Introduction

*Toxoplasma gondii* infects a wide range of animals including mammals and birds. The domestic cat and wild felids play a crucial role in the epidemiology of this infection as definitive host through shedding oocysts. Prenatal problems such as abortion and neonatal mortality in sheep and goats are the major clinical manifestations of infection [3]. In most countries, toxoplasmosis comes as the second in prevalence after chlamydial abortion. Prenatal mortality rates (including ovine abortion and neonatal mortality due to *T. gondii*) in affected flocks can be as high as 50% and in non-clinical cases may result in low losses [8]. Therefore, the infection has an economic and clinical significance in many sheep and goat producing countries.

In Africa, there are few reports on toxoplasmosis, prevalence rates ranging from 7% to 63% have been reported [2, 7, 8, 9, 12]. In Ethiopia, seroprevalence rates of 22.9% and 11.9% are reported in sheep and goats respectively [2, 4].

The objectives of this study were to estimate the prevalence rate of *T. gondii* by Agglutination Test and ELISA in small ruminants under periurban management in Rift Valley area, Eastern Ethiopia.

Material and methods

INVESTIGATED AREA

The study was carried out from November 1999 to March 2000 in and around Nazareth, Ethiopia. Nazareth is a town 90 kms South East of Addis Ababa (39.17°N - 8.33°E) with an altitude of 1622 m asl. Situated in the Rift Valley, it receives an annual rainfall of 800 to 900 mm and temperature range from 13.9 to 27.7°C [6].

INVESTIGATED ANIMALS

The study was conducted on 116 sheep and 58 goats. Sheep and goats of less than 6 months of age were not included in the study to avoid measuring antibodies passively transferred in colostrum. Blood samples from sheep were collected through a systematic random sampling procedure [10]. However, the low goat population density in the area made the sampling of all available ones. Approximately 5 ml of blood from the jugular vein were aseptically collected and the serum separated and stored at -20°C until used.

The Modified Direct Agglutination Test (Toxo - screen...
DA, Dace Behring Marburg GmBH, Germany) and the ELISA (Enzygnost Bio Merieux, SA, Lyon, France) Toxoplasmosis IgG Enzyme test were conducted according to the manufacturers’ recommandations.

STATISTICAL ANALYSIS

Kappa statistic test was used to test the agreement between the two serological tests. It is defined as the excess agreement that expected by chance, divided by the potential excess. Kappa values of greater than 0.81: almost perfect agreement, 0.6 - 0.80: substantial agreement, 0.41 - 0.06: moderate agreement, 0.21 - 0.09: fair agreement; 0 - 0.2: slight agreement and 0: poor agreement [10].

Results

Out of 116 ovine serum samples 61(52.6%) and 65(56%) were positive with MDAT and ELISA Test respectively (Table I). There is no statistically significant difference between the results of the two tests as they detected similar proportion of positive serum samples. Test agreement beyond chance between the two tests was K=0.90 and indicates almost a perfect agreement. Using the MDAT as a reference test, the sensitivity and specificity of the Enzygnost Test were 98.9% and 90.9%.

Seroprevalence for the 58 goat samples was 24.1% (14/58) by the MDAT and 25.9% (15/58) by the ELISA have been observed (data not shown).

<table>
<thead>
<tr>
<th>MDAT</th>
<th>Positive</th>
<th>Negative</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELISA</td>
<td>Positive</td>
<td>60</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>1</td>
<td>50</td>
</tr>
<tr>
<td>Total</td>
<td>61</td>
<td>55</td>
<td>116</td>
</tr>
</tbody>
</table>

TABLE I. — Comparison of the MDAT and Enzygnost tests for the detection of anti-Toxoplasma gondii IgG antibodies in sheep.

Discussion

The results of this work further confirm the presence of T. gondii infection in sheep and goat populations in Ethiopia. The difference in seroprevalence infection in sheep and goats between the present work and the previous reports from Ethiopia may be attributed to difference of serological methods and in localities where samples have been done, because there are numerous eco-climatic areas in this country. Toxoplasma seroprevalence is variable, higher prevalence being observed in warm and moist areas than in cold or hot dry areas [2]. Apart from this, variation may also be related to the age of the animals sampled and husbandry practices.

The overall prevalence recorded in sheep in the present work is higher (54.7%) compared to the previous reports from Ethiopia and other African countries. Prevalence rates ranging from 11.5% to 39% have been recorded in various African countries including Ethiopia [2, 4, 8, 11, 12]. A still wider spectrum of seroconversion rate from 21% of sheep sera in Brazil [5] to 88.7% in Cankiri, Turkey [1] have been recorded.

The overall seroprevalence of 26.7% recorded in goats in the present study is higher than those reported earlier from Ethiopia [2, 4]. In other African countries, infection rates reported are higher: 31.9% in Tanzania [11] and 63% in the Sudan [12].

The MDAT and ELISA Tests detected similar proportion of Toxoplasma positive serum samples. Therefore, both are reliable for population screening tests. However, both tests have their own advantages and limitations. The need for species specific conjugates, and automatic processor to increase the efficacy and spectrophotometer for quantifying the activity of antibodies by ELISA Test may limit its use. On the other hand, the MDAT is safe and does not require species specific conjugate and can be used on any species. Furthermore, the perfect agreement between the two tests as explained by good k-value, suggests the use of one procedure over the other depending on the choice of the investigator and availability of equipment.

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References


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