



E-ISSN: 2320-7078

P-ISSN: 2349-6800

www.entomoljournal.com

JEZS 2020; 8(6): 1334-1338

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Received: 19-08-2020

Accepted: 05-10-2020

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Concurrent occurrence of *Trichuriasis* and *Aflatoxicosis* in a goat unit in Ramanathapuram district: A case report

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Abstract

A Non-Descript (ND) Goat unit at Mothivalasai village of Ramanathapuram district, with the total strength of 30 animals maintained under semi-intensive system was reported to have sporadic mortality in the grown up animals during the month of June 2020. The affected stock showed inanition, debilitation, disinclination to move, lateral recumbency, diarrhoea and death. The animals were maintained on grazing and feeding of pulverised millets mixed with sesame oilcake. During a period of 1 month 3 Goats succumbed to death. Post-mortem examination was conducted in an excavated carcass. The carcass was a pregnant animal with poor bodily condition and showed anaemic changes, debilitation, toxic hepatitis, nephritis, enteritis, haemorrhagic and ulcerative typhilitis with helminthic parasites in the lumen. Microscopic examination of caecal content revealed the presence of *Trichuris ovis* eggs. The parasites recovered from the lumen of the caecum were confirmed microscopically as *T. ovis*. Toxicological analysis of the pulverised millets mixed with sesame oil cake revealed the presence of Aflatoxin B₁ (150 ppm). Withholding of ground millet with sesame oilcake, single oral dose of 2.5% suspension of Panacur® (Fenbendazole 25 mg) at 5 mg/ kg body weight and supplementation of liver extract (LIV52®) and multivitamin for about 10 days stopped the mortality and the animals in the unit recovered completely.

Keywords: Aflatoxin B₁, non-descript Goat, semi-intensive rearing, *Trichuris ovis*

Introduction

Goats and sheep are the first ruminants to be domesticated and can tolerate varied drought conditions with the available pastures and limited water resources, unlike other livestock [1]. The health condition of small ruminant populations is affected by improper management like poor housing and feeding practices, lack of vaccination and deworming. In many circumstances the cause of death of an animal is not restricted to a single etiological factor. It might be attributed due to combination of various infections or due to mixed etiological factors.

Aflatoxins (AFs) B₁, B₂, G₁ and G₂ are mycotoxins that may be produced by 3 fungi of the *Aspergillus* species, *A. flavus*, *A. parasiticus* and *A. nomius* [2]. Among the different types of AFs produced, AFB₁ is the most prevalent and potent toxin often found in high concentrations in cereal grains, peanut meal, maize, groundnuts, sesame and their products [3, 4].

Gastrointestinal parasitic infections are a universal problem for both small and large scale farmers due to wide range of agro-ecological factors suitable for diversified hosts and parasite species. The economical losses caused by these gastrointestinal parasites ranges from lowered fertility, reduced work capacity and reduced growth rate. Treatment cost and mortality in heavy parasitized animals might directly affect the economic status of the farmer [5]. The host-parasites relationship in case of nematode parasites plays a vital role in creating large scale damage at the site of attachment [6]. Small ruminant *helminthiasis* is found to be an important problem and *Trichuriasis* is among one such problem caused by *Trichuris spp.* *Trichuriasis* is a neglected tropical disease causing significant animal and human health related problems worldwide. *Trichuris* is a widespread gastrointestinal parasite that can be found in a broad range of hosts. Its life cycle is direct, where the orally ingested embryonated eggs hatch in the small intestine and the released larvae burrow into the intestinal wall of the caecum and proximal colon matured in to adult worms [7, 8, 9]. These worms are also called as whipworm. Clinical disease due to *Trichuris spp.* has been reported in sheep and cattle [10]. Heavy infection may be observed in very young lambs with high worm burden.

In this case report the author described the effect of concurrent occurrence of *Trichuris ovis* infection and Aflatoxicosis - B₁ in a ND goat unit in Ramanathapuram district.

Materials and Methods

Materials

The pregnant goat carcass from a commercial goat unit managed under semi-intensive system of rearing at Mothivalasai village of Tirupullani block, Ramanathapuram district, information shared by the farmer, information acquired by post-mortem examination, data generated during on farm investigation, data from toxicological analysis of the feed samples (Sesame oilcake), information from microscopic examination of the parasites and the caecal content formed the materials for this study.

Methods

Post-Mortem examination conducted, information recorded, materials collected for confirmation. On-farm investigation was done to study the management practices being followed in the farm and to assess the predisposing factors in the farm premises. The details on general management and feeding practices adopted were collected. The conditions around the farm were noted down. The information on the onset, course and pattern of death were collected. Similarly, the Sesame oilcake samples for toxic analysis was collected and analysed for the presence of fungal toxins at AFAQAL, Namakkal. Parasites lodged in the caecum were macroscopically examined and preserved in 10% formalin for microscopic examination. The caecal content was collected and the sediment was examined under microscope as per [11] to demonstrate the presence of parasitic eggs. The worms preserved in 10% formalin were cleared and examined under microscope for species identification at VCRI, Orathanadu, as per the methods described by [11].

Results and Discussion

A Non-descript goat unit with the strength of 30 animals maintained under semi-intensive system was reported to have sporadic mortality in the grown up animals during the month of June 2020 when there was a heavy rain in Ramanathapuram district, Tamil Nadu. It was reported that the affected stock showed inanition, debilitation, and disinclination to move, lateral recumbency, diarrhoea and death. The animals were maintained on grazing and feeding of pulverised millets mixed with sesame oilcake. During a period of 1 month 3 Goats succumbed (10% mortality) to death. Post-mortem examination was conducted in a two years old pregnant goat. The carcass was poor in bodily condition with blanched visible mucus membrane. Body cavity contained about 200ml of thin, serosanguineous fluid. Grossly, the liver was enlarged and pale in colour. Both the kidneys showed slight enlargement and congestion of corticomedullary junction. The kidney capsules peeled off with little difficulty. The rumen was half filled with partially digested yellowish green neem leaves and brownish green fibrous materials. The lumen of the small intestine showed sparse content mixed with mucus. The mucosa was congested and oedematous. The content in the caecum were of mucosanguineous in nature mixed with white coloured, filiform, thin worms with narrow anterior and thicker posterior end (Fig. 3). There were a few ulcerative and haemorrhagic spots on the caecal mucosa (Fig. 1). Similar

observations were made by earlier workers in different host with *Trichuriasis* [11, 12, 13]. It was earlier observed that in *Trichuriasis*, lymphoid nodules on the lamina propria was enlarged from which the parasite may produce some chemical mediators that cause local lymphoid proliferation. *Trichuris* lacerate the tissues with an oral stylet projected through the oral opening within the tunnel under mucosal layer. The anterior end of whipworms moves underneath the epithelium looking for blood and fluids by inserting the stylet into the blood vessels and causing inflammatory reaction to the site of lodgement. The haemorrhages, ulcers and nodules in the present case might have been caused in the same way.

The microscopic examination of the caecal content revealed numerous brown coloured, barrel shaped eggs with polar plugs (Fig. 2) as described by [11] for the ova of *Trichuris ovis*. The microscopic examination of the parasites showed the morphological features of *Trichuris ovis*. The anterior end of male worm posses a mouth with lacking lips (Fig. 4). They showed tiny buccal cavity, provided with a minute spear. The esophagus is very long, occupying about two third of the body length, and consists of a thin walled-tube surrounded by large, unicellular glands, the stichocytes (Fig. 5). The posterior end of male worm bears single spicule enclosed in a spiny sheath (Fig. 6). Similarly the anterior end of female posses a mouth part (Fig. 7), middle portion of body containing numerous eggs in the uterus (Fig. 8) and the posterior end showing long, slender vagina; its lumen widening gradually posteriorly (Fig. 9) and agreed with the description of [10, 11] made for *Trichuris ovis*. Faecal samples were also collected from the affected flock of Goat units and examined for ova of parasites and found to be positive for *T. ovis* in 6 samples out of 10 samples. [5] Nazima and Hidayatullah (2016) opined that a higher rate of *Trichuris ovis* infection in the female population due to physiological and hormonal changes. In this study the succumbed animal was a female which was under heavy stress due to pregnancy. The toxicological analysis of the pulverised millets mixed with sesame oil cake showed the presence of Aflatoxin B₁ (150 ppm). Similarly, [14] Samarajeewa *et al.*, (1975) reported the presence of aflatoxin B₁ (150 ppm) in concentrate mixture of *polkudu* meal fed to 1800 Goats in a commercial farm producing acute mortality in 200 Goats (11%). The aflatoxicosis by the consumption of sesame oil cake in this study favoured the *trichuriasis* infection to take upper hand with the resultant, anaemia, lower vitality and death of animals, which under normal circumstances was not much harmful for the host [11, 15] Blood and Radostits (2000), [16] Kuchai *et al.*, (2011) and [17] Welemehret *et al.*, (2012) also stated that various stress factors will reduce the immunity to acquire infections, and the female animals under pregnancy/ lactation were easily susceptible to infections. [18] Urquhart *et al.*, (1996) stated sheep do have a considerably higher immunological response to gastrointestinal parasites and were found to be more prone to *Trichuris spp.* infection than Goats. [14] Samarajeewa *et al.*, (1975) had reported a naturally occurring Aflatoxicosis in a Goat farm in the dry zone of Sri Lanka due to consumption of concentrate mixture containing *polkudu* meal. The significant necropsy findings [14] were jaundice of the sclera, subcutaneous tissue and other internal organs. The liver was congested, hard and fibrosed with no other significant gross lesions in lungs, bronchi and trachea. However the cortex of the kidneys showed varying degrees of congestion. In the present case the continuous, sporadic mortality might be due to the reduction in vitality by toxic hepatitis and nephritis

caused by aflatoxicosis. [19] Mohammed *et al.*, (2016) stated that malnutrition could reduce the ability of the host's resistance to parasitism. In the present case the malnutrition due to aflatoxicosis might have aggravated *T. Ovis* infection. The incidences were recorded during the month of June 2020, during which, this district had recorded a heavy rainfall two week before the onset of infection. [20] Nahar *et al.*, (2015) stated that overcrowding, lush pasture, hot and humid weather and a low plane of nutrition act as predisposing factor for GI nematode infections. [11] Soulsby, (1986) and [18] Urquhart *et al.*, (1996) opined that acquisition of large number of infective larvae developed in the pasture after heavy rainfall will be one of the factor for heavy worm burden in animals grazing under pastures. In the present situation, the infection might have acquired due to multiple factors like grazing lush green pasture, recent history of heavy rainfall, community grazing with sheep population with additional physiological stress by pregnancy, low plane of nutrition and feeding of sesame oilcake with aflatoxin.

To protect the remaining stock, it was advised to withhold the feeding of millet cum sesame oil cake mixture to animals. The remaining animals in the flock were advised to be dewormed with 2.5% suspension of Panacur® (Fenbendazole 25 mg) orally at a dose rate of 5 mg/ kg body weight, single dose. [11] Soulsby, (1986) suggested benzimidazoles group of anthelmintics (albendazole, mebendazole, febantel, fenbendazole) and macrocyclic lactones (doramectin, ivermectin, moxidectin) against whipworm infections in livestock and also stated levamisole was usually not effective against whipworms. [11] Soulsby, (1986) and [18] Urquhart *et al.*, (1996) had stated that prevention of whipworm infections in free ranging livestock was very difficult because *Trichuris* eggs could remain infective for years on pasture and were extremely resistant to adverse weather conditions. Hence, to ensure that they remain worm-free the animals have to be dewormed periodically, depending on the local epidemiological, ecological and climatic conditions. It was also advised to provide supplementation of liver extract (LIV52®) and multivitamin for a continuous period of 1 month. The farmer was also instructed for rotational deworming once in every 3 months to overcome anthelmintic resistance. The mortality stopped and the flock recovered completely after about ten days of therapeutic management.



Fig 1: Haemorrhagic spots in caecal mucosa with *Trichuris ovis*



Fig 2: *Trichuris ovis* Eggs



Fig 3: *Trichuris ovis* worm



Fig 4: *Trichuris ovis* – Male worm anterior end showing mouth parts

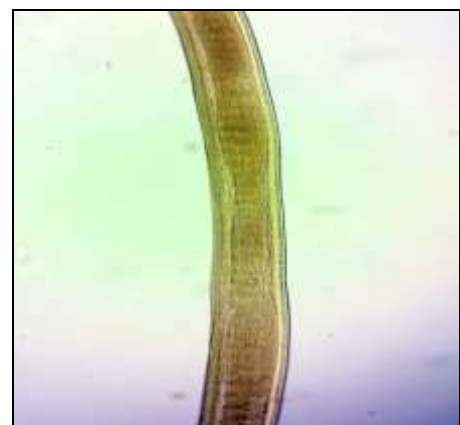


Fig 5: *Trichuris ovis* – Male worm showing glandular type of esophagus



Fig 6: *Trichuris ovis* – Male worm posterior end showing single spicule enclosed in a spiny sheath



Fig 7: *Trichuris ovis* – Female worm anterior end showing mouth parts



Fig 8: *Trichuris ovis* – Female worm showing eggs in uterus



Fig 9: *Trichuris ovis* – Female worm posterior end

Conclusions

It was understood that the adversity of *Trichuriasis* in goats could be enhanced to the level of death by the co-occurrence of *Aflatoxicosis*. The mortality in the present farm due to the concurrent occurrence of *Trichuriasis* and *Aflatoxicosis* were found to be predisposed by community grazing methods, heavy rainfall and physiological stress in the animals. Withholding of the contaminated feed, deworming with 2.5% suspension of Panacur® (Fenbendazole 25 mg) orally at a dose rate of 5 mg/ kg body weight, a single dose and supplementation with liver extract could make the affected flock to recover back to normal in about ten days.

Acknowledgments

The authors would like to thank Tamil Nadu Veterinary and Animal Sciences University for the encouragements extended during and after the investigation till it has come as a complete report.

Conflict of interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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