

Incidence Of Leptospirosis In Household Goats In Some Villages In Rivers State

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Abstract: *Leptospirosis is a zoonotic and re-emerging disease of great animal reproductive and public health significance caused by Leptospira, a pathogenic spirochete. The study was carried out to determine the incidence rate of leptospirosis in household goats in some villages in Rivers State. A total of 30 blood samples were obtained into vacutainers containing EDTA from 30 (25 WAD, 5 RSG) apparently healthy but clinically ailing unvaccinated goats. 22 of the samples (73.3%) tested positive for Leptospira using Microscopic Agglutination Test (MAT) while 8 (26.6%) were unknown. The results reveal that the incidence rate of leptospirosis in the selected villages is 73.3% and these goats are of great public health significance.*

Keywords: *Leptospirosis, incidence rate, MAT, WAD, RSG*

I. INTRODUCTION

Goats are hardy ruminants that are ubiquitous and they provide humans with meat, milk and skin (Omontese *et al*, 2012). They are important for social, subsistence and economic sustenance of humans, mainly in developing countries (Rugh, 2001). Poor reproductive performance, among other causes as nutritional deficiencies and inadequate management practices, has been reported as a fundamental factor in reducing the productivity of livestock (Martins and Lilenbaurn, 2014). Infectious diseases, especially those with high affinity for the reproductive system, play a major role in reproductive failure experienced in herds/flocks, causing important economic hazards in livestock (Grooms and Bolin, 2005; Grooms 2006, Kosgey *et al*, 2006, Subharat *et al* 2011). Leptospirosis has been recently described as the most frequently and potentially, the major disease impairing reproduction in small ruminants in Rio de Janeiro, Brazil (Martins *et al*, 2012).

Leptospirosis is a zoonotic and re-emerging disease of global significance, caused by pathogenic spirochete i.e. *Leptospira species* (Bharli *et al*, 2003). There are 21 identified pathogenic strains of *Leptospira species*, classified by genera of which 9 are pathogenic (Haake and Levett, 2015). The nine (9) pathogenic species are *Leptospira interrogans*, *L. kirschneri*, *L. borgpetersenii*, *L. santarosai*, *L. noguchii*, *L. weili*, *L. alexanderi*, *L. astoni*, *L. Kmetyi* (Picardeau, 2012).

Leptospire are serologically classified in serovars, defined on the basis of structural heterogeneity in the carbohydrate component of the lipopolysaccharide more than 200 different pathogenic serovars are currently recognized. They have a worldwide distribution and they infect a variety of mammals, including mice, rats, carnivores and ruminants (Ko *et al*, 2009; Levett, 2001; Percy and Barthold, 2007).

Leptospirosis in goats is common in several countries of the world. Many wild or domestic animals serve as reservoir of the bacterium. Symptomatic disease ranges from mild anicteric febrile illness to severe forms (acute renal failure, pulmonary forms, etc.) and sometimes death (Pages *et al*, 2015). Subclinical infection is mainly characterized by reproductive failures such as abortion, stillbirth, infertility, and birth of unthrifty kids (Lilenbaum and Martin, 2014). Infected humans typically present with jaundice, renal dysfunction, or even acute renal failure (Picardeau, 2012). According to Levett (2001), the disease occurs both in tropical and subtropical regions of the world. It is the most widespread of all zoonoses (WHO, 2003).

The mode of transmission of leptospirosis is usually through contact with water/soil contaminated by the urine excreted by reservoir animals as *Leptospira* are able to survive in soil and water for a long period depending on temperature and humidity (Lovett, 2001). Humans become infected through contact of abraded skin or mucous membranes with contaminated materials.

WHO (2003) reported that leptospirosis to be the most widespread of all zoonoses and emerging infectious disease. It is a major neglected public health problem and is highly under reported in Nigeria. The spectrum of clinical features ranges from subclinical infection to multiorgan failure. The burden of leptospirosis is more in developing countries (Ramesh, 2018). Leptospirosis has been recognized as a major public health problem and multiple epidemics have been reported, owing to the occurrence of natural disasters and the prevalence of poor sanitary conditions. Very little is currently known regarding the true incidence of leptospirosis. However, it is estimated that 10 or 100,000 people are affected with this disease each year in tropical climates. If there is an epidemic, the incidence can soar to 100 or more per 100,000 people (Park, 2011). While humans are accidental hosts, infection is acquired by humans through direct or indirect contact with water or soil contaminated by the urine of infected animals. Important epidemiological risk factors in the occurrence of the disease include contaminated environment and rainfall (Longo *et al.*, 2012). Children acquire the infection from dogs more commonly than do adult. Occupational exposure is a major cause of infection and the risk groups include agricultural and livestock farmers, workers in underground sewers, meat and animal handlers, and veterinarians (Karande, 2003).

The incidence in tropical areas is up to ten times higher, likely due to a combination of factors, including environmental (higher temperatures, humidity and rainfall favoring organism survival) as well as socio-economic (poor sanitation, closer human contact with both rodents and domestic animals). Leptospire are motile, aerobic organisms that grow best between 28 °C-30 °C and thus can remain viable for months in the environment (water or soil), where they are often widespread (Bharti *et al.*, 2003). Occupations with exposure to animals or water (farmers/ranchers) have also been associated with higher risk of acquiring leptospirosis. Transmission to humans is most commonly environmental via contact with water or damp soil contaminated with leptospire, but may also occur from direct contact with urine or blood from an infected or colonized animal. The organisms typically enter the human body via cuts abrasions or mucous membranes (Oral mucosa, conjunctivae), and are likely unable to penetrate intact skin (Haake and Levett, 2015) water contaminated with pathogenic *Leptospira* may also rarely cause infection via the fecal-Oral route (accidental ingestion) or respiratory route (inhalation of aerosolized organisms) (Haake and Levett, 2015). Organisms then spread to the bloodstream and multiply, and hematogenous dissemination throughout the body occurs, with potential to affect nearly every organ system due to the ability of the spirochetes to easily cross tissue barriers before the host antibody response clears them from the blood (WHO, 2003).

Leptospirosis remains as a neglected disease that suffers from awareness, despite its increasing number of cases and outbreaks globally (Haake and Levett, 2015).

II. MATERIALS AND METHOD

The study was carried out in Rivers State which is located in the Niger Delta region of Nigeria within latitude 6°58'0"-7

60E and longitude 4°40'0"-4°5N. Rivers State has a humid tropic climate. Blood samples were collected from 15 household goat settlements at specific locations within the state (Ikwerre, Etche, Port Harcourt, Obio/Akpor and Asari Toru LGAs).

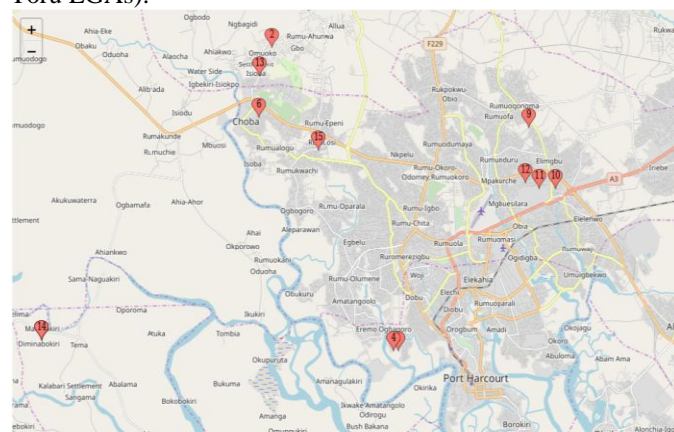


Figure 1: Map of Rivers State showing selected villages where study was conducted

Rivers State is not known for extensive livestock farming activities probably because of the oil exploration activities going on and the lack of interest from the inhabitants. However, there are pockets of goat settlements and that accounted for the sample size. A total of thirty (30) blood samples were obtained from apparently healthy but clinically ailing unvaccinated sexually mature goats of either sex. 5ml of blood was collected from each of the sampled animals by jugular vein puncture using needle and syringe and into sample bottles containing EDTA, properly labeled with respect to the different breeds and sex (Bucks & Does). It was preserved in a cooler containing ice packs and then transported to the laboratory where the samples were tested using Microscopic Agglutination Test (MAT) in which the blood was inoculated into *Leptospira* selective media for 48 hours and growth examined under dark microscope. Growths of 50% and above were read positive.

III. RESULTS

Farm	Location	Result	Vaccination status	Breed	Sex Sampled
A	University of Port Harcourt farm Abuja	Positive	Non-vaccinated	RSG	M
	University of Port Harcourt farm Abuja	Positive	Non-vaccinated	RSG	F
B	Aluu	Positive	Non-vaccinated	WAD	M
	Aluu	Positive	Non-vaccinated	WAD	F
C	Degema	Not Clear	Non-vaccinated	WAD	M
	Degema	Not Clear	Non-vaccinated	WAD	F
D	Weji	Positive	Non-vaccinated	WAD	M
	Weji	Positive	Non-vaccinated	RSG	F
E	Rumuosi	Positive	Non-vaccinated	WAD	M
	Rumuosi	Positive	Non-vaccinated	WAD	F
F	Rumuekini	Not Clear	Non-vaccinated	WAD	M
	Rumuekini	Not Clear	Non-vaccinated	WAD	F
G	Choba	Positive	Non-vaccinated	WAD	M
	Choba	Positive	Non-vaccinated	WAD	F
H	Rumuokwurushi	Positive	Non-vaccinated	RSG	M
	Rumuokwurushi	Positive	Non-vaccinated	WAD	F
I	Umulu-etche	Positive	Non-vaccinated	WAD	M
	Umulu-etche	Positive	Non-vaccinated	WAD	F
J	Eirimbu	Not Clear	Non-vaccinated	WAD	M
	Eirimbu	Not Clear	Non-vaccinated	RSG	F
L	Abbonema	Positive	Non-vaccinated	WAD	M
	Abbonema	Positive	Non-vaccinated	WAD	F
M	Rukpokwu	Positive	Non-vaccinated	WAD	M
	Rukpokwu	Positive	Non-vaccinated	WAD	F
N	Mgbouba	Positive	Non-vaccinated	WAD	M
	Mgbouba	Positive	Non-vaccinated	WAD	F
O	Rumuomasi	Not Clear	Non-vaccinated	WAD	M
	Rumuomasi	Not Clear	Non-vaccinated	WAD	F
P	Ada Ogboro	Positive	Non-vaccinated	WAD	M
	Ada Ogboro	Positive	Non-vaccinated	WAD	F

Table 1: Distribution of samples collected

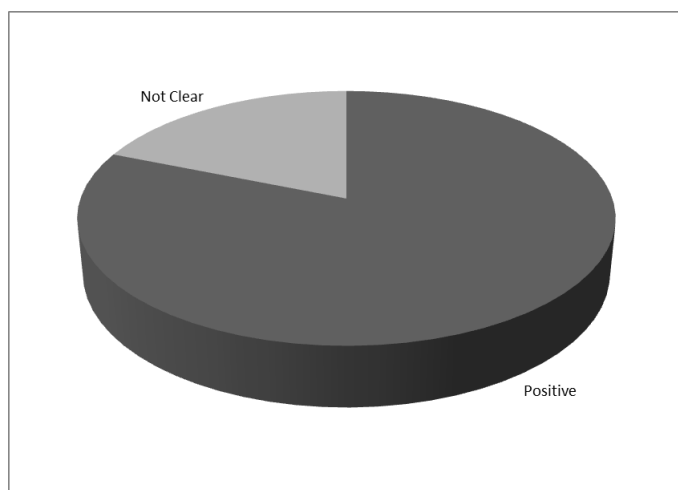


Figure 2: Pie chart showing the distribution of result

IV. DISCUSSION

The results show 73.3% incidence rate of leptospirosis in household goats in the selected villages in Rivers State. The high value is in line with the findings of (Martins and Lilenbaum, 2004) that said *Leptospira* infection in goats is common in several countries and this species can also act as carriers of Leptospire. Pages *et al* (2015) had observed that the incidence of leptospirosis is highest in tropical countries with peak during rainy seasons because the organism is able to survive in soil and water for a long period depending on the temperature and humidity. It has also been highlighted that agroclimatic conditions like heavy rainfall, clay soil and high water table favour endemicity for leptospirosis (Vihol *et al.*, 2017). These findings corroborate the result of this study because Rivers State is a coastal state in the humid tropics with high rainfall and the period of the research (May-October) coincided with high rainfall and heavy flooding of the coastal villages.

From the results, it was discovered that West Africa Dwarf (WAD) is the most common breed of goats in the villages in Rivers State. This breed is believed to be from coastal West and Central Africa and likely evolved in response to conditions of humid forests of West and Central Africa (Wilson, 1991).

In conclusion, Caprine leptospirosis is endemic in the selected coastal villages in Rivers State. These goats are sub-clinically infected *Leptospira* organisms which pose reproductive challenges to the goats and are of great public health significance.

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