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Seroprevalence of leptospire in sheep slaughtered at Sokoto metropolitan Abattoir

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ABSTRACT

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In a study to determine the seroprevalence of leptospiral antibodies in sheep slaughtered at Sokoto metropolitan abattoir, Nigeria, blood was collected from 282 sheep made up of both male and female. The serum was collected and analysed using an antigen coated IgG ELISA, out of which 20 tested positive by the ELISA giving an overall prevalence of 7.1%. Prevalences recorded for age was 18.48% for ≤ 2 yrs and 1.58% for > 2 yrs, and sex was 3.09% for male and 12.50% for females. There was a significant ($P < 0.05$) association between age groups and sexes. Breed prevalence was 8.50% for Oudah, 4.35% for Balami, and 6.02% for Cross. The association was not statistically significant among breeds. These findings suggest that leptospirosis is present in sheep slaughtered at the Sokoto metropolitan abattoir within the study period, and the Abattoir workers through unhealthy and unethical handling and processing of carcasses are highly vulnerable to contract the infection.

1. Introduction

Leptospirosis is a common global zoonotic disease of man and several warm-blooded animals especially in sub-tropical and tropical regions of the world (Shivaraj *et al.*, 2009). The disease is caused by spirochetes of the specie *Leptospira interrogans* and over 226 distinct serovars have been identified from various regions of the world (Shivaraj *et al.*, 2009). The reservoir hosts are wild and domesticated animals (Shivaraj *et al.*, 2009). Most leptospiral infections in sheep are asymptomatic but may result in high fever, abortion, stillbirth, agalactiae and prenatal death. Affected lambs may manifest fever, jaundice and haemoglobinuria which may result in death (Cousing and Robertson, 1986; Radostits *et al.*, 2000).

The occurrence of large outbreaks of leptospirosis following severe floods as reported in Central and South America following flooding as a result of El Niño-related excess rainfall (Epstein *et al.*, 1995, Ko *et al.*, 1999) is not a new phenomenon and is not restricted to tropical regions, these incidences has led to a resurgent international interest in leptospirosis (Paul, 2001).

In recent years Nigeria has experienced devastating floods in various parts of the country with potentials of disease outbreaks on the high side. In a survey of leptospirosis in sheep in Nigeria using the Microscopic Agglutination test (MAT), a prevalence of 23.5% and 31.4% was reported (Agunloye *et al.*, 2000) in Ibadan (South-West) and (Abiayi *et al.*, 2011) in Benue (North-Central) respectively.

In Nigeria, sheep are managed semi-intensively with majority kept in smallholder units and backyards which are in close proximity with their owners, operations in the abattoir where these animals are slaughtered are conducted in an unhygienic manner hence infection with leptospira may pose a human health hazard. Information on the role of sheep in the epidemiology of leptospirosis in Nigeria is generally scanty and there had not been any work on the disease in Sokoto State. This study was designed to determine the prevalence of leptospiral antibodies in sheep Slaughtered at Sokoto abattoir (North-West, Nigeria).

2. Materials and methods

Sheep slaughtered at the Sokoto metropolitan abattoir between May and September, 2012 was selected at random. The animals were identified based on sex, age (Dental eruption and wearing patterns) and breed as described by Wosu (2002). Ten mls of blood was aseptically collected from each sheep into test tubes and transported in iced packed coolers to the laboratory. The serum was harvested by centrifuging at 10,000 rpm for 10 minutes. The sera were stored at -20°C until required.

Microwell IgG leptospira ELISA kit was obtained from Diagnostic Automation, Inc. 23961 Craftsman Road, Ste E/F, Calabasas, CA 91302 U.S. The sera samples to be investigated were aliquoted into plate wells, leptospira antibody present in the sera bind to the coated antigens of the solid phase forming antigen-antibody complexes. These complexes are detected using the specific enzyme-containing conjugate. Samples interpreted as non-reactive (negative) are those with optical density values that correspond to the optical density value of the negative control test, this indicate that leptospiral antibodies are not present in the sample. While samples interpreted as reactive (positive) have optical density values corresponding to the positive control test, which indicate presence of antibodies.

The results obtained was statistically analysed using chi-square and p-value less than 0.05 was considered significant.

3. Results

Out of two hundred and eighty two (282) serum samples collected from sheep consisting of 162 (57.45%) males and 120 (42.55%) females, 20 (7.09%) were positive for leptospira.

Out of the 20 positive, 5 (3.09%) were males and 15 (12.5%) were females. There was a significant association ($P < 0.05$) between the male and females (Table 1).

Table 1

Sex Specific Prevalence of Leptospira among Slaughtered Sheep

Variable	Parameters	Number sampled	Number positive	Prevalence (%)	P value	X ²
Sex	Male	162	5	3.09	0.0097	6.695
Total	Female	120282	1520	12.5015.59		

P < 0.05 (Statistically significant)

The breed specific prevalence (Table 2) showed Oudah with 13 (8.50%), Balami 2 (4.35%), and Crosses 5 (6.02%) respectively. There was no significant association (P > 0.05) among the breeds sampled, although more Oudah breeds were sampled (153/282) as compared to Balami and Crosses.

Table 2

Prevalence of Leptospira among Breed of Slaughtered Sheep

Parameter	Number sampled	Number positive	Prevalence (%)	P value	X ²
Oudah	153	13	8.50	0.6107	0.9863
Balami	46	2	4.35		
Oudah-Balami	83	5	6.02		
Total	282	20	18.85		

P > 0.05 (Not statistically significant)

The prevalence across age groups is presented in table 3. Seventeen (18.48%) were ≤ 2 years and 3 (1.58%) for > 2 years. There was a significant association (P < 0.05) between the two age groups. However more samples were collected among sheep > 2 years compared to ≤ 2 years category.

Table 3

Age Specific Prevalence of Leptospira among Slaughtered.

Variable	Parameter	Number sampled	Number positive	Prevalence (%)	P value	X ²
Age	≤ 2yrs	92	17	18.48	0.0001	19.998
	Above 2yrs	190	3	1.58		
Total		282	20	20.06		

P < 0.05 (Statistically significant)

4. Discussion

The study showed a seroprevalence of 7.1% in sheep slaughtered at the Sokoto metropolitan abattoir. The reported results of seroprevalence of leptospiral infection in sheep vary from region to region as a result of certain environmental factors and control efforts. These factors (Temperature, Rainfall, Relative Humidity etc) have been shown to have influential effects on development of leptospiral infection in animals as seen in the report of 31.4% by Abiayi *et al.*, 2011 and 23.5% by Agunloye *et al.*, 2000. Long-term survival of pathogenic leptospires outside the host requires a warm, moist environment with a near neutral pH (Miller *et al.*, 1991), it is important to note that this is almost the case in Sokoto abattoir where the study was conducted. Prevalences of leptospiral infection in sheep based on serologic survey reported in other regions include, 14.3% in Bolivia (Ciceroni *et al.*, 1997), 4.2% in Egypt (Maronpot and Barsoum, 1972), 60.4% in India (Sratname *et al.*, 1992), 6.1% in Italy (Ciceroni *et al.*, 2000).

The prevalence based in breeds is in agreement with Haji *et al* (2007) and Abiayi (2011) who both reported that there was no statistically significant association in breeds of sheep experimented.

There was a statistically significant association (P < 0.05) between male and female as observed in this research. This is similar to the report of Abiayi *et al.*, 2011 in Benue State, who reported more females reacting positive than males despite the ratio of male to female. This could be an important factor in the epidemiology of the disease, since intra placental transmissions of the disease have been documented (OIE, 2005).

Agunloye *et al.*, (2000) reported a higher incidence of leptospirosis in young animals than aged; this was also observed in this study. This could be possibly as a result of circulation of maternal antibodies in this group of animals following earlier infection of the dam.

There is need for further investigation of leptospirosis in sheep using a larger sample size to determine the actual prevalence and the role of sheep in the epidemiology of the disease in the study area.

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