## A86 The Suitability of Digital Photographs to Evaluate Decomposition of Pig Carcasses in a Tropical Climate: A Preliminary Investigation

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After attending this presentation, attendees will understand the effects that methodology and the reliance on digital photographs have on the visual assessment of decomposition.

This presentation will impact the forensic science community by demonstrating that decomposition scores generated using photographs tend to overestimate decomposition in the early postmortem period and underestimate decomposition in the extended postmortem period. These scores were also affected by the method used, which did not always accurately reflect real-time decomposition.

The use of color photographs, including digital ones, is often encountered in medicolegal death investigations and retrospective research where the actual remains are not available; however, knowledge as to the suitability of photographs as substitutes for human remains in forensic reconstruction scenarios is currently limited.[1] Some studies demonstrated that the ability to observe and document postmortem changes can be compromised when photographs are relied upon under certain conditions.[2,3] This may hinder the ability to draw reliable postmortem conclusions, including the Postmortem Interval (PMI), from photographs.

To address this gap in the knowledge, the present study investigated the suitability of photographs as a proxy for pig carcasses that are commonly used in empirical research where human corpses are not available, using two published scoring methods to generate a Total Body Score (TBS).[1,4]

As a first step, the decomposition of three exposed pig carcasses (*Sus scrofa domesticus*) was evaluated in real-time at Chaminade University of Honolulu (CUH) in Hawaii ($n$ observers=9), using both scoring methods. A month later, 2D digital color photographs of the same carcasses were evaluated by the same group of observers. As a second step, the scoring of the photographs was repeated with a second group of observers of similar composition and size ($n$=9) from University College London (UCL) in the United Kingdom, to investigate the replicability of the results and test the hypothesis that real-time TBS scores will not differ from photograph scores. Differences between real-time and photo-based TBS were identified using a two-way Analysis of Variance (ANOVA) with *post hoc* Tukey Honest Significant Difference (HSD) tests.

Among the CUH group, significant differences between the real-time and photo-based TBS were found with Megyesi et al.'s method ($F_{1,34}$=8.48, $p$=0.006).[1] Photo-based TBS were consistently greater than real-time TBS before 30 hours postmortem but were then consistently less until the end of the experiment (1,014 hours/42 days postmortem) ($p$ <0.05). In contrast, no significant differences between the real-time and photo-based TBS were found with Keough et al.'s method ($F_{1,34}$=0.104, $p$=0.749); however, photo-based TBS were consistently greater than real-time TBS before 30 hours postmortem, but were then consistently less until the end of the experiment ($p$ <0.05).[4]

Similar results were observed among the UCL group where significant differences between the real-time and photo-based TBS were found with Megyesi et al.'s method ($F_{1,34}$=13.3, $p$=0.001).[1] Photo-based TBS were consistently greater than real-time scores before 54 hours postmortem but were then consistently less until the end of the experiment ($p$ <0.05). In contrast, no significant differences between the real-time and photo-based TBS were found with Keough et al.'s method ($F_{1,34}$=2.63, $p$=0.114) and no significant variations of the TBS according to PMI were observed ($p$>0.05).[4]

The results lead to the rejection of the research hypothesis because the scoring of real-time and photo-based TBS was found to be highly dependent on the method used and the PMI. Keough et al.'s method appears more suitable for photographs of decomposing pigs in a tropical climate. Overall, consistent overestimation in the early postmortem periods and underestimation in the extended postmortem periods of photo-based TBS demonstrates that the inability to access the remains in real-time can significantly impact the accuracy of TBS. This can have profound consequences on the estimation of PMI, which is a key element in medicolegal death investigations. These initial results indicate the need for further research to address the differences in the applicability of the two scoring methods to photographs and the development of ad hoc practices when photographs are used as substitutes for remains in a forensic setting.

**Reference(s):**

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2. Dabbs, Gretchen R., Melissa Connor, and Joan A. Bytheway Interobserver Reliability of the Total Body Score System for Quantifying Human Decomposition. *Journal of Forensic Sciences.* 61 (2016): 445-51.
3. Dabbs, Gretchen R., Joan A. Bytheway, and Melissa Connor Comparing the Scoring of Human Decomposition from Digital Images to Scoring Using On-Site Observations. *Journal of Forensic Sciences.* (2017): 1-5, accessed February 9, 2017, doi: 10.1111/1556-4029.13409.
4. Keough, Natalie, Jolandie Myburgh, and Maryna Steyn Scoring of Decomposition: A Proposed Amendment to the Method When Using a Pig Model for Human Studies. *Journal of Forensic Sciences.* 62 (2017): 986-993.

**Forensic Taphonomy, Total Body Score, Decomposition**