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Toxocara vitulorum infection in buffalo calves and its management a scientific effort with fruitful results

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Introduction

Toxocara vitulorum is an economically important and pathogenic gastrointestinal ascarid of cattle, buffaloes and other bovids, that has wide geographic distribution, especially in tropical and subtropical regions. It is also known as *Neoascaris vitulorum*, which belongs to the phylum Nematoda, class Secernentea, order Ascaridida, and the family of Ascarididae. (Soulsby, 1968). This nematode inhabits the small intestine, especially the duodenum and first section of the jejunum of animals (Roberts, 1990). *T. vitulorum* is one of the most important parasites that causes huge morbidity and mortality in newborn buffalo calves and also has zoonotic importance. Humans acquire infection by ingestion of embryonated eggs either from dirty hands, contaminated soil, raw fruits and vegetables or larvae from undercooked meat and unpasteurized milk (Borecka *et al.,* 2010). The diagnosis and control of *T. vitulorum* are not easy as the larvae migrate in the tissues and remain as hypobiotic parasites. For this reason, preventive and control strategies are important to reduce infections and economic losses due to *T. vitulorum*.

Morphology

Toxocara vitulorum is a very large creamy nematode, the adult male is up to 25 cm and the female up to 30 cm in length. It has a cuticle that gives a soft, translucent appearance and has three lips which are broad at base and narrow anteriorly. The esophagus has a posterior glandular ventriculus. The tail of the male forms a small spike-like appendage, has five pairs of post-cloacal papillae and a variable number of pre-cloacal papillae. The spicules are 0.1-1.25 mm long. The vulva is situated about one-eighth of the body length from the anterior end. The eggs are sub globular and measure 75-95 µm × 60-75 µm, with a finely pitted albuminous layer (Soulsby, 1968).

Transmission

- Trans-mammary transmission is the main route of transmission in suckling calves via ingestion of colostrum or dam milk containing migrating L_2 larvae.
- Trans-placental mode (rarely).
- Adult animals are infected by ingestion of ova (embryonated) with infective stage larvae. However, the routes of transmission may differ according to the age of the animals.

Life-cycle

The life cycle of *T. vitulorum* is unique and complex, where adult nematodes mostly appear in the intestines of 0-6-month-old animals but not in older animals, except for immunosuppressed animals due to pregnancy, lactation, or other diseases.

In the newborn and suckling calves, the transmission of infection is from mother to calf through colostrum or dam milk. There is no tissue migration and the larvae develop in the small intestine into adult worms during a prepatent period of three to four weeks. Egg production is very high and each adult female worm may produce 8×10^6 eggs/day. The adult female passes un-segmented eggs through faeces, they mature and become infective with complete development of L_2 inside the egg within 2 weeks under natural atmospheric conditions (29 ℃).

In calves over 6 months of age, ingestion of infective (embryonated) eggs, sometimes leads to patency. The hatched L_2 stage larvae penetrate the wall of the small intestine and migrate to somatic tissues (liver, lung, muscle, brain, kidney, and peripheral lymph nodes), where they enter hypobiosis. In such pregnant buffaloes, immune suppression occurs because of high reproductive hormone levels and these hypo biotic larvae (L3) migrate to the mammary gland towards the end of the pregnancy period, where they are transmitted to the calf by colostrum and milk. The milk containing migrating larvae are secreted continuously for upto 3-4 weeks after parturition (Roberts, 1990).

Pathogenesis

The pathogenesis of the infection is attributable to the parasitic burden in the duodenum. The large bulk of parasites reduces feed intake, impairs digestion and absorption of nutrients, severe weight loss and anemia. Catarrhal enteritis, rupture of intestines and even death may be reported in extreme cases of heavy worm burden in young calves (Schoener *et al.*, 2020).

Clinical signs

Lighter infections go unnoticed but in heavy parasitic burden, calves predominantly exhibit signs of anorexia, poor body condition, diarrhea, steatorrhea, colic, mud-colored evil-smelling faces, anemia, abdominal distension, emaciation, dehydration and death.

Post Mortem lesions

Small intestine filled with numerous cream-colored nematodes up to 25 cm long, with a diameter of 3-5 mm. In some areas, the worms formed tight knots, tightly attached to the mucosa,

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obstructing the intestinal lumen. Catarrhal enteritis, minute degenerative foci and necrotic changes in the liver, worms in the bile duct, multifocal suppuration in the subcapsular cortical region of the kidney and suppurative and pneumonia-like pulmonary lesions (Srivastava *et al.,* 1981).

Diagnosis

- By history and clinical signs.
- Detection of *T. vitulorum* larvae in colostrum/milk samples by microscopy.
- Microscopic examination of eggs in faeces (flotation technique and Egg per gram by McMaster technique) and morphological features of adult parasites.
- Immunodiagnostic techniques like ELISA, Indirect Hemagglutination Test and Counter-current Immunoelectrophoresis.
- DNA-based approaches like PCR that are extremely sensitive and specific in the diagnosis of early and latent infections.
- Necropsy findings.

Treatment

- Pyrantel pamoate at 250 mg total dose/ calf, per oral route.
- Piperazine salts can be given at the rate of 110 mg/kg body weight of the calf, orally.
- Fenbendazole can be administered orally to calves and pregnant animals with a dose rate of 7.5 mg/kg body weight. Albendazole at the dose rate of 5-10 mg/kg body weight (calves and non-pregnant animals only).
- Whenever the calves are treated with anthelmintic, administer glycerin orally to avoid intestinal obstruction due to dead parasites in the lumen of intestine.
- Levamisole - 7.5 mg/kg body weight and Ivermectin - 0.2 mg/kg body weight is given to eliminate the dormant larvae that are localized in tissues and organs of buffaloes and calves above 6 months of age.
- Supportive therapy like fluids, electrolytes, liver tonics and mineral mixture should be used for early recovery, better appetite and proper nourishment of the calves.

Prevention and Control

- Anthelmintic treatment of calves against immature parasites at l0-12 days-old calves is likely the most straightforward approach to prevent clinical disease in calves and environmental contamination.
- Calves should be screened for ascarids regularly and dewormed on the 10th day, 30th day and every month up to the age of 6 months, followed by 3 months intervals until one year. For every 6 months in calves above one year of age.
- Pregnant adult animals should be dewormed with pregnancy-safe deworming agents like Fenbendazole and Ivermectin according to body weight.

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- The faeces of the calves should be removed daily to prevent oro-faecal transmission to other adult buffaloes.
- Isolate the infected animals from the healthy stock and treat them completely.
- New animals brought to the farm should be dewormed and quarantined for 15 days.
- Pasteurization of milk from recently calved buffalo before human consumption should be a matter of public health importance.
- Control of soil contamination by *Toxocara* eggs using chemicals such as ammonia, phenolic acid, lime, formalin and betadine solution (Capizzi *et al.*, 2004).
- Feeding milk replacer instead of dam's milk to break the infectious cycle.
- General hygiene to prevent the oro-fecal infection route.
- Byres should always be kept clean, dry and disinfected.
- Provision of clean drinking water and pastures all the time.

Conclusion

Toxocara vitulorum, pathologically an important helminth of buffaloes causes moderate-to-severe infection in young animals which leads to yield losses or even death if not treated. The eradication of *T. vitulorum* in buffaloes is difficult due to its complex life cycle. Therefore, proper management, early detection of infected animals and their treatment are crucial for sustainable livestock farming.

References

Soulsby EJL. 1968. Helminths, arthropods, protozoa of domesticated animals. Bailliere, Tindall and Cassel, London.

Roberts JA. 1990. The life cycle of *Toxocara vitulorum* in Asian buffalo (*Bubalus bubalis*). *International journal for parasitology*, **20** (7): 833-840.

Borecka A, Gawor J, Niedworok M and Sordyl B. 2010. Occurrence of *Toxocara* spp. eggs in household environment of children with diagnosed toxocariasis in Lodz voivodeship. *Wiadomosci Parazytologiczne*, **56** (2): 141-144.

Schoener E, Wechner F, Ebmer D, Shahi-Barogh B, Harl J, Glawischnig W and Fuehrer HP. 2020. *Toxocara vitulorum* infection in a yak (*Bos mutus grunniens*) calf from Tyrol (Austria). *Veterinary Parasitology: Regional Studies and Reports*, **19**: 100370.

Srivastava AK and Sharma DN. 1981. Studies on the occurence, clinical features and pathomorphological apsects of ascariasis in buffalo calves. *Veterinary Research Journal*, **4** (2): 160-162.

Capizzi-Banas S, Deloge M, Remy M and Schwartz rod J. 2004. Liming as an advanced treatment for sludge sanitation: helminth eggs elimination- Ascaris eggs as model. *Water Research*, **38** (14-15): 3251-3258.