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RESEARCH ARTICLE

Prevalence of *Toxocara vitulorum* in Calves in Afyonkarahisar, Turkey

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ABSTRACT

This study was conducted to determine the prevalence of *Toxocara vitulorum* in calves in Afyonkarahisar between March 2018 and April 2019. Faecal samples from 603 calves in 22 different villages of Afyonkarahisar province of Turkey were randomly collected and examined for the presence of *T. vitulorum* eggs using the Fülleborn saturated saltwater flotation method. A total of five of 603 calves (0.83%) were found to be infected with *T. vitulorum*. All of the faeces infected with *T. vitulorum* belonged to animals between 0-6 months of age. The prevalence of the infection in males was 0.97% and 0.68% in females. There was no statistically significant difference in the prevalence of *Toxocara vitulorum* by either breed or gender (P> 0.05).

Keywords: Afyonkarahisar, Calf, *Toxocara vitulorum*

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Afyonkarahisar Yöresi Buzağılarında *Toxocara vitulorum* Yaygınlığının Belirlenmesi

ÖZ

Bu çalışma Mart 2018-Nisan 2019 tarihleri arasında Afyonkarahisar ilinde yetiştirilen buzağılarda *T. vitulorum* yaygınlığını tespit emek amacıyla yapılmıştır. Afyonkarahisar'da sığır yetiştiriciliği yapılan ve rastgele seçilen 22 farklı köyden, değişik ırk, yaş ve cinsiyette toplam 603 hayvana ait dışkı örnekleri Fülleborn Doymuş Tuzlu Su Flotasyon yöntemi ile *T. vitulorum* yumurtalarının varlığı açısından incelenmiştir. Dışkı muayenesi yapılan 603 hayvanın beşinin (%0.83) dışkısında *T. vitulorum* yumurtaları görülmüştür. *Toxocara vitulorum* yönünden pozitif bulunan dışkıların tamamının 0-6 aylık hayvanlara ait olduğu tespit edilmiştir. Erkeklerde hastalığın yaygınlığı %0.97 dişilerde ise %0.68 olarak belirlenmiştir. *Toxocara vitulorum*'un yaygınlığında ırk ve cinsiyetler açısından istatistiksel olarak anlamlı bir farklılık tespit edilmemiştir (P>0.05).

Anahtar kelimeler: Afyonkarahisar, Buzağı, *Toxocara vitulorum*

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INTRODUCTION

Cattle, which are bred in almost every part of the world except for polar regions, provide approximately 86.3-89.5% of world milk production and 25% of meat production alone. The physical power of cattle was taken advantage of throughout human history, and cattle skin, nail, horn and manure were used for various purposes (Akman et al. 2019). Afyonkarahisar is one of the provinces where cattle breeding is common in Turkey.

Besides bacterial and viral diseases that cause significant economic losses in cattle, parasitic diseases can also lead to decreased meat, milk quality, fertility and even death. The existence of parasitic diseases, which reduce healthy, high quality and productive breeding, varies depending on regional and climatic differences, farm management, animal husbandry and feeding conditions (Morgan et al. 2006).

Toxocara vitulorum (Goeze 1782), first recorded in 1782, is a parasite of calves. Adults usually settle in the small intestine of cattle, buffalo and zebu which are younger than six months of age and are rarely identified in animals older than six months of age (Euzeby 1963). Adult females who feed on intestinal contents shed their eggs with a brown-black, oval-round, thick shell and rough surface into faeces. Infective larvae develop inside the *T. vitulorum* eggs within less than three weeks in the presence of appropriate temperature, humidity and oxygen (Euzeby 1963; Güralp 1981). An adult female *T. vitulorum* can produce thousands of eggs every day. The eggs per gram of faeces of an infected calf could be between 8000-100.000 (Roberts 1989).

The life cycle of *T. vitulorum* varies according to the age and sex of the animals. The source of infection for animals younger than six months old is usually inhibited larvae in the mother's tissues. These larvae gain activity in the late stages of pregnancy and some will cause prenatal infection in the offspring trans-placentally, while the remaining larvae migrate to the breast tissue and continue to infect the offspring through colostrum and milk (Soulsby 1986; Toparlak and Tüzer 1997).

Eggs are detected 16-23 days after birth in the faeces of infected calves. While the disease is most common in 1-3-month-old calves, it is rarely seen in animals older than 6 months old (Güralp 1981; Akyol 1993). After the 38th day of life, calves begin to excrete adult parasites in the faeces, and most calves have cleared the infection by six months of age (Soulsby 1986).

Clinical signs appear 10-15 days after birth and are observable for six months (Urquhart et al. 1996). Clinical signs relate to digestive disorder, anorexia, greasy, foul-smelling diarrhoea or constipation and dehydration occur due to damage to the intestinal mucosa in infected animals. In addition to these, pyrexia, neurological signs, anaemia, a tangled and dull appearance in the haircoat, a cough, other respiratory signs and a butyric acid smell (like garlic) on the breath are clinical signs that can be seen. Due to severe infections, death can occur linked to peritonitis as a result of intestinal perforation (Urquhart et al. 1996; Devi et al. 2000).

Toxocara vitulorum adults, which have a strong pathogenic effect in calves up to six months old, cause the formation of ulcerative areas in the small intestines, obstruction, torsion and perforation of the intestines (Toparlak and Tüzer 1997; Arslan et al. 1997). Due to larvae migrating through the body of the host, focal necrosis in the liver and lung and inflammation in regional lymph nodes and eosinophilia can develop (Roberts 1993).

Previous studies have shown that prevalence of *T. vitulorum* varies between 0.3-29% in different provinces of Turkey (Güralp et al. 1985; Toparlak et al. 1989; Umur and Gıcık 1995; Toparlak et al. 1996; Aydenizöz et al. 1999; Altınöz et al. 2000; Aydın et al. 2006; Arslan et al. 2008, Avcıoğlu and Balkaya 2011). To our knowledge, this is the first report of *T. vitulorum* in calves in Afyonkarahisar, Turkey. This study aimed to investigate the prevalence of *T. vitulorum* in family cattle farms in Afyonkarahisar province and intended to contribute to the understanding of the parasite fauna of Turkey.

MATERIALS and METHODS

This study was carried out using 603 cattle of different age, breed and genders from different villages in Afyonkarahisar between March 2018 and April 2019. The distribution of the faecal samples according to age, gender, breed and province of the animals are given in Table 1.

Between March 2018 and April 2019, 22 villages were visited and faecal samples were taken directly from the rectum of a total of 603 animals that were bred in the family farms and had not received any anthelmintics and were grazing most of the time. Breed, age, gender and study regions of animals were recorded. Faecal samples were brought to the Department of Parasitology, Faculty of Veterinary Medicine, Afyon Kocatepe University in the cold chain and the samples that could not be examined parasitologically on the same day were stored at 4 °C until they were examined. Samples were examined parasitologically with Fulleborn saturated saline method. Eggs per gram (EPG) was quantitatively determined for positive samples using the McMaster technique.

Table 1. The distribution of animals according to age, gender, breed and province.

Province	Age		Gender		Breed		
	0-6 month	6-12 month	Female	Male	Simmental	Holstein	Brown Swiss
Bolvadin	82	39	51	70	39	37	45
Çay	49	43	48	44	34	28	30
Centrum	65	45	58	52	60	27	23
İhsaniye	54	41	41	54	39	41	15
Şuhut	46	48	50	44	38	36	20
Sandıklı	52	39	45	46	39	37	15
Total	348	255	294	309	284	226	93

RESULTS and DISCUSSION

Toxocara vitulorum egg was detected in five (0.83%) of the examined faecal samples of 603 animals. All of the samples identified as positive for *T. vitulorum* belonged to 0-6-month-old animals. Three samples (0.97%) were from male animals (one 2-month-old, two 1-month-old) and two samples (0.68%) were from female animals (one 1-month-old, one 2-month-old). *Toxocara vitulorum* eggs were not observed in animals older than six months of age. There was no statistically significant difference between male and female animals in terms of prevalence of *T. vitulorum* eggs, and also no significant difference was determined between breeds (P>0.05). The number of EPG was calculated as minimum 7,500 EPG and maximum 35,500 EPG. The distribution of infection by study regions, breed, age and gender are given in Table 2.

Table 2. Distribution of infection by study region, breed, age and gender

	Number of Examined Cattle	Number of Infected Cattle	Infection Rate %
Study Region			
Bolvadin	121		
Çay	92		
Centrum	110		
İhsaniye	95		
Şuhut	94	1	1.06
Sandıklı	91	4	4.40
Gender			
Female	294	2	0.68
Male	309	3	0.97
Age			
0-6 months	348	5	1.44
6-12 months	255		
Breed			
Simmental	284	2	1.06
Holstein	226	1	0.44
Swiss Brown	93	1	1.07

Toxocara vitulorum, which is common in tropical and subtropical climates, is a parasite that causes a disease with high morbidity and mortality, especially in calves less than three months old, and causes significant economic losses. (Srivastava and Sharma 1981; Güralp et al. 1985; Akyol 1993).

The prevalence of *T. vitulorum* varies by country; 2.94% in Syria (El-Moukdad 1979), 15.2% in India (Gupta et al. 1985), 54.4% in Nigeria (Rekwot and Ogunsusi 1985), 40% in China (Wen et al. 1986), 9% in North Central Florida (Davila et al. 2010), 37.5% in Pakistan (Raza et al. 2013) and 12.4% in Cambodia (Dorny et al. 2015). Few studies have determined the prevalence of *T. vitulorum* in Turkey; 4.6% in Ankara (Güralp et al. 1985), 2.2% in Bursa (Akyol 1993), 4.3% in Thrace (Toparlak et al. 1996), 0.3-6.2% in Konya (Aydenizöz et al. 1999; Altınöz et al. 2000), 16% in Van (Toparlak et al. 1989), 7.5% in Kars (Umur and Gıcık 1995), 28.96% in Hakkari (Aydın et al. 2006) and 1.1-22.2% in Erzurum (Arslan et al. 2008; Avcıoğlu and Balkaya 2011). Güralp et al. (1985) reported that 0.8% of the calf faecal samples collected from different regions of Turkey were infected with *T. vitulorum* eggs. In this study, *T. vitulorum* eggs were detected in five of the examined faecal samples of 603 cattle and the prevalence of the *T. vitulorum* infection was determined to be 0.83% in Afyonkarahisar. Infection rate of *T. vitulorum* in Afyonkarahisar is similar to other studies in Turkey, despite having a lower infection rate than a few studies. It has been observed that cattle are going the field for grazing in Şuhut and Sandıklı districts, while in other regions they are generally kept in barns throughout the year. In the districts of Şuhut and Sandıklı, it was determined that the use of anthelmintics was less then other regions as a result of talking with animal owners. It is thought that these differences may be caused by the difference in anthelmintics usage and housing conditions.

Inactive larvae in the muscles of infected pregnant animals gain activity in the last period of pregnancy and pass to offspring as trans-placentally and via milk, for up to one month in the postpartum period. Host

resistance begins to develop from 6-months-old with the advancement of age, and larvae gradually become inhibited in muscle tissue (Güralp 1981; Soulsby 1986; Umur et al. 2006). Studies have reported that *T. vitulorum* is more common in 1-3-month-old calves that its incidence decreases gradually until one year of age, and is very rare after this time (Akyol 1993; Umur and Gıcık 1995; Arslan 1997; Aydın et al. 2006; Avcıoğlu and Balkaya 2011, Dorny et al. 2015). In this study, *T. vitulorum* eggs were observed in the faeces of five of 348 calves aged 0-6 months and the prevalence in this age group was determined to be 1.44%. These results agree with current understanding of the disease pattern and prevalence, suggesting that Afyonkarahisar has similar levels of infection to other regions of Turkey.

Although some researchers (Güralp, 1985; Toparlak et al. 1989) report that the infection is more common in males than females, others report that the disease has no relationship with sex (Akyol 1991; Roberts 1993; Altınöz et al. 2000). This study determined that two (0.68%) of 294 female calves and three (0.97%) of 309 male calves are infected with *T. vitulorum*, and the difference was not statistically significant between males and females (P> 0.05).

It is reported that the number of EPG in faeces of infected animals with *T. vitulorum* is related to the egg production capacity of female parasites and that therefore the EPG does not correlate with the severity of infection (Soulsby 1986; Roberts 1993). Previous studies have reported EPG ranging between 25 and 95,200 EPG in faeces of infected animals in Turkey (Güralp et al. 1985; Toparlak et al. 1989; Akyol 1993; Umur and Gıcık 1995; Aydın et al. 2006; Avcıoğlu and Balkaya 2011). In this study, the number of EPG ranged from 7,500 to 35,500 EPG in the faeces of infected animals. These values remained within the range reported in previous studies.

CONCLUSION

Toxocara vitulorum was detected in 1-2-month-old calves in different villages of Afyonkarahisar. Although the prevalence of the infection was low compared to some other studies, it should be taken into consideration that disease in this age group carries high morbidity and mortality in calves. It was concluded that the farmers should be informed about the disease and appropriate treatment options. Importantly, prevention and control measures should be discussed and implemented with local veterinarians.

Ethical Statement: This study is not subject to the permission of HADYEK in accordance with Article 8 (k) of the "Regulation on Working Procedures and Principles of Animal Experiments Ethics Committees".

Conflict of Interest: The authors declared that there is no conflict of interest.

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REFERENCES

Akman N, Özkütük K, Kumlu S, Yener SM (2019). Türkiye'de sığır yetiştiriciliği ve sığır yetiştiriciliğinin geleceği. http://www.zmo.org.tr/resimler/ekler/71c50ad1a156d72_ek.pdf?tipi=14&sube= erişim tarihi: 23.10.2019.

Akyol ÇV. Bursa yöresi sığırlarında *Toxocara (Neoascaris) vitulorum*'un epidemiyolojisi. Doktora tezi. Uludağ Üniv. Sağlık Bilimleri Enstitüsü, Bursa, 1991.

Akyol ÇV. Epidemiology of *Toxocara vitulorum* in cattle around Bursa, Turkey. J Helminthol. 1993; 67(1): 73-77.

Altınöz F, Gökçen A, Uslu U. Konya yöresi sığırlarında *Toxocara vitulorum*'un yayılışı. Turkiye Parazitol Derg. 2000; 24(4): 405-407.

Arslan MÖ, Umur Ş, Özcan K. Buzağılarda ölümcül *Toxocara vitulorum* olgusu. Turkiye Parazitol Derg. 1997; 21(1): 79-81.

Arslan MÖ, Sarı B, Taşçı GT, Aktaş MS. Erzurum yöresinde buzağılarda *Toxocara vitulorum* yaygınlığı. Kafkas Univ Vet Fak Derg. 2008; 14(1): 37-40.

Avcioğlu H and Balkaya I. Prevalence of *Toxocara vitulorum* in calves in Erzurum, Turkey. Kafkas Univ Vet Fak Derg. 2011; 17(3): 345-347.

Aydenizöz M., Aldemir, O. S., Güçlü, F. Dışkı muayenesiyle sığırlarda tesbit edilen parazitler ve yayılışları. T Parazitol Dergisi. 1999; 23(1): 83-88.

Aydin A, Goz Y, Yuksek N, Ayaz E. Prevalence of *Toxocara vitulorum* in Hakkari eastern region of Turkey. Bulletin-Veterinary Institute in Pulawy. 2006; 50(1): 51.

Davila G, Irsik M, Greiner EC. *Toxocara vitulorum* in beef calves in North Central Florida. Veterinary Parasitology, 2010; 168(3-4): 261-263.

Devi HU, Ansari MZ, Singh SK, Devi KB. Prevalence and epidemiology of *Toxocara vitulorum* in cow and buffalo calve in and around Ranchi, Bihar. Indian Journal of Animal Sciences (India). 2000; 70(8): 817-819.

Dorny P, Devleesschauwer B, Stoliaroff V, Sothy M, Chea R, Chea B, Sourloing H, Samuth S, Kong S, Nguong K, Sorn S, Holl D, Vercruysse J. Prevalence and Associated Risk Factors of *Toxocara vitulorum* Infections in Buffalo and Cattle Calves in Three Provinces of Central Cambodia. The Korean Journal of Parasitology. 2015; 53(2): 197-200.

El-Moukdad AR. Helminth fauna of Syrian cattle. Angew Parasitology. 1979; 20(1): 11-16.

Euzeby J. Les Maladies Vermineuses des Animaux Domestiques et Leurs Incidences sur la Pathologie Humaine. Vigot Freres. 1963; (1,2): 478-626.

Gupta RP, Yadav CL, Ghosh JD. Epidemiology of helminth infections in calves of Hayrana state. Agricultural Science Digest. 1985; (5): 33-56.

Güralp N. Helmintoloji 2. Baskı Ankara Üniversitesi Veteriner Fakültesi. Yayın No. 368 Ankara Üniv Basımevi Ankara, 1981; pp. 426.

Güralp N, Tınar R, Doğanay A, Çoşkun ŞZ. Türkiye sığırlarında *Toxocara vitulorum*'un yayılışı. Ankara Üniversitesi Veteriner Fakültesi Dergisi. 1985; 41(2): 20-26.

Morgan ER, Torgerson PR, Shaikenov BS, Usenbayev AE, Moore ABM, Medley GF, Milner-Gulland EJ. Agricultural restructuring and gastrointestinal parasitism in domestic ruminants on the rangelands of Kazakhstan. Veterinary Parasitology. 2006; 139 (1-3): 180-191.

Raza MA, Murtaza S, Ayaz MM, Akhtar S, Arshad HM, Basit A, Bachya HA, Ali M, Khan MI. *Toxocara vitulorum* infestation and associated risk factors in cattle and buffalo at Multan District, Pakistan. Science International (Lahore). 2013; 25(2): 291-294.

Roberts JA. The extraparasitic life cycle of *Toxocara vitulorum* in the village environment of Sri Lanka. Veterinary Research Communications. 1989; 13(5): 377-388.

Roberts JA. *Toxocara vitulorum* in ruminants. Helminhological Abstracts. 1993; 62(4): 151-174.

Rekwot PJ, Ogunsusi RA. Prevalence of *Toxocara (Neoascaris) vitulorum* infection in cattle around Zaria, Nigeria. Journal of Animal Production Research. 1985; 5(2): 201-207.

Srivastava AK, Sharma DN. Studies on the occurrence, clinical features and pathomorphological aspects of ascariasis in buffalo calves. Veterinary Research Journal. 1981; 4(2): 160-162.

Soulsby EJL. Helminths, Artropods and Protozoa in Domesticated Animals, 7th Edition, Ed; Bailliere Tindall, William Cloves Limited, London, England. 1986; pp. 142-158.

Toparlak M, Değer S, Yılmaz H. Van yöresi sığırlarında *Toxocara (Neoascaris) vitulorum* enfeksiyonunun yayılışı. Ankara Üniversitesi Veteriner Fakültesi Dergisi. 1989; 36(2): 404-412.

Toparlak M, Arslan MÖ, Gargılı A, Tüzer E. Prevalence of *Toxocarosis vitulorum* in cattle in Thracia, Turkey. Doğa Türk Veterinerlik ve Hayvancılık Dergisi. 1996; (20): 341-342.

Toparlak M, Tüzer E. Veteriner Helmintoloji Ders Notları, İstanbul, 1997; pp. 102.

Umur Ş, Gıcık Y. Kars yöresi sığırlarında *Toxocara vitulorum*'un yayılışı. Ankara Üniversitesi Veteriner Fakültesi Dergisi. 1995; 42(1): 25-29.

Umur Ş, Köroğlu E, Güçlü F, Tınar R. Nematoda. In: Helmintoloji, Ed: Tınar R. Nobel Yayın Dağıtım, Nobel Basımevi, Ankara. 2006; pp. 381-382.

Urquhart GM, Armour J, Duncan JL, Dunn AM, Jennings FW. Veterinary Parasitology. Ed: Urquhart GM, 2nd Ed., Blackwell Scientific Publications, Oxford, 1996; pp. 270.

Wen YL, Zhvang ZL, Lin BM, Pan YD, Gao BZ, Wang TJ. An epidemiologic survey of Neoascaris in calves, China. Chinese Veterinary Science and Technology. 1986; 8(1): 18-20.