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Peste Des Petits Ruminants Virus (PPRV) Infection Among Small Ruminants Slaughtered at the Central Abattoir, Maiduguri, Nigeria

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ABSTRACT

Three organs (lungs, spleen and lymph nodes) were collected from each of 100 sheep and 114 goats slaughtered at the central abattoir Maiduguri, Nigeria and analysed for the presence of peste des petits ruminants virus (PPRV) precipitin antigens using agar gel immunodiffusion (AGID) test. Forty one percent (41%) and 37.7% of the sheep and goats sampled tested positive for the PPRV precipitin antigen respectively. Organ specific distribution of the PPR antigen showed goats had 27.9% positive for one organ, 25.6% for two organs and 46.5% for three organs. Sheep has 19.9% positive for one organ, 24.4% for two organs and 56.1% for three organs. The result indicates a high activity of the PPRV among the small ruminants of this environment.

Key words: Peste des petits ruminants virus (PPRV), sheep, goats, agar gel immuno-diffusion (AGID) test, Nigeria

INTRODUCTION

Peste des petits ruminants virus (PPRV), a disease with high morbidity and mortality rates and that has a substantial economic impact in developing countries, is an acute and highly contagious viral disease of small ruminants (Atta-ur-Rahman *et al*., 2004; Khan *et al*., 2007; Rengasamy *et al*., 2007). The disease is characterised by high fever, oculo-nasal discharge, pneumonia, necrosis and ulceration of mucous membranes and inflammation of gastrointestinal tract, leading to severe diarrhoea. PPR occurs in an enzootic form, it may have dramatic consequences with morbidity of 80-90% and mortality between 50 and 80% (Lefevre and Diallo, 1990). The virus that causes PPR belongs to the genus morbillivirus in the family paramyxoviridae. It is closely related to rinderpest virus which makes the PPR an important disease of small ruminants and has created tremendous problems due to its apparent similarity to rinderpest (Lefevre and Diallo, 1990). The transmission of the virus requires close contact between susceptible and infected animals in the febrile stage (Braide, 1981). The discharges from eyes, nose mouth and the loose faeces contain large amounts of the virus. Fine infected droplets are released into the air from these secretions and excretions, particularly when infected animals cough and sneeze (Taylor, 1984; Bundza *et al*., 1988). Animals in close contact inhale the droplets and are likely to become infected. The natural disease affects both sheep and goats but it is usually more severe in goats. The morbidity rate is 100% with 100% mortality in severe outbreaks and 50% or less in milder outbreaks (Hussain *et al*., 1998; Khan *et al*., 2007). PPR outbreaks are now regular features in different parts of the world from Africa to Asia the Middle East and China among others.

MATERIALS AND METHODS

Study area

The study was carried out in Maiduguri, the capital of Borno state, Nigeria between the months of June and July 2008. The state shares common borders with the republics of Niger to the north, Tchad to the east and Cameroun to the south. The state is a home to about 25% of small ruminant population of Nigeria (Egwu *et al*., 1995).

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Sample collection and analysis

Three organs (lungs, spleen and lymph nodes) were aseptically collected from 100 sheep and 114 goats after slaughter at the central abattoir Maiduguri over a period of 2 months (June –to- July 2008). The samples were ground using sterile pestle and mortar and the paste made into a 50% suspension in PBS. Each suspension was centrifuged at 1,000 rpm for 10 minutes and the supernatant collected and tested for the presence of PPRV precipitin antigen using agar gel immunodiffusion (AGID) test. The test was carried out using a modification of the OIE (2004) protocol. Briefly, an ouchterlony template consisting of 6 peripheral and one central well was used to create wells on a semi-solid agar. Positive PPR antiserum obtained from LANAVET Garoua, Cameroun, was dropped in the central well and positive and test antigens were dropped in the peripheral wells in duplicate diagonally. Four templates were cut on the semi-solid agar in each petri dish and 2 samples were tested per template. Positive samples were identified by the formation of a white line of precipitate between the central and test wells. Samples were only considered negative if no precipitin lines appear after washing the plate with 5% glacial acetic acid.

RESULTS

The results of the PPR antigen detection using AGID is presented in Table 1. It showed that goats had an overall prevalence of 37.7% and the sheep had 41%. Of the positive animals the goat samples reacted positive with 27.9%, 25.6% and 46.5% for one, two and three organs respectively. And the sheep had 19.5%, 4.4% and 56.1% of its positive samples reacting to one, two and three organs respectively (Table 1). The organ specific distribution of the positive samples is presented in Fig. 1. It is observed that the goat samples showed the lungs only having more (11.6%) positives among the single organs and the spleen and lymph node only (14%) among the two organs. The sheep samples exhibited a different pattern with the lymph node only having higher (9.8%) prevalence among the single organs and the lung and lymph node only (14.6%) among the two organs.

Table 1. Prevalence of PPRV precipitin antigen among sheep and goats slaughtered at the central abattoir Maiduguri, Nigeria

Animal species	Total No. of animals tested	No. (%) positive	Percentage of positive animals reacting with		
			One organ	Two organs	Three organs
Sheep	100	41 (41)	19.5	4.4	46.5
Goats	114	43 (37.7)	27.9	25.6	56.1

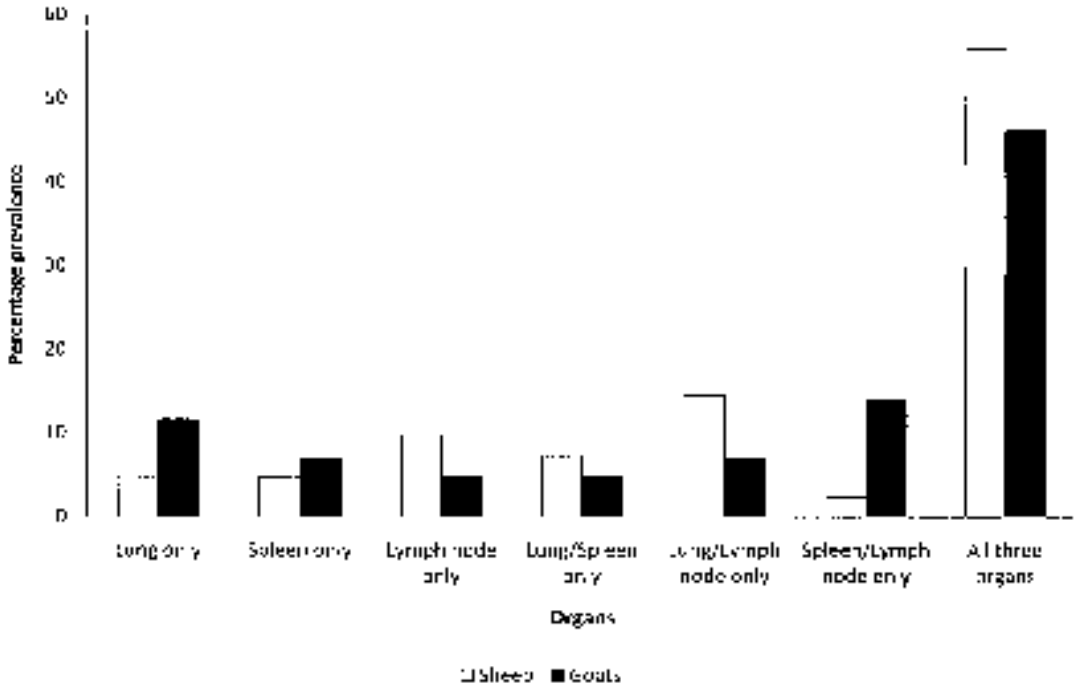

Fig. 1. Histogram of organ specific distribution of PPRV precipitin antigen in sheep and goats slaughtered at the Central Abattoir, Maiduguri, Nigeria

DISCUSSION

Peste des petits ruminants (PPR) infection is responsible for high morbidity and mortality in sheep and goats and in some small wild ruminant species particularly in fully susceptible goat populations. The huge number of small ruminants, which are reared in most of the endemic areas, makes PPR a serious disease threatening the livelihood of poor farmers (Diallo *et al*., 2007). The result of the present study shows that both sheep and goats are equally susceptible to PPRV infection as greater proportion of the sheep (41%) and the goats (37.7%) populations were infected with PPRV. The prevalence of PPRV precipitin antigen in the different organs was noted to differ between sheep and goats in the study region.

These results are in agreement with Obi *et al*. (1983) and Obi and Patrick (1984). The results further confirm the reports by El-Yuguda *et al*. (2008) in which they reported large number of suspected PPR infections among Sahel goats in the region. The high prevalence of PPRV antigen detected in the tissues of these animals that were looking apparently healthy as at the time of slaughter suggests that milder forms of the disease may occur among the small ruminants especially the partially immune members of the population.

There are considerable differences in the epidemiological pattern of the disease in the different ecological systems and geographical areas. In the humid Guinean zone where PPR occurs in an epizootic form, it may have dramatic consequences with morbidity of 80-90% accompanied with mortality of between 50 and 80% (Lefevre and Diallo, 1990). While in arid and semi-arid regions, a morbidity of 100% and mortality of 17% was reported by El-Yuguda *et al*. (2009). In the arid and semi-arid regions PPR is seldomly fatal but usually occurs as a subclinical or inapparent infection opening the door for other infections (Lefevre and Diallo, 1990). Studies have shown that virulent PPRV causes marked immunosuppression as evidenced by leukopenia, lymphopenia and reduced early antiboby response to both specific and non specific antigens (Rajak *et al*., 2005). The control of this disease is therefore not for the sake of the PPR alone but to protect the small ruminant population against secondary opportunistic infections. Outbreaks of this disease in this part of the world coincide with the wet rainy season (El-Yuguda *et al*., 2008), although it is not unusual to observe outbreaks during the dry season in other different ecological zones (Opasina and Putt, 1985). Serological data from Nigeria revealed that antibodies occur in all age groups from 4-24 months indicating a constant circulation of the virus (Taylor, 1979). Previously, PPR has reported in North-eastern Nigeria on the basis of clinical signs by El-Yuguda *et al*. (2008), serologically by Taylor (1979) and Shamaki *et al*. (2004) and an outbreak by El-Yuguda *et al*. (2009).

Agar gel immunodiffusion (AGID) test that was used in the current study is widely used in the diagnosis of PPR and can detect 42.6% of antimortem and necropsy specimen (Obi, 1984; Abraham and Berhan, 2001). It can be used to test the presence of both antigen and antibodies and can give results within 24 hours. One of the important advantages of this test is that it is highly specific (92%).

The organs used for the antigen detection in this study were derived from sheep and goats brought from all over the region for slaughter, although the samples may not be a true representation of the target population, this study provides baseline information on the epidemiology of PPRV infection in the small ruminant population in the semi-arid region of North-eastern Nigeria.

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