PREVALENCE OF *EIMERIA LEUCKARTI* IN YOUNG HORSES AND USEFULNESS OF SOME COPROSCOPICAL METHODS FOR ITS DETECTION

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Abstract

Two hundred and seven weaned foals aging 6 to 12 months from small farms in the Lublin region were examined in the years 2005 to 2007. The investigations were carried out using flotation and sedimentary flotation methods, and McMaster’s quantitative method modified by Wetzel. *Eimeria leuckarti* oocysts were found in 19 (9.18%) of the foals. The horses demonstrated occasionally clinical signs (four horses), and only two foals suffered temporary diarrhoea. The number of oocysts excreted via faeces was generally low and their presence in the faeces was detected irregularly. The sedimentary flotation method was the most effective considering the identification of *E. leuckarti* invasion.

Key words: foals, *Eimeria leuckarti*, coccidiosis, morbidity, diagnosis.

In spite of numerous investigations carried out recently into the parasite fauna of horses in Poland, the knowledge of the infection of protozoan coccidia, genus *Eimeria* in these animals is poor (9-14, 17, 18, 22). The horse family, mainly foals and young horses are infected by *Eimeira leuckarti* localised in the epithelial cells of the small intestine. Several authors found in the faeces of horses the prevalence of oocysts different morphologically from *E. leuckarti*. The species of these oocysts were not determined (8, 24).

The goal of this work was to evaluate the extensiveness of *E. leuckarti* infection in weaned foals in the Lublin region and to compare the effectiveness of coproscopic methods in the diagnosis of the infection.

Material and Methods

Detailed coproscopy examinations performed in the years 2005 to 2007 included 207 weaned foals aging 6 to 12 months and originating from small farms in the Lublin region. Two quality methods were applied in the experiment (11). Faeces samples weighing 2 g were examined using the standard flotation method with a saturated NaCl plus saccharose solution, whereas samples weighing 50 g were examined using the sedimentation-flotation method with a saturated NaCl plus saccharose solution, described in detail in the report on the diagnosis of tapeworms in horses (13). Moreover, a quantity method with the use of McMaster’s chamber according to Wetzel with a modification involving an increased amount of examined faeces sample up to 4 g (11).

In the case of positive results, the horses were examined clinically and also coprologically three times at a week interval with the use of the sedimentation-flotation method.

The data were analysed statistically using asymptotic test with equal probability at P<0.05 and P<0.1.

Results

The oocysts of *E. leuckarti* were found in faeces collected from 19 (9.18%) foals (Fig. 1). Detailed results of coproscopic examinations performed using various methods are shown in Table 1. In addition, the majority of the examined faeces samples demonstrated the occurrence of *Parascaris equorum* eggs belonging to *Strongylidae* sp. and occasionally the eggs of tapeworms from the family *Anoplocephalidae*.

The majority of horses excreting *E. leuckarti* oocysts did not demonstrate any clinical signs. Only four foals were emaciated together with lifeless fur and two of them had temporary diarrhoea. The horses suffering diarrhoea did not excrete developing forms of other parasites in the faeces.

Subsequent coproscopic examinations carried out weekly for a month in the horses demonstrating *E.
The comparison of the effectiveness of the three coproscopic methods used for the detection of *E. leuckarti* showed that the sedimentation-flotation method was the most efficient and its effectiveness was statistically significant in comparison to other methods (Tables 1 and 2).

### Table 1

<table>
<thead>
<tr>
<th>Method</th>
<th>Number of positive samples</th>
<th>Extensity of infection (%)</th>
<th>Number of oocysts minimum-maximum mean standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flotation</td>
<td>12</td>
<td>5.80</td>
<td>1-45 per sample</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>X = 6.95</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SD= 12.81</td>
</tr>
<tr>
<td>Sedimentary-flotation</td>
<td>19</td>
<td>9.18</td>
<td>1-2,634 per sample</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>X = 161.37</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SD= 599.63</td>
</tr>
<tr>
<td>Quantity (McMaster’s)</td>
<td>9</td>
<td>4.35</td>
<td>50-1,100 oocysts/g faeces</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>X = 100</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SD= 251.11</td>
</tr>
</tbody>
</table>

### Table 2

<table>
<thead>
<tr>
<th>Methods</th>
<th>Test function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flotation - Sedimentary flotation</td>
<td>1.307*</td>
</tr>
<tr>
<td>Flotation - Quantity (McMaster)</td>
<td>0.672</td>
</tr>
</tbody>
</table>
| Sedimentary Flotation - Quantity (McMaster) | 1.957** |}

*- P<0.01; **- P<0.05.

Fig. 1. Oocyst of *Eimeria leuckarti.*
Discussion

The data considering the prevalence of *E. leuckarti* in horses in Poland are not available widely in the literature (14). The extensiveness of *E. leuckarti* infection was a little higher than that reported in our earlier investigations on horses aging from 1 to 16 years and originating also from small farms. The differences found were possibly depended on the age of the horses (weaned foals) that were markedly younger and thus more sensitive to the infection. Moreover, the condition of keeping and pasturing might also influence the extensiveness of the infection as it was evidenced in an earlier report (14).

The extensiveness of *E. leuckarti* infection in several countries has been ranging from 2% to 80% (Greece 3.1%, Germany 64.9%–80.0 % (foals), 3.33% (mares), Poland 6.7 %, Turkey 4.5%–5.88%, USA 41.0% (foals), 85%-100% farms, Hungary ≤ 2%). This wide dispersion of the data may probably result from various ages of examined horses and coproscopy techniques used (1-7, 14-16, 19, 20, 23, 24).

It is believed that the infection of coccidia concerns mainly young horses and especially foals. Thus, the literature shows generally information on *E. leuckarti* infection in weaned foals and adult horses. The investigations carried out by several authors demonstrated that the *E. leuckarti* oocysts were found only in foals but not in the faeces of the mares (4, 7). Lyons *et al.* (19), reported that the first oocysts in the faeces of foals occurred on day 15 (70 d on average), whereas Beelitz *et al.* (7) – found the oocysts on day 28 of their life. The above data are in contrast to the results reported by McQueary *et al.* (21), who determined experimentally a 31-d prepatent period for the parasite.

Lyons *et al.* (19), found that *E. leuckarti* oocysts were excreted within about four months, which was in accordance with the results reported by Bauer *et al.* (4) who established a 16-week patent period of the infection. These findings are in contrast to the results of McQueary *et al.* (21), who established experimentally that the patent period had only 5 to 10 d.

The data presented in the literature showed that *E. leuckarti* oocysts were sporadically demonstrated in the faeces of the horses infected. It is worth noting that irregularity in the excretion of oocysts by infected foals was confirmed in our investigations. These findings also included the horses suffering temporary diarrhoea.

In the majority of the cases, no clinical signs are documented in the animals excreting *E. leuckarti* oocysts. These findings are supported by our observation revealing only a few foals with temporary diarrhoea. Moreover, the animals were emaciated with matting of hair but these signs could not correspond to the occurrence of other parasites, because the animals were free of them. Beelitz *et al.* (7), reported diarrhoea only in two of 24 foals excreting *E. leuckarti* oocysts whereas all foals examined by Bauer (4) and infected with coccidia failed to show disturbances in the digestive system functioning.

Our investigations compared the effectiveness of three techniques of the diagnosis of *E. leuckarti* infection that are most commonly used in the coproscopy of the parasitosis in horses. The highest effectiveness of the sedimentary flotation technique seems to be reasonable considering the examination of 50 g of faeces samples and the use of a high specific gravity solution (NaCl and saccharose). Moreover, a preliminary purification of faeces by the sedimentation and centrifugation in a flotation process helped to isolate heavy *E. leuckarti* oocysts showing a specific structure. The flotation method involving the use of the same solution was less effective, among others, as a result of using small mass samples. The lowest effectiveness of McMaster’s chamber technique arose from several factors. This quantitative technique including laborious sample preparation and its assessment caused that infections of a low intensity are most frequently undetected and a relatively high number of eggs/oocysts per 1 g of faeces results from calculations. Several authors recommend detecting *Eimeria* infection in horses by the use of sedimentation methods comparing simultaneously their effectiveness with flotation methods involving high gravity solutions and sample centrifugation.

The detection of *E. leuckarti* depends on several factors including a small number of oocysts excreted in faeces (according to Bauer (4) a mean number of excreted oocysts was low and amounted 0.1 to 33 per gram of faeces) and periodical excretion of oocysts. The recognition of invasion is also hindered by the structure of oocysts and their appearance.

The results of the present studies indicate a frequent prevalence of *E. leuckarti* in foals in Poland. However, the infection is rarely evidenced by clinical signs. Difficulties in the diagnosis of coccidia infection in horses cause that the parasitosis is not diagnosed in a routine coproscopical examination.

References

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