Professional Zooarchaeology Group (PZG) Minutes

Ageing and Sexing, Bournemouth University, 15th August 2009

The ninth meeting of the Professional Zooarchaeology Group was kindly hosted by Dr. Ellie Hambleton and Dr. Mark Maltby at the University Bournemouth on Saturday, Aug. 15th, 2009. Approximately 22 people attended the meeting. The theme of the day was ageing and sexing in zooarchaeology

The morning session began with a warm welcome from Ellie Hambleton who introduced the first talk. She had selected (corralled?) her PhD student, Claire Randall, to begin the meeting, with a review of research on herd structures and decision making amongst real live farmers and pastoralists. Claire's work was an excellent choice as it reminded us of the ultimate aim of zooarchaeological studies, which is to achieve an understanding of human behaviour in the past. Claire highlighted that although we all know that management strategies and understanding the human relationship with animals is the ultimate aim of what we do, we can become so embedded in method that we lose sight of what we are attempting to achieve. It is helpful to remind ourselves occasionally of the plethora of choices that have gone into the management of livestock animals in the past, and consider some of the varied motivations, not all of them apparently practical or immediately obvious to us, that informed those choices. Herd and flock structures not only reflect the overall strategy employed with regard to the products that people were looking for, but existed within landscapes and social structures that provided additional constraints. Some of these are more obvious, predictable and measurable, such as the physical tolerances of the animals and the basic nature of the environment. Others are more subtle, such as the approach to pasturing animals that may have the same outcome in regard to products, but achieves it in a different way, such as intensive integrated systems opposed to more extensive but labour intensive ones. Ideas of preference and taste in the ultimate product as well as perceptions of health and disease also affect how animals are managed, and we should try to find ways of exploring how these issues may have affected the data that we ultimately record.

With a view to demonstrating these issues, theoretical mortality profiles can be created for modern British livestock husbandry regimes. Any number of variables (e.g. lambing rate, neonatal mortality etc) can be altered, but it is also possible to explore what occurs with a curve when, for example, we take into account the effect of removing a cohort of animals to be finished in a different location, rather than being retained in an integrated herd. It is also possible to observe the effects of 'arbitrary' choices that do not have a direct origin in the manner in which livestock are husbanded, but in 'preference', such as the artificial cut off point for the slaughter of cattle for human consumption as a result of BSE regulations. This produces subtle but noticeable differences in curves. Applying these ideas to the archaeological material, we may not be able to identify precise motivations at any particular site, but it should prompt us to remain open to the range of possibilities, and use all opportunities available to compare data from different sites and periods to enable more consideration of how and why changes may have occurred. Claire's talk was illustrated throughout with pictures of knitted sheep (and other animals) up to all sorts (Claire, where did you get those pics?).

After Claire's excellent introduction to interpretative potentials and dilemmas, papers of a methodological nature then followed. Gill Jones has done extensive work on tooth wear and mandible stages (Jones 2006). In her talk Gill discussed the application of her live sheep work to archaeological mandible collections as well as some work-in-progress on cattle teeth and age at death (GJ and Peta Sadler). In her original study, Gill made1611 observations of tooth eruption and wear in live sheep in order to provide modern information useful in making age estimates in archaeological studies of husbandry and seasonality. She studied the Soay, Scottish Blackface, Shetland, White-faced Woodland and other traditional breeds and commercial crossbred sheep. Further to her 2006 publication, Gill makes the following recommendations:

- Subdivide sheep/goat mandible stages when of interest as this may give season at death information, especially for lambs, see notes uploaded on the Social Zooarchaeology network.
- For the UK, where most caprines are sheep not goats, consider using GJ's 'Majority' column for age estimates, i.e. the boxed area in Jones 2006 Figure 9. Stage C begins at 3 months (this has been known since 1979 for goats, Deniz and Payne 1979, 1982); Stages D and E begin during the winter of the first and second year; the upper age limit of the final stage is estimated as 13+ years, see Jones 2006 Figure 20.
- Show Stage names as well as the age estimates. Others may re-interpret age estimates. If most are goats, stage E begins later.
- If using the central point, remember the variation around this. Please always show examples of the ranges, which are small early on, and large, later.
- In data tables, please show individual tooth wear stages. We've accepted that it is useful to know individual measurements. So also, one needs to know individual mandible tooth-wear- stages, e.g., to study wear-rate.
- Use of Jones 2006 Figure 15 for estimating TWS (Tooth wear stages) in broken mandibles. Use the relevant quadrant for identifying the likely TWS of a missing tooth; ignore outer 10%; list possible subdivided mandible stages; allocate equally (simple, fast) or proportionally.
- Upper limits for sheep 13+ years, though 20 possible. Cf. Jones 2006 Figure 20. And for cattle 20+ years, though 36 possible, see below. There has crept into the literature recently a custom of using the same mandible-stage age-estimates for both sheep/goat and cattle. According to the information we have gathered, this is not sound. We suggest that the upper end of the final stage for cattle may be given as 20+ years. Work on the Halle cattle and other results is in preparation.

Gill also touched on epiphyseal fusion in sheep, noting that recent results from the Prebendal, Aylesbury project (Farley and Jones in prep) confirm that the proximal radius fuses before the distal humerus, and that unfused lamb pelves were mostly from males, while fused pelves were mostly from females.

Gill then summarised work completed recently by GJ and Peta Sadler on cattle teeth, including: recording the cementum enamel juncture (CEJ; see http://homepage.ntlworld.com/knowles.shadwell/CattleMandiblesCEJ/default.htm);

accessory pillar variability and identifying loose cattle M1s and M2s (Jones 2007) (see images on the Social Zooarchaeology network). Gill is interested to know of other criteria for identifying loose first and second molars. Gill and Peta Sadler have gathered the following information about cattle longevity and are interested to hear of other data or references. The oldest cattle from Halle is 19 years, from English Heritage 21 years; Cornevin and Lesbre 1894 give 25 years 'si on laisse vivre leur existence normale'; Odlum 1950 quotes 12 cows of 17 to 36 years and six bulls of 17 to 20 years; there is information about Chillinghams, rare breeds at Temple Newsam, the Dynevor herd, Gloucester cattle; buffalo and bison, Grimsdell 1973; London Zoo records, Jarvis and Morris 1960. Our conclusion is to follow Rackham's 1986 suggestion (quoting Reynolds pers. comm. and Odlum) of 20 years as the normal maximum, although 36 years is possible.

Following Gill's talk, Polydora Baker (English Heritage) reviewed standard sources for epiphysial fusion in sheep in the light of some recent results of the Medieval Wool project (MWP). The talk began with a review of some of the variables which influence epiphysial fusion, including sex, castration and nutrition and breeding age of ewes. The problems of using some of the primary and secondary sources for the analysis and interpretation of fusion data in faunal assemblages were discussed briefly, including small sample sizes, age gaps between age cohorts, combination of different breeds, and limits of background information/life histories. The sequence and timing of fusion were then discussed. Previous studies have indicated that fusion is early in ewes relative to rams and that castration delays fusion. These patterns are confirmed by the MWP data. The data show clearly that the onset and/or completion of fusion in ewes is always advanced compared to rams, and that the onset and/or completion of fusion in wethers is delayed relative to rams (which results in a marked delay in fusion relative to females). The extent of the delay in castrates is no doubt influenced by age at castration, but currently it is not possible to determine this effect, as comparisons between groups castrated at different ages have not been published. Nutritional plane also influences the onset and duration of fusion, with low plane animals invariably showing a delay relative to high plane animals. The MWP data indicate that age at breeding in ewes may have a slight effect on timing of fusion, with completion of fusion in early bred ewes (tupped at 18 months) being slightly delayed relative to late bred (tupped at 30 months) and unbred ewes.

The general sequence of fusion in sheep and in different sexes of sheep is broadly similar between sources, but fusion ages of the proximal radius, distal humerus, proximal calcaneum according to Silver (1969) and proximal calcaneum in Habermehl (1975) are considerably different to the MWP data and other studies and should probably be disregarded. The timing of fusion is highly variable between studies which may be related to specific population characteristics but may also reflect the problems with collecting fusion data (gaps between age cohorts). The talk concluded with recommendations regarding the publication of zooarchaeological fusion data include clarity of fusion states (ie. definition of what is meant by fusing and fused states), the bibliographic source of fusion ages, sequences, and fusion groups, and publication of epiphysis data by proximal and/or distal element (not just summaries or fusion groups). It is highly desirable also, that where entire skeletons are available, as in the MWP project and other modern research projects as well as archaeological finds, fusion states for individual skeletons should be published.

Lena Strid (Oxford Archaeology) then presented work on sexing sheep pelves and horncores. Lena first summarised approaches and associated problems of criteria for sexing sheep horncores. Most sheep sexing methods only distinguish between rams and ewes. It is however important to identify wethers, as they are very common in wool production flocks. Sex estimation using horn cores is complicated by hornlessness among sheep. Hornlessness is a genetic trait found in all sheep, although this is dormant in most "primitive" breeds. Lena explained that hornless sheep appear to have been introduced into Britain as breeding animals by the Romans, and that iconographic evidence suggests that by the medieval period virtually all ewes were hornless.. Lena summarised Tove Hatting's criteria for sexing horncores. Hatting studied horncores from the Gute sheep from the Historical-Archaeological Research Centre in Lejre, Denmark (Hatting 1975, 1983). Hatting found that wethers have larger cavities and thinner walls of the horncores than rams and ewes. Further, rams have a D-shaped circumference and a rough base. This occurs already by 1 year of age. The ewes have a sharp ridge anteriorly and a smooth base. The shape and structure of the wethers varies somewhat depending on the age at which they were castrated. They generally have a roundish circumference and a smooth base, unless castrated at a very late age. We were also directed to Naomi Syke's recent work on horncore measurements (please contact Naomi for information).

Lena then discussed her own study of pelves from several of the above Gute sheep (Historical-Archaeological Research Centre, Lejre, Denmark), noting the difficulties of distinguishing sex in young animals, but also the potential of criteria applicable to older individuals. She noted that sheep younger than one year are very similar and therefore extremely difficult to sex. Rams have a thick pubis and a pronounced ventral ridge. Ewes have a thin pubis and a deep dorsal groove. Wethers may or may not have a ventral ridge. This is likely to be dependent on the age at castration. Young rams can have a weak ventral ridge, and can thus be misidentified as wethers. The pubis of wethers is slender, although not as slender as ewes. They often have a shallow groove dorsally on the pubis. Participants were invited to have a look at Lena's pelves (sheep pelves that is!) in the afternoon.

Lena's talk was followed by a brief presentation by Polydora Baker of a new biometrical method for distinguishing between ewe and ram pelves devised by Peter Popkin and Fay Worley. When the measurements MDRA (Medial depth of the acetabular rim, after Sheep / goat measurement working party (S/GMWP; see 7th PZG meeting minutes, and Greenfield 2006) and the SDpu (minimum diameter of the pubis shaft, after the Sheep/goat working party recommendations) from sheep aged 7-52 months old are plotted on a scattergraph, ewes and rams separate out very distinctly. Age does not appear to influence the distribution nor does nutritional plane. Castrates are intermediate, overlapping slightly with both groups. Thus where there is a continuum in the distribution of measurements, this may indicate the presence of different sexes, including crucially wethers, although the presence of different breeds, sexual dimorphism within breeds and other influences must be considered.

The session then broke for an excellent buffet lunch of animal and vege products and some fantastic cakes (including gâteau forêt noir made by Mark Maltby's mother,

thank you Mrs. Maltby!). During the break we had the chance to view the Departments excellent human and animal bone labs.

In the afternoon, the final presentation of the day was by James Morris (Museum of London Archaeology). He moved away from ageing and sexing animal bones, to look at zooarchaeologists themselves. The presentation utilised data he had been collecting since April on the profile of professional zooarchaeologists working in the United Kingdom. His presentation concerned two main aspects, the age and sex of commercial zooarchaeologists and the affect of the current economic recession. The data showed that zooarchaeologists have a wide age range with the average being between 35-42. The profession also appears to be a female dominated discipline with 66%, compared to the overall archaeology figure of 44%. The data also showed that a large proportion of self employed zooarchaeologists are female, possible due to the flexibility this allows in child care arrangements.

The talk then took a some what depressing turn as James discussed the effects of the recession on commercial zooarchaeology. The April survey results indicated that 58% of participants had been affected, with 18% unsure. The follow-up survey, which finished the day before the presentation, showed that the situation may have become worse with 42% of the 33 participants indicting that the amount of work had decreased since April. James also had the unfortunate news that 4 of the August survey participants had been made redundant since April. The data also showed that zooarchaeologists based with commercial units and the self-employed were the worst affected.

However, the presentation ended on a brighter note as the survey showed just how much work zooarchaeologists had produced in the last year. The participants had been involved in a minimum of 506 projects, with the production of 55 publication reports. It was also shown that not only had the participants produced a great deal of 'grey literature', but one of the most sought after improvements was a means of sharing the literature. To this end James showed the participants a site he had developed called the Zooarchaeological Social Network which enables members to share documents within a closed network. 'Zoobook' as some people called it has now been released and anyone interested in joining should contact James at jmorris@animalbones.org.

James' talk was followed by more coffee, tea and cakes, and a practical session. Fay Worley (English Heritage) prepared an excellent exercise (with worksheet), in which participants practiced taking the pelvis measurements discussed in the morning session, on ewe, ram and wether pelves. Lena Strid made available her Gute sheep pelves for examination and Ellie provided a tray of archaeological horncores. Fay had also organised a display of sheep crania and crib sheet to show the different morphologies of horncores (or hornlessness) of ewes, rams and wethers, in different breeds (Wiltshire horn, Soay, Shetland, Cotswold, Manx, Jacobs). The display brought home just how tricky sexing of zooarchaeological horncores can be, particularly in some breeds.

The meeting was rounded off with thanks to Ellie and Mark and a discussion of possible themes and venues for the next PZG meetings. Details to be posted soon.

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Programme

Clare Randall - Herd structures and reality- identifying the complexity of livestock husbandry strategies
Gill Jones - Using GJ's live-sheep work in archaeological mandible collections (GJ); and some work-in-progress on cattle age at death (GJ and Peta Sadler).
Polydora Baker - Epiphysial fusion in sheep and the effects of sex and nutrition: a review of standard sources and discussion of recent research.
Lena Strid - Morphological identification of rams, wethers and ewes from horn cores and pelves.
Polydora Baker - Sex distinction in sheep: sample biometric results of the English Heritage Sheep Project
James Morris - Ageing and Sexing Zooarchaeologists: profiling the zooarchaeological profession
Fay Worley - practical on sexing sheep pelves and display of horncore morphology in ewes, rams and wethers of different sheep breeds.

Minutes submitted by Polydora Baker, Gill Jones, James Morris, Clare Randall and Lena Strid

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