



A study of the incidence of *Lucilia sericata* fly in ovine in Mosul city

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Abstract

The objective of the current study is to examine the incidence of *Lucilia sericata* larvae in the sheep in Mosul city, Iraq. From a total of 670 sheep examined, 92 sheep of them 13.7% were infested with *Lucilia sericata* larvae. For the 516 larvae found in the sheep, 146 (28.3%) was detected to be of the first instars larva, 120 (23.3%) was second in stars larva and 250 (48.4) as third instars larva. As the average number of larvae in the infested animals was 5.6. The infestation percentage in males was higher 26.3% compared to the females 4.2%, where there is no significant difference reported concerning with the age. The prevalence of *Lucilia sericata* larvae was 8.4% in spring, 38.9 % in summer, 2.4% in autumn and 1.5% in winter. The difference in terms of seasons were statistically significant. Sheep in the rural areas had higher infestation rate in comparison to the sheep in urban area. Most lesions occurred in the breech region, flank, leg and inter digital space of a foot. The percentage of adult flies that merged was 73.3% and the pupariation period was 12 to 20 hours, while the incubation and moulting periods were 7 to 10 days. All flies were similar in the external appearance and belonging to *Lucilia sericata* causing strike disease in sheep.

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Introduction

Lucilia sericata, a common green bottle fly (Diptera, calliphoridae), is widely spread around the world and its play a serious role in the veterinary medicine. It causes sheep strike in sheep farms (1). Adult female flies lay their eggs in sheep's wool close to the surface of the skin and wound edges or animal body openings that cause wound myiasis (2). After hatching, the larvae go through three instars and they feed on skin secretions and epidermal tissues causing severe tissue and muscle damage by secreting enzymes (3).

The feeding larvae causes economic losses, decreased production, morbidity and even mortality (4). After completion feeding, the third instar larvae then drop to the ground and pupate. Then mature flies emerge after several days (5).

The common signs of sheep strike are characterized by the isolation from the flock, restlessness, biting or kicking

the wounded area, discolor of wool, increases in respiratory rate and body temperature, loss of the body weight, anemia and toxemia. Sheep strike cause economic losses in terms of meat and wool industries, amount to millions of dollars worldwide annually (6).

The behavior of infested animal depends on the localization and the numbers of larvae (7). The incidence rate of *Lucilia sericata* is determined by several factors such as wool length, faecal soiling, sheep susceptibility and flies abundance, high rainfall and high temperature (8).

The aim of this study is to identify *Lucilia sericata*, record their occurrence in different regions of Mosul city and to identify the flies that emerge from the larvae collected from the sheep body, percentages of hatched adults, incubation period and transformation from pupa to adult fly. This study presents the first report about the current situation of the *L. sericata* distribution in Mosul city.

Materials and methods

A total of 670 sheep were visually inspected individually to detect the presence of larvae of *Lucilia sericata* in different areas in Mosul city and different age and both sexes and to determine the seasonal variation of *Lucilia sericata* infestation in sheep. So, the sites and clinical manifestation of wounds were listed.

Recovered larvae were collected, counted, washed in saline solution and fixed in 70% alcohol and the mean larvae burden was calculated per infested sheep. Thin section of posterior spiracles of the third stage larvae was taken and transferred to a clean in 10% KOH, boiled for 3 to 5 minutes and dehydrated in alcohol 50, 70, 90, 100% and these sections were transferred to a clear for 5 to 10 minutes in carboxylol solution and mounted on glass slide using DPX after mounting posterior spiracles identified by using the microscope (9,10).

Sixty mature third instars were chosen and reared in plastic vials containing sand and a bovine meat portion and marked individually (11,12). The pots were covered with gauze in room temperature at average of 23°C and average humidity 44.3. Larvae were checked to assess pupal formation and the duration of this process was recorded (13). Data was statistically analyzed using chi-square test using Jandel sigma stat scientific software V3.1.

Result

The 13.7% of the 670 inspected sheep were found to be infested with *Lucilia sericata* larvae, and these sheep were suffering from active wounds myiasis when examined. The mean intensity of larvae was 5.6 larvae per-infested sheep with an average of 28.3 L1, 23.3 L2 and 48.4 L3. All stages of *Lucilia sericata* larvae are of conical shape and smooth, and larvae were white or yellowish in the all three instars. The larval stage is determined by counting the number of slits in the posterior spiracles: one slit in the first instars

larva, two slits in second instars larva and three slits in third one (Table 1, Figures 1 and 2).

Infestation rates differed significantly between males 26.3% and females 4.2% and there were no significant differences for animals ages (Table 2). The seasonal prevalence rate of *Lucilia sericata* in sheep varied between 1.5% and 38.9% and so there was a significant difference between seasonal prevalence during the period of the study (Table 3). The highest rate of prevalence was observed in the rural areas 17.6%, but the lowest was noticed in the urban areas 8.6% (Table 4).

Most lesions occurred in the breech regions, flank, legs and inter digital space of a foot. The numbers of animals with myiasis of breech region was higher than the infestation level of other body parts. The sizes of wounds ranged from 1 to 10 cm in diameter and from a few millimeters to 2-3 cm in depth. Wounds were packed with larvae of all instars of *Lucilia sericata* and all larvae were identified as *Lucilia sericata* and there was moderate to severe bleeding and exudates over the edges wounds (Figure 3).

The behavior of infested sheep depended on the location of the infestation and the most common signs were that animals always try to bite or kick at the affected area, being isolated from the flock, discolored wool and restlessness. The sixty third stage larvae reared a total of 44 adults flies 73.3%, and 3 larvae 5% did not pupae produced. From the other hand, 13 (21.7%) could not reached the stage of adult. The percentage of pupae development and emergence are shown in (Table 5).

In this study, the pupariation period was 12-20 hours. The pupae are characterized by hardened shell black or brown in colour and they are 9-10 mm long with a width ranging from 3 to 4 mm (Figure 4). Moreover, the incubation and moulting periods take from 7 to 10 days and the emerged flies were similar in morphology when examined under the stereo microscope. They are 10-14 mm long, of metallic green color, the wings veins are light brown and the antennae and legs are black (Figure 5).

Table 1: Numbers of sheep infested with *Lucilia sericata* and its larval stages

No. of sheep inspection	No. of sheep infested	Infection rate %	No. of larvae	Mean larval burden	Larval stage %		
					L1 146	L2 120	L3 250
670	92	13.7	516	5.6	28.3	23.3	48.4

Table 2: Infestation rate according to animal age and sex

Age/Sex	No. of sheep inspection	No. of sheep infested	infestation rate %
6 months- 2years	200	25	12.5 ^a
2-4 years	240	35	14.6 ^a
4-5 years	230	32	13.9 ^a
Male	289	76	26.3 ^a
Female	381	16	4.2 ^b

A different letter in column are significantly different (P<0.05).

Table 3: Seasonal prevalence of larval stages of *Lucilia sericata* infesting sheep

Seasons	N. of sheep inspection	No. of sheep infested	infestation rate %
Spring	190	16	8.4 ^a
Summer	180	70	38.9 ^b
Autumn	164	4	2.4 ^a
winter	136	2	1.5 ^a

A different letter in column are significantly different (P<0.05).

Table 4: The infestation rate according to regions of Mosul city

Regions	No. of sheep inspection	No. of sheep infested	infestation rate %
Urban	290	25	8.6 ^a
Ruler	380	67	17.6 ^b

A different letter in column are significantly different (P<0.05).

Table 5: Pupation and emergence percentages of 60 mature third instars reared in room temperature

Pupation development	No.	Prevalence %
Emerged to adult	44	73.3%
Not pupae produced	3	5
Not reached to adult	13	21.7



Figure 1: Mature third instar larvae of a *Lucilia sericata* under dissection microscope.



Figure 2: Posterior spiracles of mature third instar larvae of a *Lucilia sericata*.



Figure 3: Wound myiasis of tail region of sheep packed with larvae of all instars of a *Lucilia sericata*.



Figure 4: Pupae of a *Lucilia sericata*.



Figure 5: Adult fly of a *Lucilia sericata* under dissection microscope.

Discussion

This study was conducted due to the lack of information about the wide spread of *Lucilia sericata* larvae in sheep and their negative impact on sheep breeders in Mosul city. A prevalence rate of 13.7%, which was observed in the study is an indication of the presence of *Lucilia sericata* larvae in Mosul city and it was determined for the first time. The prevalence of *Lucilia sericata* larvae was lower than that of studies in Hungary, which was 17.6% (14). Similarly, a higher prevalence than the one observed by our study had been reported in North Island, which was 1.7% and 0.7% (15) for the South Island. The difference might be due to the variation in the climate of the regions and the incidence of *Lucilia sericata* determined by several factors

such as wool length, faecal sailing, sheep susceptibility, fly abundance, higher portions of rainfall and higher temperature (16).

The infestation rate was significantly higher in males compared to female and this result was in agreement with those described by some authors (14,17) may be due to the physiological differences between sexes or due to the increased density of males compared to females and the habit of securing of male animals, which facilitate their attack by *Lucilia sericata* flies.

The highest prevalence rate in sheep was recorded during Summer and Spring and this might be due to the increased activity of adult *Lucilia sericata* fly and favorable climatic conditions for it and this result was in conformity with Grassberger and Reiter (18,19).

The prevalence is higher in the rural areas compared to urban areas and this difference could be due to the difference in animal density in the various areas of study in addition to the lack of awareness in the rural areas, which is a predisposing factor for larva infestation (20).

The high degree of infestation appeared in the breech area and this result is in conformity with (21,22), but it doesn't correspond with Farkas *et al.* (16), which reported that incidences of genital organ strikes were higher than other area of the animal body.

The percentage of adult flies that emerged was in conformity with those recorded by Wall *et al.* (23), which obtained a hatch rate of 77% for *Lucilia sericata* adult.

The measurement of larvae and pupa observed in this study are in agreement with those described by Williams and villet (24).

Conclusion

Total of 670 sheep examined, 92 sheep 13.7% were infested with *L. sericata* larvae. For the 516 larvae found in the sheep, the infestation percentage in males was higher 26.3% compared to the females 4.2%, The prevalence of *L. sericata* larvae was 8.4% in spring, 38.9 % in summer, 2.4% in autumn and 1.5% in winter.

Most lesions occurred in the breech region, flank, leg and inter digital space of a foot. Percentage of adult flies that merged was 73.3% and the pupariation period was 12 to 20 hours, the incubation and moulting periods were 7 to 10 days.

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Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this manuscript.

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دراسة نسبة حدوثية الإصابة بذبابة *Lucilia sericata* في الضأن في مدينة الموصل

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الخلاصة

تهدف الدراسة الحالية إلى تشخيص ومعرفة نسبة الخمج بيرقات ذباب *Lucilia sericata* في الضأن في مدينة الموصل - العراق. تم فحص ٦٧٠ من الضأن حيث وجدت اليرقات في ٩٢ من ألسان المفحوص وبنسبة مئوية بلغت ١٣,٧% وبلغت العدد الكلي لليرقات المجموعة ٥١٦ يرقة حيث بلغت يرقات الطور الاول ١٤٦ (٢٨,٣%)، ويرقات الطور الثاني ١٢٠ (٢٣,٣%)، في حين سجلت يرقات الطور الثالث ٢٥٠ (٤٨,٤%) وبمتوسط حمل ٥,٦. سجلت نسبة الخمج في الذكور ارتفاعا معنويا ٢٦,٣% مقارنة بالاناث اذ بلغت ٤,٢%، كما اشارت الدراسة ان عمر الحيوان ليس له اي تأثير معنوي على نسبة الخمج. بلغت نسبة الخمج بيرقات *Lucilia sericata* في فصل الربيع ٨,٤%، وفي الصيف ٣٨,٩% في حين سجلت في الخريف ٢,٤%، وفي الشتاء بلغت ١,٥%، كما بينت الدراسة ارتفاع نسبة الخمج في الضأن في المناطق الريفية، ولوحظ أن اغلب الأفات كانت متواجدة في المنطقة الخلفية للحيوان والخاصرة ومنطقة الساق والمساحة الداخلية للقدم. كما تم تربية ٦٠ يرقة من يرقات الطور الثالث وبلغت نسبة التحول الى ذباب بالغ ٧٣,٣%، وبلغت نسبة اليرقات التي تحولت الى عذراء لكنها لم تتحول الى ذباب ٢١,٧%، في حين بلغت نسبة اليرقات التي لم تتحول الى طور العذراء ٥%، كما بلغت فترة التشرنق من ١٢ - ٢٠ ساعة، اما فترة الحضانة من ٧ - ١٠ يوم. كما وجد أن جميع الذباب الناتج متشابه بشكله الخارجي ويعود إلى النوع *Lucilia sericata* المسبب لداء الضربة في الضأن.