Changes in Turkey and Artiodactyl Abundance in Central Mesa Verde and Northern Rio Grande Archaeological Assemblages

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Introduction

Previous zooarchaeological studies in the Southwest indicate that over time, larger animal resources such as deer are replaced by smaller ones such as lagomorphs (cottontails and jackrabbits) and domesticated turkey in Ancestral Pueblo sites. These trends are identified on the basis of various faunal indices that measure the proportional abundance of one animal resource against another. In this study, we utilize an index that measures the proportion of domesticated turkey relative to artiodactyl (primarily deer) remains to explore the changes in the food contributions of the two largest food animals. We use this index to make regional and temporal comparisons between the central Mesa Verde (CMV) and northern Rio Grande regions (NRG). In the CMV, turkey became an important source of animal protein in later periods as artiodactyls decreased in abundance on the landscape. For the NRG, we expect a lower reliance on turkeys until populations increased following the depopulation of the CMV.

Figure 1. Map of the CMV and NRG regions, noting locations of larger site assemblages considered in analysis.

Materials and Methods

Zooarchaeological data were collected from site reports for 75 sites in the central Mesa Verde region (CMV), 15 sites in the Pajarito Plateau, and 30 sites in other sub-regions of the Northern Rio Grande (NRG) region. The number of identified specimens, NISP, for identified artiodactyls, unidentified mammals deer-sized or larger, turkeys, and large birds were used to calculate a turkey-artiodactyl (T-A) index. Faunal indices, designed to range between 0 and 1, are commonly used to measure and evaluate temporal changes in the proportional abundances of key taxa. Changes in these values are assumed to reflect changes in the relative local abundance of these animals. High values for an index (near 1) indicate a high relative abundance of taxa in the numerator.

$$\text{T-A Index} = \frac{turkey + large\ bird\ NISP}{turkey + large\ bird + artiodactyl + unidentified\ mammals\ deer{-}size^{+}\ NISP}$$

Large bird remains were included as they are assumed to represent the remains of turkey in most cases (Driver 2002). Badenhorst and Driver (2009) suggest that only indices with a minimum denominator of 50 NISP should be examined. Due to small sample sizes in some sites, we were unable to meet this stringent criterion. Here we use any index with denominator of 5 or more NISP; however, we aggregate samples by temporal period which should minimize sample size bias.

To contextualize our examination of the T-A index through time in each region, estimates of population density for each respective region are also included. CMV population estimates reflect those reported by Scwindt et al. (2016) for the McElmo subregion, where most of our sites are located. Population estimates for the NRG and Pajarito Plateau are those reported by Ortman (2016) .

T-A Index in the Central Mesa Verde

Figure 2 provides a comparison of archaeological index values and population density through time. Over time, the T-A index increases through time, with greater increases observed A.D. 1150-1250. Larger increases in population density also occur during these periods. Early on, artiodactyls and large mammals contribute more to the diet than turkey. As populations increased, diet shifted to a heavier reliance on turkeys.

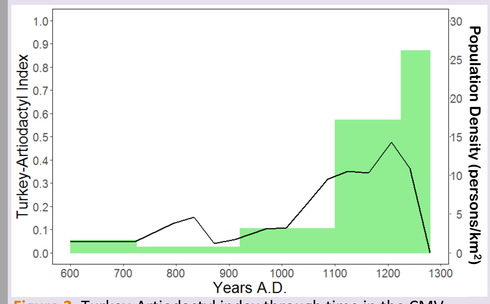

Figure 2. Turkey-Artiodactyl index through time in the CMV. Green bars represent aggregated TA indices for each time period. Population density for the McElmo area is plotted in black.

T-A Index in the Northern Rio Grande

In the NRG region (Figure 3), the T-A index remains relatively lower than in the CMV region. As population increases, the T-A index remains relatively low until ~A.D. 1150. In later years, the T-A index reaches its peak by A.D. 1325; however values indicate a heavier reliance on artiodactyls and a lower reliance on turkeys than in the CMV.

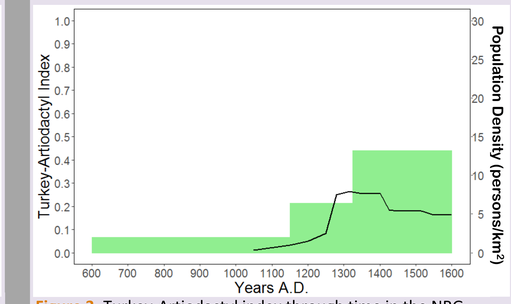

Figure 3. Turkey-Artiodactyl index through time in the NRG. Green bars represent aggregated TA indices for each time period. Population density for the total NRG is plotted in black.

T-A Index in the Pajarito Plateau

The T-A index remains relatively low in this region until around A.D. 1280, where it increases to values higher than those observed in other areas of the NRG (Figure 4). As populations increased during this time, people began to rely more heavily on turkeys. Artiodactyls also continued to contribute a substantial proportion to diet as populations in this area declined.

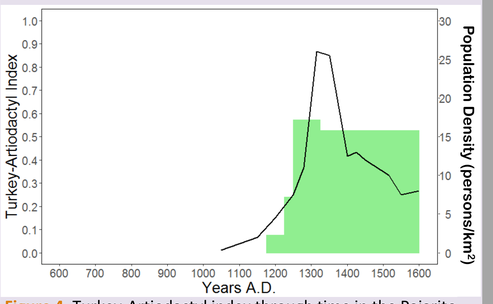

Figure 4. Turkey-Artiodactyl index through time in the Pajarito Plateau. Green bars represent aggregated TA indices for each time period. Population density for the Pajarito Plateau is plotted in black.

Data Quality Assessment

Effects of Sample Size

Potential effects of sampling bias can have a significant influence in meta-analyses (Jones and Gabe 2015). We conducted Pearson's R correlations between total sample size (NISP) and T-A index and found non-significant results ($r = 0.107$, $df = 120$, $p = 0.24$). Overall, T-A indices were not affected by sample size.

Effects of Context

Potential effects of differential distributions across sites can also influence meta-analyses (Jones and Gabe 2015). For example at Sand Canyon Pueblo (Figure 4), larger frequencies of artiodactyl remains were recovered from structures whereas more turkey remains were recovered from middens. If similar patterns exist in other sites, this could significantly influence our results if some contexts were excavated more than others.

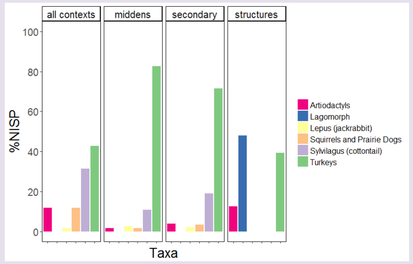

Figure 4. Distributions of %NISP of select taxa across contexts at Sand Canyon Pueblo.

Effects of Screen Size

Screen size information was recorded for a subset of CMV assemblages (n = 42). Although non-significant chi square associations were found between screen type and T-A indices ($\chi^2 = 91.12$, $df = 112$, p-value = 0.93), this result only applies to a subset rather than all sites considered.

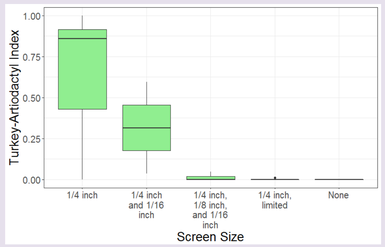

Figure 5. Box plot showing distributions of T-A indices for a subset of 42 CMV sites and screen sizes utilized in excavation.

Conclusions

As populations increased in the CMV, people relied heavily upon turkeys as a food resource. In the NRG, people began to rely more heavily on turkeys as populations increased and populations decreased in the CMV. This is especially so in the Pajarito Plateau. Unlike in the CMV, people in the NRG apparently had greater access and continued to rely heavily on deer. Our results are unaffected by assemblage size and screening methods. Contextual and other cultural biases, however, may have influenced our results. Additional considerations relating to data quality in meta-analyses must be made (Jones and Gabe 2015).

References

Badenhorst, S. and J. C. Driver. 2009. Faunal changes in farming communities from Basketmaker II to Pueblo III (A.D. 1–1300) in the San Juan Basin of the American Southwest. *Journal of Archaeological Science* 36(9):1832-1841.

Bocinsky, R. K. 2011. Is a bird in the hand really worth two in the bush? Models of turkey domestication on the Colorado Plateau. Unpublished MA Thesis, Department of Anthropology, Washington State University, Pullman.

Driver, J. C. 2002. Faunal variation and change in the northern San Juan region. In *Seeking the Center Place: Archaeology and Ancient Communities in the Mesa Verde Region*, edited by M. D. Varien and R. H. Wilshusen, pp. 143–160. University of Utah Press, Salt Lake City.

Driver, J. C. 2006. Crow canyon archaeological center manual for description of vertebrate remains, edited by C. C. A. Center. vol. 8th edition, Cortez, Colorado.

Jones, E. L. and C. Gabe. 2015. The Promise and Peril of Older Collections: Meta-Analyses and the Zooarchaeology of Late Prehistoric/Early Historic New Mexico. *Open Quaternary* 1.

Lipe, W. D., R. K. Bocinsky, B. S. Chisholm, R. Lyle, D. M. Dove, R. G. Matson, E. Jarvis, K. Judd and B. M. Kemp. 2016. Cultural and Genetic Contexts for Early Turkey Domestication in the Northern Southwest. *American Antiquity* 81(1):97-113.

Ortman, Scott G. 2016. Discource and Human Securities in Tewa Origins. In *Archaeology of the Human Experience*, edited by M. Hegmon, pp. 74-94. Archaeological Papers of the American Anthropological Association, No. 27.

Schwindt, D. M., R. K. Bocinsky, S. G. Ortman, D. M. Glowacki, M. D. Varien and T. A. Kohler. 2016. The Social Consequences of Climate Change in the Central Mesa Verde Region. *American Antiquity* 81(1):74-96.