

Prevalence of *Toxocara vitulorum* in north-central Florida beef calves: A pilot study

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Abstract

A pilot study was conducted to determine the presence of *Toxocara vitulorum* in beef calves (*Bos taurus*) in north-central Florida. *T. vitulorum* is a nematode found in subtropical climates and considered to be rare in the United States. This parasite is thought to be endemic among water buffalo (*Bubalus bubalis*), and 1 small herd located in central Florida was included in the study. A Sheather's centrifugal flotation procedure to detect parasite ova was performed on all fecal samples collected (n=463). Beef calves sampled were less than 9 months of age, and all parasite ova observed in the flotation were noted. Although *T. vitulorum* was not found in any samples, many other parasite ova were present. Results of this study suggest that *T. vitulorum* is still rarely detected in north-central Florida.

Key words: bovine, calves, toxocara, nematode

Résumé

Une étude pilote a été menée afin de déterminer la présence de *Toxocara vitulorum* chez des veaux de boucherie (*Bos taurus*) dans le nord du centre de la Floride. Ce nématode se retrouve dans les régions subtropicales et est considéré rare aux États-Unis. On pense que ce parasite est endémique chez les buffles (*Bubalus bubalis*) et un petit troupeau localisé au centre de la Floride a été inclus dans l'étude. La méthode de flottaison centrifuge de Sheather a été utilisée pour détecter les œufs de parasites dans tous les échantillons fécaux recueillis (N = 463). Les veaux de boucherie échantillonnés avaient tous moins de neuf mois d'âge et tous les œufs de parasites observés par flottaison ont été notés. Bien que *T. vitulorum* n'ait pas été détecté dans aucun des échantillons, plusieurs autres œufs de parasites étaient présents. Les résultats de cette étude suggèrent que *T. vitulorum* est toujours rarement détecté dans le nord du centre de la Floride.

Introduction

Toxocara vitulorum is a large nematode parasite commonly found in the small intestine of domestic cattle (*Bos* spp) and buffalo (*Bubalus* spp).^{1,4,12} Adult cattle and buffalo become infected by ingesting parasite eggs from infected fecal material in the environment. The eggs contain infective larvae, and hatch once ingested by a new host. Larvae then penetrate the intestines and migrate through the liver and lungs, remaining in these organs until the end of pregnancy, when they are activated. Calves acquire larvae through consumption of colostrum or milk, usually within the first 3 months of life;¹³ however, some studies indicate this occurs primarily between 2 and 18 days postpartum.¹² Studies have found larvae in milk within 2 days of birth. In 1 study, calves were experimentally infected by *T. vitulorum* when placed on foster mothers that were already infected and had their calves removed.¹²

Ingested larvae become sexually mature adults within 3 to 4 weeks, and the infected calf begins to shed eggs in feces at that time.^{1,12} Toxocariasis is characterized by weight loss, anorexia, diarrhea, and sometimes death, depending on the severity of the infection.^{13,15} Severe infections can also contribute to intestinal obstruction.¹⁰ Adult *T. vitulorum* are most common in calves, and rarely seen in adults.¹

Numerous prevalence studies looking for *T. vitulorum* have been conducted, and the parasite is found worldwide in tropical and subtropical climates.⁵ A study in Mali found *T. vitulorum* in 2.7% of dairy calves under the age of 1 month, 7.6% in dairy calves 2 to 3 months of age, and 0.9% in dairy calves 5 to 6 months old.¹⁴ A similar study of dairy calves in Hanoi, Vietnam found *T. vitulorum* in 8% of calves under the age of 3 months.⁶ *T. vitulorum* infections are rare in cattle in the United States;¹⁵ however, a recent study investigating a single beef herd in north-central Florida found 17.6% of calves less than 3 months old were infected with this nematode. Additionally, 0.4% of calves 3 to 4 months of age, and

0.9% of calves 5 to 6 months of age were also positive for *T. vitulorum*.⁴ The prevalence of *T. vitulorum* in buffalo in the United States is unknown; however, studies show this parasite is endemic in buffalo herds throughout the world.^{7,11} *Toxocara vitulorum* has previously been reported in bison herds in Wisconsin and Saskatchewan, Canada.^a

The prevalence of *T. vitulorum* in the Florida beef calf population and buffalo herds, however, is unknown. Results of this pilot study will help determine if *T. vitulorum* is a significant problem within the Florida beef cattle population, and determine whether it is a problem in buffalo herds, which could be potential reservoirs of infection for domestic cattle.

Materials and Methods

Farm Selection

Two beef farms in north-central Florida were selected for the study based on convenience. The beef calves were Angus-Brangus cross, and the buffalo calves were either Swamp or River subspecies. The calves were unweaned and 0 to 9 months of age. Neither the cows nor the calves received anthelmintic therapy until approximately 60 days after fecal sample collection. All calves (male and female) were sampled at each farm. In addition, 1 water buffalo farm with 3 calves was sampled in central Florida. None of the buffalo calves had received anthelmintic therapy.

Fecal Collection

Fecal samples were collected rectally from 460 beef calves on the 2 study farms (n=1), or collected upon immediate defecation following a failed attempt to obtain feces rectally (n=1). Additionally, fecal samples were collected from 3 water buffalo calves at 1 farm in central Florida.

Fecal Diagnostic Procedures

Fecal samples were collected in specimen cups with sealed tops to prevent cross contamination from other samples. Calf number and farm were recorded for identification; age and breed of each calf was also recorded. Samples were processed within 8 weeks, and were maintained at 39.2°F (4°C) until processed using the Sheather's centrifugal flotation procedure (specific gravity 1.27), following documented laboratory protocols.¹⁵ The flotation procedure was performed on each of the individual samples collected, and all parasite ova observed in the flotation were noted and recorded; fecal egg counts were not determined.

Results

All fecal samples from the 460 beef calves and the 3 buffalo calves were negative for *T. vitulorum*; however,

Table 1. Prevalence of parasites present in beef and water buffalo calves in Florida.

Parasite	Beef calves n = 460	Water buffalo calves n = 3
<i>Toxocara vitulorum</i>	0.0% (0)	0.0% (0)
<i>Moniezia benedeni</i>	11.7% (54)	0.0% (0)
<i>Eimeria</i> spp	98.5% (453)	66.7% (2)
Strongylate nematodes	97.4% (448)	66.7% (2)
<i>Strongyloides</i> sp	2.4% (11)	0.0% (0)
<i>Trichuris discolor</i>	49.6% (228)	0.0% (0)
<i>Cryptosporidium</i> spp	0.0% (0)	0.0% (0)

ova from 7 different parasites were found in the 463 samples tested (Table 1). All calves sampled were less than 9 months of age (Table 2). Parasite ova found in the 54 beef calves less than 3 months of age included *Eimeria* spp oocysts, strongylate nematode, and *Trichuris discolor* ova. There were 398 beef calves between 3 and 6 months of age; samples from these calves yielded *Moniezia benedeni* ova, *Eimeria* spp oocysts, strongylate nematode ova, *Strongyloides* sp ova, and *Trichuris discolor* ova. Fecal samples from the 8 beef calves 6 to 9 months of age contained *Moniezia benedeni* ova, *Eimeria* spp oocysts, strongylate nematode ova consistent with *Haemonchus* spp, *Cooperia* spp, *Oesophogostomum* spp, and *Trichostrongylus* spp, as well as *Trichuris discolor*. The 3 water buffalo calves were between 6 and 9 months of age; *Eimeria* spp oocysts and strongylate nematode ova were found in feces from 2 of these animals.

Discussion

In this pilot study, *T. vitulorum* ova were not detected in any calves sampled. This parasite is transmitted through the dam's milk between 2 and 18 days postpartum,¹² and most egg production begins 3 weeks post-infection when the nematode reaches adulthood.⁹ Calves typically shed eggs until approximately 6 months of age, when natural immunity, often combined with anthelmintic use, eliminates the adults. In this study most of the beef calves sampled (398/460) were between 3 and 6 months of age, while the water buffalo calves were between 6 and 9 months old. As a result, there should have been a high probability of recovering *T. vitulorum* ova had the calves been infected.

Similar to the present study, no *T. vitulorum* ova were found in the prevalence studies of gastrointestinal parasites in Georgia and Kentucky cattle.^{3,8} In the Georgia study, gastrointestinal parasites detected in beef calves included *Moniezia* (24%), *Eimeria* (61%), strongylate nematodes (74%), and *Trichuris* (17%). Fecal samples from the 735 calves in a Kentucky study

Table 2. Prevalence of parasites present in beef and water buffalo calves in Florida by age.

	Beef calves n = 460			Water buffalo calves n = 3		
	≤ 3mo	3–6mo	6–9mo	≤ 3mo	3–6mo	6–9mo
<i>Toxocara vitulorum</i>	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)
<i>Moniezia benedeni</i>	0.0% (0)	11.5% (53)	0.2% (1)	0.0% (0)	0.0% (0)	0.0% (0)
<i>Eimeria</i> spp	11.3% (52)	85.4% (393)	1.7% (8)	0.0% (0)	0.0% (0)	66.7% (2)
Strongylate nematode	10.2% (47)	85.4% (393)	1.7% (8)	0.0% (0)	0.0% (0)	66.7% (2)
<i>Strongyloides</i> sp	0.0% (0)	2.4% (11)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)
<i>Trichuris discolor</i>	3.0% (14)	46.3% (213)	0.2% (1)	0.0% (0)	0.0% (0)	0.0% (0)
<i>Cryptosporidium</i> spp	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)

showed that *Moniezia* (21%), strongylate nematodes (93%), *Strongyloides* (7%), and *Trichuris* (2%) were present.⁸ In a 2007-2008 study of parasites in beef cow-calf operations in the southeast, 89.9% of the fecal samples collected were positive for strongyle-type eggs, but no *T. vitulorum* ova were found.² The prevalence of gastrointestinal nematode eggs, except for *Moniezia* and *Strongyloides*, in the Georgia and Kentucky reports was lower than in the present study.

In addition to *Eimeria* spp oocysts, and ova from *Moniezia benedeni*, strongylate nematodes and *Trichuris discolor*, *Strongyloides* sp was also found in 1 fecal sample from a beef calf in the current study.

Conclusions

This pilot study found no evidence of *T. vitulorum* when fecal samples from 2 beef herds in north-central Florida, and 1 buffalo herd in central Florida, were examined. Future studies expanding on this pilot study should include only beef and water buffalo calves between the ages of 4 weeks and 3 months, and should be conducted in a more subtropical area, such as south Florida. Additionally, samples from a greater number of farms in the study and at various times of the year need to be evaluated in order to determine a more accurate prevalence of *T. vitulorum* in Florida.

Endnote

^aEC Greiner, personal communication.

Acknowledgement

The authors declare no conflict of interest.

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