FIELD SURVEY ON THE STATUS OF INTERNAL PARASITES IN YOUNG CALVES ON FARMS IN EASTERN SLOVAKIA

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ABSTRACT

The objective of this study was to evaluate the species composition of protozoan and helminth parasites of young calves on farms in eastern Slovakia. Faecal samples from calves were analysed using the floatation technique, McMaster Methods and stained slide method for *Cryptosporidium* spp. From 105 samples analysed, nine samples (8.6 %) were suspected to be positive for *Cryptosporidium* spp. The results gathered from this study displayed that 64.8 % of calves were infected with some species of parasite at the moment of sampling. The highest prevalence of infection was with *Eimeria* spp. with 56.2 % of calves infected being positive for this. OPG (oocysts per gram) values for *Eimeria* spp. observed in this study ranged from 100 to 75,200. The lowest prevalence was found to be from *Giardia duodenalis* and *Trichostrongylidae* family equally 0.95 %. All faecal samples had nematode egg counts below 50 EPG (eggs per gram).

Key words: helminths; prevalence; protozoa; species composition

INTRODUCTION

There are many parasites that inhabit calves, many of which are entirely harmless as parasites themselves, but can have negative effects on other aspects of health. Some species which are significant can cause disease in domestic cattle or, because of their zoonotic transmission, are a risk to humans. Parasite control in calves results in healthier calves with stronger immune systems, weight gains that provide return on investment, and cleaner pastures. Throughout their life, especially at a younger age, cattle are administered several vaccines. If an animal has a parasite infestation, it won't respond to the antigens in vaccines as much as normal, and therefore, the immune response to the vaccine is often reduced [2]. Stress is also an important factor implemented by parasites when present in cattle, and the vicious cycle continues, as a stressed animal also has a decreased immune response and less gain and progression in regards to growth and production. The effects of internal parasites also do vary with the intensity of an infection, as well as age of the animal, nutritional state, environmental conditions and quality of feeding. Generally,

younger animals and animals under stress are more likely to display signs of parasitism. Older mature cows often tend to acquire a degree of immunity to some parasites, but this immunity can be suppressed when these mature cows go through higher stress phases in their lives, like in early lactation when there is a negative energy balance [6].

Calves can harbour different parasites, but the most prevalent are protozoa. The time of year in relation to season, as well as the age of the calves plays an important role in the parasite infestation. Calves from birth begin their diet of colostrum, followed by milk, and slowly progress to concentrates and forages as they get older to allow for the development of the digestive system, especially the rumen. Therefore, there is an ever changing feed composition throughout this time, and these different feeds also play a huge role in the parasites which tend to colonise. When there is infection with parasites, not only the current health of the calves are affected, but it can also contribute to their production, weight gain, health status, life expectancy and general appearance later in life, and all these factors are important, especially for the owners. The diagnosis of parasites from faecal samples is a key skill in the diagnosis.

Confirming a diagnosis is also important before treatment is given, as depending on the presence or absence of infection, or intensity of infection, then drug choice and duration of treatment will be chosen. The post treatment faecal samples are also important to find out if the treatment was effective, or if there was a wrong choice of treatment, too short duration of treatment, or resistance against the treatment. The control of parasites in cattle is the strategy most often taken, as eliminating them completely is nearly impossible in most cases, and trying to do so can lead to anthelmintic resistance, which is an evolving problem in cattle herds. The main goal is focused on controlling the parasites to minimise the economic implications they cause, but also allowing there to be some exposure to allow immunity to develop and reduce the build-up of resistance to treatment [11].

The aim of this study was to evaluate the species composition of protozoan and helminth parasites of young calves on farms in eastern Slovakia.

MATERIALS AND METHODS

For the study of the calf parasites on farms in Eastern Slovakia, samples were collected from three farms in the

study area. One farm was situated in the Trebišov District in the village of Zemplínska Teplica, the second in Turňa nad Bodvou west of Košice, and the third in Horňa, Michalovce district. The samples were examined using the floatation technique, McMaster method and staining of slides for *Cryptosporidium* spp.

The samples were collected from 105 calves ranging from 3 days to 6 months old during the period between September 2019 and October 2020. According to anamnesis information, antibacterial treatment was applied to about a third of the calves before the collecting of faeces.

All samples were examined by the floatation technique for examination of protozoa and helminths. The positive samples from the floatation method were quantified for parasites using McMaster method [5]. Two methods for staining were carried out in this study. Initially Kinyoun stain was used to stain the slides to aid in the diagnosis of *Cryptosporidium* spp. After analysing 32 samples, the staining method was changed to carbol fuchsin. The samples were analysed under a light microscope (OLYMPUS model BX41TF) at $\times 40$ magnification. Slides were stained with carbol fuchsin in order to allow the stained oocysts to appear as pink spheres on a blue-green background.

Ethical statement

The UVLF Ethics Committee in accordance with applicable national and international animal welfare legislation approved the research. No animals were killed for the purpose of this study.

The authors declare that there is no conflict of interest.

RESULTS

From the total of 105 faecal samples from the calves, 68 of them (64.8 %) were infected with some species of parasite, while 37 of them (35.2 %) were not. It was found that from the total number of 105 calf faeces, the highest prevalence was with *Eimeria* spp., with 59 calves (56.2 %) infected (Table 1, Fig. 1). OPG (oocysts per gram) values for *Eimeria* spp. observed in this study ranged from 100 to 75,200. All faecal samples had nematode egg counts below 50 EPG (eggs per gram). We recorded only one positive sample for *Giardia duodenalis* with 3600 cysts in gram of the faeces.

The infections with the *Giardia duodenalis* and *Tricho-*

Table 1. Number and percentage of calves infected with different parasite species from the total number of calves examined

Parasite species	Number of infected calves	Prevalence of infected calves from total number of calves examined (%)
<i>Eimeria</i> spp.	59	56.2
<i>Giardia duodenalis</i>	1	0.95
<i>Cryptosporidium</i> spp.	9	8.6
<i>Trichuris</i> spp.	3	2.9
<i>Strongyloides papillosus</i>	3	2.9
<i>Trichostrongylidae</i> family	1	0.95

Fig. 1. Oocysts of *Eimeria* spp. (red arrow) and cysts of *Giardia duodenalis* (blue arrow) under a light microscope

strongylidae family were in the lowest prevalence equally in both cases. The results in relation to the testing samples for *Cryptosporidium* spp. were analysed after staining with carbol fuchsin. Nine calves were positive for *Cryptosporidium* spp. (Fig. 2).

The infection with *Eimeria* spp. is prevalent all year round, with infections reaching 100 % of calves in October 2020. Throughout the year, there was never less than 36% of the calves infected with *Eimeria* spp. All other

parasites found showed a much smaller occurrence, with *Strongyloides papillosus* (Fig. 3) and *Trichuris* spp. (Fig. 4) appearing to be more common in the autumn, during the months of September and October, than in other months. The *Giardia duodenalis* infections were found in a very small percentage of the calves in September and November. Infections with *Trichostrongylidae* family (Fig. 4) in only a single calf was not an aberrant result, as this was not a typical parasite found in calves of the age range analysed.

Fig. 2. Positive sample on a stained slide containing *Cryptosporidium* spp. oocysts

Fig. 4. *Trichuris* spp. and family *Trichostrongylidae* under a light microscope

Fig. 3. Eggs of *Strongyloides papillosus* under a light microscope

DISCUSSION

Analysis of faeces is carried out often to aid in the diagnosis of calf parasites worldwide. The floatation technique is a fast, simple and cheap qualitative method to determine if certain parasites are present or not. From the 105 samples analysed in our study, 64.8 % of them were infected with parasites. The calves on the farm Horña were in close proximity to each other, meaning that transmission between an

infected and uninfected individual was more likely, and the spread of faeces between calf stalls was possible, increasing the likelihood of infection. If the calves cannot come into contact with each other, the transmission of infection is much lower, resulting in lower prevalence of parasites. A similar study was carried out in Brazil with 243 faecal samples, where 46.5 % of them were negative for any protozoa, and the other 53.5 % were positive [15]. Coccidiosis is one of the most common diseases in the world, with bo-

vine coccidiosis being observed in nearly all areas where cattle are raised, especially in those younger than one year. Studies have shown that the disease is much more common in housed animals than those on pastures [6].

The results of *Eimeria* spp. infections in calves have demonstrated that in one study conducted in 2012 and 2013 in Brazil, 56.8 % of the total number of examined calves were positive and in a similar study carried out in 2018, from 400 samples analysed, 51.25 % of the calves were positive for *Eimeria* spp. also [3]. These results imply that if *Eimeria* spp. infections are present on a farm, they will affect a large population of the young stock. This, in turn, will lead to a failure of the calves to thrive and reach their optimum finishing weight or production status in later life. Therefore, farmers should try to combat the problem when it first arises, as the transmission is rapid, and can become a big problem [4]. The two stains used in this study were carbol fuchsin and Kinyoun stain. Initially the Kinyoun stain was used, but there was great difficulty in the visualisation of the oocysts, and there were reports that this stain is better for visualisation of oocysts from carnivore faeces. After the first 32 samples were analysed, the staining method was then changed to carbol fuchsin, which was much better for the visualisation of the oocysts from the faeces of ruminants. *Giardia duodenalis*, which causes infection in cattle, can be detected as early as in 14 day old calves. It can be seen at every age but it is most common in calves 2–3 months old. Mucous and fatty stool, weight loss and growth retardation are the main disease symptoms [13, 14]. The positive samples gave a prevalence of 8.6 %, whereas previous studies involving *Cryptosporidium parvum* infections on farms in Slovakia demonstrated a much higher prevalence of 31.5 % samples positive for oocysts throughout the year [10]. It has been suggested that there can be some seasonal variations in relation to *Cryptosporidium* spp. infections, but more often it is thought that the monthly variations could be related to calving periods, with infections being more prevalent around the peak calving times [7, 9]. Infections with *Trichostrongylidae* family were very low, with only 1.5 % of the calves being infected from the total amount diagnosed with parasites. These nematode eggs can survive up to 6 months in the environment, either in stables or on pastures, allowing it to be a problem on farms where the hygiene level and removal of bedding is not the best [1]. Cattle tend to develop some immunity to these worms with age, and therefore, will shed

the eggs in their faeces without clinical signs in some cases. This means that calves can be easily infected if they come into contact with the faeces, and this may result in negative effects [4].

Trichuris spp. infections in the calves tested during this study were relatively low. Table 1 shows that 2.9 % of the calves were infected with this parasite and the same proportion was infected with *Strongyloides papillosus*. Similar studies on the prevalence of *Trichuris* spp. gave similar results with only 2.17 % of the calves being infected and the same study also showed infections with *Strongyloides papillosus* to be 2.17 %. However, the calves analysed in this study were up to 180 days old, which is a greater age range than of the calves analysed in our study [8]. The reason that the *Trichuris* spp. infections were so low could be explained by the typical light infections these worms cause, meaning there will only be a small amount of eggs present in the faeces. Heavy infections with this whipworm are rare, so it is possible that calves may have been infected, but just no eggs were present in the faecal samples. Therefore, a more sensitive way of diagnosis would be more suitable.

Many medications can be used for the treatment of calf parasites, but without proper management, the complete resolution of a parasite will not be achieved. One of the three farms analysed in this study had calves in stalls where they were in direct contact with the next calf with both nose-to-nose contact and the same applied to faeces. This direct contact allows easy transmission of parasites. It is recommended for the housing of calves that the calf pens are separated with a space in between, the direct contact is prevented and only visual contact between the calves is allowed. On two of the three investigated farms there was used the 'hutch' system that allows such separation and the calves can move inside for shelter and warmth or outside for fresh air.

However, on one farm this was not available, and the calves were housed inside all day long. This may result in warm, humid conditions if no proper ventilation is ensured. Such environment may support longer survival of cysts, oocysts and eggs of parasites [12].

CONCLUSIONS

It was seen that from all the calves examined, 64.8 % of them were infected with parasites. The highest prev-

alence of protozoan infections in calves was recorded for *Eimeria* spp., that was most common throughout the year. Other protozoa, including *Giardia duodenalis* and *Cryptosporidium* spp. occurred in a much lower prevalence, along with *Trichuris* spp., *Strongyloides papillosus* and *Trichostrongylidae* family. None of these parasites were found to be any higher than 4.4 % from the positive samples.

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