Vol 18 No 2, p 283-285

GASTROINTESTINAL PARASITES OF CAMELS (*Camelus dromedarius*) FROM TURKEY AND EFFICACY OF DORAMECTIN AGAINST TRICHOSTRONGYLES

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ABSTRACT

A coproparasitological and anthelmintic efficiency study was performed in camels (*Camelus dromedarius*) on a farm in Bursa province. Faecal samples were examined by the floatation, sedimentation, Baermann and larval culture methods. The animals were found to be infected with *Trichostrongylus* spp., *Teladorsagia* spp., *Nematodirus* spp., *Trichuris* spp., *Capillaria* spp., Anoplocephalidae, *Dicrocoelium dendriticum, Eimeria cameli* and *E. rajasthani*. On the other hand, the anthelmintic activity of doramectin when administered intramuscularly at a dose rate of 0.2 mg/kg of body weight was evaluated against trichostrongyles. Pre- and post-treatment trichostrongylid egg counts (EPG) were determined by a modified McMaster's technique. Pre-treatment mean EPG was 280 and the range was from 50 to 900. Doramectin reduced trichostrongyle EPG by 100%. No adverse local or systemic reactions were observed following the treatments.

Key words: *Camelus dromedarius*, doramectin, gastrointestinal parasite, trichostrongyle, Turkey

Several investigations have reported of the occurrence of different helminths in camels in different parts of the world (Sharrif *et al*, 1997; Magzoub *et al*, 2000; Bekele, 2002; Schuster and Wernery, 2004; Dia 2006). In Turkey, the livestock census from 2008 estimated the camel population to be approximately 970 (Anonymous, 2008), majority of which are show animals. Only a limited number of studies have been carried out, especially on gastrointestinal parasites, in Turkey (Eren *et al*, 2003) and there is no investigation on the treatment of any parasitic infections. Therefore, the aim of the present study was to collect data on gastrointestinal parasites of camels and to determine the efficacy of doramectin against trichostrongyle infections.

Materials and Methods

Camels (nine females and one male) aged 2 to 15 years and originated from a farm in Bursa district (Marmara region) were used in this study. The animals fed grass hay together with a supplementary grain ration. The had not been anthelmintically treated during the previous six months according to the information given by the animal owner. Individual faecal samples were examined by floatation, sedimentation and the Baermann-Wetzel method (MAFF, 1986). On the other side, to determine the efficacy of doramectin (Dectomax® injectable, 1% w/v, Pfizer) against trichostrongyles it was administered intramuscularly at the cattle dose rate of 0.2 mg/kg body weight. Trichostrongyle egg counts per gram of faeces (EPG) were determined by a modified McMaster's technique (MAFF, 1986). Arithmetic group mean EPGs were calculated on the day of treatment and at two weeks after treatment. The percentage faecal egg count reduction (FECR) was calculated according to the formula:

$$\text{FECR (\%)} = \frac{\text{Mean EPG (before treatment)} - \text{Mean EPG (after treatment)}}{\text{Mean EPG (before treatment)}} \times 100$$

Pooled faecal samples were incubated at 27°C for 10 days for larval identification (MAFF, 1986). All animals were kept under observation during the first 24 hours after treatment to record any abnormalities at the site of application.

Results

The gastrointestinal parasites detected individually in coprological examinations are shown in Table 1. Results indicating that all camels were found carrying mixed-infections with different parasite genera. Trichostrongyle larvae isolated from faecal culture belonging to *Teladorsagia* and *Trichostrongylus* were also identified. Trichostrongyle egg counts resulted in a mean of 280 EPG and the

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range was from 50 to 900. Doramectin reduced the EPG in treated animals by 100%. In addition, no other nematode eggs were seen in the post-treatment examinations whereas Anoplocephalidae, *D. dendriticum* and *Eimeria* spp. were still present. No adverse local or systemic reactions were observed following the treatments.

Table 1. Gastrointestinal parasites found individually in camels in Bursa province of Turkey.

		n (infected)
Nematoda	Trichostrongylidae	10
	Ematodirus spp.	1
	Trichuris spp.	8
	Capillaria spp.	3
Trematoda	*Dicrocoelium dendriticum*	6
Cestoda	Anoplocephalidae	1
Protozoa	*Eimeria rajasthani*	7
	Eimeria cameli	9

Discussion

Due to fact that no other camel farm exists in the study area and even though the relative small number of total camel population (Anonymous, 2008) which is sporadically distributed in the whole country restricted us to study with a limited number of animals. To our best knowledge, there is only one investigation on gastrointestinal parasites of camels in Turkey (Eren *et al,* 2003). The parasites reported by Eren *et al* (2003) are as follows: Trichostrongylidae, *Trichuris* spp., *D. dendriticum* and *Eimeria* spp. They also found hydatid cysts in two of six died camels. In the present study, Nematodirus spp., *Teladorsagia* spp., *Trichostrongylus* spp., *Capillaria* spp., Anoplocephalidae, *E. cameli* and *E. rajasthani* were reported for the first time from Turkey. Trichostrongyle infections were found to be more prevalent than the other helminth infections. Similarly, higher infection rates for trichostrongyles have been reported from other studies (Sharrif *et al,* 1997; Tekle and Abebe 2001; Bekele 2002; Njiru *et al,* 2002). Furthermore, *Trichuris* and *D. dendriticum* were also found to be prevalent in camels in the current investigation. While varying prevalence rates were observed for *Trichuris* (Tekle and Abebe, 2001; Eren *et al,* 2003; Schuster and Wernery, 2004), *D. dendriticum* was generally reported to occur as a seldom species in camels (Kaufmann, 1996). *Capillaria* is also a rare parasite which is found in only 0.6% of the 5,686 faecal samples examined in the Dubai Emirate (Schuster and Wernery, 2004). Moreover, camels are host to a wide variety of cestode species such as *Moniezia expensa, M. benedeni, Stilesia globipuntata, S. vittata, Avitellina centripunctata, A. woodlandi* and *Thysaniezia ovilla* (El Bihari, 1985; Bekele, 2002). We found in one animal eggs of anoplocephalids; however, due to the difficulty of species differentiation based on egg morphology we did not determine this cestode infection at species level. Considering that all of these helminths are normally found also in other ruminant species, the from time to time presence of sheep on the grazing area of camels might be an explanation for these rare helminth infections detected in camels in the present study. Generally, such findings have implications for farming systems where camels and small ruminants are kept together. Those responsible for treatments of helminthoses should take this into consideration (Dia, 2006).

Eimeriosis in camels is caused by *E. cameli, E. bactriani, E. rajasthani, E. pellerdyi, and E. dromedarii* (Kaufmann, 1996; Yakhchalim and Cheraghi, 2007). Distinctly from the most helminths infecting camels *Eimeria* species are strictly host specific. The present study detected *E. cameli* and *E. rajasthani* in nine and seven animals, respectively. Nearly all animals were found to be infected with *Eimeria* and most of them had mixed-infections. Similarly, Eimeriosis in camels occurred as mixed-infections with overall prevalences of 41.6% in Saudi camels (Kasim *et al,* 1985), 17.4% in Sudanese camels (Yagoub, 1989), 12.8% in Iranian camels (Yakhchalim and Cheraghi, 2007) and 25.2% in Indian camels (Partani *et al,* 1999). The differences among *Eimeria* species and their prevalence depend on different factors such as environmental, climatic, host age, farm management, etc. For instance, Yakhchalim and Cheraghi (2007) found that young camel calves were more infected than old ones and infection increased in younger animals. However, older camels can also act as oocyst-shedding carriers without any clinical signs (Mahmoud *et al,* 1998; Hussein *et al,* 1987). Our findings are in line with the latter reports since all except one animal were ≥4 years old.

A number of studies investigating the efficacy of different anthelmintic formulations (e.g. albendazole, fenbendazole, tetramisole, levamisole, thiophanate, closantel, ivermectin, abamectin) in the treatment of trichostrongylosis in camels have been reported (Partani *et al,* 1995; Mukhwana and Mitewa, 1997; Al-Qudah *et al,* 1999; Shubber *et al,* 2003; Kadja *et al,* 2005). In the current study, injectable formulation of doramectin, a macrocyclic lactone anthelmintic

licensed for cattle, was used in camels at the cattle dose rate to assess its effectiveness against trichostrongyles. Doramectin successfully reduced the trichostrongyle EPG by 100% and no *Capillaria* or *Trichuris* eggs were present in post-treatment faecal examinations suggesting that doramectin was also effective against these helminths.

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