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RESEARCH ARTICLE

Trichostrongylosis in Cattle from South Marmara Region of Turkey: Assessment of Various Factors Related to Faecal Egg Counts

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Summary

A cross-sectional study was carried out to determine faecal egg density in trichostrongyle infections in relation to animal age, animal breed, management system and farm type in cattle in South Marmara region of Turkey. Rectal faecal samples were collected from 513 cattle and coprological examination were conducted by a modified McMaster technique to determine faecal egg counts (FEC) per gram of faeces. Overall egg density was 81.4±6.8 EPG and it remained generally low. The mean faecal egg counts for adults was higher than those for the youngs. However, no statistically significant difference was found between the age groups for faecal egg counts. Although mean FEC were higher in Turkish Grey than in Holstein and Karacabey Bown, no statistically significant difference could be determined among the animal breeds. Management system was the factor that influenced number of trichostrongyle eggs and animals under semi-extensive system had more egg counts than those kept under intensive management system. Animals in the governmental farm have been found less affected with significant difference than their counterparts at small scale private farms.

Keywords: *Cattle, Trichostrongylosis, Faecal egg counts, Turkey*

Türkiye'de Güney Marmara Bölgesindeki Sığırlarda Trichostrongylosis: Dışkı Yumurta Sayısı İle İlişkili Olarak Değişik Faktörlerin Değerlendirilmesi

Özet

Bu çalışma Güney Marmara bölgesindeki sığırlarda hayvanların yaşı, ırkı, yönetim şekli ve çiftlik tipi ile dışkıdaki Trichostrongylidae yumurta sayısı arasındaki ilişkinin belirlenmesi amacıyla gerçekleştirilmiştir. 513 sığırdan rektal yolla alınan dışkılar modifiye McMaster yöntemi ile incelenerek gram dışkıdaki yumurta sayıları belirlenmiştir. Genel olarak, ortalama yumurta sayısı düşük düzeyde olmuş ve 81.4±6.8 olarak saptanmıştır. Dışkıdaki Trichostrongylidae yumurta sayısı yaşlı hayvanlarda gençlere göre daha yüksek bulunmakla birlikte yaş grupları arasında istatistiki olarak bir fark bulunmamıştır. Ortalama yumurta sayısı Boz ırkta Holstein ve Karacabey esmeri sığırlara göre daha yüksek olmakla birlikte ırklar arasında istatistiki olarak önemli bir fark belirlenememiştir. Yönetim şekli Trichostrongylidae yumurta sayıları üzerinde etkili bir faktör olup yarı ekstansif sistemdeki hayvanlarda entansif yönetim sistemindeki hayvanlara göre daha fazla yumurta saptanmıştır. Devlet işletmelerindeki hayvanların, küçük çaplı özel işletmelerdeki hayvanlardan daha az etkilendikleri belirlenmiştir.

Anahtar sözcükler: *Sığır, Trichostrongylosis, Dışkı yumurta sayısı, Türkiye*

INTRODUCTION

Trichostrongyle infections are one of the most important causes of production losses in cattle for both small and large scale farmers [1-4]. These infections usually lack visible clinical signs, however, even when infections are subclinical, they may have a major economic impact as a consequence of reduced nutrient utilisation, weight

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gains, milk and retarded growth [4,5]. They vary greatly from place to place depending on many factors, such as climatic conditions, production type, breed and age of the animal, management and nutritional status [6-8]. Therefore, effective control of trichostrongyle infections is only possible after monitoring has provided sufficient information to understand the prevailing epidemiological factors influencing transmission. Infection with gastro-intestinal helminths has been extensively studied in many countries [3,7-9], however, despite their importance, there are limited studies focusing on the trichostrongyle infections in cattle from different localizations of larger areas determined by faecal egg examinations in Turkey [10-12].

The present study was designed with the purpose of to determine the effect of age, breed, management system and farm type on faecal egg counts in trichostrongyle infections in cattle reared in southern Marmara region of Turkey.

MATERIAL and METHODS

Study Area

This study was conducted at the South Marmara region of Turkey. This region is characterized by hot and dry summers with some rainfall. Winter conditions are change mild to cool with more extended periods of light to moderate rainfall. The mean annual temperature in the area is 14-16°C with minimum and maximum averages of 5°C and 25°C The area receives an average of 600-700 mm rain per year.

Farm Type

The study was performed on five governmental farms (A, B, C, D, E) belonging to General Directorate of Agricultural Farms (TİGEM) or General Directorate of Agricultural Researches (TAGEM), and four private farms (F, G, H, I). On private farms, the selection criteria was the herd owner's willingness to participate. On state farms, required permission was received from the relevant organisations.

Animals

A total of 513 animals (256 in governmental farms and 257 in small scale private farms) were examined for the trichostrongyle infections. All cattle were females and belonged to three different breeds including Turkish Grey, Holstein and Karacabey Brown. In each farm, all cattle were categorised into 2 age groups (≤3 and >3). Animals had not been anthelmintically treated during the previous 2 months according to the information given by farm managers or animal owners.

Sampling Method and Parasitological Examination

Faecal samples were directly collected from the rectum into a plastic bag and transported in a cooler-box to the parasitology laboratory of the Faculty of Veterinary Medicine, Uludag University. In the laboratory, faeces were analysed for trichostrongyle eggs as per gram faeces (EPG) by modified McMaster technique [13].

Management System

The investigated management systems were categorised as intensive (IMS) or semi-extensive (SEMS) based on infrastructure of herd and nutrition form of animals. In IMS, main feed sources were concentrated fed, mineral supplements, silage and dried hay. In SEMS also pasturing was essential. Feeding was mainly composed of some hay and, various pulps were given additionally. SEMS farms had their own grazing land that was fenced or not fenced.

Data Analysis

Mean egg counts per gram of faeces (mean EPG ± SE) were determined in different categories (age, breed, management system and farm type). By taking account that the egg elimination is not normally distributed, significance of the differences in each category was evaluated using the nonparametric Mann-Whitney U two-sided tests. Results were considered to be significant at $P<0.05$. All results were analysed statistically using Minitab (V-15) software package [14].

RESULTS

Trichostrongyle infections were detected in 113 (22%) of 513 cattle examined *(Table 1)*.

Table 1: *Number of infected animals with trichostrongyles and EPG ranges at farm level*

Tablo 1: *Çiftlik bazında Trichostrongylidae ile enfekte hayvan sayısı ve EPG düzeyleri*

Farm	Number of Examined Animals	Number of Infected Animals	Range (EPG)
A	50	0	-
B	50	0	-
C	30	3	0-200
D	76	27	0-100
E	50	5	0-100
F	67	0	-
G	64	48	0-600
H	58	0	-
I	68	30	0-150
Total	**513**	**113**	

The overall arithmetic mean of the egg counts was 81.4±6.8 and nearly 78% of the animals (400) had zero EPG *(Fig 1)*.

Influence of different factors on faecal trichostrongyle egg counts are shown in *Table 2*. The mean EPG was 87.5±11 (range 50-600) in >3 and 69.8±6 (range 50-200) in ≤3 year old age group. The mean trichostrongyle egg intensity for adults was higher than those for the youngs. However, no statistically significant (P>0.05) difference could be determined between the age groups for EPG intensity. Individual EPG ranged from 50-200 in infected Turkish Grey cattle and from 50-600 in Holstein cattle. Although mean EPG were higher in Turkish Grey (116.6±4) than in Holstein (77.9±6.9) and Karacabey Brown (0±0), they didn't differ significantly (P>0.05). Management type wise observations revealed that there was a significant difference (P<0.05) in EPG intensity between management systems with cattle in SEMS having the highest EPG (88.4±9.4). Mean EPG in cattle in IMS was 57.1±4.6. Moreover, variation in EPG in cattle due to farm type was also significant (P<0.05). Faecal egg counts were highest in the small scale private farms (87.3±9.3) and lowest in the governmental farms (58.8±4.9).

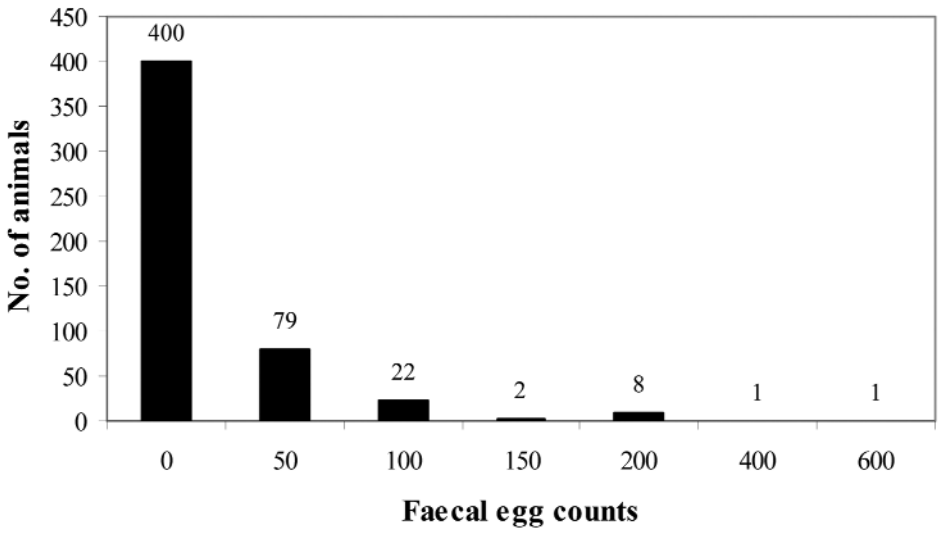

Fig 1. Frequency distribution of trichostrongyle egg counts in 513 cattle from 9 farms in South Marmara region

Şekil 1. Güney Marmara bölgesinde 9 çiftlikteki 513 sığırda Trichostrongylidae yumurta sayılarının dağılımı

Table 2: *Mean faecal egg counts in infected cattle in South Marmara region, on the basis of host age, breed, management system and farm type*

Tablo 2: *Güney Marmara bölgesindeki enfekte sığırlarda konak yaşı, ırkı, yönetim şekli ve çiftlik tipine göre dışkıdaki ortalama yumurta sayısı*

Category		n	Infected Animals	Mean EPG±SE
Age	>3 year	265	74	87.5±11 n.s.
	≤3 year	248	39	69.8±6 n.s.
				P>0.05
Breed	Turkish Grey	30	3	116.6±4 n.s.
	Holstein	433	110	77.9±6.9 n.s.
	Brown Karacabey	50	0	0±0
				P>0.05
Management System	Semi-extensive	249	78	88.4±9.4 [a]
	Intensive	264	35	57.1±4.6 [b]
				P<0.05
Farm Type	Governmental	256	34	58.8±4.9 [a]
	Private	257	79	87.3±9.3 [b]
				P<0.05

[a,b]***:*** *Values with different letters within each category are significantly different.*
n.s.: *not significant*
SE: *Standart error of mean*

DISCUSSION

Helminth infections remain a constraint to the efficient raising of cattle and primary factor in the reduction of productivity through losses due to reduced weight gains. The prevalence and intensity of gastro-intestinal nematodes in cattle may vary in different regions depending on many factors such as nutritional status, management type and climatic conditions. Therefore, different prevalence rates reported in Turkey and other countries were might be related to variation in these factors. In a study conducted in Bursa province, which had similar climatic conditions as those in our study area, Ergül [15] reported that the prevalence of trichostrongyle infections was 63.6% based on necropsy findings. In the present study, faecal egg counts were used to assess the intensity of gastrointestinal nematode infections in cattle. Using egg excretion to quantify adult trichostrongyles in cattle can be suspicious because the egg counts released from each worm can vary depending on many factors such as immune status of animals, species of gastrointestinal nematodes etc. [16,17]. Although egg counts do not always reflect nematode counts in infected animals both the simplicity of faecal sample collection and processing enables larger numbers of animals to be sampled, and a more accurate estimation of nematode burdens than would be obtained from a small number of post mortem parasite counts alone [18].

In the present study, it has been shown that generally the faecal egg output in both young and adult animals was very low. The average arithmetic egg counts showed that only light infections with gastrointestinal trichostrongyles occurred in sampled animals, indicating that worm burdens remained at subclinical level and that these infections did not interfere with health and body weight gains of the animals. This is also in line with Kırcali Sevimli et al.[12] and Yıldırım et al.[11] who found that faecal egg counts were very low in cattle in Afyonkarahisar and Kayseri provinces of Turkey, respectively.

Although intensities of faecal egg counts were higher in >3 year old age group (87.5±11) than in ≤3 year old age group (69.8±6) the difference was statistically insignificant. The high intensity rate observed in adult animals may be linked to increased feed intake and thus increased risk of ingestion of infective parasite stages and/or to less anthelmintic applications in older animals as a traditional approach.

The differences in the level of parasitism among different breeds of cattle had been evaluated in several studies [19-21]. Peña et al.[21] investigated breed susceptibility to nematode infection in Angus and Brangus cattle and reported that Angus cattle had significantly greater faecal egg counts than Brangus cattle. The difference in the tolerance of Bos taurus and Bos indicus to gastro-intestinal nematodes was evaluated by Suarez et al.[19] and they concluded that Bos taurus purebreds may be more resistant to gastrointestinal nematodes than crossbred animals. It has also been shown that gastro-intestinal nematode egg counts were significantly smaller in the calves of Pyrenean breed than in Brown Swiss [20]. In the present study, although a lower intensity of infection was observed in Holstein than in Turkish Grey cattle, no statistically significant difference was found between these cattle breeds.

Our findings that animals under semi-extensive system had more egg counts than those kept under intensive management system agree with that of Keyyu et al.[22] who reported that management practices especially grazing habitat has a significant influence on faecal egg counts in cattle infected with gastro-intestinal nematodes. On the other hand, the number of trichostrongyle eggs in our study was lower in governmental farms than that of small-scale private farms. The low egg output in governmental farms might be a reflection of high level of veterinary care, immediate removal of faeces, and routine anthelmintic treatments that may have reduced the infections compared with small scale private farms. Higher faecal egg counts in small scale private farms may be attributed to stocking density, poor nutrition, insufficient treatment and control measures.

From the data obtained in this study, it can be concluded that mean faecal egg counts in trichostrongyle infections in cattle in South Marmara region is low. Therefore, frequent treatments of cattle might be not necessary especially in intensive management systems. Furthermore, farm type and management system are important factors that influence trichostrongyle egg counts in cattle in this study area, however, breed and age doesn't seem to have an effect on the faecal egg counts.

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