Natural parasitic infections in various breeds of sheep in Poland

Abstract

The study was carried out on nine breeds of sheep naturally infected with internal parasites. The aim of the study was to estimate a prevalence of infections with protozoa, flukes, tapeworms and nematodes, parasitising gastrointestinal tract and lungs of sheep. It was found that the prevalence of *Eimeria* sp. infections ranged from 4.6% to 60%, the lower being in Polish Merino and the highest in Żelaźnieńska Sheep. The liver fluke eggs were detected only in Polish Mountain Sheep. Tapeworms infections (*Moniezia* sp.) occurred in five breeds with prevalence from 2% (Polish Corriedale) to 18.6% (Polish Mountain). Lungworm infections (*Muellerius capillaris*) were found in Kamieniecka, Pomorska and Mountain Sheep with the prevalence from 2.5% (Kamieniecka) to 12.5% (Pomorska). The highest number of gastrointestinal nematode genus/species (nine) was found in Wrzosówka and the lowest (two) in Świniarka Sheep. *Trichostrongylus* spp. showed the highest prevalence (10%-35%) in seven breeds, *Haemonchus contortus* in Pomorska Sheep (25%) and *Nematodirus* spp. in Świniarka Sheep (38.1%).

Key Words: sheep breeds, *Eimeria* sp., *Moniezia* sp., *Muellerius capillaries*, gastrointestinal nematodes
gastro-intestinal nematodes was demonstrated. Using the faecal egg count depression test it was found, that the efficacy of treatment was as low as 36.5 to 25.9 per cents (BALICKA-RAMISZ et al., 1999)

Because of increasing drug resistance among parasites and a growing concerns of pesticide residues in food and the environment, it is becoming very important to develop adjuncts to current control procedures. One of the ideas is to identify the genetic basis for naturally occurring resistance of some breeds of sheep against parasitic infections. Evidence of genetic variation in sheep and goats for resistance to or tolerance of gastro-intestinal nematodes was first documented 40-50 years ago and this subject has been comprehensively reviewed by GRAY et al. (1995). The best documented examples of sheep breeds showing resistance to endoparasites are the Red Maasai sheep in East Africa and the Djallonké sheep in West Africa (BAKER, 1995). There have been suggestions that also in Poland some breed of sheep are more resistant to parasitic infections than other. BOUIX et al. (1998) described resistance of Polish longwool sheep to infection with gastrointestinal nematodes and NOWOSAD et al. (2003) found genetic differences in natural resistance to gastrointestinal nematodes in Polish long-wool, Blackface and Weisses Alpenschaf sheep. However, the susceptibility of various breeds of Polish sheep to infection with intestinal protozoa, flukes and tapeworms have not been evaluated so far.

The aim of this study was to compare the susceptibility to infections with internal parasites of eight Polish breeds of sheep.

Table
Experimental animals (Beschreibung des Tiermaterials)

<table>
<thead>
<tr>
<th>Breed name (abbreviation)</th>
<th>Breed characteristics</th>
<th>No. of sheep sampled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polish Mountain Sheep (PMS)</td>
<td>Composite of Carpathian Zackel of 14th century, Romanian Zackel and East Friesian They are multiple purpose sheep, small, late maturing, with mixed wool</td>
<td>44</td>
</tr>
<tr>
<td>Polish Mountain Colored Sheep (PMC)</td>
<td>As above</td>
<td>43</td>
</tr>
<tr>
<td>Świniarka Sheep (SW)</td>
<td>This breed derives from the primitive sheep formerly maintained in the whole Central Europe. a primitive breed, characterised by low growth rate and weak musculature as well as late maturing</td>
<td>21</td>
</tr>
<tr>
<td>Wrzosówka Sheep = Polish Heath Sheep (WR)</td>
<td>The primitive, small fur breed of north short-tailed sheep groups. Sheep of this breed are very well adapted to the difficult environmental conditions, resistant to diseases, unseasonal.</td>
<td>80</td>
</tr>
<tr>
<td>Kamieniecka sheep (KAM)</td>
<td>Continental longwool group - Marsh sheep;</td>
<td>40</td>
</tr>
<tr>
<td>Pomorska Sheep (POM)</td>
<td>Continental longwool group - Marsh sheep;</td>
<td>16</td>
</tr>
<tr>
<td>Żelazna sheep=Polish Lowland Sheep” (ZEL)</td>
<td>Developed from Polish Merino crossed with Leicester Longwool and Łowicz.</td>
<td>65</td>
</tr>
<tr>
<td>Polish Corriedale (COR)</td>
<td>Composite of Polish Merino and Lincoln Longwool (United Kingdom)</td>
<td>49</td>
</tr>
<tr>
<td>Polish Merino (PM)</td>
<td>Imports from Merino, Electoral Merino (Spain, Germany), Rambouillet, Merino Précoce, (France, Germany) Main use: (1) wool, (2) meat; long breeding season</td>
<td>43</td>
</tr>
</tbody>
</table>
Material and Methods

Animals
The study was carried out on Four hundreds of adult sheep (males and females) of eight breeds (Table). Sheep were kept (and feed) in conventional, local conditions.

Parasitological procedures
Gastrointestinal parasites prevalence was estimated using saturated NaCl flotation and sedimentation methods. In order to assess species of gastrointestinal nematodes, infective (L3) larvae were cultured using samples of faeces from individual sheep collected from spring 2002 to autumn 2004. Baerman’s technique was used for detection of lungworm infection.

Results
Parasites were detected in 73.1% out of 400 examined sheep. Gastrointestinal nematode infections were most frequent (66.1% of prevalence). A mean prevalence of Eimeria spp. Reached 34.1%, the prevalence of Fasciola hepatica infections was 10.9% (found only in Polish Mountain Sheep), tapeworms (Moniezia sp.) about 7.0%, and lungworms (Muellerius capillaris) only 1.7%. In total, the highest prevalence of parasitic infections were observed in three breeds: Polish Mountain Colored Sheep, Zelazna Sheep and Swiniarka (100%, 89.2% and 81% respectively).
Prevalence of Eimeria spp. infections (Fig. 1) ranged from 4.6% to 60% (Polish Merino and Zelazna Sheep respectively). Tapeworms (Moniezia spp.) were found in five breeds with prevalence from 2% (Polish Corriedale) to 18.6% (Polish Mountain Sheep). Muellerius capillaris (lungworm) infections were found only in Polish Mountain Colored Sheep, Polish Mountain Sheep and Kamieniec Sheep (with prevalence 12.5%, 4.6%, 4.5% and 2.5% respectively). The highest number of gastrointestinal nematode genus/species (nine) was found in Wrzosówka and the lowest (only two; Trichostrongylus spp. and Nematodirus spp.) in Swiniarka Sheep. Bunostomum spp. and Oesophagostomum spp. were found only in Wrzosowka Sheep (prevalence 5% and 1.2% respectively). Chabertia spp. Infection was observed in three breeds: Pomeranian Sheep, Kamieniec Sheep and Wrzosowka (prevalence: 18.7%, 10% and 3.7% respectively). Strongyloides spp. were found in seven breeds (except Polish Corriedale and Swiniarka Sheep), with prevalence ranging from 1.5% to 15.9% (Zelazna Sheep and Polish Mountain Sheep respectively). All breeds of sheep were infected with nematodes from family Trichostrongylidae with prevalence from 35% (Wrzosowka) to 76.2% Swiniarka Sheep. Larvae from five genus of Trichostrongylidae (Trichostrongylus, Nematodirus, Teladorsagia, Haemonchus and Cooperia) have been found (Fig. 2). Trichostrongylus spp. showed the highest prevalence (10 – 35%) in seven breeds, H. contortus in Pomorska Sheep and Nematodirus spp. in Swiniarka Sheep. In majority of nematode positive sheep number of eggs per gram of faeces (epg) of gastrointestinal nematodes were found in faeces of examined sheep (84.35). The numerous and very numerous eggs were found in 3.6% (Polish Corriedale) to 31.2% (Swiniarka Sheep) of animals (Fig. 3).
Fig. 1: Prevalence of internal parasite infections in different breeds of sheep in Poland (Innenparasiteninfektionen bei verschiedenen Schafrassen in Polen)

Fig. 2: Prevalence of various species of *Trichostrongylidae* in different breeds of sheep in Poland (Infektionen unterschiedlichen Gattungen *Trichostrongylidae* bei verschiedenen Schafrassen in Polen)

Fig. 3: Percentage of sheep excreting high numbers of eggs of trichostrongylid nematodes (Anteil der Schafe, die im Kot die größte Eieranzahl von *Trichostrongylidae* ausscheiden)
Discussion

Previous reports on parasitic infections in sheep in Poland were focused on gastrointestinal nematodes of Wrzosówka sheep (MOSKWA et al., 1998, 2002; CHARON et al., 1999,) and Haemonchus contortus, Teladorsagia circumcincta and Trichostrongylus spp. have been reported as the most prevalent species. In the present study, Trichostrongylus spp. infections were most prevalent in all but two (Świniarka and Pomorska) breeds. In Świniarka sheep most prevalent nematode was Nematodirus sp. and in Pomorska Sheep – H. contortus. Infection with H. contortus was the second most prevalent in Wrzosówka and Corriedale. Several research studies have already established the importance of host genotype on resistance of hosts to parasite infection (STEAR et al., 1995). COLTMAN et al. (2001) showed that a microsatellite polymorphism in the gamma interferon gene is associated with resistance to gastrointestinal nematodes in a naturally-parasitized population of Soay sheep (Ovis aries) on the island of Hirta, St Kilda, Scotland, naturally parasitized by gastrointestinal nematodes, predominantly Teladorsagia circumcincta. In Poland, NOWOSAD et al. (2003) found highly significant breed effect on number of excreted gastrointestinal nematode eggs between Polish Longwool (PL) and Blacface Sheep (BL). PL ewes excreted three times fewer eggs than Blacface Sheep. In our study the highest number of eggs of Trichostrongylidae nematodes excreted sheep of Świniarka, Kamieniecka and Pomorska breed and the lowest Polish Corriedale. Świniarka Sheep showed also very high prevalence of Nematodirus sp. infections. The eggs of these nematodes are very resistant to drying and low temperatures, and may survive many months on the pasture. The sheep are infected when they ingest the developing eggs or the large infectious larvae that have crawled up onto grass. Infection is primarily in very young animals, but older animals may also be affected. Because the eggs only hatch in wet conditions, outbreaks usually occur after a rainfall. The infected animal has a sudden onset of diarrhea, dehydration, and general unthriftiness. The eggs are easy to identify, however the animal may show signs of the disease before the female worm has started laying eggs. In addition, the worm lays few eggs, so even with a heavy infestation few eggs may be seen on the preparation.

In summary, further studies of the between breeds variation in susceptibility to parasitic infection are necessary because such variations may be of fundamental importance in epidemiology and the management of the various breeds of sheep.

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