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Full Length Research Paper

Seasonal prevalence of *Oestrus ovis* L. (Diptera: Oestridae) larvae in infested sheep in Jazan Region, Saudi Arabia

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Oestrus ovis* L. (*O. ovis*) (Diptera: Oestridae) is a cosmopolitan agent of myiasis in sheep and goats. Sneezing and nasal discharges are the major clinical signs in infested animals. The present study was carried out to estimate the annual abundance of *O. ovis* in randomly selected male sheep heads in Jazan region. Survey conducted weekly for *O. ovis* during the period from November, 2010 to October, 2011, from Slaughterhouses in Jazan and the ecological data including, temperature, relative humidity, were obtained from the Department of Meteorology, Jazan. The study investigated 480 sheep heads. The collected larval specimens were identified by British Museum (Natural History), London. Results indicated that 257 (53.54%) of the total examined sheep heads showed positive infestation. Infestation recorded four peaks at January, May, July and October. The highest infestation was detected at January (82.5%), while the lowest was at August (25.00%). Also, the first, second and third larval instars represented 3.02, 20.35, and 76.63% from the total collected larvae, respectively. The data represented mean larval monthly number per sheep head. The study suggested the cold seasonal related *O. ovis* infestation in Jazan region.

Key words: Jazan, *Oestrus ovis*, sheep, seasonal prevalence, abundance.

INTRODUCTION

The present study continues the planned series of studies that aim to detect the prevalence and abundance of the dipterous insects associated with sheep in Jazan region. These studies were started by Bosly (2010), who recorded twelve dipterous species within eight genera, belonging to seven families: Calliphoridae, Sarcophagidae, Muscidae, Ceratopogonidae, Ulidiidae, Sphaeroceridae, Chloropidae on sheep in Abu Arish, Alquayiyah, (Eastern Jazan); Duhaygah and Mihliyah (Northern Jazan); Mizhirah and Industrial City (Southern Jazan). The present study focuses on the nasal botfly *Oestrus ovis*, Linnaeus 1761 (Diptera: Oestridae).

O. ovis is the almost cosmopolitan and well known myiasis causing dipterous insect species which affects the health of sheep and goats in many parts of the world (Zumpt, 1965; Nacapunchai et al., 1998; Gracía et al., 2006). The parasitic phase of *O. ovis* begins after adult females deposit first larval stage larvae into the nostrils of hosts; these larvae develop into second and third larval stages in the nasopharyngeal cavities and frontal sinuses (Zumpt, 1965). Sneezing and nasal discharges are the major clinical signs in infected animals (Angulo-Valadez et al., 2011). Sometimes, the larvae are present in human eyes, classified as ophthalmomyiasis externa if it is on

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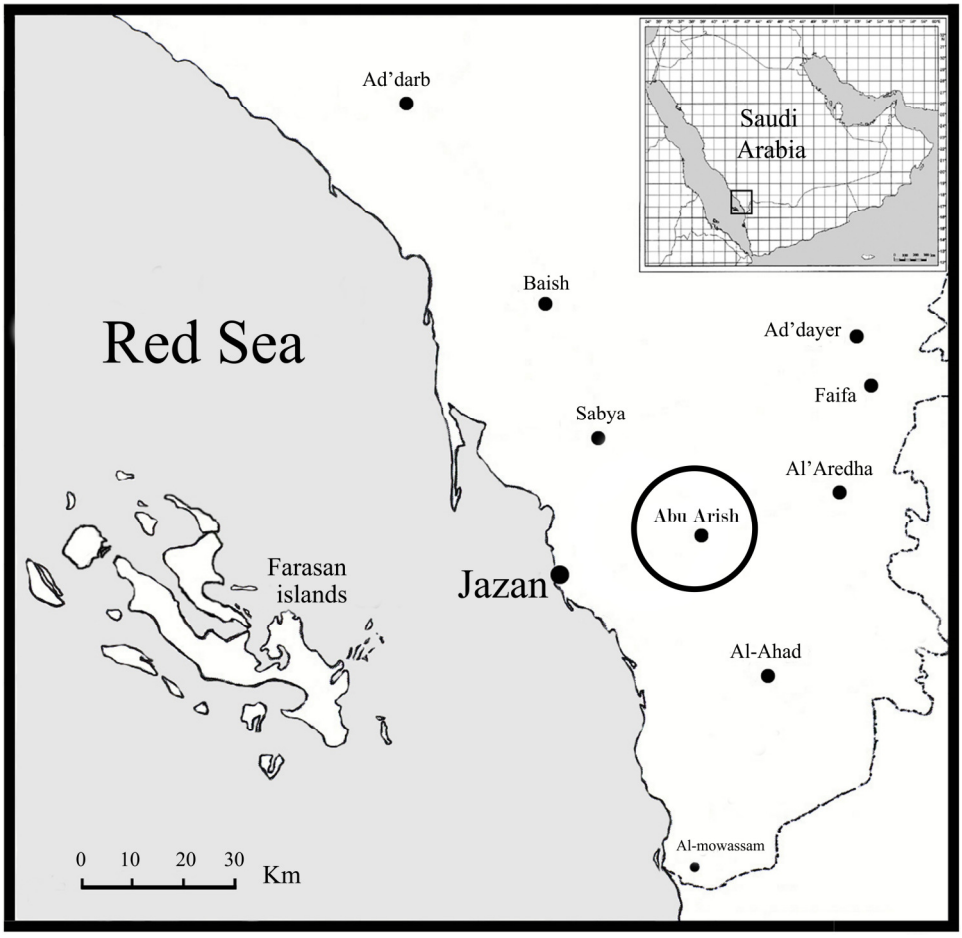

Figure 1. Map showing the location of the study area.

the conjunctiva and ophthalmomyiasis interna when there is intraocular penetration of larvae (Gregory et al., 2004; Dunbar et al., 2008; Khurana et al., 2010; Parikh et al., 2011). McGarry et al. (2012) observed infestation of dogs with first-stage larvae deposited by an adult fly the previous autumn in a farm in the Cotswolds, UK. Abundance of *O. ovis* larvae were done in many localities in central region of Saudi Arabia by Alahmed (2000). Despite the veterinary and medical importance of the nasal botfly in Saudi Arabia, little is known about its distribution and abundance in Jazan region. Accordingly, the present work aimed to detect the annual abundance of *O. ovis* on sheep in Jazan during the period from November, 2010 to October, 2011.

MATERIALS AND METHODS

The study area

The present study was carried out in Abu Arish area (Eastern Jazan), southern Saudi Arabi, (16° 58'N to 42° 47'E) (Figure 1).

Animals

The survey of *O. ovis* was conducted weekly during the period from November, 2010 to October, 2011 from Slaughterhouses in Jazan. A total of 480 randomly selected male sheep heads were examined for infestation.

Examination procedures

Heads were detached and opened from nose to the base by an electric saw. Larvae of the different instars were found alive inside heads; these larvae were picked up by forceps and preserved in 70% ethanol. Identification of specimens was performed by using keys of Zumpt (1965), Ferrar (1987) and Smith (1989), moreover some specimens were sent to British Museum (Natural History), London to confirm identification.

Weather data

Ecological data including the mean annual temperature, relative humidity and the received rainfall per annum were obtained from Meteorological Agency, Jazan.

Table 1. Monthly temperature, relative humidity and number of infested sheep head by *Oestrus ovis* in Jazan, Saudi Arabia.

Month	Temperature		Relative humidity (%)	No. of infested heads*	Percentage of infestation
	Max. Mean	Mean	Mean		
November, 2010	34.0	24.8	67	19	47.5
December	30.9	22.9	73	28	70.0
January, 2011	29.9	22.2	75	33	82.5
February	30.9	22.8	72	32	80.0
March	32.1	24.1	70	26	65.0
April	34.8	26.8	66	20	50.0
May	37.2	28.8	65	20	50.0
June	37.6	31.2	64	14	35.0
July	38.4	32.1	60	15	37.5
August	38.2	30.6	64	10	25.0
September	37.7	30.0	65	20	50.0
October	36.4	26.9	68	20	50.0
Total*	-	-	-	257	53.5

*Monthly examined 40 sheep head. *Total examined 480 sheep head during the study period.

Statistical analysis

The percentage of sheep head infestation (%) was calculated by the equation:

(Number of Infested heads / Total number of examined heads) × 100

The percentage of each *O. ovis* larval instar per infested sheep head was calculated by the equation:

(Number of larval instar / Total number of larvae) × 100

The mean larvae number per sheep head was calculated by the equation:

Number of monthly instar larval / Total monthly number of Infested sheep heads.

RESULTS AND DISCUSSION

Data in Table 1 and Figure 2 represent the monthly temperature, relative humidity and number of infested sheep heads by *O. ovis* larvae during the study period started in November, 2010 in Gizan region. Generally, the examination of 480 sheep heads revealed that 257 (53.5%) heads were infested with different larval instars of *O. ovis* (Table 1). Alahmed (2000) reported that during a period 12 months, 544 sheep heads were examined for infestation with *O. ovis* larvae in Riyadh abattoir, with recorded prevalence of infestation at 5.9%. The data reported that the lowest infestation percentage of sheep heads in August, 2011 was 25%, where temperature and relative humidity were 38°C and 64%, respectively. However, the percentage of infested heads in the present study increased to a peak abundance in January, 2011 (82.5%), followed by simple decline in February (80.0%). The results clearly showed the weather relation to the insect abundance because in Jazan region, the winter months are the best time of the year, with low temperature and high humidity while the decline in the flies' activity in most of the year was probably due to the heat and weather (http://en.wikipedia.org/wiki/Jizan). These results are in line with Alahmed (2000) who recorded the peak of infestation with *O. ovis* larvae in Riyadh as 23.3% in March (low temperature and humidity). Also, Dorchies et al. (2000) reported that the prevalence rate of *O. ovis* larvae in sheep and goats (in France) varied from 14.3% in February to 65% in October and Shoorijeh et al. (2009) found that prevalence of *O. ovis* larvae at the fairs abattoris in (Iran) ranged from 23.3% in spring to 80% in Winter.Datas in Table 2 and Figure 3 represent a total of 860 larvae of all three instars of *O. ovis* which were collected. The infestation percentages were 3, 20.4 and 76.6% of the first (L1), second (L2) and third instars (L3) larvae, respectively. The data in Table 3 showed the mean monthly number of larvae per sheep head (L/S). The L1 expressed two peaks, one in April (0.4 L/S) and the second in May (0.7 L/S) and L2 peaked in May (1.9 L/S) and in June (1.6 L/S) while L3 peaked only in August (8.4 L/S). In general, L2 and L3 instar larvae behaved in a similar trend throughout the experimental period as the fly had only one generation per year which started in November. Also data in Table 3 indicated that the mean monthly total number of all three instars had two peaks of abundance in August (8.7 L/S) and in May (6.3L/S). As regard to the predicted lower mean of the first instar larvae, Tabouret et al. (2001) previously reported that rapid larval development occurs in summer whereas L1

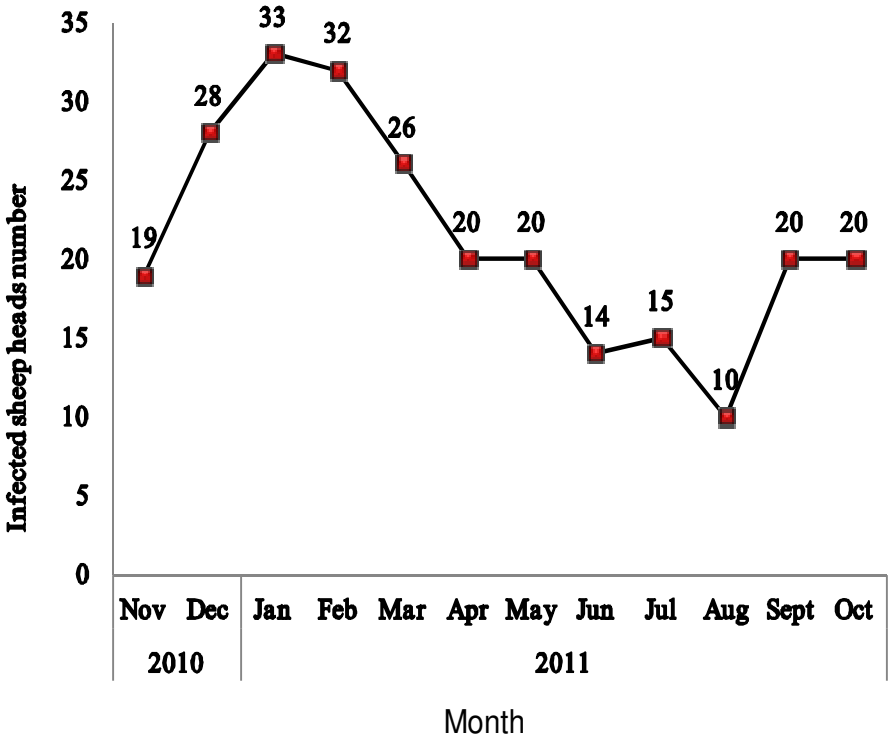

Figure 2. Monthly number of Infected Sheep Heads of *Oestrus ovis* Abu Arish area (Eastern Jazan), south Saudi Arabia.

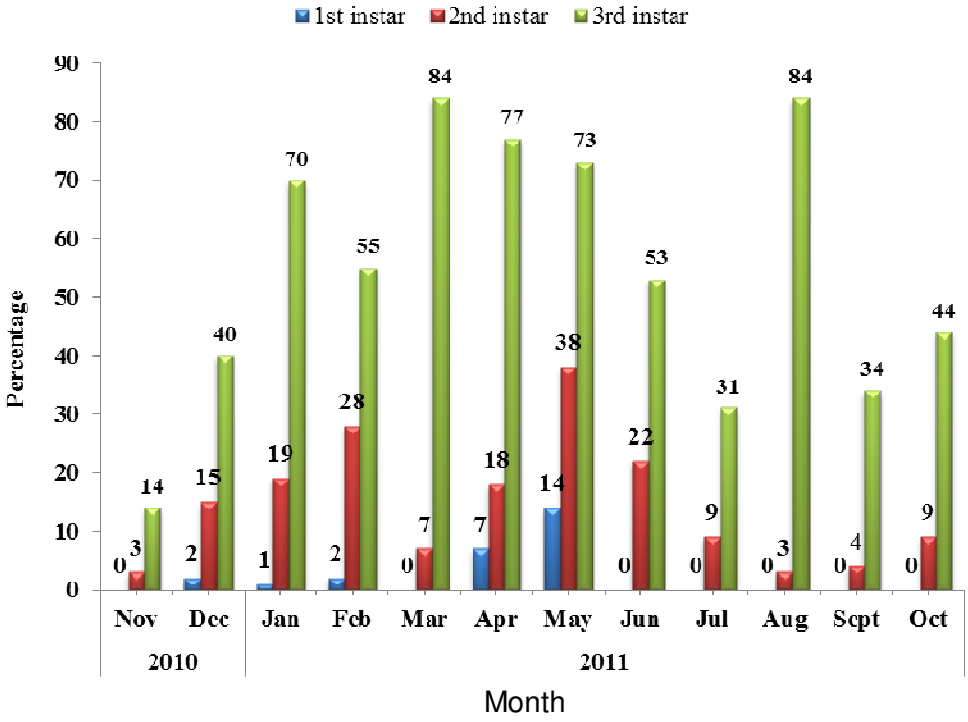

Figure 3. Monthly number intensity of *O. ovis* infection in sheep of different instars.

Table 2. Number of the three instars of *Oestrus ovis* larvae and number of each larval instar.

Month	Total No. of larvae	Larval instar					
		L1	%	L2	%	L3	%
November, 2010	17	0	0	3	17.7	14	82.35
December	57	2	3.51	15	26.3	40	70.18
January, 2011	90	1	1.11	19	21.11	70	77.78
February	85	2	2.35	28	32.9	55	64.71
March	91	0	0	7	7.7	84	92.31
April	102	7	6.86	18	17.7	77	75.49
May	125	14	11.20	38	30.4	73	58.40
June	75	0	0	22	29.3	53	70.67
July	40	0	0	9	22.5	31	77.50
August	87	0	0	3	3.5	84	96.55
September	38	0	0	4	10.53	34	89.47
October	53	0	0	9	16.98	44	83.002
Total	860	26		175		659	
Percentage		3.0		20.4		76.6	

Table 3. Monthly mean of first, second and third instars larvae *O. ovis* per sheep head (L/S).

Month	Mean larvae per sheep head (L/S)			
	1st instar	2nd instar	3rd instar	Mean total
November, 2010	0	0.2	0.7	0.9
December	0.1	0.5	1.4	2.0
January, 2011	0.03	0.6	2.1	2.7
February	0.1	0.9	1.7	2.7
March	0	0.3	3.2	3.5
April	0.4	0.9	3.9	5.2
May	0.7	1.9	3.7	6.3
June	0	1.6	3.8	5.4
July	0	0.6	2.1	2.7
August	0	0.3	8.4	8.7
September	0	0.2	1.7	1.9
October	0	0.5	2.2	2.7

whereas L1 hypobiosis takes place in the late autumn and winter. In southern Mediterranean countries (Morocco, Tunisia, etc.), the hypobiosis period is shorter and in humid tropical countries, adult fly activity and larval development occur all around the year. Also, Angulo-Valadez et al. (2010) discussed that *O. ovis* life cycle development is closely related to local climate and geographical location. Previous reported observations indicate that the range of L1 establishment rate is 0 to 48% in sheep (Dorchies et al., 1998; Frugére et al., 2000) and the L1 stage lasts from less than 10 days to more than 25 days under favorable temperatures (Cepeda-Palacios and Scholl, 2000).

Badawi (1994) previously mentioned that under Saudi Arabia conditions, the larvae spend about 9 months in sheep head before falling for pupation. Amin et al. (1997) pointed out that *O. ovis* larvae were found all over the year in sheep heads in Cairo and has one generation. Alahmed (2000) reported that the highest mean number of larvae per infested sheep head in L1, L2 and L3 were 5, 7 and 5.3, respectively in spring months. Alahmed (2004) stated that the myiasis incidences were highest during March to May (60%) and September to November (31.5%), where temperature and relative humidity are optimum. Arslan et al. (2009) found that the prevalence of sheep nasal myiasis in Turkey was 54.3% in spring, 41%

in summer and 38.9% in winter. Shoorijeh et al. (2009) indicated that prevalence of *O. ovis* in sheep head in Iran ranged from 23.3% in spring to 80% in winter. Also, Gracia et al. (2010) determined the prevalence of *O. ovis* larvae in sheep heads monthly for one year in Spain and reported that *O. ovis* recorded slower larval maturation in winter. Paredes-Esquivel et al. (2012) found that 46.03% of animals were infested in a 13-month period in the island of Majorca (Spain) and significant differences in oestrosis prevalences in winter and autumn. Silva et al. (2012) suggested that evolution and development of *O. ovis* practically occurs throughout the entire year, with larval infestation especially frequent during the spring and summer months.

This study suggested the risk of *O. ovis* larvae according to the abundance in Jazan region and the impact of climate on the infestation. Hence, the importance of controlling the sheep infestation which should be in the beginning of the winter season and for complete prevention, a seasonal treatment in April, is suggested, and every effort should be made to control them by sanitary measures and tools for the pest management. The results of this survey proved that the high infestation of sheep with *O. ovis* was monitored on January, 2011, and also revealed that this fly is becoming a serious pest in Gizan region. The prevention of myiasis is mainly achieved by treating the infested hosts. All efforts should be made to control this fly and the Ministry of Agriculture efforts should be intensified in the winter season to restrict and control the infection level.

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