

# Sero-Prevalence of Toxoplasmosis in Domestic Animals in Benadir Region, Somalia

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## Abstract

A sero-prevalence survey of Toxoplasmosis in domestic animals (camels, cattle, sheep and goats) was conducted in the Benadir region of Somalia from January to July 2014 to determine the status of the disease. A total of 151 sera were tested, 64 camels; 28 cattle; 29 sheep and 30 goats, for the presence of *Toxoplasma gondii* antibodies using Latex Agglutination Test (LAT). Totally about 15.9% (24/151) of studied animals showed sero-positive. The sero-prevalence was found in 6.3% of 64 camels, 7.1% of 28 cattle, 34.5% of 29 sheep and 26.7% of 30 goats. The antibody titres to *T. gondii* positive sera were 2 (8.3%), 9 (37.5%), 4 (16.7%), 4 (16.7%), 4 (16.7%), 1 (4.2%) and 0 (0%) by dilution of 1:2, 1:4, 1:8, 1:16, 1:32, 1:64 and 1:128 respectively. Out of 151 domestic animals (45 male and 106 female), 8 (5.3%) males and 16 (10.6%) females were infected with *T. gondii*. The study recommends the need for further researches in the whole country using different serological tests and to determine the impact of these findings on the human population. It would be important to increase public awareness on zoonotic potential of Toxoplasmosis.

## Keywords

Sero-Prevalence, Toxoplasmosis, LAT, Domestic Animals, Benadir Region, Somalia

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## 1. Introduction

Toxoplasmosis is caused by a protozoan parasite, *Toxoplasma gondii*, in both animals and humans. Cats of the family Felidae are the natural reservoir of *T. gondii* and are the key animal species in the life cycle of this parasite by excreting the environmentally resistant oocyst. Toxoplasmosis is one of the more common parasitic zoonoses worldwide. People can become infected with *T. gondii* by ingesting raw or undercooked meat con-

taining tissue cysts or by ingesting cat-shed oocysts via contaminated soil, food or water. It may cause abortion or a congenital disease in its intermediate hosts, all warm-blooded animals including humans [1]-[4]. There is a little information concerning human Toxoplasmosis in Somalia [5] [6]. However, no data is available on Toxoplasmosis in domestic animals in the country. This is the first scientific research on Toxoplasmosis in domestic animals in Somalia.

Livestock are the backbone of the socioeconomic systems of most of the rural communities in African countries including Somalia, with its vast rangeland grazing area and large animal population. They are adapted to a nomadic way of grazing which may be migrated through borders with Djibouti, Ethiopia and Kenya [7].

There is a dearth of actual and reliable data on livestock numbers and the animal health situation throughout the country. Numbers and statistics on Somalia are estimates of varying reliability. About 37.5 millions grazing animals were reported by FAO [7], other data gathered by the Food Security Assessment Unit (FSAU) was a total of 38.9 millions grazing animals [8]. The composition of animals in Southern part of Somalia is shown in **Table 1**. Due to the scarcity of research projects and lack of public awareness in the country, this study contributes a recent data base on zoonotic diseases and increases public awareness in the country.

## 2. Materials and Methods

### 2.1. Study Area

The Federal Republic of Somalia covered an area of 638,000 square kilometres in the Horn of Africa. Somalia's land-mass is dominated by arid and semiarid rangelands for which pastoralism is the most appropriate form of land use. Benadir is a region in southeastern Somalia. It is bordered by Somali regions of Middle Shebelle and Lower Shebelle, as well as the Indian Ocean. Its capital is Mogadishu [9].

### 2.2. Investigated Animals

Cattle, Sheep, Goats and Camels in Benadir region, Somalia.

### 2.3. Blood Sample Collection

Blood samples were collected from 151 apparently healthy animals in Benadir region, Somalia by venipuncture using plain vacutainer tubes and allowed to clot overnight at room temperature. Serum samples were separated and decanted into micro-tubes and then examined.

### 2.4. Sample Examination—Serological Testing

#### Latex Agglutination Test (LAT)

The serum samples and Toxoplasma antigen (Spinreact, S.A./S.A.U., Ctra. Santa Coloma, Spain) were kept one hour in room temperature before beginning of the test. A total of 50 µl of each serum to be tested was placed on a LAT plate. Then the vial of antigen was shaken gently and 25 µl of antigen was put beside each of the sera. The antigens and the serum were mixed on the plate with a stirrer and spread over the entire circle. Then the plate was rotated manually for 4 minutes and the reading was taken immediately. Any agglutination was considered as positive, whereas no reaction (negative) was indicated as the absence of Toxoplasma antibody in the sera. The positive reactors were then diluted; two fold dilution, 1:2 up to 1:128. These samples were examined in Dufle Specialist Clinic Laboratory, Mogadishu, Somalia.

## 3. Results

As delineated in **Table 2**, the overall sero-prevalence of Toxoplasmosis in different livestock species was 15.9% (24 out of 151 animals). The highest rate of *T. gondii* infection was found in sheep 10 (34.5%) followed by goats 8 (26.7%), cattle 2 (7.1%), and camels 4 (6.3%). The antibody titres to *T. gondii* positive sera were 2 (8.3%), 9 (37.5%), 4 (16.7%), 4 (16.7%), 4 (16.7%), 1 (4.2%) and 0 (0%) by dilution of 1:2, 1:4, 1:8, 1:16, 1:32, 1:64 and 1:128 respectively. Most of animals (37.5%) had antibody titer of 1:4 while higher antibody titers, 1:64, were detected only in one goat serum sample. Considering the sex of animals, as presented in **Table 3**, 8 (5.3%) of male and 16 (10.6%) of female out of 151 animals were sero-positive for Toxoplasmosis.

**Table 1.** Livestock species and numbers (FSAU, 1999).

Animals area	Camel	Cattle	Sheep	Goat	Total animal numbers
Southern	1,217,470	1,340,870	707,020	1,860,110	5,125,470

**Table 2.** Overall sero-prevalence of Toxoplasmosis in different livestock species based on LAT.

Species	Number of sera tested	Number of positive reactors (%)	Distribution of specific antibody titres to Toxoplasmosis positive reaction (%)						
			1:2	1:4	1:8	1:16	1:32	1:64	1:128
Camels	64	4 (6.3)	2 (50)	1 (25)	0 (0)	1 (25)	0 (0)	0 (0)	0 (0)
Cattle	28	2 (7.1)	0 (0)	0 (0)	0 (0)	1 (50)	1 (50)	0 (0)	0 (0)
Sheep	29	10 (34.5)	0 (0)	6 (60)	3 (30)	0 (0)	1 (10)	0 (0)	0 (0)
Goats	30	8 (26.7)	0 (0)	2 (25)	1 (12.5)	2 (25)	2 (25)	1 (12.5)	0 (0)
<b>Total</b>	<b>151</b>	<b>24 (15.9)</b>	<b>2 (8.3)</b>	<b>9 (37.5)</b>	<b>4 (16.7)</b>	<b>4 (16.7)</b>	<b>4 (16.7)</b>	<b>1 (4.2)</b>	<b>0 (0)</b>

**Table 3.** Sex related sero-prevalence of Toxoplasmosis based on LAT in different livestock species.

Species	Sex of animals	Number of sera tested	Number of positive reactors (%)	Distribution of specific antibody titres to Toxoplasmosis positive reaction (%)						
				1:2	1:4	1:8	1:16	1:32	1:64	1:128
Camels	Male	15	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
	Female	49	4 (8.2)	2 (50)	1 (25)	0 (0)	1 (25)	0 (0)	0 (0)	0 (0)
Cattle	Male	6	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
	Female	22	2 (9.1)	0 (0)	0 (0)	0 (0)	1 (50)	1 (50)	0 (0)	0 (0)
Sheep	Male	13	5 (38.5)	0 (0)	3 (60)	1 (20)	0 (0)	1 (20)	0 (0)	0 (0)
	Female	16	5 (31.3)	0 (0)	3 (60)	2 (40)	0 (0)	0 (0)	0 (0)	0 (0)
Goats	Male	11	3 (27.3)	0 (0)	0 (0)	1 (33.3)	1 (33.3)	0 (0)	1 (33.3)	0 (0)
	Female	19	5 (26.3)	0 (0)	2 (40)	0 (0)	1 (20)	2 (40)	0 (0)	0 (0)
<b>Total</b>		<b>151</b>	<b>24 (15.9)</b>	<b>2 (8.3)</b>	<b>9 (37.5)</b>	<b>4 (16.7)</b>	<b>4 (16.7)</b>	<b>4 (16.7)</b>	<b>1 (4.2)</b>	<b>0 (0)</b>

#### 4. Discussion

The overall sero-prevalence of Toxoplasmosis reported in this study was 15.9% based on LAT. The prevalence of camels in this study (6.3%) was found to be lower than that reported in Sudan (20%) by using LAT [10], Egypt (30.7%) by using Modified Agglutination Test, MAT [11], Iran (14.57%) by using MAT [12] and Turkey (90.9%) by using Sabin-Feldman Dye Test (SFDT) [13]. For cattle, the prevalence of this study (7.1%) was lower than that reported in Sudan (32%) by using LAT [10], Iran (55%) by using MAT [14], Pakistan (25%) by using LAT [15], Thailand (22.3%) by using LAT [16] but is comparable to that reported in Ethiopia (6.6%) using an Indirect Haemoagglutination Test, IHAT [17]. In sheep, the prevalence of this study (34.5%) was lower than that reported in Sudan (57.5%) by LAT [10], Libya (71%) by using LAT [18] and higher than Pakistani (2.5%) sheep by using LAT [15] and Djibouti (9.8%) by using IHAT [19]. In Ethiopia, the prevalence in sheep was obtained (22.9%) by using IHAT in 1989 [17] and later on (2004) the prevalence reached (52.6%) by using MAT [20]. In goats, the prevalence of this study (26.7%) was lower than that reported in Pakistan (52%) by using LAT [21] and higher than that reported in Djibouti (6.4%) by using IHAT [19], Iran (15%) by using Enzyme-Linked Immuno-sorbent Assay, ELISA [22] and Ethiopia, 1989, (11.6%) by using IHAT [19], but on later studies in Ethiopia, 2004, was obtained 24% which is comparable to this study [20]. The variation in the prevalence rates among different countries may be due to the number of samples taken as well as different serological techniques used.

## 5. Conclusion and Recommendations

It could be concluded that domestic animals (camels, cattle, sheep and goats) in Somalia are widely infected by Toxoplasmosis; sheep and goats are more prevalent. The study recommends the need for further researches in the whole country using different serological tests and to determine the impact of these findings on the human population. The continued rise of public awareness of zoonotic potential of Toxoplasmosis is also recommended.

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