H43 Assessing the Effect of Repeated Physical Disturbance Associated With Data Collection in Experimental Decomposition Studies

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After attending this presentation, attendees will learn whether the type of physical disturbance associated with data collection affects the progress of decomposition. They will learn how the decomposition process is reflected in a number of variables such as weight loss, soil pH, and temperature; and how these variables relate to each other. In addition they will have received information about the legislation governing decomposition studies in the UK.

This presentation will impact the forensic community and/or humanity by identifying how the act of data collection may alter variables under study in decomposition experiments. It identifies the need for adequate controls, an understanding of the varying ways in which decomposition can be measured, and how these measured variables interact.

Postmortem interval can be estimated using a variety of methods. One of those is the assessment of the stage of decomposition of the remains in question. The stages of decomposition have been well documented and many studies have been made of the relationship between decomposition and the elapsed time interval since death.

Few of these studies, however, make any reference to the effects of physical disturbance that may have occurred as a result of data collection. How accurately do existing published studies actually reflect the process of decomposition as it occurs naturally? This study compares physically disturbed rabbit carcasses with a series of undisturbed carcasses in order to assess the presence and magnitude of any effects.

The carcasses were placed on scrub-free level ground at the edge of a wheat field in Dickleburgh, Norfolk, UK, for a period of three weeks during July 2004. Environmental data was obtained from a computer-controlled weather station that took readings every 30 minutes. Experimental data collected included carcass weight (taken by suspending the carcass from a spring balance), internal temperature, soil temperature (at a depth of 5cm), and interface temperature (surface soil temperature from directly beneath the carcass). In addition, soil samples were taken from beneath the carcass for pH analysis. Visual observations of the state of the carcass and insect activity associated with the carcass were also recorded. Three replicates of eight carcasses were used, and the experiment was concluded once skeletonisation had been reached.

Synchronous placement of all carcasses minimized environmental differences between the groups. Decomposition was scored using a visually based scoring system based on that used by Megyesi (2001, 2005), where individual anatomical regions are scored independently, and the scores summed to give an overall indication of decomposition. Some carcasses were repeatedly picked up and replaced in order to take measurements of weight loss, temperature, soil samples, etc. The remainders were left undisturbed and once data had been taken from them they were not disturbed again until the end of the experiment. This enabled a time series of data for undisturbed carcasses to be constructed from the composite data that was acquired. The effect of disturbance on weight loss, carcass temperature, soil pH and overall decomposition was studied.

Predictions of the time taken for the carcasses to skeletonise were made using data from Vass et al., (1992). Time to skeletonisation was calculated in accumulated degree-days (ADD) and converted to days using average daily temperature data for the area. This was necessary to allow the correct number of carcasses to be obtained depending on how long the experiment would take. These predictions were shown to be accurate to within just a few hours.

Analysis of the results showed disturbance to have a significant negative effect on both weight loss and carcass temperature, i.e. both weight loss and internal temperatures were reduced compared to the undisturbed carcasses. No significant differences could be found, however, between the disturbance groups in terms of soil pH change or overall decomposition stage. It was not clear whether disturbance had any effect on time to skeletonisation of the carcasses. An insect-mediated mechanism for the disturbance effect in weight loss and carcass temperature is suggested, along with indications as to why this effect may be lost in overall decomposition. Studies comparing the effects of disturbance in the presence or absence of insects could confirm or refute this assertion.

Conclusions drawn from this work indicate that further research is needed in order to understand the effects that repeated disturbance has on individual decomposition parameters. In particular, study of the time to skeletonisation and the relationship between carcass temperature and weight loss merit further attention.

Decomposition, Accumulated Degree-Days, Disturbance

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