THE SCIENCE WORLD
A Monthly e Magazine
ÍSSN: 2583-2212
June 2022; 2(6), 725-730

Popular Article

Economic Impact of *Toxocara vitulorum* in buffalo and its prevention

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Introduction

In India agricultural production including livestock is predominately produced within mixed smallholder farming systems. These mostly operate at subsistence levels. The majority (95%) of agricultural product is produced by smallholder farmers. Cattle and buffalo are typically kept as assets rather than for optimal production purposes. Gastrointestinal parasitism is one of the major causes of economic losses in dairy and beef buffalo production in all buffalo breeding countries including India. *Toxocara vitulorum* is a pathogenic gastrointestinal parasite causes infection in buffaloes results in Ascariasis. It is most common and pathogenic intestinal parasite of the young buffalo. The severity of infestation varies from place to place, depending upon many factors such as sanitation, management and nutrition. It causes economic losses in dairy, beef industry. Buffalo calves are more susceptible to *T. vítulorum* than cattle calves under conditions of natural infection when they are raised together. Only 20% of cattle calves were found to be infected with Toxocara compared to 100% of buffalo calves. This may have been due to difference in the natural immunity of each specie. The economic impact of these losses, on the other hand, is a tough subject to value because they are typically insidious in nature and difficult to verify statistically on a regular basis. The principal components of impact is probably found in the costs of control of the nematode parasites and in the productivity losses. Most cattle have parasite burdens that are truly subclinical with no obvious sign yet cause large losses in potential productivity. The cost of controlling *Toxocara vitulorum* and the productivity loss are most likely the main components of impact. However, calculating the total losses caused by *Toxocara vitulorum* has significant limits.

Mechanism of infection

Adult worms are exclusively found in calves. Calves with less immunity or poor nutrition are prone for infection and often result in fatalities The usual routes of infection are transplacental and trans mammary. In the first route (postnatal) the calves are infected via colostrum few hours of birth and in the second (prenatal) the foetus is infected by ingestion of larvae present on amniotic fluid. In the adults there are no clinical significance and larvae may remain dominant in tissues. In pregnancy. However, larvae become active and can infect the foetus or sucking newborn. The usual route of infection is trans mammary i.e., through colostrum milk of dam containing second stage migrating larvae. If conditions are suitable, there is further development to the infection form of the helminths. which is then available in the environment to infect other animals. The most harmful impact of this parasite is a rise in intestinal cell epithelial exfoliation, which interferes with protein metabolism after absorption. This decreases the amount of nutrients available for the host's growth and development. Diarrhea, steatorrhea (fat in faeces), colic, mud-colored, foul-smelling faeces, emaciation, tympanism, constipation, anorexia, butyrous odour of breath, weight loss, hypoproteinemia, skin eczema, the loss of glossiness of the coat and mortality are all symptoms of this parasite. This impact is thought to be caused by pain caused by tissue damage at the infection site, changes in protein digestion, changes in intestinal motility, and an increase in intestinal hormone, all of which leads to a decrease in voluntary feed intake.

Economic impacts

(1) Effect on milk production

Toxocara reduces nutrient availability to the adult buffalo through reduce the feed intake and reduction in the efficiency of absorbent nutrients. So, it indicates that milk production is reduced when animal is in first or second lactation are exposed to excessive parasitism where animals are put on a lower plane of nutrition. There is negative effect of Toxocara on milk production of lactating buffalo.

(2) Effects on body weight

The impaired growth caused by Toxocara is partly due to the reduction in the feed intake but increased metabolic activity and nutritional demand on the host animal. Toxocara produces increase loss of endogenous protein, which might be potential cause of decreased weight gain in buffalo. Animals that infected with parasites, gained weight slower rate than animal free from parasite. As the parasite challenge increased, the large negative impact on weight gain in form of impaired growth.

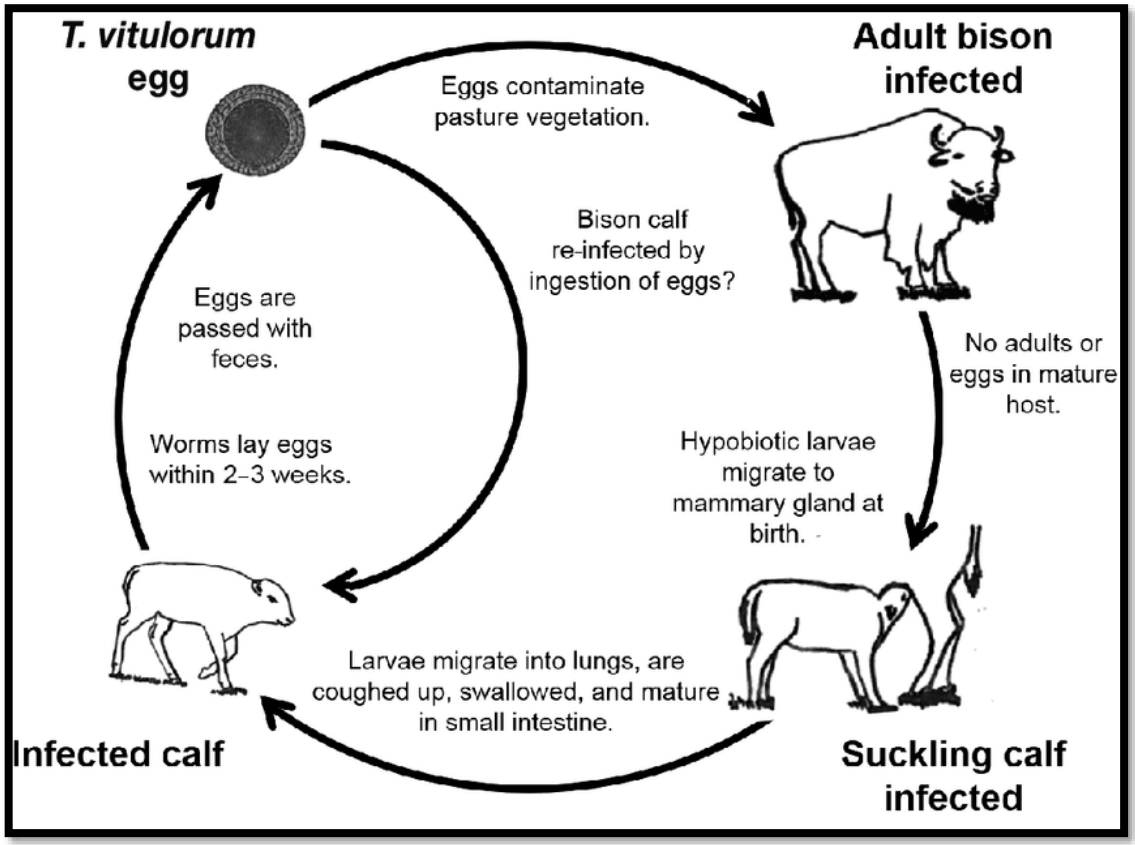

Image source- Woodbury, M. R., Wagner, B., Ben-Ezra, E., Douma, D., & Wilkins, W. (2014). A survey to detect Toxocara vitulorum and other gastrointestinal parasites in bison (Bison bison) herds from Manitoba and Saskatchewan. The Canadian Veterinary Journal, 55(9), 870.

(3) Effect on reproductive performance

Toxocara overload causes reduction in body weight gain so its indirectly affect the reproductive performance because if heifer not gain breeding weight it's not able to attain its puberty age and get conception. The weight gain improvements associated with improved fertility.

(4) Effects on Mortality and Morbidity

Mortality as a direct result of parasitism or as a consequence of increased susceptibility to other diseases is the common event in preweaning buffalo calves. Highest mortality rates are observed in age group of 1 - 3-month-old calves. Main cause of death by toxocariasis are due to pneumonia by larval migration in lungs, obstruction in GIT by adult worm balls. In weaned calves the annual average mortality due to Toxocariasis is approximately up to 3%. Calf mortality rates as high as 80% due to *T. vitulorum* infection have been reported ln buffaloes to 1.5 year the losses observed is not simply in

terms of mortality but more importantly in low production efficiency. In India and Sri Lanka calf hood mortality due to *T. vitulorum* is common.

(5) Effect on carcass quality

Toxocara infection in beef buffalo can result in an inferior product. The poor body weight gain in infected buffalo may be due to decrease feed intake, stress, poor feed conversion ratio and secondary infection. Heavy infection of Toxocara reduced the level of amino acids incorporation in muscle protein results in reduced weight gain and weight loss. Mineral deficiencies also affect the growth rates since skeletal size (bone size) ultimately determines the capacity of growing animal to accumulate muscle. Larvae of Toxocara migrate through liver and lungs inflicting physical damage, especially to lungs and causes decrease cost of offal.

(6) Economic loss during parasite control

The disease's overall cost was calculated by adding control expenditures to productivity losses. Smallholder farmers mostly use basic traditional methods for large ruminant raising and rarely keep written records of production inputs and output. Anthelmintics and other supportive medication use in Toxicara infection are major inputs effect economic outcomes.

Prevention and control

Natural prevention

Since calves are more susceptible against these worms and most infections are acquired perinatally from infected dams, it is essential to try to prevent the infection of pregnant cows. Since most eggs are shed by young calves' pastures occupied by these calves will often be highly contaminated. If buffalo cannot be kept off these contaminated pastures, they have to be treated with appropriate anthelmintics. In properties with a history of *Toxocara vitulorum* infections, thorough hygienic measures (manure removal!) and disinfection of the calf sheds are highly recommended. *Toxocara vitulorum* being buffalo specific, alternate grazing with sheep and/or horses may be considered. The longer the absence of buffalo, the higher will be the reduction of the Toxocara population in the pastures. However, this may not be advisable if the property has other gastrointestinal roundworms that are simultaneously parasitic of cattle and sheep or horses. Numerous herbal products or anthelmintics are available that effective against Toxocara infection

Chemical control

Numerous broad spectrum anthelmintics are effective against adult worms and larvae in the gut. Calf must be dewormed within 10 to 15 days of birth.

Table 1. Commonly used herbal anthelminthics drugs against *T. vitulorum.*

S.N.	Name	ose(mg/Kg b. wt.)	Route
1	(*Azadirachta indica*) Neem	300	Orally
2	*Ficus hirta*	150	Orally

Table 2. Commonly used chemical anthelminthic drugs against *T. vitulorum.*

S.N.	Name	Dose (mg/Kg b. wt.)	Route
1	Piperazine	250	Orally
2	Fenbendazole	7.5	Orally
3	Levamisole	7.5	Orally
4	Pyrantel pamoate	25	Orally
5	Ivermectin	0.2	Orally

Other prevention and control measures including

- Main hygienic condition.
- Provide balance ration with ad-libitum clean water.
- Provide mineral mixture and multivitamin to maintain immunity.
- Keep animals stress free.
- Periodically faecal examination of animals.

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