ALARIA SPP. EPIZOOTIOLOGICAL SITUATION IN WILD BOAR IN LATVIA

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Abstract
During the controls for *Trichinella* in wild boar meat, *Alaria spp*. mesocercariae in the examined samples are diagnosed. There does not exist a routine veterinary inspection for diagnosis of alariosis (*Alaria spp*.) in Latvia. The aim of the study was to determine *Alaria spp*. mesocercariae distribution in wild boar (*Sus scrofa*) meat in Latvia. Laboratory examination was performed in Latvia University of Agriculture Faculty of Veterinary Medicine laboratory of Parasitology, from 2010 to 2013. Meat samples were examined using artificial digestion method, which in regulation No 2075/2005 is considered an official detection method for *Trichinella*. In total, 1233 wild boar meat samples from different hunting regions of Latvia were examined. The territory of Latvia was divided into four regions – Kurzeme, Zemgale, Vidzeme and Latgale. For examination we used meat samples from wild boar pillars of diaphragm. Samples were taken from wild boars of different age and gender. The prevalence of infection in the examined wild boar meat samples from all regions was 8.2%, but the intensity of infection 2.8.
Key words: *Alaria spp.*, alariosis, wild boar, prevalence of infection, intensity of infection.

Introduction

To provide consumers with appropriate food, official veterinary inspection is made in abattoirs and hunted wild animals. The most well known and actual parasitological disease, which potentially can invade humans is trichinellosis (*Trichinella*). The legislation of EU member states regulates the official meat inspection for *Trichinella spp*. detection. During the examination of wild boar meat for *Trichinella*, frequently *Alaria alata* mesocercariae are detected.

Alariosis is a widely distributed infection in the world, which in definitive hosts can reach prevalence of infection up to 95% (Paulsen et al., 2012). Fluke development occurs with three different hosts. Definitive hosts are animals of *Canidae* family (dog (*Canis lupus familiaris*), wolf (*Canis lupus*), red fox (*Vulpes vulpes*), raccoon dog (*Nyctereutes procyonoides*) and polar fox (*Vulpes lagopus*) etc.), and the second intermediate hosts - amphibians and their tadpoles (Riehn et al., 2012). Relevant part in *Alaria* development is played by paratenic hosts, which can be various animals from different classes – reptiles (*Reptilia*), birds (*Aves*) and mammals (*Mammalia*), for example, animals from orders of rodents (*Rodentia*), carnivores (*Carnivora*) and ungulates (*Artiodactyla*), possibly humans, too (Paulsen et al., 2012). Definitive hosts are invaded with *Alaria* by consuming both intermediate host and paratenic host (Акбаев и др., 1998). Definitive hosts with faeces excrete to the environment parasite eggs, which at appropriate external environmental temperature, 21 °C – 27 °C become infective in 11 to 12 days. At the beginning the first stage of larvae – miracidium develops in the egg. Miracidium hatches from the egg and thereafter penetrates freshwater snail. In the snail miracidium continues its development, transforming into the second stage of larvae – cercaria. Cercaria goes through the snail and by actively moving penetrates the second intermediate host – a frog or tadpole, where it develops into metacercariae (Möhl et al., 2009; Трусова, 2009). Carnivores get infected by consuming a frog or tadpole, but here is a possibility, that the intermediate host is consumed by omnivores instead of carnivores, for example, wild boars (*Sus scrofa*), moles (*Talpa europaea* (L.)), birds (*Aves*), mice (*Muridae*), thereby becoming a paratenic host. *Alaria* larvae – mesocercariae in the paratenic host, after digestion get free in the intestines, perforate intestinal wall and migrate to different parts of organism, mostly to subcutaneous tissue where localise and do not continue their development but keep sustained possibility to invade. *Alaria* mesocercariae accumulate in the paratenic host (Гладкова и др., 1970). As soon as such a paratenic host is eaten by the definitive host, *Alaria* will develop to a mature trematode and life cycle will be finished (Трусова, 2009). It should be noted that in the Institute of Food Safety, Animal Health and Environment – 'BIOR' a study was carried out about *Alaria alata* distribution in different host animals in Latvia – the study includes information about foxes, raccoon dogs and wild boar. This study shows that *Alaria alata* is prevalent in wild carnivores in Latvia which may be a potential source of environmental contamination (Esīte et al., 2012).

According to the Federal Institute for Risk Assessment in Germany (BfR), consumers may become invaded with *Alaria* by consuming inappropriately cooked wild boar meat. The symptoms and course of disease depends on species and amount of consumed larvae (Wild boar meat may contain the harmful *Alaria alata*, 2007). In carnivores and omnivores alariosis is characterised by digestive system disorders and myositis (stage of larvae). In the case of severe invasion, the following blood chemical parameter changes are observed – increased alkaline phosphatise, increased ALAT (alanine amino

transferase) and ASAT (aspartate amino transferase) concentration, decreased protein amount, as well as decreased water content in muscles (Трусова, 2009). Information about changes in blood chemical parameters in wild boars in Latvia is not available, and we also do not have any broader studies about alariosis epizootiological situation in wild boar population, therefore the objective of our study was to determine the epizootiological situation of *Alaria spp*. invasion in wild boars in Latvia.

Materials and Methods

The research was made in Latvia University of Agriculture Faculty of Veterinary Medicine Institute of Food and Environment laboratory of Parasitology, from year 2010 to 2013. Material for research and diagnosis in cooperation with hunting collectives was obtained from different regions of Latvia. The territory of Latvia was divided into four regions – Kurzeme, Zemgale, Vidzeme and Latgale. 241 samples were received from Kurzeme region, 916 samples from Zemgale, 71 from Vidzeme, and five samples from Latgale. Overall, 1233 samples of wild boar pillars of diaphragm were examined. Until examination the samples were stored at temperature + 2 °C - + 4 °C. All obtained samples, i.e. wild boar pillars of diaphragm, were examined using artificial digestion method, which in regulation No 2075/2005 is defined as an official method for *Trichinella* diagnosis. For examination we took 50 g large samples from pillars of diaphragm. We diagnosed *Alaria* on a light microscope in 10×10 magnification. Statistical data processing was carried out with "Microsoft Excel – 2010." We calculated the prevalence of infection % (IE) and intensity of infection (II), as well as t-test. The prevalence of infection was calculated using equation 1, the intensity of infection – equation 2.

$$IE = \frac{Number\ of\ positive\ samples}{Number\ of\ examined\ samples} \times 100 \quad (1)$$

where

IE – prevalence of infection is ration of positive samples and total number of examined samples, in percentage, %.

$$II = \frac{Numberoflarvae}{Numberofpositivesamples} \quad (2)$$

where

II - intensity of infection is ratio of detected number of larvae and total number of positive samples.

Results and Discussions

Overall, from all four regions 1233 samples from wild boar pillars of diaphragm were examined and *Alaria* mesocercariae were diagnosed in 101 samples (Table 1).

In Kurzeme region the prevalence of infection in received 241 samples was 7.9%. From the region of Zemgale we received the most of wild boar meat samples, in total 916. Out of them 77 were positive and the prevalence of infection was 8.4%, which is significantly higher ($p>0.05$) if compared to the invasion in other regions. Whereas in the meat samples received from Vidzeme only in four samples *Alaria* mesocercariae were found and the prevalence of infection 5.6% was the lowest in comparison to other regions. The least number of samples were received from the region of Latgale, the obtained number of samples was only five and *Alaria* was diagnosed only in one examined sample. In the examined wild boar meat samples from all regions of Latvia, *Alaria* mesocercariae prevalence of infection was 8.2%. Other country studies show similar data. In Germany in wild boar meat *Alaria* mesocercariae prevalence of infection reached 11.5% (Riehn et al., 2012), in Austria – 6.7% (Paulsen et al., 2012), but in Croatia during a similar study the prevalence of infection was 1.8% (Urosevic et al., 2012). It should be noted that in the research carried out in the Institute of Food

Table 1

Distribution of obtained and examined samples by region

Region	Kurzeme	Zemgale	Vidzeme	Latgale	Total
Examined samples (number)	241	916	71	5	1233
Positive samples (number)	19	77	4	1	101
Larvae (number)	47	229	5	1	282
II	2.5	3.0	1.2	1.0	2.8
IE (%)	7.9	8.4	5.6	20	8.2

II – intensity of infection
IE – prevalence of infection, %

Safety, Animal Health and Environment – 'BIOR" in the period from 2009 to 2011 in wild boar meat the prevalence of infection was 19.4% (Esīte et al., 2012).

Intensity of infection in the examined wild boar meat positive samples from all regions was 2.8. The highest intensity of infection 3.0 ($p>0.05$) was observed in the region of Zemgale. In the positive 77 wild boar meat samples the detected number of mesocercariae was 229. Comparatively high intensity of infection 2.5 was discovered in the 19 positive samples from the region of Kurzeme. Low intensity of infection 1.2 was in samples from Vidzeme and 1.0 – from Latgale. In one positive sample number of *Alaria* mesocercariae varied from one to eight. In the Institute of Food Safety, Animal Health and Environment – "BIOR" similar to our study, in 50 g wild boar pillars of diaphragm, the number of mesocercariae were from one to 26 (Esīte et al., 2012). Whereas in a study carried out in Austria, when using for examination 35 g pillars of diaphragm, the diagnosed mean number of mesocercariae was 4.5 (Chmurzyńska et al., 2013). In the research done in France it is mentioned, that from eight examined regions, from year 2007 to 2009 the intensity of infection increased from 62 to 94 (Portier et al., 2011).

In recent years *Alaria* has been increasingly diagnosed in wild boar meat samples, for that reason study has to be continued.

Conclusions

1. *Alaria* mesocercariae in the examined wild boar meat samples were diagnosed in all regions of Latvia.
2. The highest prevalence of infection relative to the examined samples was found in the regions of Zemgale (IE 8.4%) and Kurzeme (7.9%).
3. The highest intensity of infection was diagnosed in Zemgale (II 3.0) and Kurzeme (II 2.5), but the least in samples from Latgale (II 1.0).

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