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SUSTAINABLE MANAGEMENT OF GASTRO INTESTINAL STRONGYLOSIS WITH LIMITED CHEMOTHERAPY

Athira C P[1*], Syamala K[2] and Bindu Lakshmanan[3]

[1]MVSc Scholar, [2]Assistant Professor, [3]Professor and Head,
Department of Veterinary Parasitology,
College of Veterinary and Animal Sciences, Mannuthy, Thrissur, Kerala
**Corresponding author: rukkuathira@gmail.com*

ABSTRACT

Goats are considered as the future livestock of choice due to its adaptability potential, feed efficiency and product quality. Gastro intestinal parasitism in particular and nematodosis in general pose serious annoyance to goat production in humid tropical state of Kerala. Farmers in the state mainly depend upon chemotherapy for parasitic control. Chemical control of parasitism is not an ideal option for sustainable animal production due to mounting drug resistance. In the current study incidence of strongylosis was evaluated during the monsoon season in a Goat Farm at Kallur (Thrissur). The study goats were screened for parasitic load and morbidity markers of parasitism. Faecal samples collected was assessed by faecal egg count (FEC) using modified McMaster technique. Anaemia score and body condition score were assessed. All the faecal samples collected were negative for strongylosis during the monsoon season which is most favourable for the development of the GI nematode parasite in Kerala.

Keywords: FEC, modified McMaster technique, Anaemia eye card, Body Condition Score

INTRODUCTION

Gastrointestinal nematode (GIN) infections constitute a significant threat to the health and productivity of grazing livestock throughout the world. It also causes a negative impact on feed intake, growth rate, carcass weight, carcass composition, wool growth, fertility, and milk yield. The major species of strongyles in Kerala are *Haemonchus contortus* (*H.contortus*), *Trichostrongylus colubriformis* (*T.colubriformis*), *T. axei*, *Oesophagostomum columbianum* (*O. columbianum*), and *Bunostomum* sp (Syamala *et al*., 2021). A higher prevalence of strongylosis was noticed during monsoon rather than during pre-monsoon

and post-monsoon due to the congenial environment favourable for hatching of eggs and survival of exogenous stages like larvae. The hypobiotic larvae are responsible for the high faecal egg count (FEC) soon after a heavy rainfall in summer (Singh and Swarnkar, 2013).

Older animals were significantly affected by strongyles rather than young ones which could be attributed to the higher exposure of adult animals to parasitic stages in the environment, while young ones were usually reared indoors (Lone *et al*., 2012).

Strongylosis is favoured by stocking density and grazing. Full day grazing without supplementary feeding and lack of proper deworming resulted in increased parasitism in small holder flocks (Rawte *et al*., 2015). But Asha (2017) attributed a higher prevalence of strongylosis among the goats maintained in organised farms compared to small holder flocks in Kerala due to high stocking density, lack of cleanliness and usage of highly contaminated permanent grazing land in farm bred stock. A major challenge is to assess the importance of helminth infection within the farm-economic framework and prioritize the available resources to the interventions that will be the most cost effective and have the largest impact on farm productivity. A crucial factor in addressing this challenge will be the diagnostic tools used to detect helminth infections and their impact on the host (Charlier *et al*., 2014). Many of the diagnostic test available would identify the helminth egg, antigen, antibodies and DNA of the parasite. However, production loss and economic impact of GI parasitism was not assessed. Hence to quantify the impact of GI parasitism, control strategies realising the efficiency of the diagnostic test at farm level are targeted.

MATERIALS AND METHODS

Study Goat Population

A total of 60 (50 adult females, 6 adult males, 4 kids) goats randomly selected from two farms located in Kallur and Chengalloor (Thrissur) were screened during monsoon seasons (July and August 2022) for parasitic load and phenotypic parameters. The adult goats belonged to the age group of 1-2 years and kids were of 4-6 months. The goats were maintained under intensive system of rearing. The sheds were well maintained with good drainage system without over stocking. They were stall fed with ad lib roughage inclusive of tree leaves and green fodder during morning and evening hours and with concentrate during morning hours. The animals were provided with ad lib clean drinking water and supplemented with vitamins and mineral mixtures. The animals were vaccinated against Foot and Mouth disease and Peste de Petits Ruminants. The goats

were not dewormed in the last six months prior to the study period.

Sample Collection

The study goats were screened for parasitological and morbidity markers. The body measurements *viz*., body length (BL), height at rump (RH), heart girth (HG) was recorded. The body weight was estimated using the formula of Perez *et al*. (2016),

Fig. 1: Study goat population

Fig. 2: Intensive system of rearing

Fig. 3: Feeding system

$$\text{Body weight (kg)} = \left(\frac{2RH+4BL+6HG}{10}\right) - 53$$

The study goats were also individually evaluated for anaemia score and body condition score. The fresh faecal samples were collected from rectum in labelled containers.

Parasitological Examination

The intensity of strongyle infection was assessed by faecal egg count (FEC) using modified McMaster technique (Coles *et al*., 1992).

Assessment of Anaemia Score (AS) as a morbidity marker

Anaemia status was assessed using validated Anaemia Eye Card (Syamala, 2020). It was possible to identify the anaemic animals that required anthelmintic treatment and distinguish them from non-anaemic animals. The criteria adopted for assessment of anaemia eye card were goats with an anaemia score of 1, 2 and 3 were regarded as non-anaemic and those with anaemic score of 4 and 5 as anaemic.

Assessment of Body Condition Score (BCS) as Morbidity Marker

Body Condition Score (BCS) is an important tool for assessing the body fat reserve in the goat population as per the guidelines of the American Institute for Goat Research, Langston University (*www.luresext.edu›body-condition-scoring*). Scoring was done on a 1 to 5 scale. Scoring was based on the perception of touch and feel of lumbar and sternal area and the level of muscling and fat deposition. The goats of BCS of 1 and 2 were categorised as those having increased risk of parasitism.

RESULTS AND DISCUSSION

Results of faecal sample examination

All the 60 faecal samples collected during the period July and August of 2022

Fig. 4: Validation of Anaemia Eye Card

Fig. 5: Validation of BCS

were found to be negative for strongylosis. Stray coccidial oocyst was observed in 4 samples collected from kids which determined a low-level infection. Cestode infection was not observed in any of the 60 faecal samples collected. Among the 60 adult animals assessed for anaemia score as a morbidity marker only 10 per cent had AS of 4 while 90 percent had score of 3 or 2. Among the 60 adult goats evaluated for BCS 30 percent had BCS 4 while 70 percent had BCS 3.

In the humid tropical climate of Kerala, seasonal influence of gastro-intestinal stronglylosis in goats was found to be highly significant as the FEC was high ($p<0.01$) compared to pre and post monsoon (Syamala *et al*..2021). This could be attributed to the relative humidity, rain fall and temperature being favourable for the development, survival and dispersal of strongyle larvae on the herbage. Goat being a ground feeding herbivore grazing, overstocking and unhygienic watering resulted in heavy strongyle infection in them. During monsoon, occurrence and intensity of strongyle larvae in pasture were high. These factors enhanced strongyle infection in small ruminants. Climatic factors during monsoon favoured the multiplication of bacteria that provided optimum nutrition to free living stages of strongyle larvae. Singh *et al*. (2011) and Velusami *et al*. (2015) suggested that full day grazing with- out any supplementation and over stocking were the major risk factors associated with strongylosis in small ruminants. In the present study the animals were stall fed and hence less chance for them to acquire infection from pasture larvae. Also, they were fed with chopped and dried grass and tree leaves, where there was no or less chance of strongyle larval burden. The goat shed and premises were clean and dry which also ensured the reduced parasitism as highlighted by Asha (2017) as an important management activity for sustainable parasite control. Thus, by avoiding contact with the infective stages of strongyle and by keeping the farm premises clean and dry the farm management succeeded in reducing the parasitism during the season which is highly vulnerable for parasitism.

The current scenario of clean, green and ethical livestock production demand for limited use of anthelmintics in farms. But in Kerala majority of the goat farmers relay on the indiscriminate use of anthelmintics for the management of GI parasitism. The targeted selective treatment is a *refugia* based strategy where-in animals which needed anthelmintic treatment were identified and treated so that, unnecessary usage of the drugs could be curtailed. Even-though the production effect of helminths were heterologous among individuals, a good diagnostic tool /Targeted Selective Treatment (TST) indicator should inform on the production impact of helminth at farm level. Also, the farmer friendly tool should correlate with the parasite burden, measure the animal productivity and use of the production or morbidity parameter should decide upon the anthelmintic treatment decision.

The gastro-intestinal parasitism causes the tissue damages and reduced functioning of the organs, channelise the energy and protein resources of host towards defence and immune mechanism rather than increased production performance and reduced feed intake (Pandey *et al*., 2010). Thus, loss of large quantity of protein into the gastro- intestinal tract and variation in protein synthesis in host tissue ultimately affect the body condition of the host. But well-nourished animals in good BCS were able to overcome the GI nematode induced pathogenesis (Coop and Kyriazakis, 2001). Morgan-Davies *et al*. (2008) considered BCS as a superior predictor of the ewe's ability to survive wide range of nutritional, environmental and management ambiguity.

When BCS was considered as a TST indicator it was noticed that mature small ruminants with higher BCS suffered less due to parasitism and anthelmintic usage could be substantially reduced. (Besier *et al.* 2010). Syamala (2020) noticed remarkable reduction in FEC in adult goats when the BCS was ≥2. In the current study most of the animals were having BCS ≥2 and hence did not warrant any treatment as BCS>2 had a protective role over those animals as observed by Soto-Barrientos *et al.* (2018). This implies that goat farmers should pay attention to improve BCS >2, so that impact of parasitism could be minimised with limited chemotherapy.

Bath *et al.* (2001) and Syamala (2020) considered AS as an index of haemonchosis and the ability of host to cope -up with the challenges of the infection. In humid tropics the anaemia eye card developed for goats had a sensitivity and specificity of 83.78 per cent and 87.82 per cent respectively and could identify anaemic animals that required anthelminthic treatment and distinguish

them from other non-anaemic animals. In the present work 90 per cent of animals had anaemia score ≤3. Syamala (2020) noticed a highly significant negative correlation with AS and FEC, so as to identify animals at risk due to haematophagous and non-haematophagous parasites.

CONCLUSION

The present communication records the incidence of strongylosis during monsoon season in two goat farms in Thrissur. With effective management practices like reduced exposure with the infective larval stages, cleanliness in the farm, optimum stock density and maintaining BCS ≥ 2 gastro-intestinal strongylosis could be reduced with limited chemotherapy.

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