



Research Article

## The Prevalence of Liver Trematodes in Slaughtered Ruminants in Aydın Province

Metin Pekağırbaş<sup>1</sup> , Mehmet Duran<sup>2</sup> , Hasan Eren<sup>1</sup> 

<sup>1</sup>Aydın Adnan Menderes University Faculty of Veterinary, Department of Parasitology, Aydın Turkey.,

<sup>2</sup>Universal Animal Health Veterinerlik Hayvancılık Sanayi ve Tic. Ltd. Şti., Bayraklı, İzmir.

### ABSTRACT

*Fasciola hepatica* and *Dicrocoelium dendriticum* are trematodes widely found worldwide including in Turkey. Liver trematode infections cause serious losses in livestock production. Also, it adversely affects the development and live weight gain of animals and damage the national economy by causing the loss of economical significant organs such as the liver. This study was performed to investigate the reveal the prevalence of *Fasciola* and *Dicrocoelium* parasites at the slaughterhouse in Aydın province and to investigate the resulting economic losses. This study was carried out from the samples collected in the Efeler slaughterhouse in Aydın province between May 2015 and June 2016. According to this, liver and bile ducts of slaughtered sheep-goat and cattle have been examined in terms of *Fasciola* spp. and *Dicrocoelium* spp. in a year. During the study a total of 3193 cattle and 3659 small ruminant (sheep and goat) livers were examined. Two species of liver fluke, *F. hepatica* and *D. dendriticum*, were encountered in the study.

As a result *F. hepatica* was detected in six of 3193 cattle (0,18%) and in one of 3659 (0,02%) small ruminants. In addition, *D. dendriticum* was detected in 13 of 3659 (0,3%) small ruminants. *Fasciola gigantica* and *D. dendriticum* were not found in cattle livers that were examined. The data in this study give valuable information concerning the prevalence of *F. hepatica* and *D. dendriticum* in slaughtered cattle and sheep in Aydın. To the best of our knowledge, this study is the first study about the examination of liver flukes in an abattoir in Aydın. Eventhough the fluke infection rates of slaughtered animals in Aydın are pretend to be remissible at present however the impact of economic losses arising due to liver destruction on the country should not be neglected.

**Keywords:** *Dicrocoelium dendriticum*, *Fasciola hepatica*, prevalence, ruminants, Aydın,

## Aydın Mezhabalarında Kesilen Ruminantlarda Karaciğer Trematodlarının Yaygınlığı

### ÖZET

*Fasciola hepatica* ve *Dicrocoelium dendriticum*, Türkiye dahil olmak üzere tüm dünyada yaygın olarak bulunmaktadır. Karaciğer trematod enfeksiyonları, hayvancılık üretiminde ciddi kayıplara neden olmaktadır. Ayrıca bu hastalıklar hayvanların gelişimini, canlı ağırlık artışlarını olumsuz etkiler ve karaciğer gibi ekonomik açıdan önemli organların kaybına neden olarak ülke ekonomisine zarar verir. Bu çalışma, Aydın ilinde bulunan mezhabada kesilen sığır ve koyunlardaki *Fasciola* spp. ve *Dicrocoelium* spp. parazitlerinin prevalansını ortaya çıkarmak ve meydana gelen ekonomik kaybı tespit etmek için yapılmıştır. Çalışma Aydın'da bulunan Efeler mezbahasında Mayıs 2015- Nisan 2016 tarihleri arasında bir yıl süre ile yapılmıştır. Buna göre kesimi yapılan koyun ve sığırların karaciğer ve safra kanalları karaciğer kelekleri yönünden incelenmiştir. Çalışma sırasında toplam 3193 adet sığır ve 3659 adet koyun kesilmiştir. 3193 sığırın altısında (%0,18) ve 3659 koyunun bir tanesinde (%0,02) *F. hepatica* erişkin paraziti tespit edilmiştir. Ayrıca 3659 koyunun 13 tanesinde (%0,3) *D. dendriticum* erişkin parazitine rastlanılmıştır. Sığır karaciğerlerinde *Fasciola gigantica* ve *D. dendriticum* parazitlerine rastlanılmamıştır. Çalışmadaki veriler, Aydın'da kesilen sığır ve koyunlarda *F. hepatica* ve *D. dendriticum*'un yaygınlığı hakkında değerli bilgiler vermektedir. Bilindiği kadarıyla, yapılan bu çalışma Aydın mezhabalarında karaciğer parazitleri ile ilgili yapılan ilk incelemedir. Aydın'da kesilen hayvanların karaciğer kelek enfeksiyon oranları şu an için önemsiz gibi görünse de, karaciğer tahribatından kaynaklanan ekonomik kayıpların ülke üzerindeki etkisi ihmal edilmemelidir.

**Anahtar kelimeler:** *Dicrocoelium dendriticum*, *Fasciola hepatica*, prevalans, ruminant, Aydın

Corresponding Author: Mehmet DURAN<sup>1</sup>, Email: duran.mehmet86@hotmail.com

## Introduction

*Fasciola hepatica* and *Dicrocoelium dendriticum* are trematodes widely found worldwide including in Turkey (Kara et al., 2009). Fasciolosis is a zoonotic trematode disease that causes pathological lesions in the liver and bile ducts in humans as well as animals such as cattle, sheep, goats, camels and causes economic losses (Saltan and Taşçı, 2020). Dicrocoeliasis is another disease caused by *Dicrocoelium* spp. trematodes in the bile ducts and pancreas of carnivores, pigs, rabbits and humans as well as domestic and wild ruminant animals (Kaufmann, 1996; Toparlak and Tüzer, 2002). Liver trematode infections cause serious losses in livestock production. Also it adversely might affects the development and live weight gain of animals and damage the national economy by causing the loss of economic significant organs such as the liver (Acıöz, 2019). Kaplan et al. (2009) have stated that the total economic value of the liver that was destroyed in Elazığ between 1998-2000 due to fasciolosis was 17,143 United States Dollars (USD). In another study showing the economic loss due to liver destruction, Balkaya and Şimşek (2010) were calculated this amount as 17.560 Turkish Liras (TL). Furthermore, liver flukes also negatively affect human health besides threatening animal health. According to the data of the World Health Organization (WHO), it has been reported that because of foodborne trematode infections two-hundred thousand people became ill and, 7000 of them died around the world (WHO, 2015). There are many studies in Turkey about presence of liver flukes according to stool or slaughterhouse examinations by various researchers. The studies conducted in Turkey report that the frequency of *F. hepatica* infections in cattle, sheep, and goats varies between 1.5-21%, 1.6-2.11%, and 0.8-41.21%, respectively. According to previously studies about *D. dendriticum* prevalence in different regions of Turkey; rate of infected sheep liver 24,6% in Antalya, 3,99% in Thrace, 11% in Afyon, 5% in Şanlıurfa were detected (Gargılı et al., 1999; Balkaya and Şimşek, 2005; Sevimli et al.,

2006; Yıldırım et al., 2007; Kara et al., 2009; Adanır and Çetin, 2016; Acıöz, 2019 Saltan and Taşçı, 2020).

In order to make more efficient livestock production, it is necessary to raise knowledge of the producers about the extent of economic losses, to reveal the existing species responsible for diseases and also to develop strategic-effective treatment and control methods against them. This study was performed to investigate the prevalence of *Fasciola* spp. and *Dicrocoelium* spp. at a slaughterhouse in Aydın province and to investigate the resulting economic losses.

## Material and Method

This study was carried out from the samples collected in the Efeler slaughterhouse in Aydın province between May 2015 and June 2016. In the first phase of the study, Efeler slaughterhouse in Aydın was visited to determine the prevalence of *Fasciola* spp. and *Dicrocoelium* species. For this aim, liver and bile ducts of slaughtered sheep-goat and cattle have been examined for the presence of *Fasciola* spp. and *Dicrocoelium* spp. in a year. During the study, a total of 3193 cattle and 3659 small ruminants (sheep and goats) livers were examined.

The liver was examined according to the method described by Ogamba-Ongoma (1972) and the parasites were identified by the morphological peculiarities according the literatures (Soulsby, 1982; Reinecke, 1983).

## Results

Two species of liver fluke, *Fasciola hepatica* and *Dicrocoelium dendriticum*, were found in this study. As a result *F. hepatica* was detected in six of 3193 cattle (0,18%) and in one of 3659 (0,02%) small ruminants. *Fasciola* infection rate was higher in male (four) cattle than female (two) cattle. In addition, *D. dendriticum* was detected in 13 of 3659 (0,3%) small ruminants. *Fasciola gigantica* and *D. dendriticum* were not found in non

**Table 1.** The prevalence of liver fluke infections in slaughtered animals

Date	Sheep						Cattle				
	<i>Fasciola hepatica</i>		*Num of PE	<i>Dicrocoelium dendriticum</i>		<i>Fasciola hepatica</i>		*Num of PE	<i>Dicrocoelium dendriticum</i>		
	Positive	%		Positive	%	Positive	%		Positive	%	
May 15	-	-	447	3	0.67	2	0.54	369	-	-	
June 15	-	-	405	-	-	1	0.3	329	-	-	
July 15	-	-	405	3	0.74	-	-	323	-	-	
Aug 15	1	0.2	489	7	1.43	-	-	298	-	-	
Sep 15	-	-	395	-	-	-	-	243	-	-	
Oct 15	-	-	272	-	-	2	1.08	184	-	-	
Nov 15	-	-	124	-	-	1	0.49	202	-	-	
Dec 15	-	-	124	-	-	-	-	233	-	-	
Jan 16	-	-	167	-	-	-	-	262	-	-	
Feb 16	-	-	285	-	-	-	-	291	-	-	
Marc 16	-	-	268	-	-	-	-	214	-	-	
Apr 16	-	-	278	-	-	-	-	245	-	-	

\* Number of post-mortem examinations

of cattle livers that were examined. *Dicrocoelium* infected liver rates were found to be similar in male (seven) and female (six) individuals. One of the sheep was detected as mixed infected for *D. dendriticum* and *F. hepatica*. The number of examined and infected animals, and the prevalence rates were given in **Table 1**.

Infected 19 livers (6 cattle, 13 small ruminants) were destroyed in accordance with the medical waste-disposal regulations. In the calculation that made to determine the economic losses, the average cattle liver was calculated as 7 kg and sheep liver as 2 kg. Besides that, the selling price per kilogram of the liver has been determined as 40 TL. Accordingly, this shown that the economic losses caused by a total of 19 livers destroyed during a year was calculated as 2720 TL.

## Discussion

The data in this study give valuable information concerning the prevalence of *Fasciola hepatica* and *Dicrocoelium dendriticum* in slaughtered cattle and sheep in Aydın. To the best of our knowledge, this study is the first study about the examination of liver flukes in an abattoir in Aydın. On the prevalence of liver fluke in Turkey, there are many studies carried out based on post-mortem examination and coprological test (Gargılı et al., 1999; Gıcık et al., 2002; Kara et al., 2009; Caya, 2012; Adanır and Çetin, 2016; Çelik and Çelik, 2018; Acıöz, 2019). The prevalence of fasciolosis in different regions varies depending on the snail population, livestock breeding conditions, the environmental and climatic conditions in the region. Different prevalence rates reported in previous studies may be associated with these factors (Yıldırım et al., 2007). The prevalence of *Fasciola hepatica* in sheep (0,02%) and cattle (0,18%) in the present study is lower than the previous studies in some provinces of Turkey (Gargılı et al., 1999; Gıcık et al., 2002; Kara et al., 2009; Caya, 2012; Adanır and Çetin, 2016). This situation can be explained by farm management differences. The fact that *F. hepatica* is more common in traditional farms when compared to dairy farms supports the herd management thesis (Keyyu et al., 2005; 2006). Yıldırım et al. (2007) was attributed the high prevalence in these farms to contaminated pastures and inadequate infrastructure systems. Studies on the evaluation of fasciolosis prevalence in cattle by gender have yielded conflicting results, and no significant difference was reported between genders in these studies (Maqbool et al., 2002; Opara, 2005). Although the number of infected males were found to be higher in our study, the numbers of males and females were found to be considered close to each other.

Although many studies were carried out about dicrocoeliasis in sheep and fascioliasis infection in Turkey, the number of studies on the spread of the parasite in cattle are very limited (Saltan and Taşçı, 2020). The rate of sheep that infected with *Dicrocoelium dendriticum* (0,3%) reported in the current study was pretty low compared to the rates reported previously in Turkey (Gargılı et al., 1999; Kırcalı et al, 2005; Kara et al., 2009). This result can be explained by the lack of a suitable environment for the intermediate host. Also, it has been considered that the reason for the low number of infected animals may be due to the regular fight against parasites in animals in Aydın.

As a result in this study, liver trematodes were detected at a relatively low rate compared to studies conducted in other regions. It is thought that this situation may be due to intensive animal husbandry and limited use of pasture in the region.

Eventhough the fluke infection rates of slaughtered animals in Aydın are pretend to be remissible at present however the im-

pact of economic losses arising due to liver destruction on the country should not be neglected. We are agree with Yıldırım et al. (2007) as they suggest there is a need more practical approaches to reduce the economic losses and to control these diseases.

More examination studies about liver flukes including different types of diagnostic tests (coprological, serological, molecular) need to be performed in the study area to understand more about liver flukes prevalence in the region.

## Acknowledgements

The authors would like to thank veterinarian Mustafa TEMİZEL who helped during the study in abattoir.

## Conflict of interest

The authors declare that they have no competing interests

## References

- Acıöz, M. (2019). Isparta'da kesilen sığırlarda distomatozis'in yayılışı. *Erciyes Üniversitesi Veteriner Fakültesi Dergisi*, 16 (2), 136-140. <https://doi.org/10.32707/ercivet.595620>
- Adanır, R., & Çetin, H. (2016). Antalya Belediye mezbahasında (An-Et) kesilen koyunlarda karaciğer trematodlarının yaygınlığı. *Mehmet Akif Ersoy Üniversitesi Veteriner Fakültesi Dergisi*, 1 (1), 15-20. <https://doi.org/10.24880/maeuofd.260786>
- Balkaya, I., & Şimşek, S. (2010). Erzurumda kesilen sığırlarda hidatidosis ve fasciolosis'in yaygınlığı ve ekonomik önemi. *Kafkas Üniversitesi Veteriner Fakültesi Dergisi*, 16(5), 793-797. DOI:10.9775/kvfd.2010.1597.
- Caya H. (2012). Prevalence of of Helminth Infection of the Liver in Small Animals Slaughtered in the Adana Province. *Adana Veteriner Kontrol Araştırma Enstitüsü Dergisi*, 2 (2): 12–7.
- Çelik, Ö.Y., & Çelik, BA. (2018). Investigation of the Prevalence of *Fasciola hepatica* in Small Ruminants in the Siirt Region, Turkey. *Iranian Journal of Parasitology*, 13(4): 627–631.
- Gargılı, A., Tüzer, E., Gülanber, A., Toparlak, M., Efil, Ş., Keleş, V., & Ulutaş, M. (1999). Pravalence of liver fluke infections in slaughtered animals in Trakya (Thrace), Turkey. *Turkish Journal Veterinary and Animal Science*, 23 (2), 115-116.
- Gıcık, Y., Arslan, M., Kara, M., & Akça A. (2002). The prevalence of Liver flukes in Sheep Slaughtered in Kars Province. *Kafkas Üniversitesi Veteriner Fakültesi Dergisi*, 8 (2): 101–2.
- Kaplan, M., & Başpınar, S. (2009). Elazığ'da son 5 yılda kesilen kasaplık hayvanlarda fasciolosis sıklığı ve ekonomik önemi. *Firat Tıp Dergisi*, 14(1), 25- 7.
- Kara, M., Gıcık, Y., Sarı, B., Bulut, H., & Arslan, M.Ö. (2009). A slaughterhouse study of prevalence of some helminths of cattle and sheep in Malatya province, Turkey. *Journal of Animal and Veterinary Advances*, 8 (11), 2200-2205.
- Kaufmann, J. (1996). *Parasitic Infections of Domestic Animals*. Berlin, Birkhäuser Basel, Springer. DOI: 10.1007/978-3-0348-7666-7.
- Kırcalı, F.S, Köse, M., Kozan, E., & Doğan, N. (2005). Afyon ili sığırlarında paramphistomosis ve distomatosisin genel durumu. *Türkiye Parazitoloji Dergisi*, 29 (1), 43-46.
- Keyyu, J.D., Monrad, J., Kyvsgaard, N.C., & Kasuku A.A. (2005). Epidemiology of *Fasciola gigantica* and amphistomes in cattle on traditional, small-scaledairyandlarge-scaledairyfarmsinthesouthern highlands of Tanzania. *Tropical Animal and Health Production*, 37, 303-314. <https://doi.org/10.1007/s11250-005-5688-7>
- Keyyu, J.D., Kasuku, A.A., Msalilwa, L.P., Monrad, J., & Kyvsgaard, N.C. (2006). Cross-sectional prevalence of helminth infections in cattle on traditional, small-scale and large-scale dairy farms in Iringa district, Tanzania. *Veterinary Research Communication*, 30 (1), 45-55. doi: 10.1007/s11259-005-3176-1.
- Maqbool, A., Hayat, C.S., Akhtar, T., & Hashmi, H.A. (2002) Epidemiology of fasciolosis in buffaloes under different managemental conditions. *Veterinarski Arhiv*, 72, 221-228.
- Ogambo-Ongoma, A.H. (1972). Fasciolosis survey in Uganda. *Bulletin of*

- epizootic diseases of Africa*, 20, 35-41.
- Opara, K.N. (2005). Population dynamics of *Fasciola gigantica* in cattle slaughtered in Uyo, Nigeria. *Tropical Animal Health and Production*, 37, 363-368.
- Reinecke, R.K. (1983). *Veterinary Helminthology*, Butterworths & Co (S.A), South Africa. ISBN : 0409112623.
- Saltan, C., & Tařçı, G.T. (2020). Ağrı y6resindeki sięırlarda karacięer trematod enfeksiyonlarının yaygınlığı. *Türkiye Parazitoloji Dergisi*, 44 (3), 132-138. DOI: 10.4274/tpd.galenos.2020.6803
- Soulsby, E.J.L. (1982). *Helminths, arthropods and protozoa of domesticated animals* (7th edt). London, Bailliere-Tindall. ISBN 0-7020-0820-6.
- Toparlak, M., & Tüzer, E. (2002). *Veteriner helmintoloji*. İstanbul Üniversitesi Veteriner Fakóltesi Yayınları, İstanbul.
- World Health Organization. (2015). (<http://www.who.int/mediacentre/factsheets/fs368/en>) (Accessed date: 12.11.2020)
- Yıldırım, A., İa, A., Duzlu, O., & İnci, A. (2007). Prevalence and risk factors associated with *Fasciola hepatica* in cattle from Kayseri province, Turkey. *Revue de Médecine Vétérinaire*, 158, 613-617.