

Research Article

Effect of the carrion weight and temperature on the attraction of *Calliphora vicina*

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Abstract

The experiment was carried out in the city of Kut, Al-Karadiya zone, Iraq on 9th May and 18th February 2020, to investigate the effect of corpse weight and temperature on the attraction of *Calliphora vicina*. The speed and density of *C. vicina* adults were recorded on May 9th, 2020 where the density of insects was 9.5% in the corpse weighing 20-15kg, while the best time was morning (39±2°C), with an average of 9-12 insects. The percentage of presence in the corpse weighing 5-3kg was 3.3%, while the best time for their presence was morning (39±2°C) with an average of 3-5 insects. The temperature had a clear effect on the attraction of *C. vicina* to the carrions, where 39±2°C (morning) was the most appropriate degree for the attraction for all weights (7.1%), while 42±2°C (noon) was the lowest (4.8%). On the 8th of February, the presence rate of *C. vicina* on the carrion 20-15kg was 3.0%, with the best time at noon (18±2°C) with an average of 4 insects. The percentage of its presence on the corpse 5-3kg was 0.3%, with the best time at noon (18±2°C), with an average was 1 insect. The temperature of 18±2°C (noon) was the best in all weights of the carrion, with a rate of 2.6%, while its presence was 1.3% at 16±2°C (morning).

Keywords: *Calliphora*, Diptera, Calliphoridae, AL-Kut city, Attraction time.

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Introduction

Calliphora vicina is a member of Diptera: Calliphoridae. This species is distinguished with its speed launch toward the corpse after minutes. This behavior made it an important element for determining the post-mortem interval (PMI), which is used in forensic medicine (Hauther et al. 2015). The adult insect develops antennae that enable it to arrive in corpse kilometers away to lay eggs on the areas of the wounds in the corpse or in the natural openings of its body. After their eggs hatch, the emerged larvae start feeding on soft tissues of the corpse especially in the first larval stage, then feed on other areas until the removal organic corpse is finished. The larvae enter into the soil below the corpse for pupation which remains for a period of 7-11 days, depending on the temperature (Watson &

Carlton 2003). Adult insect emerges a bright metallic blue color (Fig. 1), therefore can easily identify (Harvey et al. 2003). Gruner (2004) showed that adults *C. vicina* are attracted to a plant called Dead-horse, which gives a relief similar to the smell of carrion.

Calliphora vicina is important in medicine because of Myiasis infection in animals and humans i.e. this fly transmits a pathogen that causes diseases to humans and animals. There are several factors that affect the insect's behavior towards corpses, which are humidity, corpse size, light, darkness, and temperature. Temperature is the most important factor (Vogt 1988; Mendt 2008). There are several species of the genus *Calliphora* such as *C. vomitoria*, *C. coloradensis* and *C. latifrons* (Whitworth 2010). This study aimed to find out the effect of corpse



Fig.1. Adult of *Calliphora vicina*.

weight and air temperature on the attraction of *C. vicina* toward the corpse.

Materials and methods

The experiment was carried out in the suburbs of the AL-Kut city (Al-Karadiya) in two stages. The first stage on May 9th, 2020, where three dogs with different weights of 5-3, 10-9 and 20-15kg were killed and thrown in separate areas (Fig. 2). The puppies of 5-3kg weights were thrown in the morning, noon and evening, and other weights as well. High-resolution cameras were set up to monitor the arrival of *C. vicina* to the corpses, recording the numbers of the insect within an hour after throwing the corpse. The same experiment was repeated in the second phase in the winter on February 18th 2020.

Results and discussion

Weight had no effect on the speed of attraction to the carrion on May 9th 2020 (Table 1). *Calliphora vicina* was present in the carrion of 1-20kg with a rate of 9.5% during the experiment (morning, noon, and evening). Morning ($39\pm 2^{\circ}\text{C}$) was the best time for presence with an average of 9-12 insects. The presence in the carrion of 5-3kg was 3.3% during the morning, noon and evening, as the morning ($39\pm 2^{\circ}\text{C}$)

was the best time with an average of 3-5 insects. The temperature of $39\pm 2^{\circ}\text{C}$ (morning) was a clear effect on the attraction of *C. vicina* to the carrion for all weights with a rate of 7.1%, while the $42\pm 2^{\circ}\text{C}$ (noon) had the lowest attraction rate (4.8%). Richards (2013) showed that the material food (corpse) which large size have many decomposing substances and liquids, consequently increases the growth of fungi, bacteria, and molds, which in turn helps the rapid reception of the carrion smell of *C. vicina*. Ody et al. (2017) indicated that adult's *C. vicina* are attracted and lay eggs at 35°C . Anderson (2013) also showed that adults of *C. vicina* are preferred to lay eggs on a deer carcass compared to a pig carcass.

The weight of the corpse and the air temperature had an effect on the speed of attraction of *C. vicina* to the corpses after being thrown directly on February 18th, 2020 (Table 2). The corpses of 20-15kg recorded the emergence of *C. vicina* at rate of 3.0%, where $18\pm 2^{\circ}\text{C}$ (noon) was the best temperature for their presence with an average of 4 insects. The corpses with 3-5kg recorded the presence of *C. vicina* with a rate of 0.3%, whereas the best time for its presence was noon ($18\pm 2^{\circ}\text{C}$) with a rate of 1 insect. The temperature of $18\pm 2^{\circ}\text{C}$ (noon) was the best for attraction of adults in all weights of the carrions with

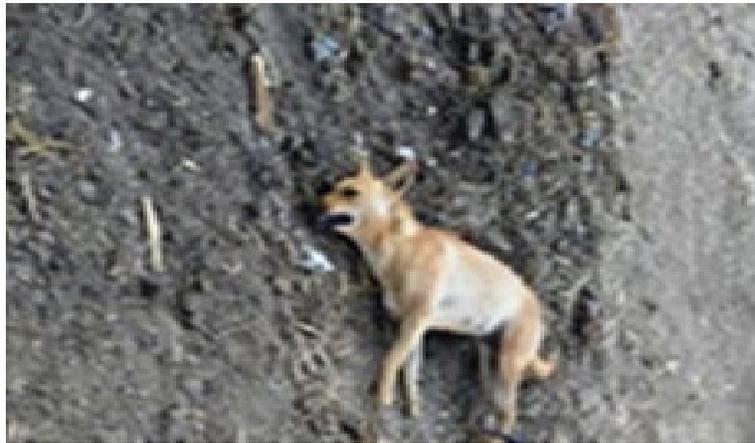


Fig.2. Carrion of dog used in this study.

Table 1. Presence of *Calliphora vicina* in May 9th 2020 (morning, noon and evening) on the carrion of dogs with different weights.

No.	Weight of carrion (Kg)	The average presence of <i>Calliphora vicina</i>			Average presence of <i>C. vicina</i> (%)
		Moring (39±2°C)	Afternoon (42±2°C)	Evening (40±2°C)	
1	5-3	3-5	2-3	3-4	3.3
2	10-9	6-8	3-5	5-6	5.5
3	20-15	9-12	7-9	8-10	9.5
Total percentage %		7.1	4.8	6.6	

Table 2. Presence of *Calliphora vicina* in May 9th 2020 (morning, noon and evening) on the carrion of dogs with different weights.

No.	Weight of carrion (Kg)	The average presence of an insect <i>Calliphora vicina</i>			Average presence of <i>C. vicina</i> (%)
		Moring (39±2°C)	Afternoon (42±2°C)	Evening (40±2°C)	
1	5-3	0	1	0	0.3
2	10-9	1	3	1	1.6
3	20-15	2	4	3	3.0
Total percentage %		1.0	2.6	1.0	

a rate of 2.6%, while it reached to 1.3% at 16±2°C (morning) (Table 2). Salimi et al. (2018) indicated that the adult's *C. vicina* are found to lay eggs at 15°C in the Kermanshah, western Iran.

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