H1 Assessment of Differences in Decomposition Rates of Rabbit Carcasses With and Without Insect Access Prior to Burial

Jutta Bachmann, MSc, Postweg 2, Fellbach, Baden-Wuerttemberg 70736, GERMANY*

After attending this presentation, attendees will have an understanding of differences in decomposition of buried remains with and without insect access prior to burial. This will assist in forensic cases where victims are frequently buried to remove traces of evidence, to conceal the crime itself, and to delay discovery and identification.

This presentation will impact the forensic community by providing regression formula for buried remains with insect and without insect access to allow a more precise estimation of the PMI. It will underline the fundamental importance of insect impact on decomposition rate and pattern.

Although progress in estimating PMI for surface remains has been made (Megyesi, et al. 2005), no previous studies allow this to be accomplished for buried remains.

Limited research has been conducted to assess decomposition pattern of buried remains, or the impact of insect access on burial decomposition in relation to Accumulated Degree Days (ADD). Considering the well-known importance of insects on the progress of surface decomposition, it was expected that pre-burial insect access to a carcass would equally result in enhanced decomposition rates.

A burial study on 60 rabbit carcasses was carried out in northwest England to assess differences in decomposition rates in carcasses with insect access prior to burial, and those without. Individually buried cadavers in 35 cm soil depth were exhumed at 50 ADD intervals, and Total Body Score (TBS), weight loss, carcass/soil interface temperature, and underneath carcass soil pH were assessed.

A comparison between decomposition rates between the two groups in relation to log ADD indicated a highly significant faster decomposition rate ($p < 0.001$) in the Insect group than the Non-Insect group. The following regression formulae were developed by statistical Analysis of Co-variance (ANCOVA):

Insect group: TBS = -39.4+23.38 x log ADD
Non-insect group: TBS = -29.49+17.63 x log ADD

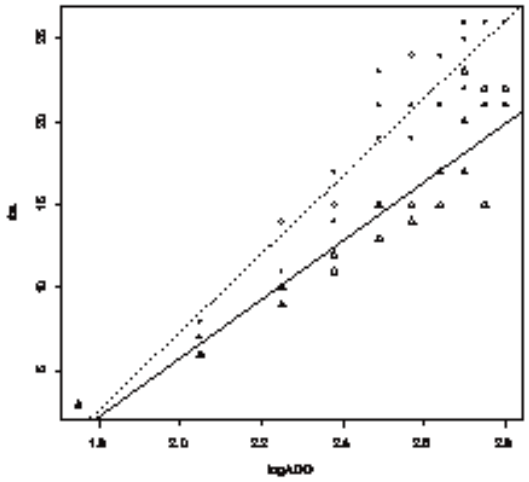

Figure 1: Regression lines of TBS against log ADD of Insect (indicated by circles) and Non-Insect group (indicated by triangles), showing enhanced decomposition in the Insect access group.

Preferred initial oviposition sites of blowflies in the genital area coincided with further localized decomposition progress, skeletonization, and disarticulation. Basic decomposition patterns in both groups were similar, but first appearance of hallmarks of the various decomposition stages in the Insect group preceded their appearance in the Non-Insect group by 200 ADD. At a total study interval of 641.87 ADD this represented an approximately 30% enhanced decomposition in the carcasses with insect access prior to burial. Thus, the effectiveness of TBS in precisely reflecting decomposition stages in relation to ADD is confirmed.

Intra-abdominal liquefaction occurred during advanced decomposition stages, exhibiting an ADD-related pattern. Parallel to external decomposition characteristics, the Insect group preceded the Non-Insect group by approximately 200 ADD. There is potential to refine the TBS scoring system by incorporating features of internal decomposition.

 ** Presenting Author*

True larval masses were never observed during the course of this study, thus interface temperatures did not exhibit significant differences from reference soil temperatures. Correspondingly, there were no significant differences between interface temperatures in the Insect and Non-Insect groups.

Weight loss between the two groups presented significant differences of low magnitude, but was subject to measurement bias due to soil adherence. Soil pH was shown to peak at 311.12 ADD, parallel to increased weight loss, but did not closely reflect earlier or later decomposition rates or patterns.

Insect stages were collected and reared to adulthood and included mainly the order Diptera, family Calliphoridae (*C. vomitoria spp., C. vicina spp.*); there was sporadic presence of few insects of the order Coleoptera, family Carabidae.

The results of this study must be further tested, as thus far there is paucity of data on ADD in decomposition, which does not allow useful comparisons between studies.

Burial, Decomposition, Insects

 ** Presenting Author*