



G103 Variance in Growth Rates of *Calliphora vomitoria* on Different Tissue Types: Mass Raised vs. Single Raised

Bridget R. McSweeney, BA*, 1629 South Shenandoah Street, Los Angeles, CA 90035; and Tal Simmons, PhD, School of Forensic & Investigative Sciences, University of Central Lancashire, Preston, PR1 2HE, UNITED KINGDOM

After attending this presentation, attendees will have a better understanding of the variances in growth rates for *Calliphora vomitoria* that occur not only when raised on differing tissue types, but also when raised in mass versus single.

This presentation will impact the forensic science community by demonstrating the need for further understanding of larvae activity and growth rates on differing tissue types.

Without a more thorough understanding of larvae species and their possible species specific growth rates and interactions with tissue types, the use of them in determining postmortem intervals (PMI) is suspect.

Recent studies show that there are significant differences in maggot growth rates depending on what type of tissue they consume. While previous studies have determined that the structure of the tissue didn't make a difference, what exactly causes the variation in growth rates has not yet been discovered. Since most comparison studies have been conducted using lab raised larvae (commonly grown on cow liver or pig liver), there may be significant problems with using such larvae to determine PMI in real cases. To better understand the implications of the variation in growth and development, development rates of larvae raised on various tissue types need to be explored more completely. This raises the question of whether the specific tissue consumed, or a change within the mass's activity, causes a change in growth rate.

A comparison between single raised larvae and mass raised larvae was used to judge the possible connection between being raised in mass and differences in growth rates on varying tissue types. If the difference in growth rates between different tissue types was not related to being mass raised, then single raised larvae and mass raised larvae from the same tissue type would show the same variations in growth rates.

This experiment examined the growth rates of single versus group raised maggots (N=100) on various tissue types. Growth rate differences were measured in two ways: mean maggot size, and instar stage. Larvae were procured from eggs laid in the lab by a mixture of wild caught and lab raised *C. vomitoria*. Larvae were laid on kidney, liver, heart, lung, or brain before being transferred within an hour of hatching to the tissue on which they were to be raised. All larvae were transported from the tissue on which they were laid to either a piece of the same tissue type or a different tissue type. By this means, it could be seen if a variation in origin tissue and sustenance tissue for a larvae during the first instar stage had an effect on the rate at which it matured.

Each tissue type had three replicates of masses being born and raised on the same tissue type and three replicates of larvae being born and raised on differing tissue types, for six replicates in total. Single raised larvae were replicated in groups of twenty for each origin tissue, resulting in batches of forty replicates total per a raising tissue type. All larvae were killed approximately six days after hatching and were measured by length from mouth to instar markings to the nearest .01 μm .

Whether the tissue type on which a larva was born was switched during first instar was not statistically significant. However, the relationship between size, tissue type, and whether a larva was mass grown or single grown was significant. In PMI studies larvae are used to determine PMI based on length at time of death, or time needed to grow them to adulthood in a laboratory setting combined with accumulated degree days. The variations in growth seen in this study differ from those seen with previously studied species, signifying that tissue based variations in growth rates are species specific. The wider variance in lengths noted in mass raised larvae as compared to single raised larvae indicates that size is not the best determinant of age as previously presumed. These results could mean a significant change in the way fly larvae are viewed and utilized in the field of taphonomy and forensic entomology for determining PMI. **Development Rate, Forensic Entomology, Postmortem Interval**