H37 The Influence of Body Fat on the Rate of Decomposition in Traumatized Pigs

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This presentation will demonstrate the effects of body fat on the rate of decomposition in surface decomposing pigs as measured in ADD from fresh to skeletonization.

The results of this research will impact the forensic community by demonstrating the percentage body fat will not influence decomposition and hence time since death estimations/postmortem interval estimations.

The high prevalence of obesity worldwide is raising concern among forensic scientists and nutritionists. This trend in developed, first world countries due to the sedentary life styles and the increased intake of foods with higher amounts of fats (Prentice and Jebb 1995) are of concern to the forensic scientists who must attempt to determine the time since death, or postmortem interval (PMI), from the stage of decomposition exhibited by a human corpse (Megyesi, et al. 2005). Body fat is among the factors identified to influence the process of decomposition, yet the relationship is anecdotal (Mann, et al.1990). A pilot study of the effect of body fat on pig decompo- sition suggested that higher fat content increases the rate of decomposition (Jessen 2005). The aim of the current research was to determine the influence of percentage body fat on the rate of decomposition in traumatised pigs (*Sus Scrofa*). At approximately 45 ADD periods over a period of 9 weeks (734.8 ADD *en toto*), decomposition was measured as the amount weight lost in 37 pigs with different weights, sexes and percentages of body fat. The research was conducted at a facility in northwest England during the spring/summer of 2007. For each pig, the weight, soil pH, total body score, ambient, carcass, and ground interface temperatures and carrion insects were monitored.

There were no significant difference in weight lost in carcasses with different percentages of body fat ($F= 0.475$, $p= 0.875$, $\alpha= 0.10$) and body fat does not influence weight loss ($F=0.12$, $p=0.73$, $\alpha= 0.10$) and changes in pH ($F= 0.0074$, $p=0.9317$)**;** however, the interaction of weight loss and time (ADD) was shown to influence soil pH ($F= 59, 2395$; $p<0.000$). Changes in ground temperature were correlated to changes in ambient temperatures. Arbitrary grouping of carcasses into high and low fat groups also showed no differences in mean weight loss. Carrion insects associated with decom- position were primarily of the Calliphoridae and Silphidae families.

The lack of significant differences in weight loss in pigs with different percentages of body fat rules out the suggestion that increased amounts of body fat promote the numbers and activity of bacteria during decomposition. These bacteria are said to disseminate through the greater volume of a fatter body, thereby causing liquefaction and hence accelerating decomposition (Campobasso, et al. 2001; Mann, et al. 1990) as bacterial activity is temper- ature dependant (higher temperatures promote their activity). The low mean ambient temperatures observed over the duration of most of this study could influence the observed results. During certain periods where ADD accumulated more rapidly due to higher daily ambient temperatures, decompo- sition of the internal structures and external structures continued, promoting bacterial and maggot activity and hence aided biomass removal. However, the abdominal contents of some carcasses remained till the end of the study, probably due to the influence of lower mean temperatures rendering bacteria and maggots less active. There was no observed difference in the numbers of flies visiting the carcasses of different fat or size, suggesting that there were no preference of flies for carcasses with greater amounts of fat (Jessen 2005; Hewadikaram & Goff 1991).

The northwest of England experienced its highest ever recorded rainfall during the months the experiment took place, and the influence of rain resulted in the formation of adipocere. This retarded carcass depletion and resulted in water-logging, weight gain, migration and inactivity of most carrion fauna. Dry periods observed thereafter resulted in a new wave of fly activity and reduction in soft tissue once again. This confirms an earlier observation (Archer 2003). With increasing ADD, and hence weight loss, and leaching and accumulation of sulphur and nitrates, changes in pH with weight loss resulted.

This study shows that percent body fat does not influence the rate of weight lost and hence decomposition. Thus, estimations of PMI will not be influenced by different body compositions (percentages of body fat), thus contributing to aim of increasing the accuracy of PMI estimations.

Body Fat, Decomposition, Pigs

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