**Toxocara vitulorum** in an adult Holstein cow from arid area: a case report

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**Abstract.** We report a case of toxocariasis caused by *Toxocara vitulorum* in a 7-year-old Holstein cow in Kerman, southeast of Iran. The animal was admitted due to anorexia, emaciation and intermittent diarrhea. Microscopic examination revealed a large number of *T. vitulorum* eggs in the feces. The cow was successfully treated with ivermectin as anti-parasitic drug. This study is the first report of *T. vitulorum* infection in an adult cow from the arid area.

**Keywords:** Toxocariasis; *Toxocara vitulorum*; Holstein cow; Arid area.

Received 28.02.2016. Accepted 14.06.2016.

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**Introduction**

One of the major constraints for livestock production is the gastrointestinal (GI) parasitism which increases susceptibility to secondary infections and mortality, declines farm effectiveness and yield, and finally results in economic losses (Maharana et al., 2015). *Toxocara vitulorum*, as an agent of toxocariasis, is a parasitic ascarid of cattle and buffaloes (Davila et al., 2010; Rast et al., 2013). This nematode is found mostly in tropical and subtropical climates, although may occur worldwide (Rast et al., 2014; Dorny et al., 2015).

Calves can be infected by ingesting third stage larvae via the lactogenic route (Davila et al., 2010; Rast et al., 2013). Ingested larvae mature in 3–4 weeks, then shed a large number of eggs in the feces. Hatching of *T. vitulorum* eggs does not occur in the environment, but larvae in the eggs change to the infective third stages. Following ingestion, the infective eggs hatch in the host, and the larvae penetrate the intestinal wall, migrate and persist in a hypo-biotic state in muscles. In female animals, the larvae are reactivated, migrate to the mammary glands and are excreted in the colostrum (Rast et al., 2013; Ahmed et al., 2015).

Toxocariasis may manifest as an asymptomatic illness in calves (Borgsteede et al., 2012; Ahmed et al., 2015), although decreased appetite, reduced muscle mass and hair coat...
quality, poor performance and diarrhea are common manifestations of this disease (Dorny et al., 2015). Intestinal obstruction, intussusceptions, volvulus and perforation cause mortalities in calves, especially younger ones with severe infections (Rast et al., 2013).

To the best of our knowledge, there is no previous report of *T. vitulorum* in the adult cattle from the arid area in all over the world. Moreover, there is no information about clinical and hematological findings of toxocariasis in mature animals. This study is the first report of toxocariasis caused by *T. vitulorum* in a 7-year-old Holstein cow in Kerman, southeast of Iran, which describes historic and clinical signs, and laboratory findings associated with this condition.

**Case history**

A 7-year-old Holstein cow was referred to the veterinary animal hospital of Shahid Bahonar University of Kerman, with a history of anorexia, emaciation and intermittent diarrhea. Detailed history delineated that the animal was kept in a group pen with ten Holstein cattle from both sexes and different ages three months ago. The case was born in Kerman and had a history of environmental stress due to transportation from other region in Kerman province to this area. Clinical examinations revealed dehydration, tachypnea, tachycardia with strong heart tone and hyperemic mucus membranes. On inspection, diarrheic stool was malodorous, steatorrheic and coated with mucus. Hematologic investigation showed leukocytosis without a left shift, neutrophilia, eosinophilia and PCV at the lower normal range. Then, fecal sample was manually collected pre-rectally from the animal for further investigations. In the laboratory, the specimen was evaluated by centrifugal sedimentation and flotation methods (Ahmed et al., 2015) for any parasitic infections. Moreover, bacterial culture of fecal sample was done.

The microscopic examination revealed a large number of *T. vitulorum* eggs (15000/g) (figure 1) according to the morphological characters based on standard keys (Bilal et al., 2009). So, the cow was recovered by therapeutic intervention with ivermectin (Erfamectin®1%; Erfan Pharmaceutical Co, Iran, 0.2 mg/kg, SC) twice at an interval of 14 days as anti-parasitic drug. Fluid loss was also replaced by lactated Ringer's solution (LRS). Recheck was done at one week later, and no other complications were identified at this time. Furthermore, fecal examination of the mentioned case and other animals in the group pen revealed no presence of *T. vitulorum* and other parasites.

**Figure 1.** *Toxocara vitulorum* egg (Length: 69-95 µm, Width: 60-77 µm) with pitted surface, thick shell and granular contents

**Discussions**

*T. vitulorum* is one of the most important parasites found mostly in tropical and subtropical areas (Avcioglu and Balkaya, 2011; Rast et al., 2014; Dorny et al., 2015). Following change in of their host, this nematode can implicate hazardous consequence in the
stressful and restricted conditions (Radostits et al., 2007). This study is the first report of *T. vitulorum* infection in an adult Holstein cow from Kerman, southeast of Iran (latitude 30°19'N and longitude 52°07'E) as an arid area with hot and dry weather.

Toxocariasis has been reported in calf, dog, cat and human caused by *Toxocara* spp. (Macpherson, 2013). In comparison to our results, other researchers reported various prevalence of *T. vitulorum*, ranging from 4.97% to 22.6% in cattle and buffaloes from many tropical and subtropical parts of the world (Avcioglu and Balkaya, 2011; Rast et al., 2013; Maharana et al., 2015). It appears that differences between results of numerous studies are related to variation between evaluated populations, host factors, geographical and environmental conditions, identification methods and preventive measurements (Avcioglu and Balkaya, 2011; Rast et al., 2013). It is difficult to determine reasons of our findings, but may be attributed to global climate change (geo-climatic condition) that has been experienced over the last several decades, which has altered distributions of organisms worldwide (Davila et al., 2010).

According with our report in an adult cow, the presence of *T. vitulorum* eggs was reported in 3% of fecal samples of adult cattle in Pakistan by Farooq et al. (2012). In contrary, other researchers found an association between *T. vitulorum* infections and age of animals which young calves had the highest prevalence (Maharana et al., 2015). Avcioglu and Balkaya (2011) reported that rate of *T. vitulorum* infections was decreased up to 1 year and rare after 1 year old. Rast et al. (2013) also stated "*T. vitulorum* egg output is not consistent throughout the patent period, peaking when the calf is about 5–7 weeks of age and tapering off due to a natural ageing process of the parasite as well as the maturing of the humoral and cell-mediated immune response of the calf".

Role and pathogenic significance of *Toxocara* strains of domestic animals remain inconclusive. *T. vitulorum*, as the most pathogenic organism in calves, presents in the intestinal tract (Göz et al., 2006; Davila et al., 2010). It is believed that this organism acts as an opportunistic pathogen via the invasion of the intestinal epithelium damaged by other infectious agents. However, enteric disease due to the *T. vitulorum* has been reported without any concomitant infections in calf (Göz et al., 2006; Davila et al., 2010), which is similar to our findings. On the other hand, various stress conditions, immunodeficiency, and malnutrition can result in clinical disease in infected hosts (Radostits et al., 2007). In this case, there was also a history of environmental stress, ration change and concurrent disease three months ago.

The present case was similar to other studies reporting poor hair coat, weight loss, anorexia, anemia and diarrhea as the most clinical symptoms (Göz et al., 2006; Ahmed et al., 2015). According to our results, clinical findings of adult cow were similar to that reported for calves (Rast et al., 2013; Dorny et al., 2015). As we describe here, diarrhea is the most common reported clinical sign that occurred by numerous conditions, including infectious diseases, parasites and nutrition. Other clinical signs are non-specific and could be observed following other disorders (Rast et al., 2014). In the current case, no parasite was observed in the blood smear. Furthermore, *Mycobacterium paratuberculosis* was not detected by acid-fast staining. Moreover, bacterial culture of fecal sample was negative. No other parasites were also detected in the feces.

We report the leukocytosis without a left shift, neutrophilia, eosinophilia and PCV at the lower normal range for hematologic parameters of this case. This finding is in accordance with Omar and Barriga (1991) who reported eosinophilia, lower erythrocyte counts and PCV, possibly due to toxemic effects, in experimentally infected rabbits.

Diagnosis of toxocariasis is based on clinical signs, necropsy findings, fecal examination and serological assays such as Indirect Haemagglutination Test (IHA), Counter-current Immunoelectrophoresis (CIEP) and Enzyme-Linked Immunosorbent Assay (ELISA) (Macpherson, 2013; Ahmed et al., 2015). Thus, demonstration of *T. vitulorum* eggs is not
adequate for diagnosis of latent infections in adult animals (Jyoti et al., 2011). High number of *T. vitulorum* eggs without presence of other pathogens in the fecal sample, concomitant decrement in the number of *T. vitulorum* in feces with improvement of clinical signs, and concurrent disappearance of clinical findings and absence of the parasite in the fecal specimen confirmed a diagnosis of toxocariasis in the present case.

Anthelmintic treatment with either pyrantel or benzimidazoles has been documented to be effective in the elimination of *T. vitulorum* infections in calves (Borgsteede et al., 2012; Ahmed et al., 2015). In the current case, ivermectin was administrated to treat an affected adult cattle, and showed good therapeutic effects because of complete elimination of the fecal parasites at seven days after the onset of the treatment. Our finding is in accordance with other studies in which this drug was proved as the effective and available drug in the treatment of cattle toxocariasis (Davila et al., 2010).

Our data shows that adult cattle can be infected by *T. vitulorum*, providing pathogenic importance of these populations even in an arid area. The fact that the larvae in tissues of female adults can survive for several years and infect calves over 1–3 parturitions, shows the importance of this issue (Rast et al., 2013). So, veterinarians should warn owners regarding the potential impact of this parasitic organism, especially in younger and diarrheic animals. Consequently, optimization of sanitary and prophylactic measures, particularly appropriate parasite control strategy is predominantly essential to prevent of toxocariasis outbreaks.

References


