



E18 Testing the Use of Pigs as Human Proxies in Decomposition Studies

Melissa A. Connor, PhD*, Colorado Mesa University, 406 Lowell Heiny Hall, 1100 N Avenue, Grand Junction, CO 81501-3122

After attending this presentation, attendees will better understand the use of proxies in decomposition studies and factors that may or may not make an animal a good proxy.

This presentation will impact the forensic science community by providing information relevant to decomposition studies that use proxies rather than human remains.

The present study compares decomposition in 19 pig carcasses and 23 human remains. One previous study used five each of pigs, humans, and rabbits and concluded the rabbits differed from the pigs and humans.¹ In the present study, the pigs were euthanized by Gunshot Wound (GSW) to the head. Human cause of death included cancer, lupus, heart attack, GSW to the head, and blunt force trauma caused by a fall. The experiment was conducted at the Forensic Investigation Research Station (FIRS) in western Colorado. The climate is arid, generally receiving less than eight inches of rain a year.

The remains were placed in the facility at different times between September 2012 and February 2015. Environmental data were collected from a HOBO® weather station placed among the remains. Accumulated Degree Days (ADD) were calculated for each day that the Total Body Score (TBS) was recorded.² This resulted in 1,381 data points for the human subjects and 1,091 data points for the porcine subjects. Maximum ADD for the first specimen placed in 2012 was 11,269. Preliminary analysis shows both the mean and the median of the ADD at each TBS point is consistently lower in the human sample, although generally within two standard deviations. The samples were closest during early decomposition (TBS 3-16), but the gap grew as TBS increased.

In early decomposition, pigs and humans showed similar patterns of decomposition; however, in almost 60% of the pig specimens, the intestines ruptured through the abdomen during the bloat phase. This occurred in none of the human specimens. Both species plateaued between TBS 21 and 24 for a significant period of time. The humans stayed in moist decomposition for a longer period of time; however, the pigs were animals of a healthy weight and more than half the human sample was overweight or obese. Body fat does impact decomposition, hindering dissipation of heat and providing liquid for bacterial growth.³ The cause of death in the humans included cancers and injuries. Antemortem infections accelerate putrefaction and wounds provide additional places for insect oviposition.^{4,5} In FIRS' arid climate, most remains mummify. The first pig laid out, in September 2012, has a TBS of 24 at this writing. As of this writing, only pigs had progressed past a TBS of 30. The two humans who progressed past a TBS of 24 were very ill at the time of death (lupus and cancer) and decomposed relatively quickly.

Non-human proxies do provide a more homogenous sample, allowing isolation of individual variables. Human samples tend to be more variable, particularly in body fat and cause of death, both of which impact the pattern of decomposition. Pigs may be useful in studying general trends, but they are not a substitute for human subjects. Above all, reliance on a relatively homogenous proxy sample may make researchers overconfident in their ability to predict the timing and patterns of decomposition.

Reference(s):

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2. Megyesi M., Nawrocki S.P., Haskell N.H. Using accumulated degree-days to estimate the postmortem interval from decomposed human remains. *J of Forensic Sci* 2005;5 (3): 618- 626.
3. Gonzales T.A., Vance M., Helpem M., Umberger C.J. *Legal Medicine, Pathology and Toxicology*. New York: Appleton-Century Crofts, Inc., 1954.
4. Polson C.J. 1996. *The Essentials of Forensic Medicine*. London: English Universities Press Limited.
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Decomposition, Taphonomy, Animal Models