Beyond Counting Sheep

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The study of animal remains associated with past human activity in the archaeological context:

Faunal assemblages are proxy data in meta-analysis of the relationship between animal husbandry and cultural and environmental change.

- Identification and analysis of faunal species
- Reconstructing human diets
- Determining the impact of animals on past economies
- Understanding the environment at the time of deposition

Number of Identified Specimens (NISP):

The raw count of each bone and fragment; the base quantified unit of archaeological assemblages.

Tallied in whole numbers.

Relative Species/Taxonomic Abundance:

Measurement of taxonomic abundance, calculated

\[ \frac{\sum \text{species1}}{\sum \text{all species}}, \text{as a ratio between 0.00 to 1.00} \]
> `R` plot looks significantly different than the previous linear plots!
> `plot()` may not be fit with linear regression, but is much closer than before and still indicates a negative relationship.
> `Exported to pdf as: plot.png`
> `library(ggplot2)`
> `autoplot(linmod1)`
> `plot at Residuals vs fitted --> and normal Q-Q plots`.
> `And what does this mean --> points fit the line very closely, all the other fitted values do not seem to match the model well.`
> `Exported to pdf as: autoplot.png`
> `Calculate totalhep using the Togonormal test for goodness of fit:`
> `tSheep03 <- pnormSheep(tSheep03Totalhep)`
> `ggplot(tSheep03, aes(x=totalhep3, y=tSheep03)) + geom_density()`
> `This is totally unhelpful. Need to experiment more with `tSheep03`.
> `tSheep03 <- pnormSheep(tSheep03Totalhep)`
> `makes a plot just the exact mirror of `pnormSheep`. Also, unhelpful.`
> `zSheep01 <- scale(zSheep01) + geom_point()`
> `ggplot(zSheep01, aes(x=totalhep1, y=zSheep01)) + geom_density()`
> `ggplot(zSheep01, aes(x=totalhep1, y=zSheep01)) + geom_point()`
Why Count Sheep?

Exploring the relative ratio of sheep to other domesticated species in the archaeological record (aka taxonomic abundance) may show patterns in the data that help to explain:

- Cultural and economic shifts in land management
- Evidence of physical alteration of living domesticates
- Change in pastoral husbandry strategies across time
- Change in relationships between flock, farmer, and economic values
Increased caring for sheep: greater investment = greater financial return

Change to cash - driven strategies: management of health influenced by marked demands rather than humanitarian concerns

Re-structuring of the human landscape: institution of sheeplands, change in transhumance practice, movement from arable land to pasture, eventual enclosure and privatization of pastureland
Methodological issues in Meta-Analysis

- Addressing biases in large, older assemblages
- Changes in research questions/interests
- Advancement of available technologies
- Re-evaluation of quantitative methods
- Inter-analyst bias and errors
- Lack or loss of contextual information
Benefits of Open Sourced Data Sets

Accessibility to students and researchers at every career stage

Changing antiquity laws that restrict where analysis can take place

Archaeologists = Data Producers

Advancement of digital repositories

Facilitation of data reuse

Inter-disciplinary consultation/collaboration
Measuring Variation in Faunal Assemblages

A Review of Animal Bone Evidence from Central England
Umberto Albarella, Tessa Pirnie, 2008

- Geographic region of Central England
- Published assessment reports and grey literature + unpublished manuscripts
- No lower limit on minimum Assemblage size
- Current data set presented here
- No written report published

A Review of Animal Bone Evidence from the Saxon to Post Medieval Periods in Southern Britain
Matilda Holmes, 2018

- Geographic region of South England
- Published excavation reports, some unpublished manuscripts
- Assemblage size limit > 100 NISP identified to major domesticates
- Report in publication
A Review of Animal Bone Evidence from Central England
Umberto Albarella, Tessa Pirnie, 2008

Introduction
Overview
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Usage Statistics
Data copyright © Umberto Albarella unless otherwise stated

Alms Ln 78
Urban - Medieval (high medieval, i.e. AD 1260-1400 or mid C13th to beginning C15th)
Hand-collected, coarse-sieved and bulk-sieved fractions, where present, are listed separately below.
Bone counts are given as NISP (number of identified specimens) and/or as MNI (minimum number of individuals) where information was available.

COLLECTION METHOD: Hand Collected
Large and medium mammals (total number of fragments): 1125
Small mammals (total number of fragments): 1
Notes: from this period onwards the area is used for disposing of domestic refuse rather than industrial remains like in previous periods
The table below contains more detailed information on individual taxa. Use the scroll bar underneath the table to view all of the data.

<table>
<thead>
<tr>
<th>Taxa</th>
<th>NISP</th>
<th>MNI</th>
<th>Butchery</th>
<th>Butch notes</th>
<th>Body parts</th>
<th>Body notes</th>
<th>Biometry</th>
<th>Bio notes</th>
<th>Age</th>
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</tbody>
</table>

few indiv

<< Return to summary record for site
Albarella & Pirnie, 2008
Presence of possible outliers at opposite ends of the range
- NISP sheep = 1.00
- NISP cattle = 0.00

Late Period is not normally distributed:
- Central peak is further away from the mean
- Clumping of values at or near 1.00 and 0.00
- Lean towards dominance in cattle ratio with greater number of sites with only cattle or sheep remains
Differences in the spread of the data and the range are apparent. Late Period stands out again as showing a more even distribution of data across the entire range. Early Period stands out as the largest assemblages are present, and clumped around the median. Urban sites consist of the greatest number of observations, including the largest NISP assemblages.
Correlation of z-scores and TotalNISP:

cor (zSheeps1, Sheeps1$TotalNISP): -0.2007795

linModel3 < - lm(logSheeps1 ~ TotalNISP, data=Sheeps1): p-value: 1.49e-07

#Adjusted R-squared: 0.1422

Data indicates there is a relationship between NISP and Z-score, but it is not a linear relationship, and only explains a small proportion of the variation seen here.
Future Work

Further test correlations of NISP and Z-score: analysis methods and investigate relationship between the variance of the mean and NISP between Periods.

Explore the effect of environmental factors on species relative abundance.

Investigate statistical significance of differences in species abundance between Central and Southern England.

Encourage primary data publication and curation of digital copies of published reports for future reference.

Continued work on established methodology and integration with large digital data sets.

Ensure accessibility of data and reproducibility of results, establish publications on case studies.
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