# The Role of Olfaction in Orientation of Blowflies to Hosts or Odorous Baited Traps

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**Abstract**

Traumatic myiasis is a serious threat for worldwide sheep flocks. It is known that the blowflies' abundance and occurrence of strikes could be diminished by traps use. The aim of this study was to ascertain the role of olfaction in blowflies' orientation towards the odorous traps. Three genera of blowflies: *Calliphora, Lucilia* and *Protophormia* were monitored. For the 50 m distance all three genera had a positive response to detect the odorous bait, while for the 100 m distance its perception was decreased, but the structure in re-trapped blowflies remained the same, better for *Calliphora* (18%) and diminished for *Protophormia* (2%). For the 200 m distance only blowflies of *Calliphora* (10%) and *Lucilia* (2%) genera were recovered, respectively.

**Keywords**: blowflies, olfactory cue, recover.

## 1. Introduction

Traumatic myiasis represents a major threat for all sheep flocks. Over 80% of farmers from Great Britain reported at least one case each year, due mainly to *Lucilia sericata* [1].
There are several species of blowflies which can cause traumatic myiasis in sheep. *Chrysomya bezziana* and *Cochliomya hominivorax* are the main species from America [2]. *Lucilia cuprina* cause serious injuries in Australia [3] and South Africa [4], and *Lucilia sericata* affects sheep mainly in west European countries: England, Wales, Germany, Holland [5, 6], but also in New Zealand [7]. In central and south European countries, *Wohlfahrtia magnifica* seems to be the most important species [8-11].
The majority of studies concerning the response of blowflies (*L. cuprina, L. sericata*) to olfactory cues were carried out in laboratory [12-15]. That is why the studies carried out in the field are, obviously, necessary from two reasons: 1) laboratory results are not real indicators of field actions and 2) the selectivity of attractants for target species has to be evaluated.
The aim of this study was to establish the place of olfaction in orientation of blowflies to odorous baited traps.

## 2. Materials and methods

Experiments were carried out in the Parasitic Disease Discipline Park of Faculty of Veterinary Medicine Timisoara, in summer of 2007.
Blowflies were captured by the classical traps with liver and ammonia. The traps were placed in the discipline park, on wood props, at 1.5 m height and approximately 10 m apart each other.
The traps were maintained for 6 hours, during the noon, between $10^{00}$ and $16^{00}$, to capture as many flies were possible. After that, the traps were covered with polyethylene bags and transported to the laboratory. Inside of each bag 2 cotton tampons imbued with ethyl-ether to anaesthetize the trapped blowflies were filled in.
Then, the flies were handled with care, not to harm their integrity and separated on genera in

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order to touch them with white paint. 450 individuals of *Calliphora, Lucilia* and *Protophormia* genera were chosen and painted with a little drop on the mesothorax.

These marked blowflies were put in another polyethylene bag to recover after anesthesia and, and the next day were released at different distances from the experiment site: 50 m, 100 m, and 200 m, respectively. Each time, 50 individuals of the three genera were released, on the up-wind direction.

The traps were placed again and the retrieving process of marked blowflies has been monitored.

## 3. Results and discussion

The results of the experiment are shown in Table 1.

**Table 1**.The recovery rate of coloured blowflies.

| Genus | The number of recaptured blowflies (%) | | |
|---|---|---|---|
| | **50 m** | **100 m** | **200 m** |
| ***Calliphora*** (n = 50) | 12 (24) | 7 (14) | **2 (4)** |
| ***Lucilia*** (n = 50) | 9 (18) | 3 (6) | **1 (2)** |
| ***Protophormia* (n = 50)** | **5 (10)** | **1 (2)** | **-** |

Thus, it can be observed that after blowflies' releasing at 50 m apart the trap, the recovery rate was not grater than 24%.

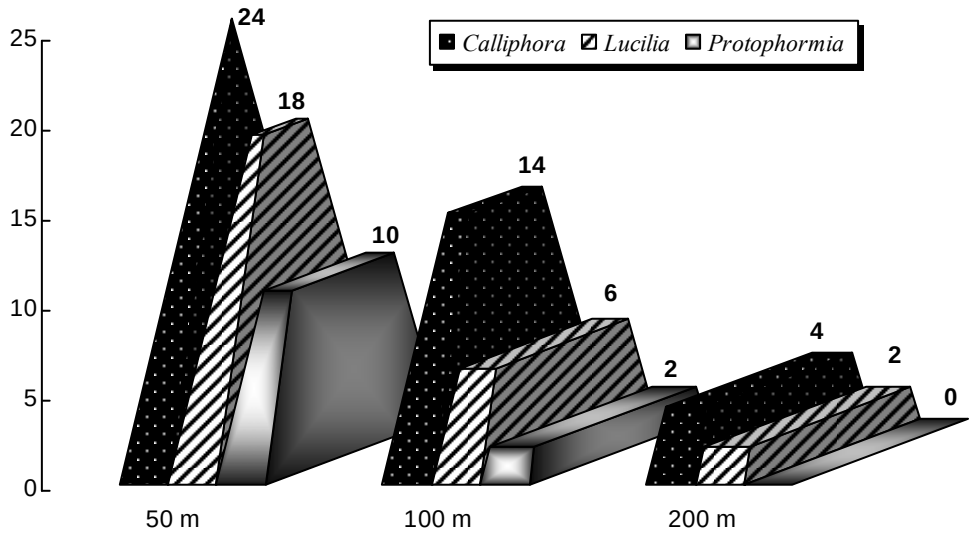


**Figure 1.** The ratio of recovered blowflies genera.

The greatest percent was noticed in *Calliphora* genus (24%), followed by *Lucilia* genus (18%) and *Protophormia* one (10%), respectively (Figure 1). The monitoring process was ruled on during whole day for each release of blowflies. For the 100 m distance the recaptured blowflies percent was halved: 14% for *Calliphora* genus, 6% for *Lucilia* genus, and 2% for *Protophormia* one, respectively. The poorest results were obtained at 200 m distance, when only 4% of *Calliphora* genus painted blowflies, and 2% for *Lucilia* one were recaptured. *Protophormia* genus blowflies were traped no more.

Figure 2 suggestive shows the importance of the olfaction for the three genera.

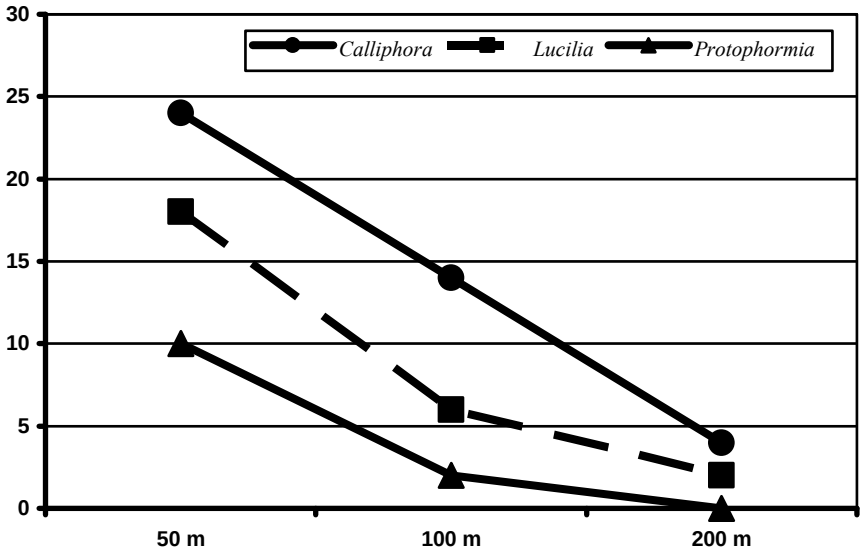


**Figure 2.** The importance of olfaction for the investigated blowflies genera.

Investigating the data from Figure 2 it can be observed that, in the case of *Calliphora* genera, the decrease of trapped blowflies slower but constant up as the distance rise. This fact can point out a developed olfactory sense for individuals of this genus or, as well, it can represent a favorable answer to the received olfactory cue. It is possible that also the ample zigzag flight to positively influence the result of trapping.

*Lucilia* genus blowflies had an important decrease when the distance increased. If at the 50 m distance 18% of blowflies were recaptured, at 100 m their number decrease very much to 6%, and at 200 m the number of flies reached only 2%.

As for *Protophormia* genus, it recorded the most drastic decrease. At 50 m were recaptured only 10% of blowflies, while at 100 m the value diminished to 2%. No painted flies were trapped at 200 m distance.

So, it can be concluded that the *Calliphora* genus blowflies have the most developed olfactory sense, followed by *Lucilia* genus individuals, and on the last place the *Protophormia* genus ones, respectively.

There were used a lot of organic and chemical materials to attract blowflies, but the macerated liver with ammonia solution was proved to be the most attractive, till swormlure-4 (a synthetic bait) was introduced [13, 16-19]. That's why we used it in experiment.

This study with painted blowflies was the first one carried on in Romania, and the results are important. Furthermore, no references on this item were found, so we couldn't make relevant comparisons.

## 4. Conclusions

At the 50 m distance all three genera had a good answer for the olfactory cue, with a better recapturing for *Calliphora* blowflies (24%) and weaker one for *Protophormia* blowflies.

At 100 m distance the efficacy of olfaction was diminished, but the structure for recapturing remains the same, better for *Calliphora* (18%) and limited for *Protophormia* (2%).

At the 200 m distance only *Calliphora* (10%) and *Lucilia* (2%) blowflies were trapped.

The best olfactory sense was recorded for *Calliphora* genus. *Lucilia* blowflies had a medium olfaction and *Protophormia* blowflies the lowest one.

This experiment was carried out for the first time in Romania, but further studies are required to accurate establish the role of olfactory sense in host detecting.

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