Body tissue influence on the growth rate of blowflies

Background information

Blowflies, such as Lucilia sericata , are among the first insects to colonize a body after death, making their development rates a key tool for forensic experts estimating the post-mortem interval. Age calculations typically rely on standard growth curves derived by rearing fly larvae in constant temperatures on a single medium, most commonly mammalian liver. However, various environmental factors like temperature fluctuations, crowding, and the type of tissue consumed can affect growth predictability, potentially leading to inaccurate estimates of time since death.



Odor produced during early stages of decomposition attract blowflies

Blowflies lay their eggs in natural body openings, such as the nostrils and mouth, or wounds

Larvae feed on soft tissue areas such as mucous membranes or the brain

Purpose of this study

The reseachers wanted to confirm and extend previous findings regarding how different body tissues affect larval development in the blowfly Lucilia sericata, using lung, liver, and heart tissues from both cows and pigs. They also wanted to determine whether any differences in growth and development were caused by the physical structure of the feeding medium or by the intrinsic chemical properties of the tissues themselves.

Methods

Adult flies were kept in rearing cages at 25°C with water, sugar, and beef liver. Fresh beef liver was provided for egg laying, and the resulting eggs were monitored until hatching. Newly hatched larvae were placed into a total of 240 experimental pots. The setup tested combinations of animal species (cow or pig), organ types (liver, heart, or lung), and tissue textures (either cut into 2 cm x 2cm chunks or liquidized for 10 seconds). The pots were placed inside larger beakers containing a layer of sawdust, covered with mesh, and kept in an incubator at 25°C and 70% humidity. Half the pots were run until the larvae finished feeding and migrated into the sawdust, while the other half were kept until adult flies emerged. The researchers recorded the time it took for 50% of the larvae to migrate and measured a random sample of larval body lengths. For the adult group, they tracked emergence times and measured wing vein length as an indicator of adult size.

Examples of:

a) Rearing cage



b) Incubator



c) Pots



Results

Food texture (chunked versus liquidized meat) had almost no effect on how long larvae took to feed, though larvae in chunked meat were on average 0.2 mm longer than those in liquidized meat. Animal species played a minor role, with larvae raised on pig tissue developing slightly faster and growing marginally larger than those on cow tissue.

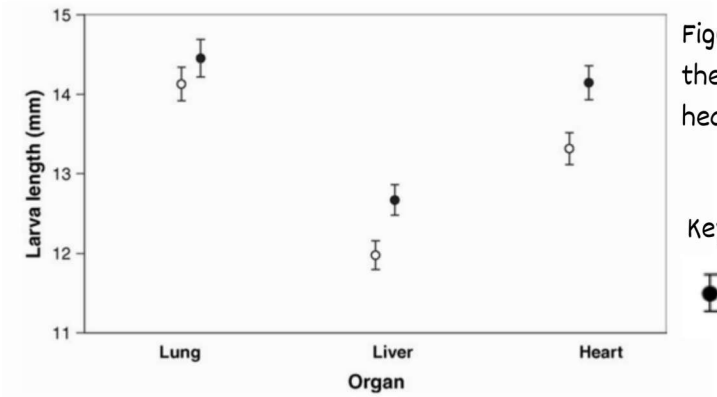


Figure 1: The mean lenght of Lucilia sericata larvae at the start of the wandering phase after feeding on pig or cow lung, liver, or heart.

Key:



Organ type caused the most dramatic differences in the larval stage, as larvae fed on lung and heart reached the wandering phase roughly 30 hours earlier and grew significantly larger than those fed on liver.

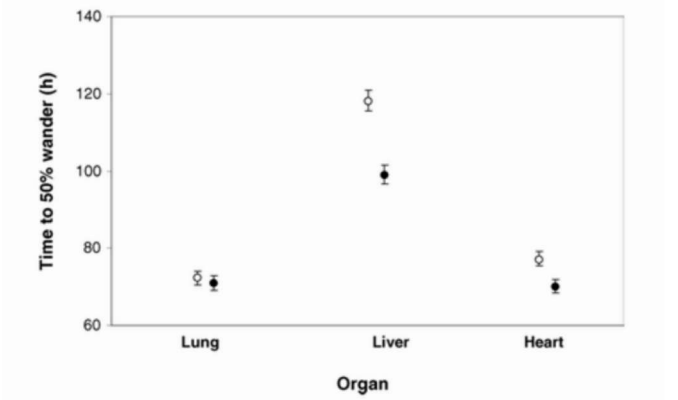


Figure 2: The mean time to for 50% of Lucilia sericata larvae to wander after feeding on pig or cow lung, liver, or heart.

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For the adult stage, neither animal species nor tissue structure changed development time or final fly size. Organ type still influenced adult size, with flies reared on liver ending up significantly smaller than those reared on lung or heart.

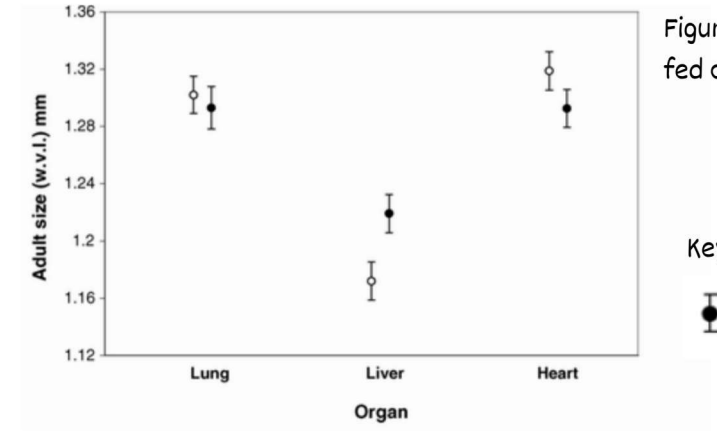


Figure 3: The mean size of Lucilia sericata adults after larvae had fed on pig or cow lung, liver, or heart.

Key:



Why studies like this are important

Since comparing chunked versus liquidized meat showed little difference in growth rates, texture is not the main driver, instead, intrinsic properties of the liver, such as potential growth-inhibiting toxins or chemical composition, likely cause the slower development. Because larvae grow significantly slower and end up smaller on liver than on lung or heart, relying on standard development curves based solely on liver can lead to underestimating the time since death. Underestimating or overestimating the time since death can affect criminal investigations by altering timelines, supporting or contradicting alibis, or influencing court outcomes. More accurate developmental data can therefore improve the reliability of forensic evidence.

References: 1) Amazon. n.d. Premium nylon fly mesh cage. Available: https://www.amazon.com.au/Stainless-Structure-Breeding-Observation-Laboratories/dp/B0DGQLKXCC [2026, August 02] 2) Canden. n.d. One door insect rearing chamber. Available: https://candenproducts.com/irc20-one-door-insect-rearing-chamber/ [2026, August 02] 3) Charabidze, D., Depeme, A., Devigne, C. & Hedouin, V. 2015. Do necrophagous blowflies (Diptera: Calliphoridae) lay their eggs in wounds?: Experimental data and implications for forensic entomology. Forensic Science International. 253:71–75. DOI:https://doi.org/10.1016/j.forsciint.2015.05.025. 4) Clark, K., Evans, L. & Wall, R. 2006. Growth rates of the blowfly, Lucilia sericata, on different body tissues. Forensic Science International. 156(2):145–149. DOI:https://doi.org/10.1016/j.forsciint.2004.12.025.