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Full Length Research Paper

Prevalence of antibodies to infectious bronchitis virus (IBV) in chickens in southwestern Nigeria

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A total of 672 sera from apparently healthy commercial and indigenous chickens of different ages were screened for antibodies to infectious bronchitis (IB) virus using the enzyme-linked immunosorbent assay (ELISA). Samples obtained from breeder, layer, grower and indigenous chicken flocks in Oyo, Ogun, Ondo and Lagos states of southwestern Nigeria were screened. The total seroprevalence was 82.7% with ELISA units of 77.0 ± 8.0. Among the groups of birds, layers had the highest ELISA units of 80.0 ± 9.0, breeders had 73.0 ± 8.0 while indigenous chickens had 73.0 ± 7.0 ELISA units. These chickens, except the breeders, had no history of vaccination against infectious bronchitis. The higher prevalence observed in layers, growers and indigenous chickens may be due to field infection since maternal antibody was expected to have waned between three and four weeks of life. These findings indicate a high infectious bronchitis virus activity in southwestern Nigeria chickens hence there is an urgent need for the development of prevention and control policies against IB in Nigerian poultry farms and a national control programme for infectious bronchitis virus infection should be planned.

Key words: Chickens, infectious bronchitis virus, Nigeria, prevalence, southwest.

INTRODUCTION

Poultry happen to be the most numerous species of livestock in Africa. The indigenous chickens constitute over 70% of the Nigerian poultry population (Adene, 1997), which has been placed at 134 million (Akinwumi et al., 1979). Owners usually keep the indigenous chickens on free range with very little input of production (Gueye, 1998). It was believed that the free range chicken act as potential reservoir of infection to themselves and the commercial birds (Adene et al., 1985, Emikpe et al., 2003). The commercial birds are kept majorly in the urban areas where they are to be raised for meat, especially broilers and cockerels while layers are raised for egg production. Recently, the total egg production has doubled and poultry meat consumption has increased tremendously worldwide (FAO, 2002). In Africa, poultry egg production has increased by 20.69% within the last six years. In Nigeria to be precise, production of egg has increased by 38% in the same period (FAO, 2002).

One of the major problems in the poultry industry is disease. Diseases reduce the gross profit of production and limit the supply of poultry products. They can be broadly categorized into those affecting the general health of the birds such as respiratory and neoplastic diseases, and those that affect the production capacity of the bird in terms of egg and meat production. Some specific diseases affect the reproductive organs of birds thereby having a serious effect on egg production. Such diseases include infectious bronchitis (IB), Newcastle disease (ND) and egg drop syndrome (EDS).

Infectious bronchitis (IB) is an acute, highly contagious viral infection of chickens of all ages with adverse effects on egg quality, egg production and marked depression of growth especially in the laying birds (Cavanagh and Nagi, 1997). It is characterized by respiratory signs which include rales, gasping and sneezing, sometimes accompanied by lacrimation, facial swelling and negligible mortality (Jordan and Pattison, 1999). The disease is of major economic importance because it causes poor weight gain and poor feed conversion efficiency. It is often a component of mixed infections that produce air sacculitis, which may result in meat condemnation during processing and/or losses from production and egg quality. The losses from production inefficiencies are usually of greater concern than losses from mortality

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(Cavanagh and Nagi, 1997).

IB is not a well-studied disease in Nigeria probably because it is not commonly encountered and more especially because it is usually masked by other infections like ND and EDS. Despite the worldwide distribution of the disease (El-Houadfi et al., 1986, Mauermans et al., 1987, Ambali and Jones, 1988, Parsons et al., 1992, Chen and Itakura, 1996, Gough et al., 1996,), there is very little information on the epidemiology of IB in West Africa with few reports on the occurrence in commercial birds in Nigeria (Komolafe et al., 1990). Apart from the report of Oyejide et al. (1988), there is a dearth of information on IB activity in these chickens, especially in southwestern Nigeria. This study was meant to investigate commercial and indigenous chickens in the southwestern states of Nigeria for antibodies to infectious bronchitis virus.

MATERIALS AND METHODS

Test samples

The samples used for this study were sera from 54 commercial chicken flocks (10 growers, 19 layers, 6 broiler and 9 layer breeders) and indigenous chickens from 45 households in Ogun, Lagos, Oyo and Osun states of southwestern Nigeria (Figure 1). Six hundred and seventy two (672) blood samples (Table 1), collected by jugular venipuncture into sterile Bijou bottles, were allowed to clot at 4°C to allow for serum separation. The harvested sera were heat-inactivated at 56°C for 30 min. They were then screened with the indirect enzyme-linked immunosorbent assay (ELISA) for infectious bronchitis virus antibodies using the procedure described by Oyejide et al. (1988).

Chequerboard titration for determination of optimum dilution of analytes

The optimum working dilution for each of the analytes in the test procedure (antigen, serum and conjugate) was determined empirically by a chequerboard titration. The antigen used was freeze-dried live avian infectious bronchitis vaccine (B1-VAC20) (Neuva®, Netherlands). The hyperimmune (positive control) serum was obtained from 10-week old pullets that were inoculated at Day 1 with 1 ml of IB vaccine, with booster doses administered at Day 8 and Day 12. Thereafter, serum was obtained at Day 21 post-vaccination and preserved as positive control. The negative control serum was a negative chicken serum produced by IDDEX Laboratories®, USA. The optimum dilutions obtained following the chequerboard titrations were: antigen 1/100, serum 1/50 and conjugate 1/10,000.

Data analysis

Descriptive statistics was used to summarize the data generated from the study. The prevalence was expressed as a percentage in comparison to the total number of chickens screened.

RESULTS

The percentage prevalence for each state was as presented in Table 2, Ogun (91.30%), Ondo (80.65%), Lagos (96.67%) and Oyo (70.49%). The samples were obtained from four types of birds. The percentage prevalence and the sample: positive ratio (S: P) for each type are: breeders (90.91%, 0.79 ± 0.08), layers (91.67%, 0.80 ± 0.09), growers (63%, 0.73 ± 0.08) and local chickens (78.32%, 0.73 ± 0.07) (Table 3). These values were calculated using 0.94 and 0.35 as control positive and control negative optical densities respectively. The S: P ratio for each optical density was calculated and the cut-off S: P ratio was 0.60. Thus, all S: P ratios below 0.60 (i.e. 60 EU) were considered negative while those above 0.60 were considered positive. One ELISA unit equals 100 (S: P ratio).

DISCUSSION

The results obtained in this study showed that 84.98% of the commercial chickens tested were positive for IBV antibodies. This is quite high when compared with previous reports from other parts of Nigeria: 15.3, 42.5 and 3.3% IB prevalence in Jos (Central) and Ibadan (South west) (Oyejide et al., 1988), and Nsukka (South east) (Komolafe et al., 1990) respectively. This clearly showed the increase in the activity of IB in Nigerian chickens. This result is comparable to that obtained from Pakistan using the hemagglutination inhibition (HI) test where 88% of the flocks were seropositive for M-41 antibodies, whereas 40, 52 and 8% of the flocks were positive for D-274, D- 1466, and 4-91 IBV strains, respectively (Ahmed et al., 2007). In Jordan however, 92.9% of the flocks free from respiratory disease were seropositive for antibodies to the M-41 strain, whereas 90% and 61.4% of the flocks were seropositive for antibodies to the 4/91 and D274 strains, respectively (Dergham et al., 2009).

The prevalence of IB in commercial birds based on type of birds was high as breeders had 90.91%, layers 91.67% and growers 63.0%. when compared to that obtained from jordan where Infectious bronchitis virus nucleic acid was detected in 16 broiler (64%), 8 layer (53%), and 6 broiler breeder (54.54%) flocks affected with respiratory disease (Dergham et al., 2009). The high prevalence in breeders in this study could be due to vaccination against IB virus usually administered to breeders in the first week of life while that of layers and growers may be a result of field infection with IB virus since maternal antibodies is expected to have waned between three and four weeks of life (Cavanagh and Nagi 1997).

The prevalence of IB in indigenous chickens in this study was 78.32%. This was not as high as the result of the study on indigenous chickens from Kano, which was 91.3% (Oyejide et al., 1988). Although the same serological technique was used, this variance could be attributed to different climatic conditions that exist in dif-

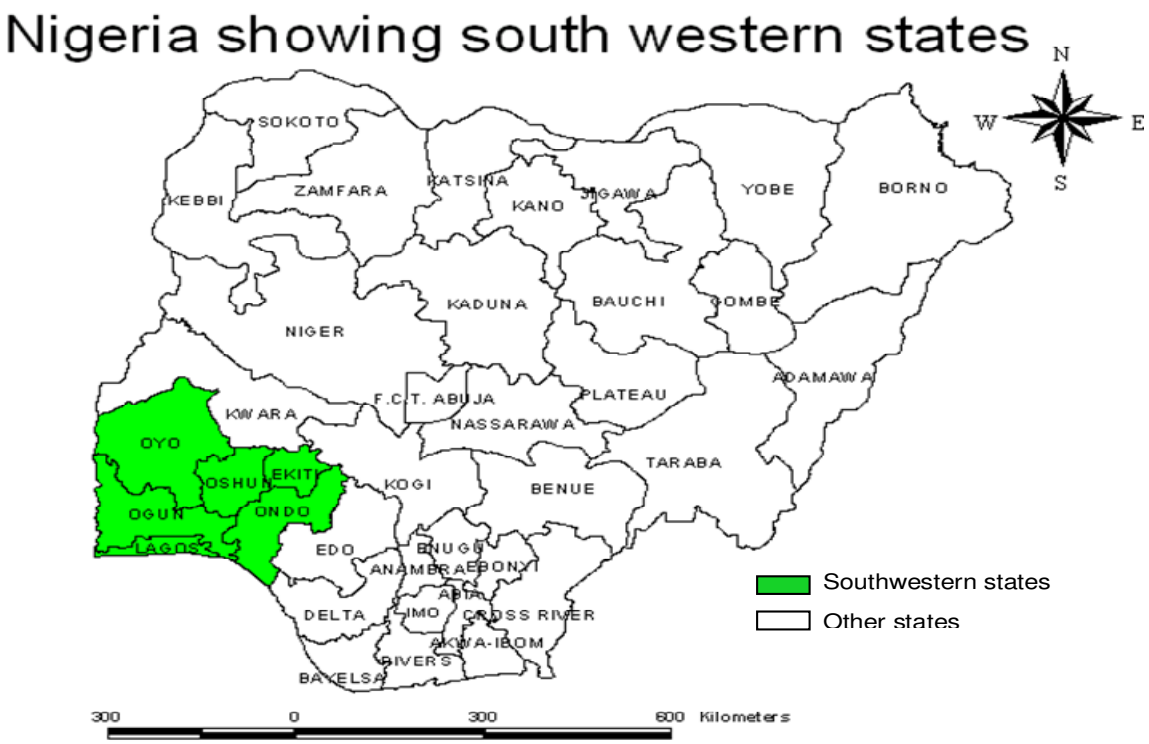

Figure 1. Map of Nigeria showing the sampled states.

Table 1. Distribution of samples.

Type of bird	No sampled	Location	Age
Growers	100	Oyo state	10 weeks
Layers	90	Ogun	28 weeks
	62	Ondo state	30 weeks
	40	Oyo state	40 weeks
Breeders	60	Lagos state	26 weeks
	94	Ogun state	31 weeks
Indigenous	186	Oyo state	56 weeks
Chickens	40	Oyo state	40 weeks

Table 2. Prevalence of IB antibodies in different locations in southwestern Nigeria.

State	No sampled	No sampled	% prevalence
Ogun	184	168	91.30
Ondo	124	100	80.65
Lagos	120	116	96.67
Oyo	244	172	70.49
Total	672	556	82.7

ferent zones in Nigeria. Southwestern Nigeria being in the tropical rain forest is usually wet for a large part of the year while Northern Nigeria, where Kano is located, is in the Sahel savannah zone, which is usually dry and dusty for most parts of the year. A dusty and dry weather will aid the transmission of IB virus, which is usually viaaerosol. However, the prevalence in indigenous chickens was higher compared to the 53.3% reported by Emikpe et al. (2003) for IB prevalence in Ibadan. This is not unexpected as the present study covered the southwestern states of which Ibadan (Oyo State) is an integral part. It was also an indication of a continuous infection of the indigenous chickens with IB virus.

On states basis, Lagos and Ogun states have IB prevalence of 96.97% and 91.30% respectively. This can be attributed to the fact that large concentrations of poultry farms are found in these states. The implication of the possible carrier status of the indigenous chickens (Adene et al., 1985) was of significance in the transmission of infectious bronchitis, especially to commercial flocks in the southwestern states of Nigeria. This correlates with high prevalence seen in indigenous chickens. The high percentage prevalence obtained for the different types of birds and in the states surveyed suggests an urgent need for the development of prevention and control policies against IB in poultry farms in Nigeria. This should be given proper consideration in planning a national control programme for infectious bronchitis virus

Table 3. Prevalence of IB antibodies in different types of birds in southwestern Nigeria.

Type of bird	Number Sampled	Number positive	% prevalence	SP Mean	ELISA Units
Breeders	154	140	90.91	0.79 ± 0.08	79 ± 8
Layers	192	176	91.67	0.80 ± 0.09	80 ± 9
Growers	100	63	63.00	0.73 ± 0.08	73 ± 7
Local chickens	226	177	78.32	0.73 ± 0.07	73 ± 7
Total	672	556	82.70	0.77 ± 0.08	77 ± 8

infection.

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