



Physical Anthropology Section – 2008

H25 The Taphonomic Effects of Agricultural Practices on Bone

Sarah A. Kiley, MS*, University of Indianapolis, Archeology & Forensics Laboratory, 1400 East Hanna Avenue, Indianapolis, IN 46227

After attending this presentation, attendees will learn how agricultural practices distribute and damage bone.

This study will impact the forensic community and/or humanity by improving search and recovery strategies for human remains dispersed in cultivated fields.

Forensic anthropologists are often asked to assist investigators in the search and recovery of human remains from a variety of outdoor contexts. The forensic anthropologist's understanding of postmortem processes that affect remains can help to guide search techniques and maximize evidence recovery. Outdoor forensic scenes in the Midwest are often disturbed and concealed by standard agricultural practices. These practices hinder the processing and interpretation of a forensic scene by altering its context and dispersing the human remains. In addition, farming instruments may cause postmortem damage to evidence and bones, complicating laboratory analysis.

In the forensic literature there are very few surveys on the effects of cultivation on forensic scenes and no experimental studies testing the dispersal characteristics of bone. However, the traditional archeological literature includes a considerable amount of experimental data on the movement of artifacts in cultivated fields, some of which may apply to forensic scenes. The direction of plowing, type of equipment, and duration of farming practices all contribute to the movement of artifacts in a field. This study tests the application of archeological models developed for artifacts and fills a research gap with a descriptive analysis of the movement of a bone sample in an agricultural field.

Bones modified by agricultural practices are expected to have a unique taphonomic profile depending on the type of farming machinery used and the number of cultivations. The spatial distribution of recovered remains is likely to parallel the dominant plow direction and should widen with subsequent cultivations. Over time, the percentage of elements recovered will likely decline due to the destructive nature of agricultural practices, weathering effects on bone, and carnivore dispersal. Bones recovered are expected to sustain a combination of sharp-force and blunt-force trauma, with more episodes of cultivation resulting in more damage.

This study used twelve nearly complete skeletonized ($n = 8$) and mummified ($n = 4$) pigs. The remains were painted different colors using exterior fluorescent paint to optimize the chance of recovery. Six of the pigs were placed in a sweet corn field and six were placed in a sorghum and buckwheat field. In both fields, a single datum was established outside of the plow zone. The datum was marked with a wooden stake set at ground level to permit relocation. Standard archeological mapping and recovery techniques were employed to record the positions of all visible bones in the field after plowing. Six pigs were recovered after one season of cultivation and six pigs were recovered after two seasons of cultivation.

Plowing affected the number of elements recovered, resulting in a cumulative reduction of the number of surface elements. After only one season of cultivation, plowing showed a systematic effect on the linear displacement of remains in the direction of plowing. This displacement became more pronounced after two seasons of cultivation, with bones being found further from their original deposition points. Larger bones were recovered more frequently than small bones, consistent with the archeological and agricultural engineering literature. With continued seedbed refinement, tillage equipment mixes the soil, allowing smaller elements to fall into crevices while larger elements remain on the surface. Skeletal elements recovered after one season of cultivation showed significantly less trauma than those that were recovered after two seasons of cultivation, and repeated plowing continued to fragment and damage the remains. Mummified pigs exhibited significantly less fragmentation and damage than skeletonized pigs likely due to the protection of the bones by skin and soft tissue.

The results of this study indicate plow direction has an impact on distributing remains horizontally in the direction of plowing, with each pass increasing the distribution. Overall the percentage of elements recovered after two seasons of cultivation (8%) is consistent with the archeological literature. This study will help guide search and recovery efforts when remains are dispersed in cultivated fields and thus may increase the percentage of bones recovered for analysis.

Taphonomy, Plow Damage, Bone Trauma