Iranian Journal of Veterinary Research, Shiraz University, Vol. 9, No. 3, Ser. No. 24, 2008

Short Paper

Prevalence of *Eimeria* infection in sheep of Tabriz suburb, Iran

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(Received 15 Aug 2006; revised version 5 Jan 2008; accepted 4 Mar 2008)

Summary

This study was undertaken to determine the prevalence and diversity of *Eimeria* species in sheep in Tabriz suburb. The prevalence of ovine parasitism due to *Eimeria* spp. was estimated in 240 sheep aged less than six months to over 12 months, in a period of one year (2003-2004). The samples were collected from pre-slaughtered sheep in Tabriz slaughterhouse and transferred to the parasitology laboratory. Afterwards, sporulation of the oocysts was performed. The overall prevalence of *Eimeria* infection in sheep was found to be 16.7%. Two pathogenic species of *Eimeria*, including *E. ahsata* (8%) and *E. ovina* (18%) and four non-pathogenic species, *E. faurei* (18%), *E. parva* (13%), *E. pallida* (8%) and *E. intricata* (35%) were identified. All of the infected sheep (40 out of 240) had mixed infections at least with three species. Intensity of the infection was significantly higher in young sheep compared with older animals ($P<0.05$). Gender had a significant effect on the prevalence and intensity of the infection ($P<0.05$). Diversity in *Eimeria* spp. in different age groups, potentially, might be an important factor contributing to notable losses in small ruminants in this area.

Key words: Prevalence, *Eimeria* spp., Sheep, Tabriz, Iran

Introduction

Coccidiosis is of great economic and medical importance in sheep (Levine, 1985). Coccidial infections have been reported in almost all sheep rearing in the world. It is assumed that many of domestic ruminants become infected with coccidia during their life (Taylor and Catchpole, 1994). Fifteen *Eimeria* species were considered to have the capability of infecting sheep (Platzer *et al*., 2005), 14 species were found in the intestine of the sheep and one species (*E. gilruthi*) in the abomasum (Reginsson and Richter, 1997).

There have been some studies on sheep coccidian infection in Iran. Furthermore, infective species of *Eimeria* was found to be common in faecal samples of sheep in Iran, but there was no study on the prevalence and diversity of *Eimeria* infections in sheep of Tabriz suburb. The objective of the present study was to determine the prevalence and diversity of *Eimeria* species in sheep in Tabriz suburb.

Materials and Methods

Field study area

This study was carried out in Tabriz slaughterhouse, East Azerbaijan province, from January 2003 to January 2004 during wet and dry seasons. East Azerbaijan province is situated in the northwestern Iran and has an area of about 46929.9 km^2 including 2.3 million hectares of pastureland. An average population of 3.5 million sheep exists in this area according to annual report of Iranian Veterinary Organization (IVO, 2003).

Parasitological procedure

A total of 240 faecal samples were collected from rectum of sheep. Sample size

was calculated according to Thrusfield (1997). Sheep were selected randomly from the pre-slaughtered animals in Tabriz slaughterhouse and divided into 3 different age groups; 6 months, 6-12 months and more than 12 months old. Each sheep was numbered and subjected to clinical examination, including general body condition, heart and respiratory rates, ruminal movements and signs of diarrhoea. The collected samples were put separately into a plastic container with a lid and data pertaining to the sex, age and consistency of faeces were recorded.

Three grams of each sample was mixed with 42 ml of tap water. The mixture was subjected to centrifugal sedimentation (1500 rpm for 3 min) and flotation technique using standard Sheather's solution (sp.gr.1.12) for demonstrating the presence of oocysts. The intensity of infection was estimated in terms of oocysts per gram of faeces (OPG coefficient). Sporulation of the oocysts was performed using Hendrix (1998) procedure. The species were identified based on morphometry study of Eckert *et al*. (1995) and Soulsby (1986).

Statistical analysis

Statistical evaluation was carried out using SPSS for Windows. Data were analysed using chi-square (χ^2) test. A p-value less than 0.05 was considered as statistically significant.

Results

Of 240 sheep, 129 were male and 111 were female. The oocyst of *Eimeria* spp. was found in the stool of 40 (16.7%) sheep (16 lambs, 14 immature and 10 adults). The association of the prevalence of *Eimeria* spp. infection in different age groups with other factors were shown in Table 1. Consistency of faeces and intensity of infection had significant association with age ($P<0.05$) (Table 1). The sex and age of the sheep had significant effect on the prevalence ($P<0.05$), as well.

Six species of *Eimeria*, including *E. intricata* (35%), *E. faurei* (18%), *E. ovina* (18%), *E. parva* (13%), *E. ahsata* (8%) and *E. pallida* (8%) were identified (Fig. 1) in 40 out of 240 examined sheep. All of the infected sheep (16.7%) had mixed infections at least with three species and the others (83.3%) were not infected.

Discussion

In the present study, two pathogenic and four non-pathogenic *Eimeria* species were identified. All of the infected sheep (16.7%) had mixed infections at least with three species. Demir (1997) reported that 97.7% of the animals were found to have either single or mixed infections. Similarly, Alani *et al*. (1989) noted that there was no

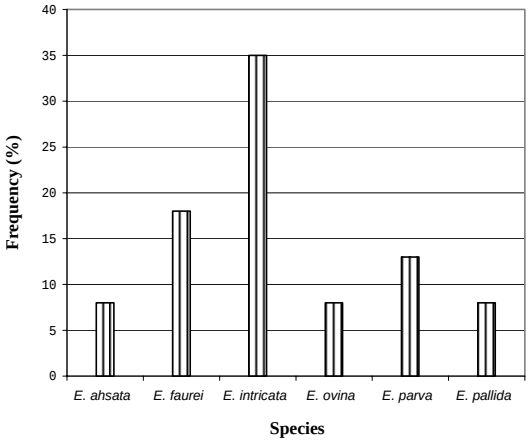

Fig. 1: Prevalence of *Eimeria* spp. exhibited by oocysts morphology and morphometry in sheep

Table 1: The prevalence of *Eimeria* infection in different age groups according to sex, consistency of faeces and intensity of *Eimeria* infection in sheep (n = 240)

Age (months)	Sex[a]		Consistency of faeces[a]				Intensity of infection[a] (OPG count)		
	Male	Female	N	S-S	S	D	$<10^{3*}$	10^3-$5\times10^{3**}$	$>5\times10^{3***}$
<6	6	10	–	–	–	16	–	–	16
6-12	3	11	–	6	8	–	–	14	–
>12	2	8	10	–	–	–	10	–	–
Total	11	29	10	6	8	16	16	14	10

[a]: $P<0.05$, *+1, **+2, ***+3, N: Normal, S-S: Semi soft, S: Soft and D: Diarrhoea

significant seasonal variation in infection with these parasites. In the study of Sisodia *et al*. (1997) the highest prevalence was recorded in animals aged between six months and one year compared with older animals.

The number of *Eimeria* species identified in sheep was similar to that of other studies (El-Mouldad, 1977; Foreyt, 1986; Kusiluka *et al*., 1996; Platzer *et al*., 2005). The most prevalent species was ***E. intricata*** (35%). *Eimeria* infections in sheep occurred as a mixed infection with 3-10 species of *Eimeria* in the same sample (Pout *et al*., 1973). Although *Eimeria* species were presented in sheep throughout the year, their percentage seemed to increase, particularly during the late fall and whole winter. The infection rate decreased due to the absence of rainfall (during July to September months in 2003), high temperature and low relative humidity. Hence, aggregation of sheep of different age groups during cold season was considered as the most important factor that influence seasonal variation on the percentage of *Eimeria* infection. This is in accordance with the findings of Taylor and Catchpole, 1994 and Cox, 1998.

Nine of the 15 *Eimeria* species infective to ovine intestine were not detected in this study in contrast to other studies (Alani *et al*., 1989; Reginsson and Richter, 1997; Sisodia *et al*., 1997). But in all age and sex groups, coccidial infection was observed which is in agreement with Taylor and Catchpole (1994).

OPG counts were significantly higher in the young sheep compared to immature and adult sheep ($P<0.05$). Barutzki *et al*. (1990) reported that lambs passed large numbers of oocysts in their faeces compared with ewes or yearlings. Amarante and Barbosa (1992) stated that the highest oocyst counts were observed in 4–8-week-old lambs. In the Himachal Pradesh, the northwestern state of India, young sheep and goats aged less than six months were the main victim of coccidiosis (Gupta *et al*., 1992). Although these species were common in faecal samples, their appearance depends upon the age and immunity status of the host. Whereas, the OPG + 3 in immature sheep (three males and seven females) and low prevalence of infection and normal form of faeces in lambs showed that they served as carriers. Foci of infection to lambs were consistent with the observations of Radostits *et al*. (2000). In addition, sheep coccidiosis is an important disease in pre-weaned and recently weaned lambs. In the majority of hosts, the coexisted parasites causing minimal damage. Clinical coccidiosis only occurs if the host was subjected to heavy infection or due to lowered host resistance (Taylor, 1995). Considering the early weaning time and prepatent periods (Rommel, 2000), the infection of the lambs most likely originated from the surrounding environment and not from their mothers (Platzer *et al*., 2005). Of course, the heavier infection in lambs compared to immature and adult sheep is related to the management practices on the farm where the first lot of sheep were moved into the infected farm without any suitable strategy against the infection (Hindson and Winter, 2002).

Acknowledgements

The authors gratefully acknowledge the support and interest of the technical member of Parasitology Lab. in Urmia University, especially Mr. E. Aghapur. We wish to thanks Dr Sh. Javadi for useful comments on the manuscript and Dr. F. Soltanalinejad for altering the statistical analysis of data.

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