Seroprevalence of *Toxoplasma gondii* in Domestic Goats in Multan, Punjab, Pakistan
Zahida Tasawar, Mushtaq Hussain Lashari*, Muhammad Hanif and Chaudhary Sikandar Hayat
Institute of Pure & Applied Biology, Bahauddin Zakariya University, Multan, Pakistan

Faculty of Veterinary Sciences, Bahauddin Zakariya University, Multan, Pakistan

Abstract
The present study was conducted to investigate the seroprevalence of *Toxoplasma (T.) gondii* in goats. Out of 200 goats 104 were seropositive showing an overall prevalence of 52%. *T. gondii* was more prevalent (55%) in female goats as compared to male goats (25%) with statistical significance (P<0.05). Results regarding the relationship between different breeds of goats and *T. gondii* revealed that the prevalence of toxoplasmosis was highest (57.14%) in Beetal and lowest (46.03%) in Teddy goats with statistical significance (P<0.05). Toxoplasmosis had highest prevalence (77.27%) in age group of (60-75 months) and lowest prevalence (39.32%) was recorded in age group of (12-27 months) showing the statistical significance (P<0.05). Results regarding the relationship between body weight of animals and *T. gondii* showed that parasite had highest prevalence (60.71%) in body weight group of (45-59 kg) and lowest prevalence (34.54%) in body weight group of (15-29 kg) with statistical significance (P<0.05).

Keywords: prevalence, *Toxoplasma gondii*, goat, age, sex, breed, LAT, Pakistan

Introduction
Toxoplasmosis is a widespread zoonotic disease caused by protozoan parasite, *Toxoplasma gondii*. It has economic relevance to both veterinary and human medicine (Hill et al., 2005). In sheep and goats infection not only results in significant reproductive losses, but also has implication for public health since consumption of infected meat and milk can facilitate zoonotic transmission (Bisson et al., 2000). Fetal death rates (including caprine 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 (Radostits et al., 1994).

Introductin
Toxoplasmosis is a widespread zoonotic disease caused by protozoan parasite, *Toxoplasma gondii*. It has economic relevance to both veterinary and human medicine (Hill et al., 2005). In sheep and goats infection not only results in significant reproductive losses, but also has implication for public health since consumption of infected meat and milk can facilitate zoonotic transmission (Bisson et al., 2000). Fetal death rates (including caprine 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 (Radostits et al., 1994).

Materials and Methods
Animal blood sera
A total of 200 goats of both sexes male (n=20), female (n=180) with age of 1-6 years from Budhla Sant, Multan district of Punjab province were tested for toxoplasmosis. These goats belonged to three breeds Beetle (n=56), Teddy (n=63) and Nachi (n=81). A blood sample was obtained (5ml) from the jugular vein of each animal. After clotting, sera were extracted by centrifugation at 4000 rpm for 10 minutes and were stored at -20°C till further analysis.

*Corresponding Author: Mushtaq H. Lashari Institute of Pure & Applied Biology, Bahauddin Zakariya University Multan, Pakistan Email: mushtaqlashary@gmail.com*
Seroprevalence of Toxoplasma gondii in goats

Serological test used for detection of T. gondii
The collected sera were examined for detection of T. gondii antibodies using the latex agglutination test. This test was evaluated as a screening serologic test for toxoplasmosis in animals (Tsubota et al., 1977).

Latex agglutination test
The test procedure was carried out according to the method described by manufacture. The commercial “Toxoplasmosis Latex Kit” (Antec Diagnostic Product TM Uk) was used for this purpose. Briefly, fifty microliters of 1:8 diluted sera was mixed with the (LAT) buffer. A positive result was expressed by agglutination. Sera were serially 2- fold diluted i.e. 1:16, 1:32 and 1:64.

Statistical analysis
Statistical analysis of frequencies of the number of positive animals of different breeds, age and sex were performed using chi-square test. The differences were considered statistically significant at P≤0.05.

Results and Discussion
The overall prevalence of toxoplasmosis
Out of 200 goats, blood sera, 104 were reacted positively (52%). Different prevalence rate from 0-100 % was recorded in different areas of the world (Olivier et al., 2007) depending upon their customs, traditions, life styles of the inhabitants, weather conditions, age of the animals and husbandry practice. Sanad and Al-Ghaban (2007) found almost similar findings 51% prevalence in goats of Saudi Arabia as recorded in the present study. The prevalence rate in the present study is higher than those reported by several authors in goats from different areas of the world; prevalence rate of 28.9% in Brazil (Bisson et al., 2000), 27.9 % in Satun Province, Thiland (Jittapalapong et al., 2005), 25.4% in Pakistan (Ramzan et al., 2009) and 19.88% in sheep of southern Punjab, Pakistan (Lashari and Tasawar, 2010) were already reported. On the other hand the prevalence rate recorded in the present study is lower than 67.9% level of infection found in Ethiopia. The prevalence of anti T. gondii antibody was significantly higher (P<0.01) than that for males (21.1%). Teshale et al. (2007) determined the prevalence and risk factors of toxoplasmosis in goats in southern and central Ethiopia. The prevalence of anti T. gondii antibody was significantly higher in females than in males. The hormonal differences between males and females play an important role in determining susceptibility to parasitic infection. It is now widely accepted that many hormones including the sex-associated hormones directly influence the immune system (Roberts et al., 2001). It has been reported that estrogen enhances antibody production and androgen suppress both T-cell and B-cell immune responses (Da Silva, 1999), but immunity in females can be broken down due to various factors e.g., nutrition, age, pregnancy and environmental factors. Reasons for higher prevalence of T. gondii during the present study may be the number of female goats examined which are greater in number as compared to male goats.

Relationship between breed and toxoplasmosis in goats
The prevalence of toxoplasmosis was (29/63) 46.03% in Teddy, (32/56) 57.14% in Beetal and (43/81) 53.08% in Nachi. The difference was non-significant (P>0.05), But apparently the teddy breed showed higher infection rate Beetal and Nachi goats. Similar findings were reported by Jittapalapong et al. (2005). The prevalence of toxoplasmosis varies in different breeds of animals. The reasons for different prevalence may be due to genetic variation and resistant to infection in different breeds (Van der Puije et al., 2000; Arko-Mensah et al., 2000).

Relationship between body weight and toxoplasmosis in goats
The highest prevalence of toxoplasmosis 60.71% was recorded in body weight group of 45-59kg and lowest prevalence 34.54% in body weight group of 15-29kg. The prevalence of toxoplasmosis directly related to the body weight as the body weight of animal increases the prevalence was also increased. The similar results have been reported by (Clementino et al., 2007). Contrary to present findings, generally higher prevalence of toxoplasmosis in lower body weight group was recorded by Lashari and Tasawar (2010) in sheep. The higher prevalence of parasites in heavier body weight group may be due to low resistance to parasitic infection.
Relationship between age and toxoplasmosis in goats

Relationship between age and toxoplasmosis in goats revealed that the parasite had highest prevalence 77.27% in age group of 60-75 months and lowest prevalence 39.32% in age group of 12-27 months. The prevalence increased as the age of animal increased. Progressive increase of *T. gondii* with age suggests a continuous exposure to the organism in the environment as earlier reported (Jittapalapong et al., 2005; Ivana et al., 2006; Sharif et al., 2006).

Dubey and Adams (1990) reported that seroprevalence increased with age of goats; 3.7% of 54 six-month-old goats were seropositive (greater than or equal to 1:40) vs 17.8% of 218 one-year-old goats. Jittapalapong et al. (2005) studied the seroprevalence of antibodies to *T. gondii* in domestic goats of Satun Province in Thailand with commercial latex agglutination test kits. A total of 631 goat sera were examined for antibodies against toxoplasmosis. Older goats were more seropositive than young goats under 1-year old (Teshale et al., 2007). The prevalence of anti *T. gondii* antibody was significantly higher in older goats than in kids. Results of the present study are in agreement with results reported by (Arko-Mensah, 2000; Van der Puije et al., 2000; Clementino et al., 2007). This may be explained on the basis that older animals are less resistant to toxoplasmosis due low immunity (Roberts et al., 2001).

References


Seroprevalence of Toxoplasma gondii in goats


