

# Seroprevalence of *Toxoplasma Gondii* in Domestic Animals in Pakistan

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## Abstract

The seroprevalence of *Toxoplasma gondii* infections among food animals in South-West Pakistan was measured by serological examination using a commercial latex agglutination test (LAT). In all 262 blood samples, from 100 cattle, 40 sheep, 58 goats and 64 chickens, were collected from the city abattoir. Titers considered diagnostically significant ( $\geq 1:64$ ) were detected in 25% of cattle and 2.5% of sheep. None of the goats and chickens presented seropositivity for anti-toxoplasma antibodies. The study suggests the need for further investigations to determine the impact of these findings on the human population (JPMA 45: 4,1995).

## Introduction

Infection with the intracellular protozoan parasite, *Toxoplasma gondii*, is prevalent worldwide in many species of warm-blooded animals and human beings<sup>1-4</sup>. Cats are the definitive hosts and harbor the intestinal, sexual stage of the organism i.e., the oocyst<sup>1,5-9</sup>. Intermediate animal hosts such as cows and sheep acquire toxoplasmosis mainly due to ingestion of oocyst<sup>9,12,13</sup>. Transmission and spread of infection among humans is largely through inhalation or ingestion of oocyst discharged in the faeces of infected cats, inoculation of trophozoites through the skin, drinking raw cows milk or contaminated water, ingestion of birds' eggs and by eating raw or undercooked infected meat<sup>1,3,5</sup>. Persistence of *Toxoplasma gondii* tissue cysts has been reported in various edible tissues of infected cattle, e.g., tongue, heart, liver, roast (semimembranosus and semitendinosus muscles), ribs (intercostal muscle), brain and intestine<sup>14,15</sup>.

The diagnosis of toxoplasmosis can be made by serology, histology of infected tissues or isolation of the etiological agent. From a practical clinical point of view however, serological tests are the most readily available and easy to handle<sup>9-11</sup>. In toxoplasmosis as in all systemic infections, high serum antibody titres are presented during acute phase. The titres gradually taper off to much lower levels which then persist for many years, usually throughout life<sup>1,5</sup>. *Toxoplasma gondii* antigens give rise to both IgM and IgG antibody responses in infected individuals. Detectable levels of IgM antibodies appear fairly early, indicating recently acquired or reactivated acute phase infection, but their serum levels fall off or disappear within a short time span. IgG antibodies on the other hand appear later but reach greater titres which then persist for many years. High IgG antibody titres have also been observed in cases of chronic asymptomatic toxoplasmosis. Therefore, although detection of IgG in the serum cannot be used to make diagnosis of acute or active toxoplasma, it is of great epidemiological significance as it is an indication of previous contact of the individual with the pathogen<sup>1,9,16</sup>. The magnitude of toxoplasmosis in Pakistan is still uncertain. Very few studies have been done on the seroprevalence of *Toxoplasma gondii* among different population groups<sup>1,2,9</sup>. However, no data is available on toxoplasmosis among food animals in Pakistan. The present study was therefore undertaken to conduct a small scale seroepidemiological survey of *Toxoplasma gondii* infections among cows, buffalos, sheep, goats and chicken destined for local human consumption. It was hoped that some information on the magnitude of toxoplasmosis among food animals in Pakistan would come

to light.

## Material and Methods

A total of 262 animal sera including 100 cattle (cows and water buffalos), 40 sheep, 58 goats and 64 chicken were examined during the period of October to December, 1993. Blood samples were collected at random from the local slaughter house which is supplied with animals largely from various regions of Tharparkar and in part from Punjab. On an average 15 to 20 milliliters of blood were collected from each animal as it was slaughtered. Following overnight refrigeration, serum was separated by centrifugation at 2300 rpm for 15 minutes and analyzed without delay. Antibodies were detected using the latex agglutination tests (LAT). For this purpose the Toxo reagent kit (Eiken Chemical Co. Ltd., Japan) was used according to the manufacturer's instructions. The kit included both positive and negative controls. The control tests were performed with a 100% accuracy for each batch of animal sera tested. Sera which reacted at or above 1:64 were considered positive.

## Results

Seroprevalence of anti-toxoplasma antibodies in the animals tested is shown in Table.

**Table. Prevalence of anti-Toxoplasma antibodies among food animals in South-West Pakistan.**

Animal host	No. examined	Positive	
		No.	%
Cattle (Cows/Buffalos)	100	25	25
Sheep	40	1	2.5
Goats	58	0	0
Chicken (Shaver/Farm).	64	0	0

The seropositivity rate was highest in cattle. The maximum titre exhibited among cattle was 1:512 by 2(8%) of the animals, 2 (8%) cattle had a titre of 1:256, 7 (28%) of them gave a titre of 1:128 and 14 (56%) presented a titre of 1:64. The single seropositive sheep gave a titre of 1:64 while none of the 64 chicken and 58 goats displayed seropositivity for antitoxoplasma antibodies in their sera.

## Discussion

Although *Toxoplasma gondii* is found in most parts of the world, there are relatively few reports on toxoplasmosis in Pakistan. The prevalence of *Toxoplasma gondii* infections in Pakistan has been reported in young children<sup>1</sup>, in pregnant women<sup>2</sup> and in some high and low risk groups<sup>9</sup> but no reports on toxoplasmosis in food animals exist. The present study revealed toxoplasma antibodies in 25% of cattle (cows and water buffalos) and 2.5% of sheep while all 64 chicken and 58 goats were sero-

negative. The data is based on a single blood sample from each host from among an apparently healthy animal population. Considerable variations in the prevalence of toxoplasmosis among different animal groups have been reported<sup>17-23</sup>. In the present study the overall prevalence of anti-toxoplasma antibodies among cattle was found to be higher than that reported in Ethiopia (6.6%)<sup>17</sup>, China (4.4%)<sup>18</sup>, Bangladesh (16.1%)<sup>19</sup> and South West Iran (14.8%)<sup>20</sup>. For sheep our figures were lower than those reported by North Central USA (65.5%)<sup>21</sup>, Ethiopia (22.9%)<sup>17</sup>, Zimbabwe (6%)<sup>22</sup>, Bangladesh (17.6%)<sup>19</sup> and South West Iran (13.8%)<sup>20</sup>. In contrast to our study significant seropositivity rates among goats have been reported from Ethiopia (11.6%)<sup>17</sup>, Sri Lanka (22.3%)<sup>23</sup>, Zimbabwe (7%)<sup>22</sup>, Bangladesh (12.1%)<sup>19</sup> and South West Iran (13.1%)<sup>20</sup>. Thus, in the light of our results and the data available from both third world and developed countries indicate that variable seropositivity was seen in different geographical situations.

This may be attributed to the fact that ingestion of oocysts from cat faeces is the primary mode of infection of ruminants. As chickens in principle avoid contact with felines the chances of their acquiring toxoplasmosis are negligible. This preliminary survey shows that *Toxoplasma gondii* infections among food animals are quite common in Pakistan. These infections seem to be confined largely among cattle and in part within sheep. Given the ever increasing preference for eating among Pakistanis the probability that infected meat is an important source of infection cannot be entirely ruled out. Thus further investigations are needed to determine the impact of this parasitic infection on the health of the human consumer.

### Acknowledgements

The author is grateful to Professor Dr. Viqar Zaman for invaluable advice during the course of the study and critical review of the manuscript and Mr. Hilary Frankey Fernandes for preparation of the manuscript.

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