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Oestrid myiasis in European Mouflon from Spain

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ABSTRACT: From February 1992 to March 1997, 245 European mouflon (*Ovis orientalis musimon*) from Sierras de Cazorla, Segura y Las Villas Natural Park (southern Spain) were surveyed for oestrid larvae in order to estimate prevalence and mean intensity of parasitism by *Oestrus ovis*. Over 46 percent of the animals surveyed were infected, with a mean intensity of 9.6 larvae/host parasitized. No significant differences in prevalence rates between host sexes were observed, but older mouflons were infected with more larvae than younger ones.

Key words: European mouflon, nasal myiasis, *Oestrus ovis*, *Ovis orientalis musimon*, sheep bot fly, survey.

The sheep bot fly, *Oestrus ovis*, a cosmopolitan species with a Palaearctic origin, is mainly a parasite of domestic sheep and goats (Zumpt, 1965; Haeselbarth et al., 1966; Jagannath et al., 1989b). This fly also has been reported from wild sheep and goats including the Siberian ibex (*Capra ibex sibirica*), argali (*Ovis ammon*) (Grunin, 1957; Wetzel and Bauristhene, 1970) and bighorn sheep (*O. canadensis*) (Capelle, 1966; Bunch and Webb, 1979; Allen and Bunch, 1982). Due to similarity to other *Oestrus* spp., *O. ovis* has not been confirmed from African antelopes. However, Howard (1980) reported that it may occur in Nubian ibex (*C. ibex nubiana*) and Barbary sheep (*Ammotragus lervia*). A case of nasal myiasis by *O. ovis* in a domestic dog from the Canary Islands (Spain) has been recently reported by Lucientes et al. (1997), and *O. ovis* larvae fairly frequently have been identified as causing human ophthalmomyiasis (Nabeel and Saliba, 1978; Apt et al., 1980).

This parasitism may be a predisposing factor for caprine pleuropneumonia (Jagannath et al., 1989a). In bighorn sheep, chronic sinusitis is considered as a major mortality factor, especially in captive conditions. Presumably, chronic sinusitis is due to bacterial infection induced by the bot fly parasitism (Bunch and Webb, 1979; Allen and Bunch, 1982).

The impact of *O. ovis* in livestock is well known (e.g., Cobbett and Mitchell, 1941; Unsworth, 1949; Horak, 1977; Horak and Butt, 1977; Pangui et al., 1988; Pandey, 1989; Ruiz et al., 1992), and the biology, ecology, and bionomics of this oestrid have been investigated (see Rogers and Knapp, 1973; Breev et al., 1980; Jagannath et al., 1989b; Bart and Minar, 1992). Climate influences life-cycle duration and number of generations per year, and is related to a high mortality rate (up to 99%) in larval stages. Nevertheless, data on occurrence of this parasite on wild hosts are scarce. The main goal of our study was to analyze basic epidemiological parameters influencing oestrosis affecting the European mouflon (*Ovis orientalis*), an exotic ungulate species which was released in southern Spain during the 1950's and 1960's. Presently mouflon are sympatric with red and fallow deer (*Cervus elaphus* and *Dama dama*) and Spanish ibex (*Capra pyrenaica*) in this mountain range.

From February 1992 to March 1997, 245 European mouflon were surveyed for oestrid larvae. Samples came from the Sierras de Cazorla, Segura y Las Villas Natural Park, southern Spain (38°30′N, 2°45′E). Sampling was limited to the official hunting season (October to March). The head and neck were removed from each carcass and frozen in plastic bags (−4C, 12 to 48 hr after death) until they were examined. Age of mouflon was assessed by counting horn rings and teeth

replacement (Pfeffer, 1967). Necropsies were conducted following the method described by Ruiz et al. (1993) and Pérez et al. (1996), and oestrid larvae were identified according to Grunin (1957), Zumpt (1965) and Wetzel and Bauristhene (1970). Prevalence and mean intensity of oestrosis were calculated according to Margolis et al. (1982) and Bush et al. (1997). Differences in intensities and prevalences between different host sex and age classes were tested by means of ANOVA or Mann-Whitney analyses and chi-squared, respectively, (Sokal and Rohlf, 1995), using the BMDP program (Dixon, 1990). Type material, consisting of 5 L_2 and 5 L_3 larvae, was deposited at the Museo Nacional de Ciencias Naturales (CSIC: Madrid, Spain).

A total of 1,100 bots were removed from 114 mouflon, for a prevalence of 47%. All larvae were *O. ovis.* Prevalence was similar in males (46%) and females (47%) (Table 1). Prevalence tended to increase with host age (Table 1), but these differences were not significant (x^2 = 16.985; df = 10; P = 0.0747). The mean (±SD) intensity was 9.6 ± 17.9 larvae/host parasitized (range = 1–142), with 105 and 142 larvae from an 11-yr-old female and an 8-yr-old male, respectively. If these extreme values are deleted, no significant differences were observed in the intensity of oestrid larvae across sexes (Mann-Whitney's U = 51.61; P = 0.9397). The mode in the parasitized hosts was 1 (n = 16). However, intensity of parasitism in older mouflons was higher relative to younger ones (Levene's F = 4.47; df = 10; $P < 0.0001$). The distribution of larvae within hosts followed a negative binomial distribution (K = 0.251; $\bar{x}$ = 2.463; variance = 16.372; Diggle, 1983).

The prevalence observed in this study are close to values given by other authors for domestic sheep and goats parasitized by *O. ovis.* Prevalence observed in mouflon was less than levels in sheep in southern Spain and Morroco (Ruiz et al., 1992), and less than those seen in other wild ungulate species such as Spanish ibex, red

TABLE 1. Parasitism in 245 European mouflon by *Oestrus ovis,* according to sex and age classes collected February 1992 to March 1997 in southern Spain.

Statistic	Age							
	≤2-yr-old		3- to 5-yr-old		6- to 9-yr-old		≥10-yr-old	
	Males	Females	Males	Females	Males	Females	Males	Females
Number examined	38	63	18	46	13	53	0	14
Number infected	14	20	9	23	9	30	—	9
(%)	37	32	50	50	69	57	—	64
Mean intensity (±SD)	6.7 ± 6.4	7.2 ± 7.8	11.2 ± 10.6	6.8 ± 4.2	29.0 ± 44.2	6.0 ± 8.7	—	17.6 ± 31.2
Range of intensity	1–22	1–32	1–37	1–17	1–142	1–44	—	2–105

deer and fallow deer, from the same study area (Ruiz et al., 1993; Pérez et al., 1996).

The mean intensity of *O. ovis* also was within the range of values obtained in other studies on the occurrence of larvae of this species in domestic animals. Increased numbers of larvae with host age has been reported previously in wild ungulates (Ruiz et al., 1993; Pérez et al., 1996) and this may be explained by the availability of greater space provided by the nasopharyngeal areas and the frontal and horn sinuses of older animals. More data acquired during different months are needed to determine the seasonal dynamics of oestrosis in mouflon as well as in the domestic sheep which are sympatric.

Price (1980) analyzed the host-specifity of different kinds of parasites, including Old World oestrids, and noted that 49% of oestrid species are specific to a single host species. This author suggested that specificity in the Oestridae results partially from limitation in the number of available hosts rather than strong selection pressures for specialization on one or a few hosts. The record of *P. picta*, normally a parasite of red deer, parasitizing mouflon in Hungary (Sugar, 1974) supports the idea that oestrid flies can be opportunists. The same happens with *O. ovis* when it accidentally parasitizes the dog or human.

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