



GLOBAL JOURNAL OF MEDICAL RESEARCH: G
VETERINARY SCIENCE AND VETERINARY MEDICINE
Volume 14 Issue 2 Version 1.0 Year 2014
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

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GJMR-G Classification : NLMC Code: QX 140



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Seroprevalence of *Toxoplasma Gondii* and *Neospora Caninum* Infection in Cattle in Grenada, West Indies

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Abstract- In view of the limited data on the seroprevalence of *Toxoplasma gondii* and *Neospora caninum* in the Caribbean region, this study aimed to estimate the seroprevalence of these parasites in cattle in Grenada, West Indies. In Total 148 serum samples were collected from the jugular veins of cattle from the six parishes in the country. The samples were surveyed for *T. gondii* and *N. caninum* antibody by an enzyme-linked immunosorbant assay (ELISA). The overall seroprevalence of *T. gondii* was 2.7% (4/148) and the seropositivity of *N. caninum* was 6.8% (10/148). The present results indicate exposure of cattle to *T. gondii* and *N. caninum* in Grenada.

I. INTRODUCTION

Toxoplasma gondii (*T. gondii*) is a zoonotic protozoan parasite causing infection in most warm blooded species of animals including humans (Dubey 2010). *T. gondii* causes major economic losses in livestock through abortions, stillbirths and neonatal losses (Dubey et al. 2007). Infection in humans and animals can occur by ingestion of *T. gondii* oocysts from cats which are the definitive hosts or by consuming raw uncooked meat containing *T. gondii* tissue cysts, which develop in infected animals (Dubey 2010). Cattle and other herbivorous animals contact the infection from grass and pastures contaminated with cats' feces (Jacek et al. 2007). In humans, *T. gondii* constitutes an important health problem in pregnant women because of the threat of fetal infection and in immunocompromized patients, aggravates existing pathological conditions (Jacek et al. 2007, Dubey 2010). Apart from a survey in Grenada by Chikweto et al. (2011) who demonstrated a seroprevalence of 8.4% (10/119) tested by a modified agglutination test (MAT) in cattle, there is paucity of information on *T. gondii* infection in cattle in the Caribbean region.

Neosporosis caused by *N. caninum*, another coccidian parasite of animals morphologically similar to *T. gondii*, has emerged as a serious disease of cattle

and dogs world wide (Dubey 2010). Antibodies to *N. caninum* have been demonstrated in many domestic and wild animals. *N. caninum* is a major cause of abortion and reproductive failure in both dairy and beef cattle (Vural et al. 2006, Dubey et al. 2007). Vertical transmission from dam to fetus and horizontal transmission through ingestion of oocysts voided by dogs are demonstrated modes of transmission in cattle (Gavrea et al. 2009, Dubey 2010). In contrast to *T. gondii*, infection of cattle with *N. caninum* has been reported from Argentina, Brazil, Chile, Paraguay, Peru and Uruguay, which are in vicinity of the Caribbean countries (Moore 2005). To our knowledge there is no information on *N. caninum* infection of cattle within the Caribbean region.

The objective of this study was to estimate the seroprevalence for *T. gondii* and *N. caninum* in cattle in Grenada.

II. MATERIALS AND METHODS

For the present survey a 2 step (multistage cluster sampling) sampling procedure was adopted. Generally cattle herds in Grenada are small comprising 1-4 animals. In the first step, 35 herds consisting of 6% of (2500) estimated cattle population in Grenada, were selected randomly from all the six parishes in the country. All herds having less than 10 cattle were sampled. For a herd size greater than 10, 80% of the animals were sampled. A total of 148 cattle were sampled randomly. Two milliliter of blood from the jugular vein of each animal was obtained. Blood samples were centrifuged at 1500g for 15 minutes, and the serum was collected and stored at -20°C until tested for antibodies to *T. gondii* and *N. caninum* using commercial ELISA kits (IDvet France). ELISA was performed following the instruction of the manufacturer.

III. RESULTS

Out of 148 cattle tested 4 animals [2.7%, 95% confidence Interval (CI), 0.09% to 5.31%] were positive for *T. gondii* and 10 [6.8% 95% confidence interval (CI), 2.74% to 10.86%] for *C. caninum*. Results are presented in table 1.

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Table 1 : Antibodies to *Toxoplasma gondii* and *Neospora caninum* in cattle from Grenada, West Indies

<i>Toxoplasma gondii</i>			<i>Neospora caninum</i>		
Number of cattle tested	Number positive	Percent positivity	Number of cattle tested	Number positive	Percent positivity
148	4	2.7	148	10	6.8

IV. DISCUSSION

In the present survey antibodies to *T. gondii* were detected in only 4 [2.7%, 95% CI, 0.09% to 5.31%] of the tested cattle. Chikweto *et al.* (2011) reported a seroprevalence of *T. gondii* (8.5%) in cattle using MAT. In both surveys antibodies to *T. gondii* in cattle was low. Cattle are considered to be a poor host for *T. gondii* because of its relative natural resistance to this parasite (Dubey and Thulliez 1994, Pita Gondim *et al.*, 1999, Dubey 2010). Similar to our observations in Grenada, low seroprevalence has been reported from Iran 1.6% (Raeghi *et al.* 2011 and 0% by Sharif *et al.* 2007) India 2.4% (Sharma *et al.* 2008) Brazil 1.03% (Pita Gondim *et al.* 1999), USA 3.2% (Dubey 1985) and Malaysia 6.3% (Chandrawathani *et al.* 2008). However, a high seroprevalence of *T. gondii* in cattle has been reported from many countries of the world; 32% in Sudan (Khalil and Elrayach, 2011); Tenter *et al.* (2000) in their paper reported 22% in the Czech Republic, 40% in Greece, 13-43% in Netherlands, 43% in Portugal, 40% in Spain, 69% in France, 92% in Italy and 66% in Turkey. Jacek *et al.* 2007 found 53% seroprevalence in Poland.

The variation in seroprevalence of *T. gondii* between various countries may be attributed to the difference in the rate of contamination of the environment with oocysts from cat, the definitive host and differences in management methods (Pet Gondim *et al.* 1999, Jacek *et al.* 2007). The low prevalence of *T. gondii* (2.7%) could be related to cattle production in Grenada. Cattle herds in Grenada are small compared to more intensely managed herds elsewhere in the world. Small herds get better hygienic conditions and are in less contact with infected cats. Further studies regarding the differences between management practices for cattle in Grenada could potentially shed more light on this topic.

This is the first report of *N. caninum* surveillance in cattle in Grenada. Antibodies to *N. caninum* was low [6.8%; 95% CI, 2.74% to 10.86%] in the tested cattle. Low prevalence has also been reported in Germany 4.1% (Conraths *et al.* 1996), Canada 8.3% (Vanleeuwen *et al.* 2006), and Serbia 15% (Kuruca *et al.* 2013).

Variations in the seroprevalence of Neosporosis depending on the region, climate and type of serological tests have been reported (Dubey *et al.* 2007).

This variation amongst the different countries and regions of the world may be attributed to risk factors like dog density, climatic factors and management practices on the farm. Climatic factors influence the sporulation and survival of oocysts (Rinaldi *et al.* 2005). Variation in seroprevalence with respect to management

practices could be attributed to the size of farm (Guimaraes *et al.* 2004; Rinaldi *et al.* 2005).

A positive relation between seropositivity of farm dogs and bovine neosporosis has been reported by previous researchers (Wouda *et al.* 1999; Kacar *et al.* 2012). Seroprevalence in cattle is lower where dogs are not present on the farm (Basso *et al.* 2001, Antony and Williamson 2003). In Grenada seropositivity for *N. caninum* in dogs has been demonstrated to be low varying from 1.2% in owned dog to 1.6% in stray dogs (unpublished data). This low seropositivity in dogs correlates well with the lower seropositivity in cattle (6.8%).

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