Bovine Gastrointestinal Parasitism with Special Emphasis on Cryptosporidiosis in Badulla District

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Abstract

Due to the negative impact of subclinical parasitic infections on production; control of gastrointestinal (GI) parasitism in cattle is becoming an important management practice. Cryptosporidiosis is a zoonotic disease and there is no effective therapy. This study examines the prevalence of gastrointestinal parasitism in Badulla district with special interest on *Cryptosporidium* spp. and identifies the significance of age, water source and feeding pattern for the prevalence of *Cryptosporidium* in cattle. The prevalence of gastrointestinal parasites in faeces from a total of 250 cattle in three age categories was examined. Eggs of gastrointestinal parasites were identified using salt flotation technique and McMaster method. Larval culture was done to identify the genera of parasites. Oocysts of *Cryptosporidium* were demonstrated using the Shearther's sucrose flotation method followed by staining with modified Ziehl-Neelsen technique. In Badulla district the prevalence of gastrointestinal parasites and *Cryptosporidium* were 57.2% (143/250) and 15.2% (38/250) respectively. *Trichostrongylus* spp, *Haemonchus* spp, *Strongyloid* spp, *Toxocara* spp, *Trichuris* spp, *Moniezia* spp, *Eimeria* spp were the common gastrointestinal parasites in cattle in Badulla district. Prevalence of *Cryptosporidium* was significantly higher in cattle <6 months (57.9%; 22/4) compared with 7-12 months and >12 months of age ($P < 0.05$). The highest prevalence of infection (81.5%; 31/4) was observed with cattle served with surface water. There was no significant association of prevalence of *Cryptosporidium* oocysts with feeding pattern ($P > 0.05$). These findings clearly demonstrate that cattle in Badulla district are more exposed to the infection.

Key words: Cattle, *Cryptosporidium* spp, Gastrointestinal parasites, Zoonosis

Introduction

The Gastrointestinal tract may be inhabited by many species of parasites. Members of the genus *Cryptosporidium* are eukaryotic organisms, including obligate and intracellular parasites. *Cryptosporidium* has a complex life cycle, including both sexual and asexual reproduction, and the ability to complete its development within a single host. The transmission form is a robust, environmentally resistant oocyst, excreted in the dung, which can exist for long periods of time in the environment. Because, animals in particular domesticated livestock, became its primary host, but possible zoonosis for human. Those at greatest risk groups are immune-compromised adults and children, travelers to endemic regions, cattle farm workers and their families.

Cattle are spread throughout all regions of Sri Lanka. The districts with a significant milk production are Kurunegala, Badulla, Anuradhapura, and Nuwara-Eliya. There can be many factors affecting the level of milk production. Diseases among the cattle are a factor affecting the level of milk production. Since Cryptosporidiosis is a gastrointestinal zoonotic disease which impact on the production of cattle and there is no effective therapy for this disease, early identification is important to minimize the risk of spreading. Several factors such as age of the animal, water source and type of such feeding may affect the occurrence of cryptosporidiosis in cattle (Merck Veterinary Manual 2008). There can be several species of *Cryptosporidium* present in cattle and some of them can be zoonotic. This has led to the research problem, identify the prevalence of gastrointestinal parasites in Badulla district with special reference to *Cryptosporidium* spp and identify the significance of age (less than 6 months, 7-12 months, more than 12 months), water source (Well water and surface water)

and feeding pattern (Stall feeding, tethering, tethering and stall feeding, grazing and stall feeding) for the presence of *Cryptosporidium* spp as it lays a solid foundation for future prevention plans of cryptosporidiosis. The objectives of this study were to identification of the prevalence of gastrointestinal parasites with special emphasis on *Cryptosporidium* in cattle in Badulla district and identifying the factors affecting the prevalence of *Cryptosporidium* in cattle.

Materials and Methods

Two hundred and fifty cattle have been selected from ten (10) Veterinary Surgeon regions (Badulla, Passara, Soranathota, Hali-Ela, Welimeda, Bandarawela, Haputale, Mahiyanganaya, Kandeketiya and Meegahakiula). From the sample, milking cows and dry cows represents 24.4% and 4.0% respectively. Heifers and calves represent 35.6% and 36.0%, respectively. About 10 g of faeces was collected directly from the rectum into plastic bags and was transported to the laboratory under refrigeration (4 °C). Salt flotation technique was used to find out the positive samples for gastrointestinal parasites. Simply about 3g of feaces was grinded with 50 ml of saturated salt solution using mortar. It was strained and kept for about 5-10 minutes. A smear was prepared using a drop and eggs were observed using a light microscope (40X). Positive samples of gastrointestinal parasites were subjected to McMaster technique to get the EPG/OPG value (Eggs per gram /Oocysts per gram). Simply about 3 g of feces was grinded with 42 ml of saturated salt solution using mortar and pestle. It was strained and a drop was observed using light microscope (10X) and EPG/OPG values were taken for each type of eggs. The eggs/oocysts of gastrointestinal parasites were categorized into six groups, Strongyl, Strongyloid, Trichuris, Ascaris, Monieza and coccidian using their morphology. Samples having EPG/OPG value more than 1000 were selected and cultured. About 10 g of feces was taken from positive samples, cultured in pre-sterilized cow dung samples in sterilized empty jam bottles and were covered with a cheese cloth. Water was sprayed daily to the cultured samples. After 14 days' time period, the bottles were fully filled with water, covered with Petri dishes and were turned upside down. After 3 hours, a drop was taken from the Petri dishes and kept on a glass slide. A drop of iodine was added. The morphology of the larvae was observed under the light microscope (40X).

Sheather's sugar flotation technique was used to isolate *Cryptosporidia* oocysts (Garcia et al. 1983). Acid-fast staining was used to identify the morphology of oocysts (Garcia and Bruckner 1993). Prevalence was analyzed using tables and charts. The chi-square test was used to evaluate the associations between prevalence (*Cryptosporidium*), age groups (less than 6 months, 7-12 months, more than 12 months), feeding pattern, water source and using Minitab computer statistical package. Statistical significance was set at $P< 0.05$.

Results and Discussion

One hundred and forty three samples (57.2%) were positive for at least one gastro intestinal parasitic species. 72% (103/143) from the infected animals were purely infected animals and 28% were mix infected animals. Thirty eight animals (15.2%) in Badulla district were positive for *Cryptosporidium*. The common parasitic egg types found in cattle in Badulla district were Strongyl, Strongyloid, Moneiza, Toxocara, Trichuris and Eimeria oocysts (Table 1). *Trichostrongyl* spp and *Heamonochus* spp were the prominent *Strongyl* spp in Badulla district.

There is a significant association between age group, water source and the presence of *Cryptosporidium* spp in cattle in Badulla district ($P<0.05$). This finding is

Table 1: Types of parasitic eggs among cattle in Badulla district

Parasitic spp	Prevalence % (n/143)	Mean EPG	Range of EPG value (Minimum-Maximum)
Strongyl	46	179.2	0.0-3900
Ascaris	18	1205.0	0.0-150000
Moneiza	6	66.0	0.0-5000
Strongyloid	2	25.6	0.0-5700
Trichuris	6	17.2	0.0-800
Eimeria	22	517.0	0.0-42000

consistent with those of previous researches which showed that age of the cattle has a positive impact on the prevalence of *Cryptosporidium* spp (Fernando et al. 1999). There can be several reasons for the higher prevalence of *Cryptosporidum* spp in calves. Neonates can acquire the infection at birth mainly because of the high number of oocysts shed by the dam at parturition and that is one cause for the occurrence of *Cryptosporidium* oocysts in calves. William and Lynne (1990) described that there is a risk of spreading Cryptosporidiosis through water. Wastewater in the form of raw sewage and runoff from dairies and grazing lands has been identified as a likely source of oocysts that contaminate drinking and recreational water. The importance of agricultural sources of oocyst contamination should not be taken lightly since infected calves can pass up to 1010 oocysts per day for up to 14 days. Thus, large numbers of oocysts can enter the surface water system following a hard rain on a pasture containing infected animals (William and Lynne, 1990). There is no significance association between feeding pattern and the presence of *Cryptosporidium* spp in cattle in Badulla district ($P > 0.05$). Contaminated feed are the source of transmission of pathogen and it is not depend on the feeding pattern either stall feeding or grazing.

Nematodes, cestodes and protozoans are the common gastrointestinal parasites of cattle in Badulla district. Among the nematodes *Strongyl* spp are more prevalent in the district. According to the results of larval culture, *Trichostrongyl* spp and *Haemonchus* spp are the prevalent Strongyles in cattle in Badulla district. Another common nematode present in cattle is *Strongyloid* spp. *Toxocara vitulorum* and *Trichuris* spp are also present in cattle in Badulla district. *Moneiza* spp found to be the most common intestinal cestode present in cattle in Badulla district. *Eimeria* spp and *Cryptosporidium* spp are the common protozoans present in cattle in Badulla district.

The findings of the present study demonstrates prevalence of gastrointestinal parasites with *Cryptosporidium* infection in cattle in Badulla district in Sri Lanka. Common gastrointestinal parasites in Badulla district are large stomach worm/wire worm, bankrupt worm/small stomach worm, intestinal thread worm, cattle ascarid/toxocara, cattle tape worm, whip worm and *Eimeria* spp. The associations of age of the cattle and water source with the prevalence of cryptosporidiosis are significant respectively. Yet, the association of feeding pattern with the prevalence of cryptosporidiosis is not significant. The present study was able to identify the prevalence of *Cryptosporidium.* Future studies can be deployed to identify the *Cryptosporidium* species present in cattle in Badulla using developed molecular based techniques.

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