



Helminth Infections in Cattle: A Study on Fecal Samples from the Ağrı Region

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ABSTRACT

The aim of this study was to investigate the prevalence of helminths in cattle in Ağrı region and to create literature information that will contribute to the fight against helminth diseases of both veterinarians working in the region and local people engaged in animal husbandry. The study included 438 cattle belonging to family enterprises located in different settlements of Ağrı center and its districts. Approximately 30-50 g of fecal samples were taken from the rectum of each cattle and examined under a light microscope using a modified sedimentation-centrifugation method. Of the 438 cattle whose faecal samples were examined, 198 (45.2%) had helminth eggs, 65 (32.8%) of the samples had two and six (3%) had three species. Eggs belonging to *Fasciola* spp. were detected in 63 (14.4%), *Dicrocoelium dendriticum* in 11 (2.5%), *Toxocara vitulorum* in 80 (18.3%), *Trichostrongylus* spp. in 106 (24.2%) and *Trichuris* spp. in 15 (3.4%) of the samples. More helminth eggs were found in Yerli kara breed compared to Holstein and Simmental breeds ($p=0.009$). As a result, it was observed that there was a high rate of helminths in cattle in Ağrı region. These parasites, which cause significant low productivity and even deaths in cattle, are of great importance and it is extremely important to periodically check the animals for intestinal parasites and to treat parasitic animals, especially in the region where pasture animal husbandry is common.

Keywords: Ağrı, Cattle, Helminth.

ÖZ

Sığırlarda Helminth Enfeksiyonları: Ağrı Bölgesinden Toplanan Dışkı Örnekleri Üzerine Bir Çalışma

Bu çalışmanın amacı, Ağrı yöresinde sığırlarda helminthlerin görülme sıklığını araştırarak, hem yörede görev yapan veteriner hekimlerin hem de hayvancılık ile uğraşan yöre halkının helminth hastalıklarıyla mücadelesine katkı sağlayacak literatür bilgi oluşturmaktır. Çalışmaya, Ağrı merkez ve ilçelerine bağlı farklı yerleşim yerlerinde bulunan aile işletmelerine ait 438 sığır dahil edildi. Her bir sığırın rektumundan yaklaşık 30-50 g dışkı örneği alınıp modifiye sedimentasyon-santrifüjleme yöntemi ile ışık mikroskopunda incelendi. Dışkı örneği incelenen 438 sığırın 198'inde (%45.2) helminth yumurtası saptanmış olup, numunelerin 65'inde (%32.8) iki ve altısında (%3) üç türe ait helminth yumurtası saptandı. Numunelerin 63'ünde (%14.4) *Fasciola* spp., 11'inde (%2.5) *Dicrocoelium dendriticum*, 80'inde (%18.3) *Toxocara vitulorum*, 106'inde (%24.2) *Trichostrongylus* spp. ve 15'inde (%3.4) *Trichuris* spp.'ye ait yumurtalar görüldü. Holştayn ve simental ırklarına göre yerli kara ırkında daha fazla helminth yumurtası saptandı ($p=0.009$). Sonuç olarak, Ağrı ve ilçelerinde sığırlarda görülen helminthlerin yüksek oranda olduğu görüldü. Sığırlarda önemli verim düşüklüğüne ve hatta ölümlere neden olan bu parazitlerin önemi büyük olup, özellikle mera hayvancılığının yaygın olduğu yörede hayvanların periyodik aralıklarla bağırsak parazitleri yönünden kontrollerinin yapılması ve parazitli hayvanların tedavi edilmesi son derece önem arz etmektedir.

Anahtar Kelimeler: Ağrı, Helminth, Sığır.

INTRODUCTION

Livestock farming constitutes an important part of agricultural activities in many parts of the world. According to the data of the Turkish Statistical Institute for 2023, the number of cattle in Türkiye was reported to be 16 million 421 thousand (TÜİK 2023). According to data

from the Invest in Ağrı Investment Support Office in Turkey, Ağrı province accounts for 2.2% of the country's total cattle population and 36% of its meadow and pasture areas. Known for its intensive meat and dairy cattle breeding, the majority of livestock enterprises in the province are small family-run businesses. However, in these enterprises, anthelmintic drug applications are



often not performed at the right time before the animals are put out to pasture and before they are taken into the barn (TÜİK 2023).

In many tropical and subtropical climate zone countries, including Türkiye, it is observed that there are significant economic losses caused by different helminth species, particularly in dairy cattle, including disease, body weight loss and death of affected animals in severe cases (Adedipe et al. 2014). Gastrointestinal helminths are parasitic agents known to limit ruminants and especially cattle production. Animal mortality from these parasitic diseases may not be alarming, but their indirect effects on livestock productivity and their zoonotic effects on human health are becoming increasingly important (Behera et al. 2020).

Helminth infections are generally found at higher rates in underdeveloped and tropical climates. However, more than two billion people worldwide are also affected by these infections due to mass migration, asylum, tourism and war. Helminth infections cause a decrease in meat and milk yield and quality, and even death of animals. This situation leads to carcass and offal losses in animals and causes financial losses especially for livestock farmers. Helminth infections may vary depending on variables such as climatic conditions in the cattle breeding region, nutrition and management of the enterprises (Arbabi et al. 2020; Pavlovic et al. 2023).

The effect of infection caused by helminth parasites varies depending on risk factors such as parasitic density, infestation, species and age. It also varies in healthy and productive cattle breeding enterprises in different regions due to various reasons such as feeding style, farm management and climatic conditions. There have been many studies (Sevimli et al. 2007; Köse and Kırçalı 2008; Kozan 2014) investigating the prevalence of gastrointestinal helminths (GH) and the diseases they cause by fecal examination method in cattle throughout the country, but no recent study has been conducted in Ağrı region and no study investigating the prevalence of GH has been found.

The aim of this study was to investigate the helminth species in cattle in Ağrı region where cattle breeding and pasture animal husbandry are common and to create literature information that will contribute to the fight against helminth diseases of both veterinarians working in the region and local people engaged in animal husbandry.

MATERIAL AND METHODS

Approval for the study was obtained from Van Yüzüncü Yıl University Animal Experiments Local Ethics Committee (Date: 26.12.2024, Decision no: 2024/12-01). The study was conducted in the center of Ağrı and Patnos, Doğubeyazıt, Diyadin, Eleşkirt, Taşlıçay, Tutak and Hamur districts. In the study, fecal samples of approximately 30-50 g were collected from the rectum of a total of 438 cattle (Table 1) of different ages, breeds and sexes belonging to family farms in different settlements of the mentioned locations and placed in sterile screw-capped fecal containers. The samples were delivered to Van Yüzüncü Yıl University Faculty of Medicine, Department of Parasitology Research Laboratory and kept at +4 °C until they were examined. The sedimentation-centrifugation method was modified and applied in the examination of stool samples (Köse and Kırçalı 2008; Kozan 2014; Hammami et al. 2024). The samples dissolved in pure water were filtered using a plastic tea strainer, and the final filtrate was taken into centrifuge tubes and centrifuged at 1800 rpm for

three minutes. The liquid on the tubes was poured off and preparations were prepared from the precipitate at the bottom of the tubes and examined under a light microscope with a 10X and 40X objectives.

Statistical Analysis

The relationship between categorical data was determined using the Z (t) ratio test. Analyses were performed using Minitab (ver: 26) statistical package program.

Table 1: Distribution of gender, breed and age of cattle included in the study according to districts.

Districts	Gender		Breed		Age		Total (%)
	Female	Male	Hollstein	Simmental	Domestic Black cattle	2-4+	
Ağrı center	37	7	6	5	33	36	44 (10)
Taşlıçay	45	9	11	13	30	47	54 (12.3)
Diyadin	39	6	7	7	31	38	45 (10.3)
Eleşkirt	58	8	5	6	55	55	66 (15.1)
Doğubeyazıt	41	3	8	7	29	36	44 (10)
Hamur	49	5	6	9	39	45	54 (12.3)
Tutak	61	7	13	7	48	54	68 (15.5)
Patnos	57	6	9	4	50	50	63 (14.4)
Total	387	51	65	58	315	361	438
*p.	0.788	0.180			0.968	0.963	

*p: Comparison of significance value for the distribution of each factor by districts.

RESULTS

Helminth eggs were detected in 198 (45.2%) of the 438 cattle fecal samples examined in the study. Of the 198 samples with helminth eggs, 65 (32.8%) had two species of helminth eggs and six samples (29.4%) had three species of helminth eggs. In the study, eggs belonging to *Fasciola spp.* were seen in 63 (14.4%) of the samples, *Dicrocoelium dendriticum* in 11 (2.5%), *Toxocara vitulorum* in 80 (18.3%), *Trichostrongylus spp.* in 106 (24.2%) and *Trichuris spp.* in 15 (3.4%) (Table 2).

Table 2: Distribution of helminth species detected in infected cattle.

Helminth species	Infected Cattle	
	Number	%
<i>Fasciola spp.</i>	44	22.2
<i>Dicrocoelium dendriticum</i>	11	5.5
<i>Toxocara vitulorum</i>	15	7.6
<i>Trichostrongylus spp.</i>	47	23.7
<i>Trichuris spp.</i>	10	5.1
<i>Fasciola spp.</i> + <i>T. vitulorum</i>	12	6.1
<i>T. vitulorum</i> + <i>Trichostrongylus spp.</i>	47	23.7
<i>Fasciola spp.</i> + <i>Trichostrongylus spp.</i>	6	3.1
<i>T. vitulorum</i> + <i>Trichostrongylus spp.</i> + <i>Trichuris spp.</i>	5	2.5
<i>Fasciola spp.</i> + <i>T. vitulorum</i> + <i>Trichostrongylus spp.</i>	1	0.5
Total	198	100

Helminth eggs were found in 156 (35.6%) of the cattle aged 2-4 years and 42 (9.6%) of the cattle older than 4 years (p=0.070). Helminth eggs were found in 175 (39.9%) of females and 51 (11.6%) of males (p=0.987). Helminth eggs were detected in 39 (8.9%) Holstein cattle, 19 (4.3%) Simmental cattle and 140 (32%) Domestic Black cattle (Table 3). When age, gender and race were evaluated as risk factors, no statistically significant relationship was found between gender and age and helminth prevalence, whereas a statistically significant relationship was found between race and helminth prevalence (p=0.009).

Table 3: Frequency of helminths detected in cattle according to risk groups.

Variable		Total (%)	Helminth		*p
			Positive (%)	Negative (%)	
Gender	Female	387 (88.3%)	175 (39.9%)	212 (48.4%)	0.987
	Male	51 (11.6%)	23 (5.2%)	28 (6.4%)	
Breed	Hollstein	65 (14.8%)	39 (8.9%)	26 (5.9%)	0.009
	Simmental	58 (13.2%)	19 (4.3%)	39 (8.9%)	
	Yerli Kara	315 (71.9%)	140 (32%)	175 (40%)	
Age	2-4	361 (82.4%)	156 (35.6%)	205 (46.8%)	0.070
	4+	77 (17.6%)	42 (9.6%)	35 (8%)	

When the distribution of helminth detection rates by districts was examined, the lowest rate was observed in Ağrı center (27.3%) and the highest rate was observed in Hamur (68.5%) (Figure 1). However, there was no statistically significant difference between the positivity rates in the districts ($p=0.993$).

**Figure 1:** Distribution of 198 cattle with helminth according to districts.

DISCUSSION AND CONCLUSION

Helminth infections caused by nematodes, cestodes and trematodes, which are among the most important factors in decreasing production and productivity in cattle, cause economic losses by causing malnutrition, anemia, diarrhea, growth retardation, weight loss and sometimes death of animals. In recent years, it has been reported that morbidity and mortality rates due to helminth infections in ruminants have increased and great yield losses have been observed globally (Arbabi et al. 2020; Shabbiroddin et al. 2022).

In studies conducted worldwide, helminths were reported to be seen in cattle at a rate of 33.9-86.4% (Köse and Kırçalı 2008; Moussouni et al. 2018; Mary et al. 2019; Behera et al. 2020; Ola-Fadunsin et al. 2020; Raval and Sachaniya 2020; Sirbu et al. 2020). In studies conducted in Türkiye, 26.4-73.8% helminths were observed in cattle and the most common helminths were nematodes, as in this study conducted in Ağrı region (Kozan 2014; Taşçı et al. 2016).

In our literature review, we did not find any studies on helminth species in cattle in general except *Fasciola spp.* (Şahin et al. 2023) and *T. vitulorum* (Afshar et al. 2023) species in Ağrı and its region. When the results of this study (45.2%) in Ağrı region were compared with the results of recent studies (Sevimli et al. 2007; Kozan 2014) conducted in different regions of Türkiye, it was observed that the rates were close to high. This result shows that the yield losses due to helminth infections in cattle in Ağrı region are too high to be ignored and necessary precautions should be taken by informing the breeders in the region. *Fasciola* species, which occasionally cause infection in humans, lead to a decrease in meat, milk, fleece

wool and fertility in animals and cause significant economic losses (Altıntaş et al. 2004). In studies conducted on cattle worldwide, *Fasciola spp.* has been reported to be seen at a rate of 0.25-62.9% (Shit et al. 2017; Pezeshki et al. 2018; Moussouni et al. 2018; Shinggu et al. 2019; Ola-Fadunsin et al. 2020; Raval and Sachaniya 2020; Sirbu et al. 2020). In studies conducted in different regions of Türkiye, it was reported that this parasite was observed at a rate of 2.02-33.5% (Sevimli et al. 2007; Balkaya and Şimşek 2010; Şen et al. 2011; Altun and Sağlam 2014; Saltan and Taşçı 2020; Şahin et al. 2023). In a study conducted in Ağrı region, *Fasciola spp.* was detected with a rate of 18.7% in fecal examination of cattle (Şahin et al. 2023). In this study conducted by us in the same region, *Fasciola spp.* was observed in 14.4% of the cattle. The reason why the results obtained in this study were lower than the results found in the previous study (Şahin et al. 2023) in the same region is thought to be due to the different age groups of the animals examined in the two studies and the different sample collection methods.

Dicrocoelium dendriticum is a zoonotic helminth that infects the bile ducts and gallbladder of ruminants and, rarely, humans. Since the parasite has a direct effect on liver damage and infected livers are destroyed in slaughterhouses, it is thought to be important in terms of both economy and veterinary medicine by causing loss of protein, an important macronutrient in the human diet (Bari et al. 2016). In studies conducted on cattle in different countries around the world, *D. dendriticum* was reported to be found at rates of 0.6-59.2% (Adedipe et al. 2014; Arbabi et al. 2018; Pezeshki et al. 2018; Squire et al. 2018; Shinggu et al. 2019; Ola-Fadunsin et al. 2020; Sirbu et al. 2020; Pavlovic et al. 2023), and in studies conducted in Türkiye, it was reported to be found at rates of 4-25.5% (Sevimli et al. 2007; Altun and Sağlam 2014; Saltan and Taşçı 2020). In this study conducted in Ağrı region, *D. dendriticum* was detected at a rate of 2.5%. This rate was found to be lower than the rate found in studies conducted in Türkiye. We believe that this is due to the climate and ecology of the Ağrı region.

Toxocara vitulorum is a gastrointestinal nematode that is observed in countries located in tropical and subtropical climate zones, including Türkiye, and causes economic losses. In studies conducted in various countries, it was reported that this parasite was observed at a rate of 0.3-26.7% (Marskole et al. 2016; Shit et al. 2017; Behera et al. 2020; Sirbu et al. 2020; Purwandani et al. 2021; Pavlovic et al. 2023). In studies conducted in different regions of Türkiye, *T. vitulorum* was found at rates of 0.89-10.5% in cattle (Köse and 2008; Çelik et al. 2022; Afshar et al. 2023). In a study conducted in cattle in Ağrı region, *T. vitulorum* was found in 10.5% of cattle over two years of age (Afshar et al. 2023). In the present study, this parasite was found in 18.3% of the cattle, which is close to studies conducted in different parts of the world and higher than studies conducted in Türkiye. We believe that this result is due to the dense cattle population in Ağrı region and the easy spread of infection among animals grazing in the same place.

Trichostrongyliasis is an infection caused by nematodes belonging to the Trichostrongylidae family, which is commonly seen in the small intestine of ruminant animals, especially cattle, sheep and goats (*T. colubriformis*, *T. orientalis*, *T. axei*, *T. capricola*, *T. vitrinus*, *T. probolurus*, *T. skrjabini*, *T. lerouxi*) and humans (*T. colubriformis*, *T. orientalis*) in different parts of the world (Gholami et al. 2015; Çelik et al. 2022). In our country, it has been reported that *Trichostrongylus spp.* were found at a rate of

22-44% in studies conducted according to fecal examination (Şenlik et al. 2010; Şen et al. 2011; Kozan 2014; Taşçı et al. 2016). In studies conducted worldwide, it was reported that these parasites were found at a rate of 5-65.9% (Moussouni et al. 2018; Mary et al. 2019; Ola-Fadunsin et al. 2020; Raval and Sachaniya 2020; Sırbu et al. 2020; Alali et al. 2021; Mustafa et al. 2022; Pavlovic et al. 2023). In this study conducted by us in Ağrı province, it was observed that these parasites were found at a rate of 24.2%, which was the average of the studies conducted worldwide and in Türkiye.

Trichuris species are gastrointestinal helminths called whipworms and are found in the large intestines of ruminants such as sheep, goats, cattle, buffalo, as well as cats, dogs, foxes and pigs in many countries around the world. Infections caused by *Trichuris spp.* are mostly asymptomatic, but occasionally symptoms such as diarrhea, lethargy, weakness, and sometimes death have been reported. In a few studies on Trichuris species in cattle in Türkiye, it was reported that this parasite was found at a rate of 0.7-6.7% (Cellat 2003; Kozan 2014). In studies conducted worldwide, the prevalence of this parasite was reported to be 0.63-8.6% (Singh et al. 2012; Adedipe et al. 2014; Squire et al. 2018; Mary et al. 2019; Ola-Fadunsin et al. 2020; Purwandani et al. 2021; Mustafa et al. 2022; Thapa et al. 2022; Pavlovic et al. 2023). The result obtained in this study (3.4%) was found to support the studies conducted both in Türkiye and in the world.

In this study, it was observed that infections caused by various helminths are an important problem in small-scale cattle enterprises in Ağrı region. In order to reduce the negative effects of this situation on both animal health and the national economy, we believe that an effective prevention and control program against helminth infections should be implemented as soon as possible, animal breeders should be made aware of these diseases and more comprehensive studies should be carried out in the region.

CONFLICTS OF INTEREST

The authors report no conflicts of interest.

AUTHOR CONTRIBUTIONS

Idea / Concept: SA, MA

Supervision / Consultancy: SA, SE

Data Collecting and / or Processing: SA, MA, SK

Analysis and / or Interpretation: SE, MA

Writing the Article: MA

Critical Review: SA

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