Haithabu Greylag Goose bones with those of recent wild Greylag geese from Central Europe. They found the range and mean of the length measurements to be largely identical with those of the wild Greylag Goose while the breadth measurement differed. Domestic geese retain the instinct to migrate, but are no longer capable of doing so. The natural grey feather colour has changed to white in some breeds. The time and onset of the moult can be changed (VOITKEVICH 1966).

Some aspects of behaviour have not changed. There has been no significant change in the reproductive cycle and age of sexual maturity and geese continue to be most fecund between the third and fifth year. Reproductive rate continues to be low compared with domestic fowls and domestic ducks.

III. PRODUCTS

As well as the main products of meat, eggs, and feathers, geese also take on roles of lesser economic significance. The way geese are raised to provide each of these three has implications for the archaeological evidence.

M e a t

Their natural tendency to lay down deposits of fat has made geese desirable food in the past, especially in the autumn and winter. During the first 12-15 weeks, when there is an abundance of grass and green plants, domestic gosling gain weight rapidly, and can be brought to a marketable weight of 4.5-5.4 kg (CRAWFORD 1984), which is already the weight of an adult wild goose. At this age they are known as 'green geese'. It is the age at which geese come into 'full feather', an important stage because they can be plucked cleanly. Birds reared less intensively may take 24 weeks to reach 4-5 kg (LUTTMANN & LUTTMANN 1978). Traditionally, birds kept into the autumn were fattened on the grain which fell among the stubble following the harvest. At the beginning of the last century, commercial farmers were encouraged to aim for a weight of 20 lb (9 kg) for an adult gander, 18 lb (8.1 kg) for an adult goose, 18 lb (8.1 kg) for a young gander and 16 lb (7.2 kg) for a young goose (TERRY 1915), but weights may not have reached these levels in earlier centuries. Today geese for the table are kept to a maximum age of 10 months. The farming literature is silent on the treatment of the

older birds, but presumably they, like the first year birds, will fatten if kept penned and fed frequently.

The food product with the highest value today is the fatty liver, sold as *pâté de foie gras*. Geese are naturally prone to fatty degeneration of the liver because of the fat stores laid down naturally in autumn and spring. To produce *foie gras*, geese are overfed with carbohydrates, kept in a warm place and allowed very little exercise (HOYO et al. 1992). A breed, the Toulouse, has been developed in France, which will permit itself to be force fed. The enlarged liver may weigh as much as 2 lbs (0.9 kg) (NORSKOG 1974). Goose fat has uses other than for food: it was used for grease and as the basis for ointments.

Age and season of consumption

Medieval records make it clear that eating goose was a seasonal activity. 'Green geese' were eaten in May and June and 'stubble geese' in October and November. This was the pattern for the monks of Westminster in the later Middle Ages (HARVEY 1993) and it continued in the 16th century. According to King's 'Art of Cookery', quoted by HARTING (1978),

"So stubble-geese at Michaelmas are seen
Upon the spit; next May produces green".

To reach the age of 12 weeks by May or June, the gosling must have hatched in early March from a clutch laid in February or even late January. However, the Westminster accounts for the early 16th century show that green geese were treated by the kitchener as being one quarter only of the weight of a fat goose (HARVEY 1993: Table B). These may be pasture raised goslings which were still very small. Alternatively, geese may have been eaten younger than 12 weeks, since the weight indicated seems very low for a 12 week bird, even one extensively raised. If these birds are at least 12 weeks, it suggests that the laying season was advanced, but not necessarily to as early in the year as January.

Other historical accounts however suggest that geese were chiefly available from August onwards. For instance, in the household of Dame Alice de Bryene, a wealthy aristocrat who was able to choose the best food for herself and her household, the peak month for eating goose was August (DYER 2001 unpublished lecture). These are presumably geese hatched in about April. Geese were generally eaten from Michaelmas (29th September) onwards. Geese of course have also been a traditional Christmas season dish.

Goose Fairs used to be held in or near some cities: green geese fairs were held in June and July (KEAR 1990) but the more famous fairs, outside towns such as Nottingham, Oxford and Cambridge, were held in the autumn.

E g g s

Egg production in geese, unlike, for instance, in the chicken, is more or less unchanged from the Middle Ages. As we have seen, domestic geese lay from the age of two years and laying takes place from February onwards. They lay one egg per day, or one on alternate days, in clutches of up to 15 eggs at a time, with a pause between clutches (LUTTMANN & LUTTMANN 1978). There are usually more eggs in the second year of laying than in the first with a peak of fertility in the fifth year of age, so for egg production, female geese should be kept to about five years of age. Eggs would therefore have been available for sale or consumption from February onwards, for 2-3 months. They can then be stored for several weeks.

Geese, like other birds, form medullary bone when in lay. It has been found for instance in the bones of the wild geese in Greenland (GOTFREDSEN 2002). A bone with medullary tissue will therefore be from a bird killed between about February and June.

F e a t h e r s

Birds have three types of feathers: the flight feathers, the down feathers, and the hairlike filoplumes (VOITKEVICH 1966). They are formed from keratin. The flight feathers are the feathers of the wing and tail, and are also known as the contour or helm feathers. The down feathers have the qualities of elasticity, lightness, freedom from matting, and softness. Of all birds, the down feathers of geese 'are the fluffiest and have the smallest relative density'. The quills and down feathers have many uses for humans while the filoplumes have none.

The moult is under hormonal control: it is affected by day length, nutrition and other physiological factors. Plucking feathers from the live bird is best carried out prior to the moult at the time when the feathers are fully developed, since if it is carried out while the feather is developing, the feather base or anlage is damaged (VOITKEVICH 1966). According to the *ENCYCLOPEDIA BRITANNICA*'s account of geese, in 18th and 19th century England the down was sometimes plucked up to five times a year. When a grey goose is plucked, the natural grey feathers may be replaced with white.

Both flight and down feathers have a long history of use. The best known use of the flight feathers is in quill pens, which have been in use at least since the 6th century AD. The quills of geese and swans are among the sturdiest for use as pens, though flight feathers of many other species can be used. The primaries (Fig. 1) are used, and of these the second and third are best, with the ideal fit for right-handed writers come from the left wing, and for left-handers, from the right wing (REES 1819). The feathers of older birds are of better quality than those of juveniles, and plucked feathers are better than those from slaughtered birds. Flight feathers were also used in the Middle Ages as weaving bobbins (EVANS & TOMLINSON 1992), brushes for applying paint, for fletching arrows, to arm shuttlecocks, and as a pick for a musical instrument, the oud (CRAWFORD 1984). The hollow shaft of the feather was used as vial for storage of gold dust.

The distal wing with the feathers attached has been used as a brush everywhere in the circum polar regions, from northern Canada to Greenland, Scotland and Ireland.

One goose can yield 150 gm of down feathers. The uses of down have hardly changed: it was and is used for insulation: in the lining of garments, mattresses, pillows, quilts, and today in sleeping bags. The best quality pillows and duvets even today are made with goose feathers.

According to CRAWFORD (1984), today live geese continue to be plucked only in Hungary. Elsewhere the feathers are harvested only from dead geese. In the Middle Ages however the plucking of live geese was much more widespread. Those who dealt in feathers or 'plumes' were known as 'plumers'. This was one of the 21 trades listed as being carried out in Winchester in 1437 (VICTORIA

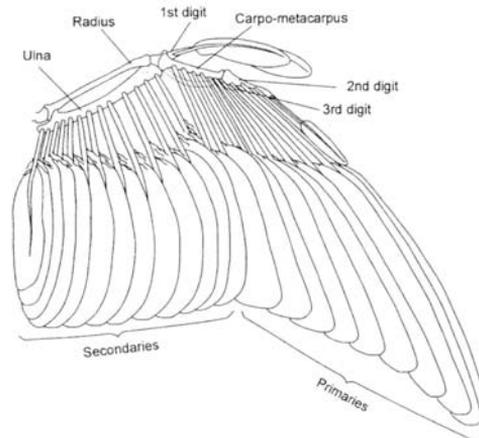


Fig. 1. Wing of bird showing flight feathers. The primaries, attached to the carpometacarpus and wing digits, are used as quill pens. Drawing by P. COPELAND.

COUNTY HISTORY 1912: 41). Feathers are of course still commercially valuable, but they reached their highest value in the 18th and 19th centuries.

Both flight and down feathers were therefore important products, particularly since the quality of both types from geese is higher than from chickens or any other domestic bird. It seems likely that in Europe in the Middle Ages the main supply of feathers would be from the live birds, while those from slaughtered geese would be a secondary source.

M i n o r u s e s

In addition to their uses for food and products, geese are useful property guardians in a farmyard or village because, even more reliably than dogs, they make a noise day or night when strangers approach.

Since young shoots of grass and other vegetation are their favoured food of geese, geese can be useful for weeding crops, though the smaller Chinese Goose *Anser cygnoides* (LINNAEUS, 1758) is better than the domestic Greylag for this purpose. They are brought in once a crop has reached the stage where it is too old to be palatable to keep down the young weeds (LUTTMANN & LUTTMANN 1978).

Geese have also been bred and trained for fighting. Fighting geese were bred in Russia until the sport was banned in 1906. The breed developed was the tula, which survives today as the basis of the flocks now kept for meat and eggs.

A r c h a e o l o g i c a l c o r r e l a t e s

This survey of the behaviour of geese and the products which they can provide has a number of implications for what might be expected among the archaeological remains. Their behaviour requires adult males as well as females to be kept, so the distribution of males and females among adult birds would be expected to show a ratio of between 1 : 1 and about 1 : 3. Where birds were raised primarily for meat, we should expect to see three age classes among the remains, one of 12 week old birds (green geese), one of birds between 5-10 months, and one of mature birds from five years of age, with a high proportion of birds in the first two age classes. The Westminster accounts may suggest that some goslings younger than 12 weeks were also eaten. If birds were kept for eggs, the same ratio of males and females would have been kept, but a higher proportion of the flock would be kept to maturity, since the only surplus birds in the first year were not many more than half of the young ganders. Because geese lay relatively few eggs in a year, it would not have been economic to keep geese mainly for eggs. (The number of eggs laid does however leave a few superfluous to the number needed to maintain the size of the flock). Unlike domestic chickens, which can be slaughtered while in lay because they have a long laying period and which are less seasonal in their behaviour, there would be every incentive to avoid slaughtering a goose during the season of lay and consequently we should expect to see few cases of medullary bone. If geese were raised primarily for feathers, we should again expect a high proportion of adult birds, since the best quality quills come from adult birds, and were plucked from live birds. Harvesting the feathers after death need leave no trace on the skeleton, unless it is evident in the removal of the distal wing complete with flight feathers. It might be possible to recognise archaeological remains of birds bred for fighting if they were especially large or strong. Geese kept to a very advanced age would probably come only from flocks kept as watch geese, where their value as food was secondary.

There is a greater conflict between the different uses for geese than with many other domestic animals, because a higher percentage of males must be kept compared with, for instance, sheep or chickens. If a high proportion of the males in the flock are slaughtered in the first year, it is not only the potential egg production which is lost but also the potential crops of feathers.

A g e a n d s e x o f t h e g o o s e s k e l e t o n

In the absence of literature on the sequence and age of maturation of the goose skeleton, I have had to rely on the evidence of just four modern reference skeletons of birds of relevant age (Table I).

Table I

Maturation of bones in a sample of four modern goose skeletons

Specimen number Age at death Sex		A 84 4 weeks Male	250 Immature, age unknown Unknown	968 16 weeks Unknown	A 79 c.16 weeks Male
Skeletal element					
Tibiotarsus	TIB	Fused prox porous, distal fusion line visible	Fused prox Fused dist	Fused prox Fused dist	Fused prox Fused dist
Tarsometatarsus	TMT	Unfused prox porous	Fused, prox fusion line visible	–	Fused prox fusion line visible, slightly porous
Prox phalanx	PP	Unfused prox porous	Fused, fusion line visible	–	Fused prox , slightly porous
Synsacrum	SYN	Not united, ilium unfused to pubis	Not united, ilium unfused to pubis	Partly united, ilium fused to pubis	Partly united, ilium fused to pubis
Sternum	ST	Porous	Porous	Mature, keel porous	Mature, keel porous
Femur	FEM	Porous	Porous	Mature	Mature
Scapula	SC	Porous	Porous	Mature	Mature
Humerus	HUM	Porous	Porous	Mature	Mature
Radius	RAD	Porous	Porous	Mature	–
Ulna	ULN	Porous	Porous	Mature	–
Coracoid	COR	Porous	Porous	Mature	Mature
Carpometacarpus	CMC	Porous, mc II and mc III not united	Porous, mc II and mc III not united	–	–

A84 Wild Greylag Goose, M, 4 weeks. Zoological Museum, Copenhagen.

250 Greylag Goose, immature, unknown age. Department of Archaeology, University of Southampton.

968. Domestic goose, purchased from a poultry wholesaler in Suffolk. Described as 16 weeks. Lacks skull and distal extremities. Department of Archaeology, University of Southampton.

A79. Wild Greylag Goose, M, 16 weeks. Zoological Museum, Copenhagen.

In the 4 week bird all bones are porous and the elements which unite in the adult skeleton are still separate with the exception of the tibiotarsus. Specimen 250 appears to be a little older. Most elements are still porous and some elements are unfused, but the proximal tarsometatarsus has fused, though the fusion line is visible. By 16 weeks most of the skeleton appears mature. The only evidence for immaturity is the still-visible fusion line on the tarsometatarsus (specimen A79), the incomplete fusion of the pelvis with the sacrum (both specimens), and the porous keel to the sternum (both specimens).

These skeletons suggest that maturation is completed quite rapidly, with the leg bones maturing more rapidly than those of the wing and the body. It appears that most of the skeleton is mature by the age of 16 weeks. In the wild, grey geese are about to make their first autumn migration at this age

so need the bodily strength to carry it out. The comparative material available does not include any birds of 12 weeks, the earliest age at which green geese were consumed in recent historical times. At this age the skeleton is presumably approaching that of the 16 week bird in maturity, but there may be significant differences which I have not been able to check. It seems likely that most of the immature bones seen in archaeological assemblages belong to birds which were younger than the 12 weeks which is the earliest age recommended for slaughter, and are therefore goslings which died accidentally of disease or accident. Some however may be young green geese. Ageing will only be refined further when more skeletons are available of birds killed between 10 and 15 weeks.

Establishing the sex of individual birds is possible only in females in lay with medullary bone and I have failed to find any references in the literature to the length of time during which geese have medullary bone. Ganders tend to have both longer and broader bones than geese (BACHER 1967) so metrical analysis has the potential to establish a sex ratio in the population. Up to now, however, measurement studies have been dominated by the need to distinguish domestic from wild geese (eg REICHSTEIN & PIEPER 1986). There may also be size changes related to age: it would also be worth investigating whether the main leg bones grow broader with age, which would allow first year to be distinguished from older birds. Unfortunately the results of any study of size distributions is liable to be ambiguous, in view of the possibility that the sample includes wild as well as domestic geese, birds of more than one breed or type.

IV. ARCHAEOLOGICAL EVIDENCE FROM WINCHESTER AND EYNSHAM

I shall consider the goose bones from two assemblages from the south of England, one from the Medieval suburbs of the city of Winchester and the second from Eynsham Abbey, a religious house a few kilometres distant from Oxford. The city of Winchester was founded in the 9th century AD and was the capital city of England for two centuries. It continued to be an important city throughout the Middle Ages, with its wealth based mainly on the wool trade. The animal remains, including bird remains, from a number of suburban sites around the city have been studied over a period of nearly 20 years by three authors (BOURDILLON in press; COY in press; SMITH & SERJEANTSON in press). Altogether 56 different context-groups or phases were analysed from all periods from the 9th to the 17th centuries. Eynsham Abbey was a religious house also founded in the Late Saxon period, which continued as a monastery until it was dissolved in the early 16th century. The earlier Saxon assemblage was analysed by MULVILLE (in press) and the Medieval assemblage by Ayres et al. (in press). The occupation phases are divided into six periods from the 11th to the early 16th century. At both sites domestic fowls outnumber geese, but the relative numbers fluctuate according to context at both Winchester (Fig. 2) and Eynsham Abbey where they vary according to whether the bones were recovered from contexts within or without the abbey precincts (Fig. 3). This clearly does not reflect any differences in the environment, as MACDONALD & BLENCH (2000) suggest as a reason for variation in the relative numbers of the two species between sites.

The criteria for recognizing the geese as domestic at both sites are broadly those used by HUTTON-MACDONALD et al (1993): there is a large population of geese in the faunal material and geese are referred to in the Winchester records as elsewhere in household and market records. Among the geese from each site, a few bones were identified which belong to the smaller wild geese, *Anser albifrons* (SCOPOLI, 1769) and/ or *Anser brachyrhynchus* BAILLON, 1834, but most fall within the size range of the wild and domestic Greylag Goose. The only element from Winchester which did not fit the measurements of wild and domestic Greylag Geese quoted by BACHER (1967) is the car-pometacarpus; the mean length is smaller than that in the comparative sample (Fig. 4). This reduction in wing length was also observed at Haithabu (REICHSTEIN & PIEPER 1986).

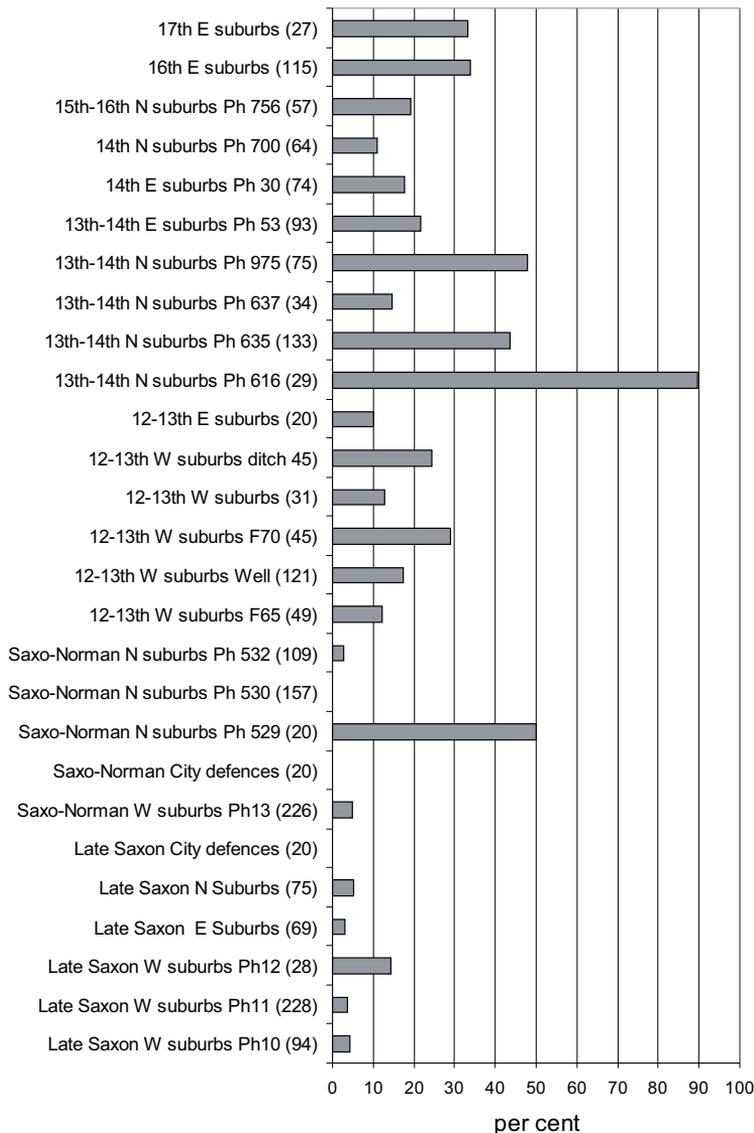


Fig. 2. Winchester: per cent goose of goose and chicken in each context-group (Ph). Groups with fewer than 20 bird bones omitted. Sample size is shown in brackets. F – feature.

Age and sex in the archaeological samples

The age estimates at both sites were based on the main wing and leg bones; age evidence was not recorded for the synsacrum and sternum. No immature bones were recorded among the finds from Late Saxon Winchester, but MULVILLE (in press) reports that a few were present at Late Saxon Eynsham. Immature bones are absent or few in the substantial groups from the 12th-14th century at Winchester but the number rises to 9 per cent in the 15th-16th century group and to more than 30 per cent in the 16th century group (Fig. 5). Two of the bones included with the immature data are tarsometatarsi with the proximal fusion line visible. The trend among the Eynsham bones is broadly similar,

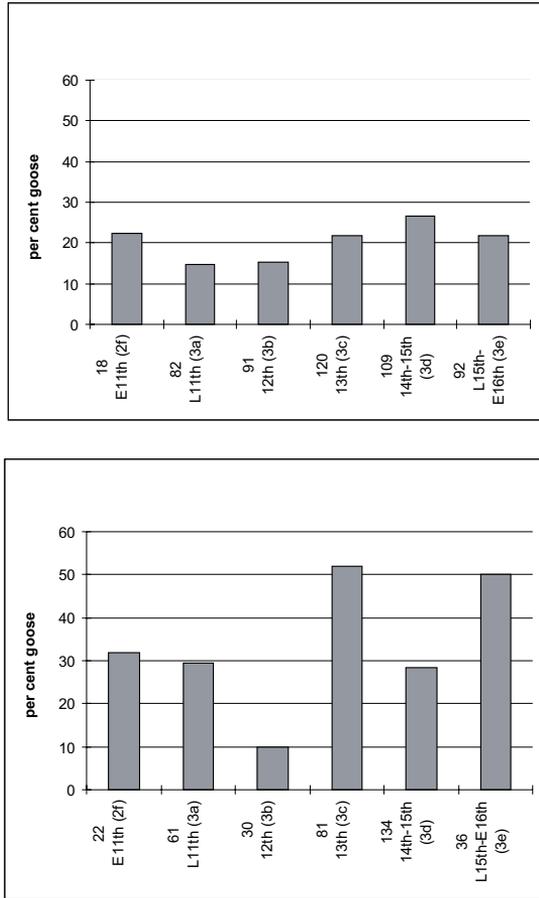


Fig. 3. Eynsham Abbey: per cent goose of goose and chicken from internal (top) and external contexts (below). In all phases but one the percentage is lower in contexts within the abbey precinct, which consist mainly of table waste. Phase (in brackets) and sample size are also shown. E – early, L – late.

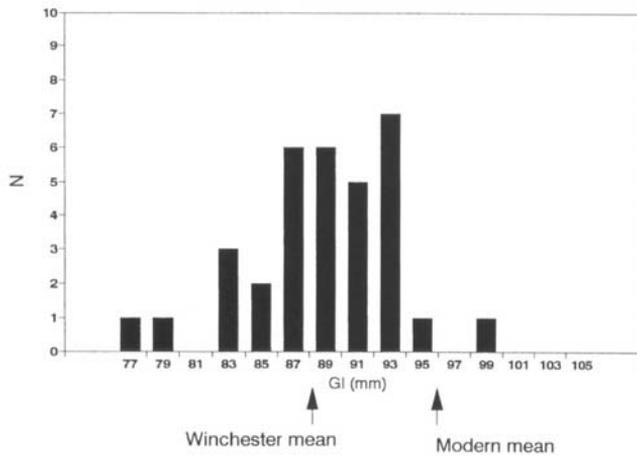


Fig. 4. Total length (Gl) of goose carpometacarpi from the Winchester medieval suburbs. The mean is compared with the mean length of modern domestic geese, taken from BACHER (1967).

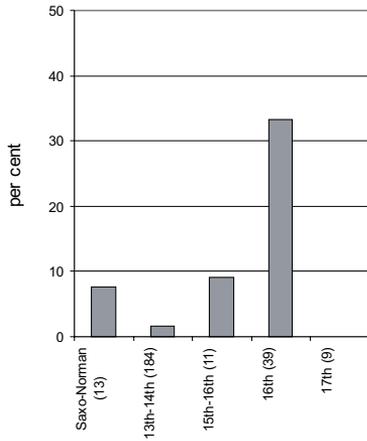


Fig. 5. Winchester: per cent of immature goose bones. Sample size in brackets.

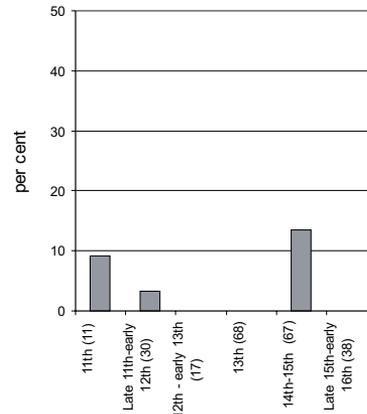


Fig. 6. Eynsham Abbey: per cent of immature goose bones. Sample size in brackets.

with one immature goose bone in the small sample from the Late Saxon (11th century) phase, and the greatest number from the late Medieval (14th-15th century phase) (Fig. 6). One tarsometatarsus has the fusion line visible.

Thus at both sites, one or two bones only can be assigned to the 12-16 week age class. Other immature bones approach adult size but are still porous; these too may be green geese, while some are certainly tiny and must be gosling casualties. Certainly it seems that the potential number of green geese is below what the historical records would suggest, and the most likely explanation is that we have failed to recognise geese in this age group. Under natural processes of bone destruction a higher proportion of immature than mature bones would be destroyed, but this alone cannot account for the discrepancy between historical records of green geese and archaeological evidence for immature birds.

No medullary bone was observed in any period, as predicted. This is quite unlike what we find among Medieval chickens. For example, in the 12th century assemblage from Carisbrooke Castle (SERJEANTSON 2001) half of all femurs have medullary bone; at Eynsham the percentage is 25% in the 12th, 66% in the 13th and 50% in the 14th century. (The calculation was not made for the Winchester groups). No attempt was made at metrical analysis which might have separated the sexes.

B u t c h e r y

The majority of the goose bones from both sites were disarticulated and found with other food remains and have cuts and chop marks, as in the Dublin material discussed by HUTTON-MACDONALD et al. (1993). One context-group from Winchester is an exception. Among the bones from 13th-14th century contexts from Victoria Road in the northern suburbs the carpometacarpi and wing digits are more numerous than other elements. This can be seen in Fig. 7 where the anatomical distribution is compared with two other typical groups, one from the 13th-14th century and second from the 16th century, both in the eastern suburbs (Chester Road, phase 53 and St John's Street, phase 49). In the latter the distribution of bones is more even, and the tibiotarsus and tarsometatarsus are more common than the carpometacarpus. Of the total of 278 goose bones from Winchester, 55 (20 per cent) are carpometacarpi, more than any other element, compared with Eynsham where the percentage of carpometacarpi is 7.5 per cent of the total of 266 goose bones, more typical if all skeletal ele-

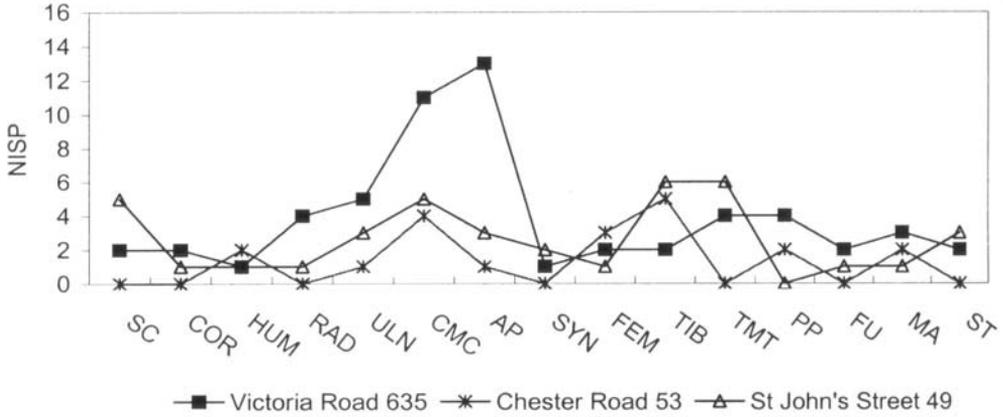


Fig. 7. Parts of the body compared from three context-groups from Winchester, 13th-14th century Victoria Road (phase 635), 13th-14th century Chester Road (phase 53), and 16th century St John's Street (SJS49). Carpometacarpi and anterior phalanx of the wing are more numerous than other elements in the first group, while distribution of skeletal elements is more even in the other two groups. NISP number of identified specimens. Key see Table I. AP anterior wing phalanx, MA mandible, FU furcula.

ments are present in approximately equal proportions. Numbers of right and left hand side are approximately equal (11 R, 9 L) at Eynsham, while there are more right hand (34) than left hand (21) bones in the Winchester assemblage. A high proportion of the carpometacarpi from Victoria Road have cut marks, either on the pollical facet or on the nose where the extensor ligament attaches (Fig. 8). Some cuts were also seen on the carpal trochleas where the external ligament from the distal ulna attaches. These are careful cut marks; and the use of the knife may indicate that they are associated with removal of the distal wing for a purpose, rather than crude butchery.

D i s c u s s i o n o f a r c h a e o l o g i c a l e v i d e n c e

If the immature bones in the archaeological assemblages are from green geese the evidence would suggest that consumption of these was restricted to the Late Saxon period and then to the later



Fig. 8. Carpometacarpi from 13th-14th century Winchester showing typical location and angle of cut marks.

Middle Ages, since there is little evidence for immature birds in the 12th-14th centuries. This conflicts with many accounts and records which refer to green geese earlier than the 15th century. What seems more likely is that many of the geese sold and consumed as green geese are not in fact recognisable in the archaeological material, since, as we have seen, the skeleton is already mature at sixteen weeks. The absence of medullary bone also suggests that care was taken to avoid slaughter at the time the eggs were being laid.

At least two other sites in England have assemblages in which the carpometacarpi greatly predominate among the goose bones: 33-35 Eastgate, Beverley (EVANS & TOMLINSON 1993), and the Flint shaft at Castle Mall, Norwich (MORENO-GARCIA 1995). I have raised the possibility that the group at Winchester may be a butchery deposits. However, since head and foot bones are lacking, it is more likely that it is waste from the collection of distal wings, complete with primary feathers. The Beverley group are from a site with associations with weaving and two possible interpretations were suggested for these: the quill feathers were collected to use as weaving bobbins or the complete wing was used as a fan to keep the woven fabric moist. (Both uses have some documentary support). I proposed that the bones from Winchester were from wings collected to use for quill pens and this is also the interpretation made by MORENO-GARCIA (1995). In Norwich it was strongly supported by the fact that there were more lefts than rights (270 vs 122), and, as we have seen, feathers from the left hand wing are preferred for right handed scribes. There is also some support for this interpretation in Winchester, where a pen was found (Crummy, in press) at the Victoria Road site, close to the pit containing the goose wing bones, although it is from a context rather later than phase 635.

V. GOOSE HUSBANDRY

While nearly all the bone remains from Eynsham, and most from Winchester, are from animals slaughtered for food remains, some evidence for casualties is to be expected at sites where animals were raised. The paucity of evidence for goslings before the 16th century in Winchester suggests that few geese were raised in the city and suburbs, at least until the late Middle Ages. The absence of bones of geese dead while in lay, whether natural deaths or slaughtered birds, also tends to confirm that birds were not generally raised in the city. This conclusion raises the question of how goose flocks were managed in the Middle Ages to provide meat and other products for the cities and other central places. There is some historical evidence which suggests how this was done, some of which is directly relevant for Winchester.

From the 8th century onwards, wealthy farmers kept goose flocks of some size. In Charlemagne's edict 'De Villis' 100 chickens and 30 geese are regarded as the appropriate number for a large royal farm, and 50 fowl and 12 geese on smaller ones (HAGEN 1995). Later in the Middle Ages it is clear that flocks might be quite large. At the death of Lord Berkeley in 1368 'at least a hundred geese were fattened for the funeral feast' (HAMMOND 1995), which implies that on his estates there was either a single very large flock or a number of smaller flocks under his control. Where several villagers kept their own flocks, they would appoint a goose herder to take the geese out to pasture each day. In the 16th century in Lincoln it was proposed that sixty geese was a suitable allowance for each commoner (THIRSK 1957: 38). (A commoner was a villager who had the right to pasture animals on the village land over which there were communal grazing rights.) By the 18th century 'in some English counties, especially Norfolk and Lincoln, it was no uncommon thing for a man to keep a stock of a thousand geese' (ENCYCLOPEDIA BRITANNICA 1910). From these counties, as elsewhere in England and in Europe, geese were walked into the cities in large flocks up to several thousand, sometimes from considerable distances. Their rate of travel was one mile (1.4 km) per hour or ten miles (14 km) per day, and, like cattle and sheep, the geese grazed as they walked. The breeders generally 'shoed' them first, by walking them over several baths of tar and sand or sawdust, so that thick layer was formed to protect their feet (HOYO et al. 1992).

Though the main area of England in which geese were raised is the eastern counties, they were also raised on the downland of the south. The downs, which were used mainly to raise large flocks of sheep and also for cereal cultivation, had wide expanses of grass and access to water, suitable for rearing geese. Approximately 7 km to the east of Winchester is a ridge of chalk downland with the name 'Ganderdown'. This name goes back to the 10th century, when 'gadran dune' formed one of the boundaries referred to in a charter setting out the boundaries of Tichborne (HAGEN 1995). To the west was Salisbury Plain. Shakespeare wrote in *King Lear* Act ii Sc. 2:

"Goose, if I had you upon Sarum plain,
I'd drive you cackling home to Camelot"

This drew on the common knowledge of the time that geese were raised on Salisbury (Sarum) Plain and were driven to Winchester for sale. Shakespeare must have been familiar with a popular history of King Arthur, in print in the sixteenth century, which describes Winchester as the site of Camelot (HARTING 1864). Geese were fattened on arrival at the city. There is a reference to an individual living in the city in the 13th century with the name of Hugh the Gozmongere ('goose seller') and to the selling of geese in the city, and it is indeed a trade usually carried out by outsiders rather than inhabitant of Winchester (KEENE 1985: 261-2).

VI. CONCLUSIONS

M e t h o d

This preliminary examination of goose ageing has identified some of the advances which are needed before we can go further towards identifying husbandry patterns, but it leaves much work still to be done. This discussion has been based on only two specimens in the key age range of 10-16 weeks, and it will be important that more skeletons are examined of both wild and domestic birds of known age. We have seen that geese were normally killed at three stages of life: at 12-16 weeks (green geese) or at 6-10 months if kept for meat, or at 5 years or so if they were only eaten after they had been kept until they had provided several opportunities for plucking the mature feathers, and/or three or more clutches of eggs. Since the limited evidence available at present suggests that the main limb bones are already mature at 16 weeks, each of the three age stages at which geese are culled may be included in the age class 'adult' as normally identified by zooarchaeologists. If we are ever to succeed in distinguishing green geese from older birds, the bones which need to be carefully examined are the tarsometatarsus, the synsacrum and the sternum, which still appear immature in geese of sixteen weeks and below. It is also possible that other bones may prove useful when more skeletons of 10-16 weeks have been included in a comparative study. The oldest porous and immature wing and leg bones may be from green geese, but to separate these from casualties, it will also be necessary to record the length of the immature bone: very small bones are likely to be casualties, while those approaching adult length may be green geese. If we wish to separate the two later stages, the one year and the older birds, it may also be necessary to give much greater attention to the development of the muscle attachments of the main limb bones, which might be expected to change with age.

Other metrical analyses may contribute in the future to the interpretation of age. Does the breadth of the leg bones increase with age? If a single population of geese can be demonstrated, are there metrical differences which might distinguish males and females?

M e d i e v a l g o o s e h u s b a n d r y

In the original report on the Winchester suburbs I concluded that geese were mainly kept as much for feathers as for meat. The age at death of the geese cannot now be regarded as supporting evidence for this, but it does however seem likely, in view of the uses of feathers and the superiority of those plucked from live birds. The finding at Winchester, as at Norwich, that young birds are common only from the later Middle Ages may confirm ALBARELLA's (1997) observation that geese were raised mainly for meat from the later Middle Ages, especially in the towns, but does not neces-

sarily do so. Many of these could equally be the casualties expected in any flock in which young are being raised.

The number of surplus ganders among the goose flocks in the countryside would have been relatively few (compared, for instance, to the number of surplus males in flocks of chickens or sheep). It would have been possible to sacrifice not many more than half of all ganders in the first year if the security of the flock was to be ensured and the production of eggs and especially feathers was to be maintained. It was presumably these as well as adult birds of five years which were driven to the cities and fairs and sold for consumption. No doubt because the eating of geese remained highly seasonal, no females in lay were slaughtered, unlike with chickens where it was very common to kill hens in lay. Though some eggs will have been sold, the shorter laying season makes it unlikely that geese – unlike hens – were ever kept mainly for eggs. Since goose flesh had a higher value than chicken, the increase in goose consumption at the end of the Middle Ages may reflect the higher standard of living at this time, evident in the greater purchasing power of town dwellers in particular and their increasing demand for meat.

Hints from secondary historical sources suggest two regions in the hinterland of Winchester in which flocks of geese were reared. There were no doubt more and the records for some may well survive. The possible sources for the Eynsham geese have not been investigated. The archaeological evidence for the farms or households on which geese were raised would in theory contain a few bones of casualties among laying geese, whose bones would contain medullary tissue, and also some of young goslings. As we have seen, few bones of gosling, and no cases of medullary bone were found at Winchester and goslings were only sporadically present among the Eynsham geese.

This research was prompted by the unsatisfactory match between the historical and archaeological evidence for the age at death of geese, and broadened into a wider study of goose biology and husbandry. For geese, as for some other animals, the fit continues to be unsatisfactory, but it is in the collaboration between the disciplines of archaeology, developmental biology of geese, and history that our understanding of Medieval food consumption, animal trades and husbandry will be advanced.

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