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Seroprevalence of Newcastle disease in local chickens in Mezam division of North-west Cameroon

H. M. Mai[1]*, M. A. Qadeers[2], I. A. Bawa[1], M. Sanusi[1], K. N. Tayong[1] and I. Saidu[3]

[1]Animal Production Programme, School of Agriculture, Abubakar Tafawa Balewa University, Bauchi, Nigeria.
[2]Department of Biological Sciences, School of Pure and Applied Sciences, Federal University of Technology, Yola, Adamawa State, Nigeria.
[3]College of Agriculture, Bauchi, Bauchi State, Nigeria.

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ABSTRACT

This study was conducted to determine the seroprevalence of Newcastle disease antibodies in free-range chickens in five subdivisions of Mezam, North-west Province, Cameroon. Haemagglutination inhibition test was used to detect Newcastle disease antibodies. Results indicate that out of the 390 samples analyzed, 41 (10.5%) tested positive for Newcastle disease antibodies, with highest seroprevalence occurring in 20 (46.5%) in Bamenda central division, followed by Santa 7 (16.3%), Tuba 6 (14%), Bafut 6 (14%) and the lowest in Bali 4 (4.7%). Analysis of variance revealed that there was highly significant difference between the subdivisions ($P < 0.01$). The seroprevalence of Newcastle disease antibodies were observed in all the subdivisions. It was concluded from this study that free range chickens in Mezam had exposure to Newcastle disease virus and they could serve as a source of transmission to commercial exotic breed of poultry.

Keywords: Cameroon, haemagglutination inhibition, local chickens, Newcastle disease.

*Corresponding author. E-mail: hassanmai@hotmail.com. Tel: +234 (0)80 36799211.

INTRODUCTION

Local chicken production is recognized as an important activity in all villages of developing countries (Minga et al., 1989). Chickens in the village poultry system provide animal protein through low input system representing 30% of total income (Aini, 1990). They are available for sale or barter where cash is not abundant (FAO, 1997). Similarly, local chickens are very active in pest control; provide manure and are essential for traditional ceremonies. In Cameroon, Ekue et al. (2002), reported that local chicken production is largely dominated by traditional farmers which comprise about 70% of the estimated 19 million chicken population. These benefits are however constraint due to the presence and endemicity of Newcastle disease. It is the major constraint to the production of the local chickens in many developing countries (Spradbraw, 1988; Alexander, 1991). Ekue et al. (2002) reported that Newcastle disease is the principal limiting factor in rural poultry farming. The disease affects poultry of all ages and species (Alexander, 1998). It constitutes the single most dreaded fatal disease of the local chickens and may kill up to 80% of the household poultry (Fatumbi and Adene 1979; Minga et al., 1989; Aini, 1990; Bell, 1992). These adverse effects of Newcastle disease on the local chickens eventually limit the economic dependence of the rural household (Bell, 1992). Similar effects of Newcastle disease have been reported in local ducks and local guinea fowls in Jos, Nigeria (Mai et al., 2004).

Furthermore, the extensive system of management of local chickens resulting in close contact with exotic flocks strongly suggests that they could play a role in the dissemination of this highly infectious Newcastle disease virus. Despite vaccination exercise in commercial poultry farming, cases of this disease continue to manifest (Bell and Mouloudi, 1988). This is because of the presence of small free-range scavenging flocks that roam around

these commercial farms. They act as a reservoir of the virus, exerting a high viral pressure on the exotic commercial flocks thus revealing the slightest failure in vaccination (Bell and Maouloud, 1988). The susceptibility of both local and exotic breeds of chickens to Newcastle disease has been documented in field observations (Uzoukwu, 1967).

In view of these threads and devastating effects of this disease and its significance in the life of the local chickens, a serological study was conducted to determine the seroprevalence of this disease in apparently healthy free-range flocks in Mezam division, North-west Cameroon.

MATERIALS AND METHODS

Study area, sampling frame and population

The study was carried out in five sub-divisions of Mezam division of the North-west province, Cameroon Republic. Three districts from each of the 5 sub-divisions were randomly sampled. These include Nkwen, Mankon and Azere districts in Bamenda central sub-division; Bambui, Bambili, and Babanki districts in Tuba sub-division; Bafut, Ntambeng and Ntansi districts in Bafut sub-division; Santa, Pinying and Akum districts in Santa sub-division while Njenka, Mujong and Ntanko districts in Bali sub-division. In addition, the sub-divisions were further classified according to settlements as follows; urban, semi-urban and rural areas.

Weekly visits to these districts were made for the sampling. The parameters considered included adult local chicken of both sexes kept by rural farmers on free range system and in small flocks ranging from 5 to 21. A total of 390 adult local chickens were sampled. All chickens sampled had no history of previous vaccinations of any kind and their ages could not be ascertained.

Sampling and sera preparation

About 3 ml of whole blood was collected from each chicken by venepuncture. The blood samples were slanted under atmospheric conditions for effective clotting and maximum serum separation to take place. All samples collected were transported in ice-packed insulated box to the research laboratory of Institute of Agricultural Research for Development (IARD), Bamenda. The sera were further separated using centrifuge and decanted into sterile bijou bottles and stored at -20°C for further analysis.

Serological analysis for antibodies against Newcastle disease virus

Antibodies against Newcastle disease virus were determined by using the haemagglutination inhibition test (Allen and Gough, 1976). The strain of Newcastle disease used was LaSota ND vaccine as antigen. Agglutination was assessed more exactly by tilting the plates. A serum sample was considered positive when titre was equal to or greater than log 2^1.

Statistical analysis

The data obtained were subjected to descriptive statistics and percentages. Analysis of variance (ANOVA) was used to determine the association of Newcastle disease in the various districts, sub-divisions and settlements as described by Thrusfield (2005).

RESULTS

Of the 390 samples collected, 41 had positive titres giving a seroprevalence of 10.5% (Table 1).

From the results obtained, seroprevalence of Newcastle disease was highest in Mankon district with a positive titre of 30.8%. Furthermore, three districts, Babanki, Njenka and Ntanko recorded 0% seroprevalence in this study (Table 1). There was no significant difference in the seroprevalence of Newcastle disease between the districts.

The result showed Bamenda sub-division had the highest seroprevalence of Newcastle disease virus of 23.3% while the lowest seroprevalence of 2.7% was obtained from Bali sub-division (Table 2). Similarly, samples collected from these local chickens were analysed according to districts as shown in Table 2. There was a highly significant difference of the seroprevalence of Newcastle disease between the subdivisions ($P < 0.01$).

The study also categorized the sampling into urban, semi-urban and rural areas. Results obtained showed that urban areas had highest prevalence of 23.3%, followed by semi-urban with 8.6% and rural was the least with 5.6% (Table 3). There was a significant difference of Newcastle disease between the settlements ($P < 0.05$).

DISCUSSION

The result of this study showed the presence of Newcastle disease antibodies in the sera of local chickens sampled from all the five sub-divisions of Mezam division of Cameroon, with most of the districts affected. This finding confirms earlier reports by Spradbraw (1988) and Alexander (1991) who reported that, Newcastle disease is the major constraint to the production of local chickens in many developing countries. Ekue et al. (2002) also reported that the disease is the principal limiting factor in rural poultry farming. Furthermore, the result obtained in this study is in agreement with the field observation by Uzoukwu (1967) who stated that the local chickens are as susceptible to Newcastle disease virus as their exotic breeds; and reports by Mai et al. (2004) in local ducks and local guinea fowls in Nigeria. This suggests that the local chickens are fully susceptible to the Newcastle disease virus and should be considered as an important factor in the epidemiology of the disease. The significance of this disease to the rural farmers is not only due to high mortality of chickens but that such affected chickens if survived could eventually become carriers and enhance the dissemination of the virus to other healthy susceptible flocks.

Of interest in this study is the overall seroprevalence of 10.5% obtained from all the 5 sub-divisions of Mezam division. This shows that natural infection had occurred and antibodies were generated. It is noteworthy that the

Table 1. Distribution of the seroprevalence of Newcastle disease in local chickens based on districts in Mezam division.

Sub-divisions of Mezam	Districts	No. of chickens sampled	No. of positive	% positive
	Nkwen	30	5	16.7
Bamenda central	Mankon	26	8	30.8
	Azere	30	7	23.3
	Bambui	22	3	13.6
Tuba	Bambili	25	3	12.0
	Babanki	23	0	0.0
	Bafut	30	2	6.7
Bafut	Ntanbeng	25	2	8.0
	Ntansi	27	2	7.4
	Santa	21	1	4.8
Santa	Akum	29	3	10.3
	Pinyin	28	3	10.7
	Njenka	21	0	0.0
Bali	Mujong	29	2	6.9
	Ntanko	24	0	0.0
Total		390	41	

Table 2. Seroprevalence of Newcastle disease according to sub-divisions.

Sub-division	No. of chickens sampled	No. of positive	% positive	*P*- value
Bamenda	86	20	23.3	< 0.01
Tuba	70	6	8.6	
Bafut	82	6	7.3	
Santa	78	7	9.0	
Bali	74	2	2.7	
Total	390	41		

Total 3. Seroprevalence of Newcastle disease based on settlements.

Area	No. of chickens sampled	No. of positive	% positive	*P*- value
Urban	86	20	23.3	< 0.05
Semi-urban	127	11	8.6	
Rural	177	10	5.6	
	390	41		

local chickens were not vaccinated. The finding is also in consonance with the work reported by Alexander (1990), who opined that the presence of Newcastle disease antibody in the serum of unvaccinated chickens shows that infection had taken place.

Among all five sub-divisions, Bamenda sub-division recorded higher seroprevalence than all the other districts. This may be due to the fact that the farms were located closer to Bamenda town which is urbanized with high concentration of commercial poultry farms. Most of the workers in these farms are villagers that live at surrounding villages close to Bamenda town. They come daily to work in these farms to earn their means of livelihood and support their families. These workers in the course of their duty may often participate in the reconstitution of live vaccines of Newcastle disease to be given to the exotic chickens. There may be possibility of using the same dress and foot wears to and from work.

This suggests that they may constitute intermediaries in the spread of the Newcastle disease virus between the exotic chickens and the local scavenging chickens in their villages (Salihu et al., 2011). In fact mere attending to these affected exotic chickens by the villagers can also lead to infection of the local chickens. Furthermore, since the infection is highly airborne, the possibility of the spread of Newcastle disease virus by aerosol from exotic flocks to local chickens resulting in a higher seroprevalence obtained in this sub-division cannot be ruled out.

It has been established from this study that Newcastle disease is endemic in Mezam division of Cameroon Republic. The disease prevalence varied from sub-divisions and settlements. This is because of the extensive system of management of these local chickens in these areas which does not allow for prophylaxis. This finding, apart from being of economic significance, it is also of nutritional importance because of the high mortality of the birds, which calls for adoption of preventive measures to help curb the devastating effects of the Newcastle disease virus. To effectively control this disease, more attention should be given to those areas with higher seroprevalence by adopting prophylaxis through the use of heat resistant Newcastle disease vaccines for the local chickens. Also, isolation and characterization of the spreading virus strains should be carried out in order to provide more information that could be used in formulating and planning for effective control of Newcastle disease in Cameroon.

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