

Serological survey of antibodies to *Toxoplasma gondii* in goats, sheep, cattle and water buffaloes in Bahia State, Brazil

L.F. Pita Gondim^{a,*}, H.V. Barbosa Jr.^a, C.H.A. Ribeiro Filho^a, H. Saeki^b

^a Veterinary School, Universidade Federal da Bahia, Av. Ademar de Barros 500, Ondina, Salvador, 40170-110
Bahia, CEP, Brazil

^b Nippon Veterinary and Animal Science University, 1-7-1, Kyonan-cho, Musashino-shi, Tokyo 180-0023, Japan

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Abstract

Serum samples from 439 goats, 240 sheep, 194 cattle and 104 water buffaloes were tested for antibodies to *Toxoplasma gondii* by a latex agglutination test. Antibodies to *T. gondii* were found in 28.93% of goats, 18.75% of sheep, 1.03% of cattle and 3.85% of water buffaloes, at a dilution of $\geq 1:64$. The highest titres observed in goats, sheep, cattle and water buffaloes were 1:2048, 1:2048, 1:64 and 1:512, respectively. ©1999 Elsevier Science B.V. All rights reserved.

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1. Introduction

Toxoplasmosis is a widespread zoonosis caused by the coccidian protozoan *Toxoplasma gondii*. It infects human beings and many warm-blooded animals, inducing abortions and neonatal mortality in goats and sheep (Dubey and Beattie, 1988). The infection in cattle does not usually cause clinical symptoms as they have a high natural resistance to the parasite (Dubey and Thulliez, 1994). Little is known about the infection and prevalence of *T. gondii* antibodies in water buffaloes (*Bubalus bubalis*), but it seems to be lower than in cattle (Dubey et al., 1998; Huong et al., 1998).

In Brazil, studies have shown the presence and importance of *T. gondii*, especially in small ruminants (Amaral et al., 1978; Chiari et al., 1987; Sella et al., 1994), although in

* Corresponding author. Tel.: +55-071-2456103; fax: +55-071-2452813; e-mail: pita@ufba.br

Table 1
Number of serum samples collected from different climatic regions

Host animal	Number of samples		Total
	'Recôncavo' (A)	'Caatinga' (B)	
Goat	274	165	439
Sheep	104	136	240
Cattle	109	85	194
Water buffalo	104	0	104

some regions, such as the Bahia state which possesses large numbers of goats, sheep, cattle and water buffaloes, there is little information on prevalence of infection. Since it is well known that meat from persistently infected animals is one of the most important potential sources of human toxoplasmosis (Lundén and Uggla, 1992), it is necessary to investigate the prevalence of *T. gondii* infection among domestic animals. The purpose of this study was to determine the frequency of antibodies against *T. gondii* among goats, sheep, cattle and water buffaloes bred on certain farms in Bahia state, Brazil.

2. Materials and methods

2.1. Animals and blood collection

Blood was collected from 439 goats (10 farms), 240 sheep (10 farms), 194 cattle (10 farms) and 104 water buffaloes (3 farms). These samples were collected between June and September 1996. Of a total of 439 goats, 274 were dairy goats and the remainder were for milk and meat production. All the sheep were kept for meat production. The cattle consisted of dairy cows and the water buffaloes were bred for both milk and meat production. The farms were distributed in two different climatic regions, one called 'Recôncavo', region (A), is located near the Atlantic coast and is a humid environment; the other region, called 'Caatinga', region (B), is about 200–500 km inland. Region (A) has a larger human and pet animal population, including cats, than region (B) which is a dry zone. The number of samples collected in each region is shown in Table 1. The serum samples were prepared and stored at -20°C until use.

2.2. Serological testing

A commercial latex agglutination test (LAT) kit (Toxocheck-MT, Eiken, Japan) was employed to detect antibodies against *T. gondii* and the reactions were performed using polystyrene microplates (Falcon - 3911, Becton Dickinson, USA). The sera were screened at dilutions of 1 : 16 to 1 : 128 and an agglutination titre at a 1 : 64 dilution was considered as a cut-off level for *T. gondii* antibodies. Positive serum samples showing a titre of 1 : 128 were further diluted to determine the end point. Goat positive and negative controls were used in each analysis.

Table 2

Frequency of antibodies against *Toxoplasma gondii* among goats, sheep, cattle and water buffaloes on some farms in Bahia state, Brazil

Host animal	Number of farms	Sera tested	Positive (%)
Goat	10	439	127 (28.93)
Sheep	10	240	45 (18.75)
Cattle	10	194	2 (1.03)
Water buffalo	03	104	4 (3.85)

3. Results and discussion

The goat and sheep samples showed high proportions of positive reactions, compared to those in cattle and water buffaloes (Table 2). The highest titre to *T. gondii* in goats and sheep was 1 : 2048, in cattle, 1 : 64 and in water buffaloes, 1 : 512.

The seropositive rates of goats in regions (A) and (B) were 41.97% (115/274) and 7.27% (12/165), respectively, and the average was 28.93%. The frequency of seropositivity in sheep sera in regions (A) and (B) were 26.92% (28/104) and 12.50% (17/136), respectively. These differences in seropositivity between the two regions indicate that the goats and sheep bred in region (A) were exposed to an environment contaminated with more *T. gondii* oocysts, compared to those bred in region (B). Dubey (1985) showed that the seropositivity of sheep and goats from Montana against *T. gondii* by the Sabin–Feldman dye test was 13.2% and 22.7%, respectively. Samad et al. (1993) reported that a higher percentage of antibodies against *T. gondii* by LAT was shown in cattle (16.10%) than in goats (12.09%). Hashemi-Fesharki (1996) tested sera from 2000 cows, 3311 sheep and 638 goats and found no positive reactions in cow sera, although 24.50% of sheep and 19.25% of goats showed positive reactions. Compared with previous reports, our data indicate that seropositivity was highest in goats, especially in region (A). In Bahia state, the goat is one of the most important animals for meat and milk production. Although milk from infected cows is regarded as a very unlikely means of *T. gondii* transmission (Dubey, 1994), we should pay attention to milk as well as meat from goats as a potential source for human toxoplasmosis (Skinner et al., 1990), because of their greater susceptibility to infection and their higher rate of seropositivity than cattle.

In general, seropositivity to *T. gondii* in cattle is not high. Dubey (1985) recorded a seropositivity of 3.2% to *T. gondii* antibodies among cattle in Montana using a modified agglutination test and sera previously treated with 0.2 M-mercaptoethanol. In our study the frequency of antibodies to *T. gondii* observed in water buffalo sera (3.85%) was higher than in cattle (1.03%). Lower seropositivities in cattle and water buffalo samples compared to those in goats and sheep may be attributed both to differences in susceptibility to *T. gondii* and to differences in management methods. In Vietnam, Huong et al. (1998) detected higher levels of *T. gondii* antibodies in cattle (10.5%) compared to water buffaloes (3.0%) using the LAT. On the other hand, Dubey et al. (1998) examined 75 water buffalo sera from Egypt by LAT, but they did not find any positive reactions to *T. gondii* antibodies. In spite of the presence of *T. gondii* antibodies in water buffaloes in some tropical countries, little is known about the infection, clinical aspects and public health importance of this protozoan.

Since there is a trend to increase the number of water buffaloes farmed in Bahia state and other states in Brazil, we consider that it is necessary to investigate the importance of *T. gondii* and other parasitic zoonoses in both water buffaloes and other domestic animals.

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