THESIS OF THE Ph.D. DISSERTATION

FASCIOLOIDES MAGNA (BASSI, 1875) INFECTION OF HUNGARIAN RED DEER AND ROE DEER STOCK AND THE POSSIBILITY OF PROTECTION

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1. INTRODUCTION

Parasites spend most of their life cycle in their hosts, using them as food source and home, thus reducing the host's reproductive and survival chances, as well as causing different diseases at times (Rózsa, 2005).
„Foreign" parasites, being unfamiliar to the game stock, mean a significant danger, since the game have developed no inherited protective reaction against them (Sugár, 2000).
When introducing species to places different from their original habitat, we also have to consider that they might carry parasites to the newly populated areas, thus significantly increasing the chances of disease in the new territories. This was the case with the large American liver fluke (*Fascioloides magna*, Bassi 1875) when, about 140 years ago, it was carried into Europe with the wapiti and the white-tailed deer. Since that time it has spread to various European countries causing, with the free movement of the game, inevitable infection in countries neighbouring the already infected areas.
Present dissertation is based mainly on the analysis of the volume of *Fascioloides magna*-infection diagnosed in Hungary first of all in red deer and roe deer stocks of Szigetköz and later in Gemenc since 1994, and also on the measures taken against the spreading of the infection.

1.1 The objectives of present dissertation were

- To assess the infection caused by the large American liver fluke (*Fascioloides magna*) on infected areas already known (Szigetköz, Gemenc)
- To examine the not yet infected but potentially endangered stocks
- To identify the effects of the infection in the examined red deer and roe deer stocks
- To identify possible intermediate host species
- To examine pathological changes caused by flukes
- To evaluate the efficacy of the anthelminthic treatments

2. MATERIALS AND METHODS

Survey of localities and dates

The examinations were carried out in the Mosonmagyaróvár and Győr Forestry of Kisalföld Forestry Corp., between 1999 and 2006. The sampling localities in Szigetköz are shown in Fig. 1. To assess the volume of *Fascioloides magna* infection, we performed several diagnostic dissections in different game management units of Hungary. During 2003-2004, investigations were carried out in the game meat processing plant of Matusz-Vad Co. Ltd. in Győr, where we had an opportunity to examine samples not only from the Kisalföld Forestry Corp. but also from Szigetköz Hunting Co., Lajta-Hanság and Hajagvidék Hunting Companies, as well as from Csigere Hunting Co. (Balaton Highlands, Bakony). In 2003, we carried out examinations in the Szekszárd and in 2004, in the Pandúr Forestry of Gemenc Forestry and Game Management Corporation. We also had an opportunity to investigate a few samples from the floodplains of Upper-Tisza (Nánás-Puszta and Kossuth Hunting Companies). In 2004, the Vajszló Forestry of Mecsek Forestry Corporation provided samples for us. Dissections were carried out at the Animal Health Department of the Animal Science Institute at the University of West-Hungary, Faculty of Agriculture and Food Sciences, and also on plants of the above mentioned hunting companies; in 2003-2004 dissections were carried out in the meat processing plant of Matusz-Vad Co.Ltd. From October 2000 to February 2001, nine parenchyma samples (size: 3x3 cm) of red deer livers infected with *Fascioloides magna* were provided for bacteriological testing to the Győr-Moson-Sopron County Institute of the National Public Health and Medical Officer Service. Our aim was also to identify the bog-loving intermediate hosts in Szigetköz and for this reason, we chose suitable biotopes. In the spring and summer of 2002 we collected snails at various places of Szigetköz: at Cikolasziget, at Tejfalusziget, at Dunaremete and at Patkányospuszta. They were examined at the Fish and Bee Health Department of the National Veterinary Institute. In the summer of 2003 and 2004 we collected specimens of *Galba truncatula* exclusively, at Patkányospuszta, and we examined them later at the Parasitology and Zoology Department of the University of Veterinary Science in Vienna.

Fecal samples were collected in the summer of 2007 near Ásványráró, and examined for the presence of *Fascioloides magna* eggs at the Animal Health Department of the University of West-Hungary.

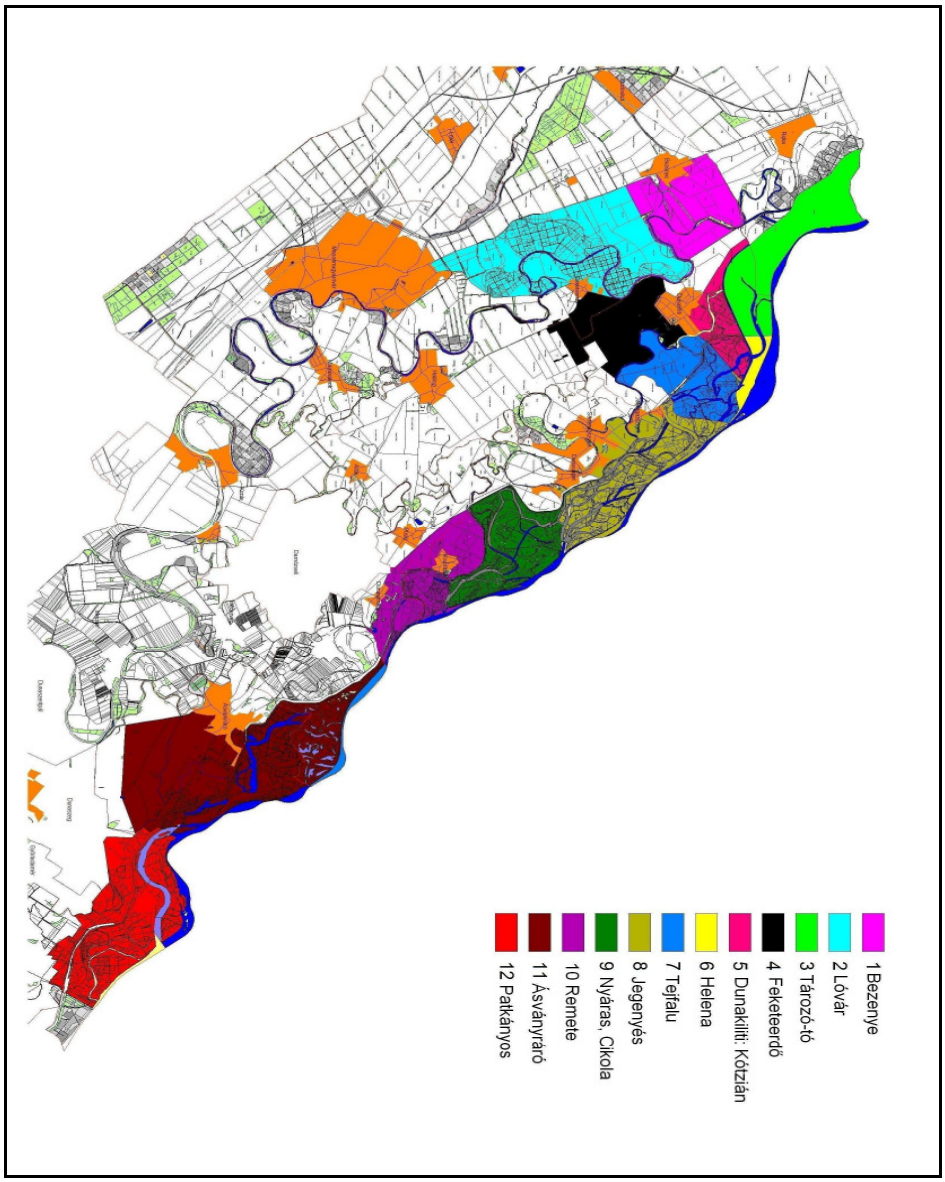


Figure 1. Sample collecting localities in Szigetköz
* settlements marked in orange

2.2. Materials of the examinations

Examined livers

The subjects of the examination were livers of red deer and roe deer that were living free on the territories of the forestries and hunting companies and were hunted in season. The samples were given by deer of different age and sex. The livers were tested freshly as well as deep-frozen. Table 1. gives us details of the origin and quantity of the tested livers.

Table 1. The origin and quantity of the examined red deer and roe deer livers

Years	Sampling localities	Red deer liver examined	Roe deer liver examined
1999-2006	Szigetköz	494	54
2003-2004	Gemenc	38	-
2003	Hanság	27	-
2003	Balaton Highlands, Bakony	16	-
2004	Territories along River Dráva (Vajszló)	10	-
2004	Floodplains of the Upper-Tisza	2	9
Total:		**587**	**63**

Intermediate hosts investigated

During the process of identifying possible intermediate host species we collected mainly *Galba truncatula* (Fig. 2.)*, Radix auricularia, Radix peregra, Stagnicola palustris, Lymneae stagnalis, Planorbarius corneus* and *Bythinia tentaculata* species.

Applied anthelminthics

We used anthelminthics of different active substances, such as:

1. Rafendazole-premix (rafoxanide + mebendazole)
2. Vermitan (albendazole)
3. SBH-Exwormer experimental granules (triclabendazole + levamizole)
4. Dewormer experimental medical premix (triclabendazole + levamizole)
5. Tribex 10 % suspension (triclabendazole)

2.3. Methods of the examinations

2.3.1. Examination of intermediate hosts

The snails were collected into plastic boxes in which we had put some water and menthol crystal. Due to the effects of the menthol snails do not go back into their shells thus they can be easily removed from their shell (Majoros, oral statement). We dissected the snails under a macroscope and in case of any abnormalities we put a sample on a slide and evaluated the larvae forms in 320-fold enlargement under the stereomicroscope.

2.3.2. Dissection of livers

Livers were sectioned – using Egri's method - both on the diaphragmatic and visceral surfaces as deep as half of parenchyma thickness, on every 1.5-2 cms. Thus we made approximately 30 cuts on both surfaces (see Fig. 3.). In this way, we were able to locate all immature and adult flukes (Egri and Sztojkov, 1999).

Figure 2. *Galba truncatula* snails in the mud (Source: own)

Figure 3. The dissection of a red deer liver (Source: own)

2.3.3. Coprological examination

For the examination of the feces we used a Paracount-EPG set (Chalex), containing 2 McMaster chambers, 2 pieces of 15 ml spin tubes, 2 plastic syringes and 2 beakers.

2.3.4. Methods of treating

Between 1996-2000, Rafendazole-premix (Bioferm, Praha) mixed with grind-corn in a 1:9 proportion was administered via feeding boxes and feeding places in Mid-Szigetköz (up to Dunaremete). 1000 gr of the medicated feed contained 10 g rafoxanide and 8 g mebendazole. 1 kg of the medication was enough for 500 kg body weight.
In 2001, Vermitan (Chinoin) was administered in the Upper-Szigetköz (near Tározó Lake and its surroundings). The active substance here was albendazole, which was administered in a 20mg/kg body weight dose, mixed with grind-corn.
In 2001, in Lower-Szigetköz (from Dunaremete up to Patkányos), and also in 2002 and 2003 all over the Szigetköz area we used SBH-Exwormer (SelBruHa). 100 g of the medication contained 10 g triclabendazole and 7.5 g levamizole. We put a mixture of 50 g medication granules and 100 g grind-corn over silage, which was an adequate dose for 500 kg body weight.

In 2004, we administered Dewormer (United Animal Health) all over the Szigetköz area, the active substances and dosage of which was identical with those of the SBH-Exwormer.
In 2005, Tribex 10% suspension (Chanelle, Ireland) was administered all over the Szigetköz area (see Fig. 4.). We placed the anthelminthic contained triclabendazole mixed with grind-corn, in a 20mg/kg body weight dosage. Fig. 5. shows the medicated forage already in the feeding box.

Figures 4-5. The Tribex suspension and medicated forage in the feeding box (Source: own)

2.3.5. Statistical evaluation of the data

In the quantitative parasitology evaluation of the results, we used the QP 2.0 (Reiczigel and Rózsa, 2001) statistical program.

3. THE EVALUATION OF THE RESULTS

3.1. The results of the examination of red deer livers from Szigetköz

- Between 1999-2006 we examined 494 red deer livers, 229 of which proved to be infected with *Fascioloides magna* (Bassi, 1875) fluke.
- The prevalence varied between 21.1- 65.1 %; the lowest value was in 2000, then there was a continuous increase that remained steady with a 40-50% value. In 2006, values started to increase again owing to the lack of treatment.
- These parasites are known to form groups of two to three in one fibrous capsule (see Fig. 6-7). However, we even observed as many as 4-5 mature flukes in a single fibrous capsule (Fig. 8).
- Specimens with an exceptional rate of infection were: 96 flukes per animal in 2001, 115 flukes per animal in 2002, 138 flukes per animal in 2003, 118 flukes per one red deer liver in 2004. Another animal infected with 115 flukes deceased.
- The phenomenon of re- and overinfection is proved by the fact that we often found flukes of different ages in a red deer liver (see Fig. 9).
- Although during troat stags roam a larger territory, we experienced no significant increase in infection among them. The animal infected with the largest amount of flukes (138) was a hind shot in Patkányos.
- The rate of infection of fawns in Upper-Szigetköz were 1-2 flukes per animal, while in the Lower-Danube floodplains of Szigetköz it was 7-18 flukes per animal.
- Aggregative distribution was characteristic of the samples, especially for test years of 2000: (D=0,896), 2002: (D=0,866), 2003: (D=0,827), 2004: (D=0,851), which is also shown in the high index of Discrepancy value (D).
- We experienced a larger volume of infection in the Lower-Danube floodplains than in Upper-Szigetköz.

A significant difference is found when comparing the prevalence values of the successive test years:

- Between the prevalence values of the 2000-2001 test years, Chi-square test- P=0.001; Fisher's exact test- P=0.002

- Between the prevalence values of the 2005-2006 test years in Upper-Szigetköz, Chi-square test - P=0.027; Fisher's exact test- P=0.03.
- Between the prevalence values of the 2005 Upper-Szigetköz-2006 Upper-Szigetköz test years, Chi-square test- P=0.013; Fisher's exact test- P=0.017.

When comparing several test years, a significant difference can be observed:

- Between the prevalence values of the 2004-2006 test years, Chi-square test - P=0.035; Fisher's exact test- P=0,034
- Between the prevalence values of the 2000-2006 test years, Chi-square test- P=0.002
- Between the prevalence values of the 1999-2006 test years, Chi-square test- P=0.001.

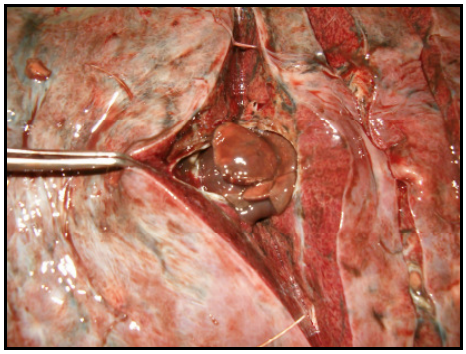


Figure 6. The position of flukes in the fibrous capsule

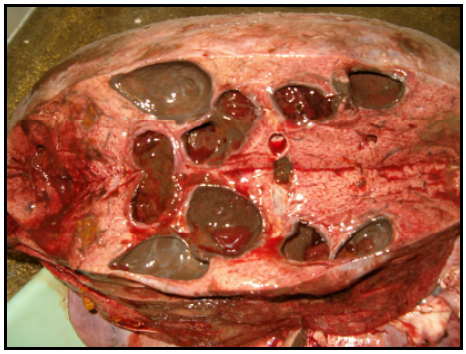


Figure 7. Fibrous capsules with the brownish-black content

(Source: own)

Figrue 8. Four adult flukes in a single fibrous capsule

Figure 9. Flukes of different age groups from the same liver

(Source: own)

3.2. The results of the examination of roe deer livers from Szigetköz

On the basis of our study we can establish that the prevalence of the infection in the roe deer population of Szigetköz is low; we found 2 positive cases from 54 samples, one with only one fluke, the other with four ones.

3.3. The results of the examination of red deer livers from Gemenc

During the autumn of 2003, we performed the dissection of 12 red deer livers at the plant of the Szekszárd Forestry of Gemenc Forestry and Game Management Corp. We found *Fascioloides magna* in none of the livers, however, the typical pigmented stripes, which were the tracks of the migration of immature flukes, were well observed.
23 of the 26 red deer stag livers examined by us in 2004 on the Karapancsa hunting territory of the Pandúr Forestry proved to be infected (88,5 %). The largest number of flukes per liver was 28, which is a less excessive value than the ones in Szigetköz. Thus, the aggregation rate is much lower, as it is shown by the low index of Discrepancy. In Karapancsa, the intensity values also showed similar results, as opposed to the results in Szigetköz (mean intensity: 23; median intensity: 3.5).
When comparing the samples in 2004 from Karapancsa and Szigetköz, a significant difference can be observed between the prevalence values of the two territories. Chi-square test P=0.000; Fisher's exact test - P=0.000,

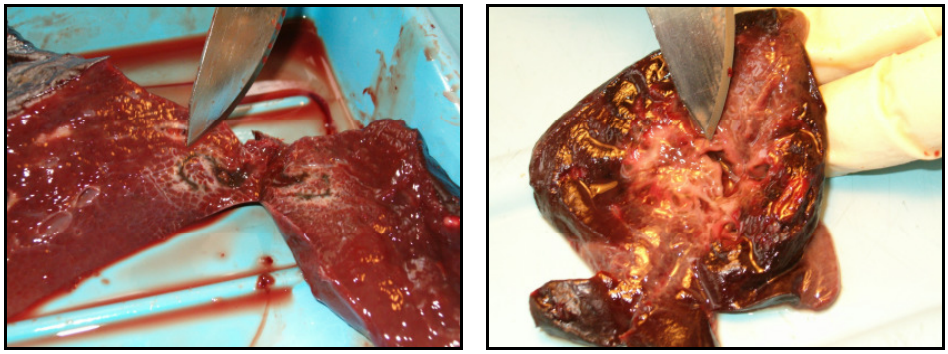
which means that the difference was so large that it was indicated by zero in the QP 2.0 program.

3.4. The results of other sample collecting localities

We found all the examined red deer livers form Hanság (27), Balaton Highlands, Bakony (16), Vajszló (10), Upper-Tisza floodplains (2), as well as all roe deer livers from the Upper-Tisza floodplains (9) healthy.

3.5. The occurance of the parasite in wild boars

The black pigmented stripes on the liver section of the wild boar shot in Derékerdő in 2005, on the hunting territory of Mosonmagyaróvár Forestry are the obvious signs of *Fascioloides magna;* this pathological change is not typical of any other fluke species (Fig. 10-11).



Figures 10-11.: Pathological changes indicating the presence of *Fascioloides magna* in a wild boar liver (Source: own)

3.6. Supplementary findings of the dissections

In 9 cases of the examined 587 red deer livers (1,5 %) we found larval cysts of tapeworms on the surface of the liver and also below the liver sheath. The small apple-sized cysts were the larvae of *Taenia hydatigena* (*Cysticercus taeniae hydatigenae*). In one case it occured as **companion parasitosis** of *Fascioloides magna*. In 3 cases we found a liver abscess, and one of the these livers was also infected with *Fascioloides magna*.

3.7. The results of the bacteriological testing of some infected livers

The following bacteria were isolated during the laboratory tests of 9 red deer liver samples infected with *Fascioloides magna*:
Enterococcus faecalis, Enterobacter amnigenes, Serratia liquefaciens, Stenotrophomonas maltophilia, Aeromonas hydrophila, Pseudomonas fluorescens, Citrobacter braakii, Enterobacter intermedius, Hafnia alvei, Cryseomonas luteola, Pseudomonas alkaligenes, Pseudomonas stutzeri, Escherichia coli. Anaerob breeding: *Clostridium spp*. The species identification was not completely successful but the species *Clostridium paraputrificum*, *C. bifermentans* és *C. cadaveris* can possibly be isolated.

3.8. Examination results aimed at the identification of intermediate hosts

During the examinations (668 specimens) no *Fascioloides magna* larvae forms were found in the above mentioned snail species.

The following development stages (sporocysts, rediae, cercariae) of flukes belonging to other fluke families were found in the snail fauna of Szigetköz:

- *Cyathocotylidae-* intermediate host: *Bythinia tentaculata*
- *Plagiorchidae-* intermediate host: *Lymnaea stagnalis, Planorbarius corneus*
- *Echinostomatidae-* intermediate host: *Galba truncatula, Radix auricularia, Radix peregra, Stagnicola palustris, Lymnaea stagnalis*

We also observed cercariae of :

- *Leucochloridium paradoxum-* intermediate host: *Oxyloma elegans*

3.9. The results of the demonstration of *Fascioloides magna* eggs

From the 7 fecal samples collected in 2007 we found *Fascioloides magna* eggs in an the amount of 50 EPG in only one sample, and in the same sample, *Moniezia spp.* eggs were also found.

4. CONCLUSIONS AND RECOMMENDATIONS

In certain regions of Hungary (especially in Szigetköz and in Gemenc) fascioloidosis has become endemic. Just like in the neighbouring countries, the floodplains of the Danube provide optimal conditions for the different development stages and intermediate hosts of *F. magna*, thus infection focuses can be found in Szigetköz and Gemenc. The Danube plays a leading role in the spread of this parasitosis. Hanság would also be an optimal biotope for the parasite, so a new infection focus is likely to develop there. Territories along the River Dráva are also potentially endangered, and the migration of red deer from the Croatian side together with the watery habitat may support the spreading of the parasite. It typical that the presence of the parasite has become constant in national parks and nature protected areas both in Hungary and in the neighbouring countries, which makes prevention and the decrease of infection extremely difficult.

Owing to the larger number of visiting animals, the surroundings of big game feeding places increase the opportunity of being infected with fluke eggs. Therefore, feeding places and boxes should be installed at drier and higher places, and it is also advisable to maintain their surroundings with regular mowing. Metacercariae may also get into the digestive system of wild and domestic animals with the forage hay, thus hay should be left „to rest" for six months after mowing before being used as animal feed – this will help reduce the survival chances of metacercariae.

With the administration of medicated feed for 3-4 days in late February, early March of 2002-2005 we were able to keep the infection volume between 40-50%. In Slovakia, similar results are attained by administering Rafendazole-premix four times annually. In our opinion, the administration of a 40-60mg/kg body weight dosage of triclabendazole medication would be sufficient. Besides, an anthelminthic treatment should be administered in the late autumn period. In order to avoid the development of resistence to medication, it is advisable to use combined active substances, such as triclabendazole + levamizole, or to alter different medications. It is important that treatments should be carried out in accordance with border neighbours.

The little infection volume in roe stags is probably connected with their territorial behaviour. Their medication treatment can be more difficult, owing to the common biotope with deer and wild boars.

Government subsidies for the treatment of game stock and for the survey of efficacy are available in the neighbouring countries but not in Hungary. Due to financial reasons, no treatments were administered in 2006 and 2007 in Szigetköz, with a possible result of a large number of deceased roe deer, and a larger occurrence of infection among red deer. We may also expect deteriorating values in the Szigetköz in red deer stock, as well as the decease of highly infected specimens. Moreover, the parasite can be expected to spread and constantly infect the wild boar stock. As a result, the appearance of *Fascioloides magna* can also be expected to appear in domestic animals in the region. All ruminants – especially sheep – grazing on the pastures of the protected sides are endangered. Moreover, ruminants kept in stables may also be infected with the metacercariae present on the hay collected from this area.
Sufficient rest should be provided for animals apart from the rest season before the treatment.
Medication treatment can only be effective if it is administered together with game management and habitat improvement measures.
The transportation of wild ruminants from endemic areas to new, and not yet infected regions should be prohibited.

The bacteria found during the bacteriological study of the infected livers cannot be connected to the parasitosis, all of them could normally have been present in the intestines of the animals (*E. coli*, *Enterococcus faecalis, Enterobacter-, Serratia-, Citrobacter-, Clostridium* species), or they may occur in the soil and natural waters (such as *Aeromonas hydrophila*). The *Pseudomonas* species in food that were inappropriately stored or stored in a refrigerator for a very long time, causing the deterioration of the food. *Clostridiums,* among others, together with other members of the intestinal flora, invade the tissues after the death of the host organism, and they have a primary role in the decay of the body (Gergely et al., 1999).

The identification of intermediate host snails can be the subject of a new study. Owing to the low infection volume, the examination of more than

ten thousand snails would be necessary, the collection of which is extremely time consuming.

Feces examination was not suitable to evaluate the rate of infection. During the collection of fecal sample we cannot avoid to collect the feces of the same animal on several occasions. If the infection is fresh, the feces examination would give a false negative result, since there are no mature flukes – and thus no egg production – in the host animal.

It seems that we have to live together with this parasitosis in the red deer and roe deer stocks in Hungary, as its total elimination is impossible. However, we can reduce the infection volume to a value that is reasonable for the game stock. The reduction of the damage caused by the parasite is only possible if we co-operate with the neighbouring countries (reconciling hunting seasons and the date and method of medicative treatments). It is also important to carry out regular surveys and employ state-subsidized, combined anthelminthic treatments to endangered red deer, roe deer and wild boar stocks, because their separation in their habitat is impossible. It is only through such government that measures are likely to decrease the population of flukes in Hungarian game stocks.

5. NEW SCIENTIFIC RESULTS

1. The prevalence of *Fascioloides magna* infection between 1999-2006 has altered between 21.1- 65.1 % in Szigetköz. The infection on the floodplains of the Lower-Danube showed a higher frequency rate than that of the Upper-Szigetköz. Specimens with excessive rate of infection were also from the floodplains of the Lower-Danube. In the examined roe deer stocks, fascioloidosis is present at a relatively low level.
   In Karapancsa, in the Pandúr Forestry of Gemenc Forestry and Game Management Corp., a red deer stock that had previously not been treated with anthelminthics, showed an extremely high – 88.5 % - prevalence.

2. Quantitative parasitology methods (QP 2.0, Rózsa et al., 2000) were used to compare in the year data 2004 from Karapancsa and Szigetköz. Significant differences were observed in the prevalence values. Aggregation and intensity values also differed significantly between the two regions. In Karapancsa, there are specimens with a high level of infection, thus the distribution is less aggregated, as it is indicated by the low index of Discrepancy. Mean and median intensity values are similar, while, on the other hand, the Szigetköz region was characterised by opposite indicators.

3. The parasite was present in red deer irrespectively of age or sex. The maximum number of flukes in a single red deer liver was 138. In one case, we observed the decease of a red deer infected with 115 large American liver flukes.

4. Technical literature mentions 2-3 flukes per one fibrous capsule, however, in several cases we found as many as 4-5 adult flukes per capsule. Continuous overinfection is proved by the fact that we often found 2 or – rarely – 3 flukes of different ages in the liver of one host animal.

5. The examination of red deer liver showed a 1,5 % infection frequency by the larva of *Taenia hydatigena* (*Cysticercus taeniae*

hydatigenae), which, in one case, occurred as companion parasitosis of *Fascioloides magna*.

6. Typical pathological changes indicating the presence of *Fascioloides magna* were observed on wild boar livers for the first time in Hungary.

7. Anthelminthics of different active substances were administered in Szigetköz. The lowest infection frequency (21.1%) was measured in 2000, when Rafendazole-premix (rafoxanide + mebendazole) was administered. Between 2002-2005, we administered SBH-Exwormer, Dewormer (triclabendazole + levimazole) and Tribex (triclabendazole), and prevalence started to be constant at a level of 40-50%, which may also be a result of insufficient rate of medicative treatments. In 2006, the infection frequency increased by 20% in Szigetköz compared to the previous year, which was evidently the result of cancelled treatments. The significant difference was also proved by statistical methods.

6. LIST OF PUBLICATIONS IN THE THEME OF THE DISSERTATION

6.1. Publications in supervised scientific journals

1, **Giczi, E**., Egri, B. (2005): A fascioloidosisról. Magy. Áo. Lapja, 127: 557-562.

2, **Giczi, E**., Egri, B. (2006): Quantitative parasitologische Untersuchungsergebnisse zum Vorkommen von *Fascioloides magna* (Bassi, 1875) bei Rothirschen im Nordwesten von Ungarn (1998-2005). Tierärztl. Umschau, 61: 660-665.

3, **Giczi, E**., Egri, B. (2006): Helyzetkép a magyar gímszarvas-és őzállomány *Fascioloides magna*- fertőzöttségéről (2003-2004). Vadbiológia, 12: 70-74.

4, **Giczi, E**., Egri, B. (2007): Quantitative parasitologische Untersuchungsergebnisse zum Vorkommen von *Fascioloides magna* (Bassi, 1875) bei Rothirschen im Nordwesten von Ungarn (1998-2005). Paraziten-Spezial (Tierärztl. Umschau & Kleintiermed. Verleger-Beilage), 1: 54-57.

6.2. Oral presentations

1, Egri, B., **Giczi, E**., Törzsök, Gy. (2003): „Sentinel-Punkte" als regelmäßige Kontrollmöglichkeiten zur Erschlißung der *Fascioloides magna*- Infiziertheit im ungarischen Wildbestand (Gegenwart und Zukunft). Proc. Interreg-Projekt Amri-Egel-Austria: Erforschung und Bekämpfung des Amerikanischen Riesenleberegels (*Fascioloides magna*). Vet. med. Uni., Wien, 2. Dez., p.6-9.

2, Egri, B., **Giczi, E**. (2003): Fascioloides up-to-date. MTA Állatovostud. Biz., Akadémiai beszámolók. Parazitológia, halkórtan. Állatorvostud. Egyetem, Budapest, jan. 22., 29: 8.

3, Egri, B., **Giczi, E**. (2004): „Sentinel"- pontok a fascioloidosis felismerésének szolgálatában. MTA Állatorvostud. Biz., Akadémiai

beszámolók. Parazitológia, halkórtan. Állatorvostud. Egyetem, Budapest, jan.28., 30: 1.

4, Egri, B., **Giczi, E**. (2005): Aktueller Lagebericht über die Infiziertheit durch *Fascioloides magna* (Bassi, 1875) des ungarischen Hirschbestandes (Alte und neue Herde in 2004). Proc. Interreg-Projekt Amri-Egel-Austria: Erforschung und Bekämpfung des Amerikanischen Riesenleberegels (*Fascioloides magna*). Vet. med. Uni., Wien, 21. Jan., p.3-4.

5, Egri, B., **Giczi, E**., Törzsök, Gy. (2006): Aktueller Lagebericht über die *Fascioloides magna* (Bassi, 1875) Infiziertheit der Rothirsche in der Region des Szigetköz (Kleinen Schütt) (quantitative parasitologische Erschließung 2005). Proc. Interreg-Projekt Amri-Egel-Austria: Erforschung und Bekämpfung des Amerikanischen Riesenleberegels (*Fascioloides magna*). Vet. med. Uni., Wien, 17. Feb.

6.3. Abstracts

1, Egri, B., **Giczi, E**. (2003): Fascioloidosis of roe deer and red deer in Hungary (1997-2002). Proc. 19th Int. Conf. WAAVP, New Orleans, USA, Aug. 10-14., p.106.

2, Egri, B., **Giczi, E**. (2006): Fascioloidosis of red deer and its therapy in „Szigetköz" region in the North-West of Hungary (1998-2005). Proc. 6th Int. Deer Biology Cong., Prague, Czech Republic, Aug. 7-11., p.78-79.