The Infestation Study of *Oestrus ovis* L. 1761 in Sheep of Al-Amara Region, Maysan Province, South of Iraq

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Abstract

362 heads of sheep obtained (in multiple visits) from the central slaughterhouse and the sheep abattoir at Al-Amara region (Maysan, South of Iraq) between November 2016 and March 2017 were examined for the detection of *Oestrus ovis* larvae for the first time in this region. Sheep heads were examined by dissecting them longitudinally, the sheep were of local breed. Of the 362 heads, 296 (81.8%) were infested with *O. ovis* larvae. *O. ovis* larvae were observed recorded in both sexes and all age groups in different temperature ranges (low, medium and high) during the research period. A total of 985 larvae were collected. The overall infestation intensity (IN) was 5.443% L/H with a range of 2-8 larvae per infested head of sheep (L/Hs). The infestation of larval in the infested sheep was 54.14% in low- temperature weather, while 100% in relatively high- temperature weather. March showed the highest infection intensity, while January showed the lowest infection intensity. The novelty of the current study is to conduct the research in an area that totally different from what has been studied before in Iraq in regards to the geographical location and the climate conditions.

***Keywords**: Oestrus ovis, Oestrosis, infestation, sheep.*

Introduction

Oestrus ovis (Linne 1761, Diptera: Oestridae) the sheep nasal bot fly, is a well-known parasite of the cavities and adjoining sinuses in sheep and goats[1]. *O. ovis* has a worldwide distribution and is connected with a severe parasitosis of small ruminants, with emphasis particularly in the Mediterranean regions and Middle East. The growth of larvae in the nasal sinus cavities may guide to serious clinical signs that together with the irritation caused by the larvae of bot fly may result into severe economic losses[1]. Moreover, *O. ovis* infestation may be considered a zoonotic parasite[2] as it may cause ophthalmyiasis in human as reported in many parts of the world including Libya[3] and other Middle Eastern countries such as Jordan, southern Iran, northern Iraq, Saudi Arabia and Libya[4,5,6,7,8]. The pathogenicity of *O. ovis* larvae has frequently been clarified to cause mechanical and traumatic harm to the nasal mucus by the oral hooks and cuticular spines of the larvae that leads to inflammation and induces secondary infection[1]. Oestrosis causes nasal discharge that affects breathing especially in Iraq due to hot and dry weather and it may migrate from the nasal cavities and sinuses into brain causing false gid[9]. The sheep bot fly larva of *Oestrus ovis* is a mammalian parasite of the skin, nose, ears, and eyes[2]. When the larvae infest and feed on the eternal parts of the eye, the case is called ophthalmomyiasis. A number of cases of ophthalmitis or nasal/pharyngeal myiasis in humans caused by the oestrosis larvae have been reported with high infestation from numerous regions all over the world[3].

Several studies on *O. ovis* have been reported from the northern cities in Iraq[10] and in some Arabic countries[4,11,12]. In addition to some neighbor countries such as Iran[13], Turkey[14,15]. The infestation of *O. ovis* in sheep in Europe varies from 21.9% to 93.7%[16]. 28.4% in France[1], and 45% in Spain[17].

To the best of our knowledge, there is no information on the intensity and incidence of *O. ovis* infestation available to the sheep in Southern Iraq despite the popularity of sheep breeding, therefore, this study was undertaken to investigate the infestation and intensity of infestation by *O. ovis* in sheep in Maysan Province/ southern of Iraq, in order to plan a cooperation with the

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Ministry of Agriculture to get rid of this parasite.

Materials and Method

Animals and study area: 362 heads of sheep were slaughtered and examined for *O. ovis* infection from November 2016 to March 2017 at the slaughterhouse and abattoirs located in the Maysan province. The area lies north-east of Basra city and south of Baghdad (the capital city of Iraq) and located on longitude 31.8496° N and attitude 47.1460° E.

Examination procedure: Individual heads of the slaughtered animals were separated from the carcasses, all information such as the date of sampling, the cod number of the head, the result of the examination and the number of larvae in each head were recorded. The heads were cut along their longitudinal and sagittal axes using dissecting equipment with assisting of the butchers. After slaughter, the heads were put separately into nylon bags and transported to the laboratory for examination. All nasal cavity (the nasal passage, septum, middle meatus, and conchae) and paranasal sinus (frontal and maxillary) of each head were carefully examined. The larvae of insect *O. ovis* was isolated and collected into vials and transferred to the laboratory. After collection of the larvae, 1% hydrogen peroxide (H_2O_2) was injected through the breathing hole of the larvae and was preserved in 70% ethanol as described by[18]. The larvae were counted and recognized according to[19]. The intensity of the infestation (IN) was calculated based on number of larvae/ number of infested animal heads (L/Hs).

Statistical analysis: The collected data were analyzed statistically using the chi-square test, standard deviation, percentage, and F- test using the Statistical Package for Social Sciences (SPSS). All data was rested for normal distribution and submitted to one- way ANOVA.

Results and Discussion

The *Oestrus ovis* fly had been known to be epidemic in Iraq for long time ago; however, only a limited data on its infestation is available and have been reported from the Northern Iraqi Provinces [10,20,21,24]. Hence this study was conducted for the first time to calculate the incidence of this parasite in Southern of Iraq which is totally dissimilar to the above studies in regards to the geographical location and the climate conditions[22]. The activity of this parasite is strongly influenced by the climatic factors[23].

The investigation for *O. ovis* larvae had been made during the months of November, December, January, February, and March (2016/2017) (**Table 1**). Out of the examined 362 sheep heads, around 81.8% were found to be infested with *O. ovis* larvae (**Figure 1**). This prevalence of infestation rate of sheep was higher than those recorded in Northern of Iraq [10,20,21,24,25]. These recorded rates are also higher than to what have been conducted in other regions of the world[4,12,13,14, 15,26, 27,28,29,30,31,32]. This might be due to differences in geographical location, livestock breeding, animal race, animal age, host resistance, size of sheep flock, veterinary care and previous treatment with drugs, and environmental condition[4,21,23].

The current study showed the monthly prevalence of infestation ranged from 58.1% in January to 100.0% in March (**Table 1**) the total monthly results revealed high significant differences in the *O. ovis* infestation among the months of study ($F= 11.773$; $p< 0.001$). Temperature degrees [22] in the studied area showed in (**Table 2**).

During summer, the activity of the adult *O. ovis* fly increases [32], while during winter, the larvae suffer diapause periods, and decrease in their growth rate [1]. These findings coincided with previous reports[15,26]. In addition, the recorded larvae numbers actually return to an older formation (few months ago) due to the life cycle of such parasites. It was confirmed that 20 °C was the minimum temperature for the parasite activity, while most favorable temperature appears to range between 26 °C and 28 °C[23]. Consequently, the temperature were optimal for the parasite during February and March.

The morphological characteristics of the larval stage were displayed in **Figure 2** and the most frequent larvae sizes were displayed in **Figure 3**. The present study showed that all larval instars were recovered (L1,L2and L3) instars which were detected clearly, but the L2 and L3 instars were the most recovered larvae (**Table 3 and Figure 4**). Many prior reports had provided similar observation in Iraq [21,24], and other countries [4, 14,15,28]. It was observed that sheep, over two years old, has acquired immunity against *O. ovis* larvae as a result of repeated exposure to infestation while lambs remain more susceptible to infestation[31]. The small size of L1 larvae made them disappear in small places such as the ethmoid bone, during the examination period[28]. A proportion of *O. ovis* L1 larvae may develop inside the nasal cavities

in the cold months,this explains the disappearance of the adult stage at this time with probability that expelled larvae either die or winters as pupal diapauses[32]. Therefore, the *O. ovis* adjusted its life cycle according to the surrounding local climate[15,28].

The mean of infestation intensity of infested sheep (IN) was 5.433 larvae per infested sheep head (L/SH) (**Table 3**). These results might return to the same factors that affected the distribution of this fly which explained by[4,21,23].

Table 1. The monthly infestation of *Oestrus ovis* in sheep.

Months	Total of examined animals	number of infested animals	%
November	37	29	78.4
December	85	60	70.6
January	43	25	58.1
February	132	117	88.6
March	65	65	100.0
Total	362	296	81.8

Table 2.: The infestation of *Oestrus ovis* larvae in sheep with regards to Temperature range.

Temperature range C°	Number of Examined Sheep	Number of Infested Sheep	%
6-19	165	114	69.09
20-39	197	182	92.3
Total	362	296	81.8

Table 3. The frequency of larval (IR) burden of *O. ovis* among the infested heads of sheep distributed in months of the study

month		Number of larvae in infested heads (L/H)							Total	Intensity	Uncounted heads	Non-infested heads	Total heads
		2		4	5	6	7	8					
Nov.	No. of heads	7	14	3	4	0	0	0	14	3.286	15	8	37
	Σ of larvae	14	8.0	12	20	0	0	0	46		-	0	-
Dec.	No. of heads	1	7	2	1	0	0	1	7	4.143	53	25	85
	Σ of larvae	2	4.0	8	5	0	0	8	29		-	0	-
Jan.	No. of heads	-		-	-	-	-	-	25	-	25	18	43
	Σ of larvae	-		-	-	-	-	-	-		-	0	-

Cont... **Table 3. The frequency of larval (IR) burden of *O. ovis* among the infested heads of sheep distributed in months of the study**

Feb.	No. of heads	0	90	12	28	17	33	0	90	5.789	27	15	132
	Σ of larvae	0	51.1	48	140	102	231	0	521		-	0	-
March	No. of heads	0	65	15	15	18	17	0	65	5.569	0	0	65
	Σ of larvae	0	36.9	60	75	108	119		362		-	0	-
Total	No. of heads	8	176	32	48	35	50	1	176	5.596	120	66	362
	Σ of larvae	16	100	128	240	210	350	8	985		-	0	-

X2= (229.868;df=28);p<0.0001

Figure 1: A sagittal section sheep head showing different larval stages of the nasal pot (the blue arrow: L2, the black arrow: L3).

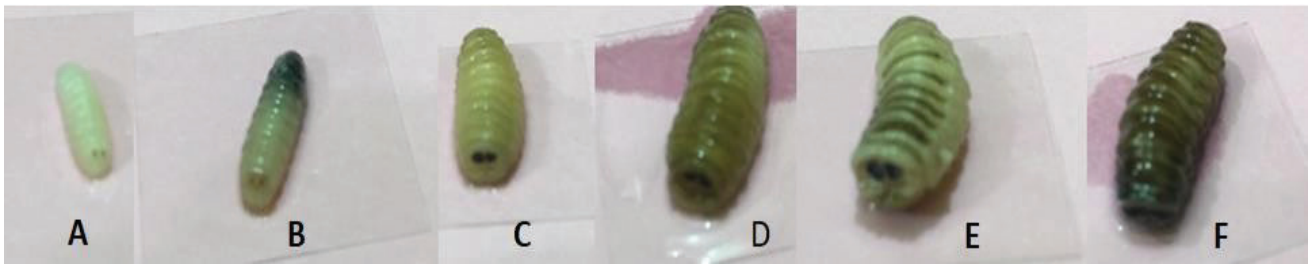

Figure 2: The three larval instars of *O. ovis* in the nose of sheep. A-B: Second larval instar (L2), C: initial stages of third larval instar (L3), D-F: more advanced stages of L3.

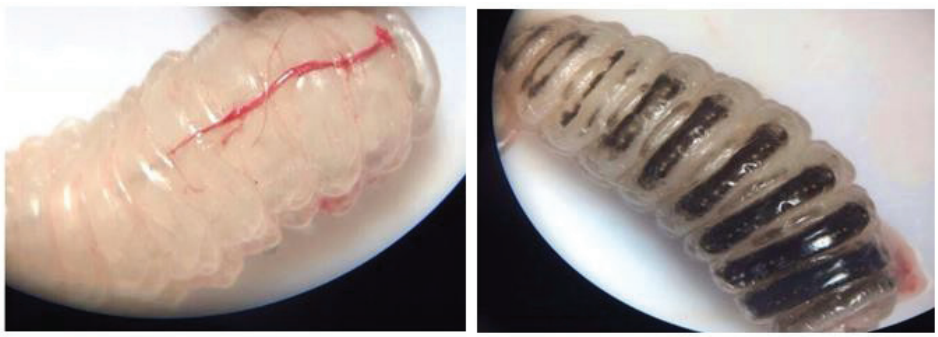

Figure 3: The most frequent larvae sizes found in the current study.

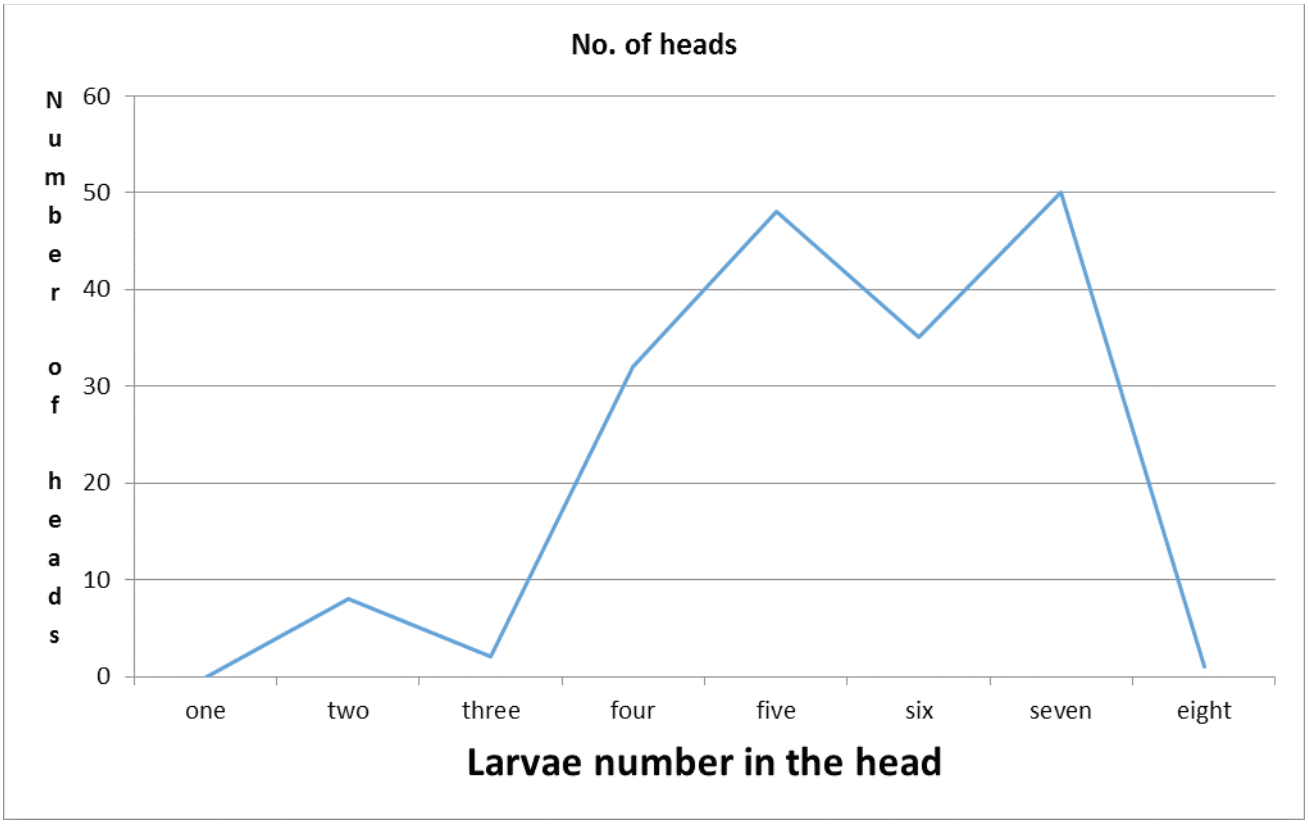

Figure 4 Larvae number in the infested sheep heads

Conclusion

The infestation of oestrosis in the sheep at Southern Iraq has been determined for the first time and *O. ovis* larvae were detected in 81.8% of the sheep examined. Infection by *O. ovis* is considered to be an important problem in sheep in Maysan province and is expected to be of importance for animal production and welfare. In order to estimate the economic significance of oestrosis, the efficiency of control measures and determines the precise infestation of *O. ovis* infestation in this province, further examinations are required including more animals and determining more risk factors. Finally, in order to lower the infestation rate of oestrosis it would be essential to use an effective and persistent drug against *O. ovis* in order to achieve eradication of the disease. In conclusion, it is possible to state that more than a few annual generations of adult flies may arise in the region. Novel studies will be essential to assess the impact of oestrosis in sheep production, as well the most excellent strategies of prophylaxis.

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Conflict of Interest: There are no conflicts of interest.

Ethical Clearance: Permission to conduct this study was issued by the Health institutional and the main slaughterhouse authorities. Heads collection was carried out under veterinary public health technician supervision.

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