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308 Lasani Town, Sargodha Road, Faisalabad - Pakistan
Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorijps@gmail.com

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Serological Status for Newcastle Disease Virus in Unvaccinated Indigenous Chickens in Yewa Division of Ogun State, Nigeria

M.A. Oyekunle[1], A.O. Talabi[2] and A.O. Okeowo[3]
[1]Department of Veterinary Microbiology and Parasitology, University of Agriculture, Abeokuta, Nigeria
[2]Department of Veterinary Medicine and Surgery, University of Agriculture, Abeokuta, Nigeria
[3]Department of Animal Production, Olabisi Onabanjo University, Ago-Iwoye, Nigeria

Abstract: A sero-epidemiological survey of antibody to Newcastle disease (ND) virus was conducted in the unvaccinated local chickens in Yewa division of Ogun State, Nigeria using haemagglutination inhibition (HI) test. All the 180 sera samples collected tested positive for ND antibody. The range of HI antibody titre was 2^3 to 2^7. Out of the 180 chicks tested, 44 (24.4%) had HI antibody titre of 2^3; the remaining birds (75.6%) had higher titres of up to 2^7. The results showed the high endemicity of the disease among the local chicken population in the survey area in Nigeria.

Key words: Serology, Newcastle disease, indigenous chickens, Nigeria

Introduction

In Nigeria, it is estimated that poultry supplies about 10% of the total meat needs and out of about 150 million poultry birds, 102 million are indigenous (Majiyagbe and Lamorde, 1997). The indigenous village chicken is identified as a way of providing rural women with diverse income earnings and employment (Alexander, 2001). However, the endemic Newcastle and associated mortalities constitute a major obstacle to the promotion of large holding of these birds (Majiyagbe and Lamorde, 1997, Alexander, 2001).

Newcastle disease is a viral disease of birds, which causes devastating losses in both susceptible commercial and village chickens (Alexander, 2001). The disease is worldwide in distribution and virus strains of widely varying degrees of pathogenicity exist. Reports from some parts of Nigeria rated New castle disease as one of the greatest constraints to the development of rural poultry production (Dipeolu *et al.*, 1998).

In order to formulate appropriate control measures, the national situation with regards to the Newcastle disease status among the indigenous chickens needs to be established. This study determines Newcastle disease antibody status of the indigenous village chickens in Yewa division of Ogun State, Nigeria.

Materials and Methods

Location: Nine villages/town within four local government areas in Yewa division of Ogun state (Table 3) were covered in this study.

Sample collection: A total of one hundred and eighty (180) free range indigenous village chicks between 5-6 weeks of age with no history of previous vaccination against Newcastle disease (ND) or any other infectious disease were randomly purchased from their respective owners in nine (9) locations. Twenty (20) chicks were purchased per location in Yewa division of Ogun state. The chicks were then separated into two groups: chicks obtained within 100 meters from a commercial flock were grouped as close to commercial flock (CCF) while those obtained beyond 100 meters were grouped as not close to commercial flock (NCF).

At most, 0.5ml of blood was collected through the jugular vein from each chick with a hypodermic needle and syringe into labeled bijou bottle. The blood was allowed to clot for about 4 hours at room temperature (25°C). The serum was extracted into bijou bottle and stored at -20°C until ready for use.

Haemagglutination inhibition test: Newcastle disease antibody in the sera was detected using haemagglutination inhibition (HI) test performed in micro titre plates as described by Allan and Gough (1974). 0.025ml of two-fold serial dilutions of the test sera in phosphate-saline buffer (pH 7.2) were made in the wells 1-10. This was followed by the addition of 0.025ml of virus (La Sota) suspension diluted with normal saline to contain 4 Haemagglutination (4HA) units. Wells 11 and 12 served as serum and antigen controls respectively. After 30 minutes, 0.025ml of 1% chicken erythrocyte suspension in phosphate saline buffer (pH 7.2) was then added to each well and the plates were gently mixed and allowed to incubate for 45 minutes at 4°C before reading the results.

The erythrocyte indicator for HI test was obtained from the jugular vein of a second-generation isolation reared chicken, which was unvaccinated and serologically free from ND. The erythrocytes were washed twice in 20 volumes of normal saline after 3 cycles of centrifugation (3000g x 10 minutes) and re-suspended in phosphate saline buffer to obtain 1% suspension of the cells.

Table 1: Haemagglutination Inhibition antibody titres of unvaccinated chicks close (CCF) and not close to commercial flock (NCF)

Group	HI Titres					Total
	2^3	2^4	2^5	2^6	2^7	
NCF Count	25 (27.5)	36 (39.6)	15 (16.5)	09 (9.9)	06 (6.5)	91 (100)
% of Total	13.9	20	8.3	5	3.3	50.6
CCF count	19 (21.3)	25 (28.1)	22 (24.7)	13 (14.6)	10 (13.5)	89 (100)
% of Total	10.5	13.9	12.2	7.2	5.6	49.4
Total count	44	61	37	22	16	180
%	24.4	33.9	20.5	12.2	8.9	100

No in parenthesis indicates percent within group.

Table 2: Comparison of Newcastle Disease antibody titres in the indigenous chicks in the various Local Government areas in Yewa Division of Ogun State Nigeria

Local Government (LG)		HI Titres					Total
		2^3	2^4	2^5	2^6	2^7	
Yewa North	Count	14.0	18.0	5.0	1.0	2.0	40
	% within L G	35.0	45.0	12.5	2.5	5.0	100
Yewa South	Count	8.0	11.0	13.0	5.0	3	40
	% within L G	20.0	27.5	32.5	12.5	7.5	100
Ipokia	Count	7.0	16	11	15	11.0	60
	% within L G	11.7	26.1	18.3	25.0	18.3	100
Imeko Afon	Count	15	16	8	1	0	40
	% within L G	27.5	40.0	20.0	2.5	0	100
Total	Count	44.0	61.0	37	22.0	16.0	180
	% within L G	24.4	33.9	20.5	12.2	8.9	100

Results

All the 180 unvaccinated indigenous chicks examined had ND haemagglutination inhibition antibody titre between 2^3 to 2^7 (Table 1). And out of the 180 chicks that were examined, 89 (49.4%) were close to commercial flock (CCF) while 91 (50.6%) were not close to commercial flock (NCF). From the 180 chicks, that were tested, 44 (24.4%) had ND antibody titre of 2^3, 61 (33.9%) had ND antibody titre of 2^4 while 16 (8.9%) had ND antibody titre of 2^7, the highest detected in the series in this study (Table 1).

Within the NCF group of chicks, 25 (27.5%) had ND antibody titre of 2^3, 36 (39.6%) had titre of 2^4 while 6 (6.5%) had titre of 2^7. Within the CCF group of chicks, 19 (21.3%) had ND antibody titre of 2^3, 25 (28.1%) had titre of 2^4 while 10 (13.5%) had titre of 2^7 (Table 1).

Higher percentage of the NCF chicks (13.9%) than the CCF chicks (10.5%) had ND antibody titre of 2^3. On the other hand, lower percentage of the NCF chicks (3.3%) than the CCF chicks (5.6%) had ND antibody titre of 2^7. (Table 1)

The distributions of the ND antibody titres of chicks within the local governments were compared on Table 2. Chicks having ND antibody titres of 2^3 and 2^4 were highest (35% and 45% respectively) in Yewa North and lowest in Ipokia (11.7% and 26.7% respectively). On the other hand, chicks that had ND antibody titre of 2^7 were highest (18.3%) in Ipokia and lowest (0%) in Imeko Afon than chicks in the other Local Governments that were studied.

The ND antibody titres of chicks within the villages/town in the Local Governments were compared on Table 3. The table also showed the distribution of the two chick groups (NCF and CCF) within the villages/towns in the Local Government areas. In Sawonjo, the two chicks that had the highest ND antibody titre (2^7) were within the CCF group. The ratio of the NCF to CCF chicks that had the highest ND antibody titre of 2^7 was 1:2 in Owode, 1:3 in Ipokia and 3:2 in Idi Iroko. Chicks within the two groups (NCF and CCF) in Ayetoro, Ilaro and Imeko did not have ND antibody titres above 2^5.

Discussion

The result of this study showed that all the 180 sera samples from the unvaccinated indigenous chicks contained ND antibody titre ranging from 2^3 to 2^7. This result lends credence to the observation of El-Yuguda and Baba (2002), who described ND virus as endemic in Nigeria. The ND sero-positive status could be as a result of survivors from or subclinical previous ND infections. It could also be that the chicks possess maternal antibodies. The latter option may not hold because according to Rao *et al.* (1987), ND maternal antibody in chicks can only persist for up to 10^{th} day of life and no detectable levels of ND antibodies were observed in 15 days-old chicks.

Adequate ND antibodies are defined as HI titre, that is, 2^3 or greater for birds less than 18 weeks of age and 2^5 or greater for birds 18 weeks of age or older (Alders and Spradbrow, 2001). The distribution of the ND antibody titre (Fig. 1) of chicks examined in this study suggests that all of them carried protective HI titres. When chicks

Table 3: Newcastle Disease HI antibody titres of unvaccinated indigenous chicken in the villages / towns within local government areas in Yewa, Ogun State, Nigeria

Local Government Area	Town/ Village	Group	HI Titres					Total
			2^3	2^4	2^5	2^6	2^7	
Yewa North	Sawonjo	Total Count	6	9	2	1	2	20
		NCF Count	5	6	0	0	0	11
		CCF Count	1	3	2	1	2	9
Yewa South	Ayetoro	Total Count	8	9	3	0	0	20
		NCF Count	4	4	1	0	0	9
		CCF Count	4	5	2	0	0	11
	Ilaro	Total Count	4	8	8	0	0	20
		NCF Count	2	5	2	0	0	9
		CCF Count	2	3	6	0	0	11
	Owode	Total Count	4	3	5	5	3	20
		NCF Count	4	3	4	2	1	14
		CCF Count	0	0	1	3	2	6
Ipokia	Ipokia	Total Count	3	3	5	5	4	20
		NCF Count	3	3	3	1	1	11
		CCF Count	0	0	2	4	3	9
	Tube	Total Count	4	7	3	4	2	20
		NCF Count	2	4	0	2	1	9
		CCF Count	2	3	3	2	1	11
Imeko Afon	Idi – Iroko	Total Count	0	6	3	6	5	20
		NCF Count	0	1	2	4	3	10
		CCF Count	0	5	1	2	2	10
	Imeko	Total Count	8	8	4	0	0	20
		NCF Count	0	6	2	0	0	8
		CCF Count	8	2	2	0	0	12
	Afon	Total Count	7	8	4	1	0	20
		NCF Count	5	4	1	0	0	10
		CCF Count	2	4	3	1	0	10

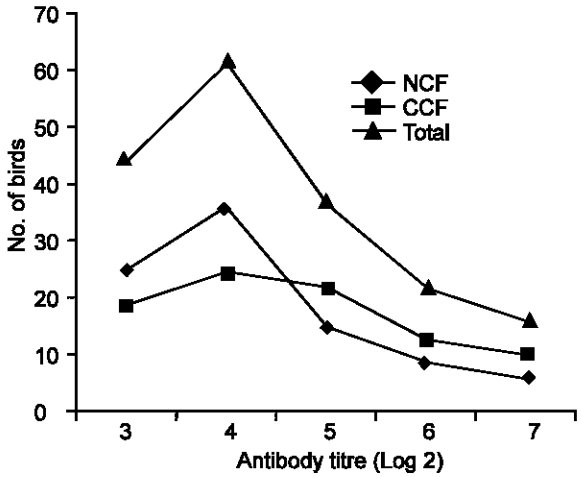

Fig. 1: Distribution of Haemagglutination inhibition (HI) antibody titres in indigenous chicks in Yewa Division, Nigeria

are first vaccinated against ND, an anticipated serological HI titre of 2^3 is assumed to be protective against the disease although not against the mutant virus (Alders and Spradbrow, 2001). According to Alders and Spradbrow (2001), it is estimated that a booster will raise the serological titre to 2^5. The above implies that only 44 (24.4%) of all the chicks (180) sampled in this study may need a booster ND vaccine (Table 1).

The variation in the ND antibody titres observed among chicks in the groups (CCF and NCF) (Table 1), village/towns (Table 2) and Local Governments (Table 3) may be as a result of possible differences in the age of the chicks at the time of exposure to the ND virus. A comparatively better immune response was reported (Rao *et al.*, 1987) in 10 days old chicks than 1 and 5 days old chicks with maximum immune response in 15 days old chicks.

Similarly, variation in the level of dietary arginine and lysine in the feed available to the chicks in the various locations may affect their level of immune response (Kidd *et al.*, 2001). We observed also that higher percentage of chicks in the CCF group (5.5%) than the NCF group (3.3%) had the highest ND titre (2^7) recorded in this study (Table 1). This may be attributed to possible exposure of CCF to residual ND vaccine virus routinely administered in the commercial flock near the indigenous chicks. Observations by Spradbrow (1992), at village sites in Australia showed that the ND vaccinated birds did not perform better than their unvaccinated counter parts. According to Spradbrow (1992), control of ND alone on the field may not show any spectacular break through because the village environment harbored a complex of hazards for poultry,

some of them just as serious as the effect of ND.

We are thus, tempted from our results to suggest that the indigenous chicks in Yewa, Ogun state do not need any ND vaccination, but what is required is the education of the keepers of these indigenous birds on improved management practices.

References

Alders, R.G. and P.B. Spradbrow, 2001. Controlling Newcastle disease in village chicken: A field manual. Australian Center for International Agricultural Research (ACIA) monograph series,82.

Alexander, D.J., 2001. Newcastle Disease. Bri. Poult. Sc., 42: 5-22.

Allan, W.H, and R.F.A. Gough, 1974. A standard haemagglutination inhibition test for Newcastle disease: a macro and micro methods. Vet. Rec., 95: 120-123.

Dipeolu, M.A., O.M. Kenipe and A.J. Gbadamosi, 1998. Chick mortality in indigenous chicken under free range system in Abeokuta, Nigeria. Nig. Vet. J., 19: 5-11.

El-Yuguda, A.D and S.S. Baba, 2002. Prevalence of selected viral infections in various age groups of village chickens in Borno State, Nigeria. Nig. J. Anim. Prod., 29: 245-250.

Kidd, M.T, E.D. Peebles, S.K. Whitmarsh, J.B. Yeatman and R.F. Wideman, 2001. Growth and immunity of broiler chicks as affected by dietary arginine. Poult. Sci., 80: 1535-1542.

Majiyagbe, K.A. and A.G. Lamorde, 1997. Nationally coordinated research programme on Livestock diseases: Sub-sectoral goals, performance and medium-term research plans. Trop. Vet., 15: 75-83.

Rao, A.S., M.S. Chetty, V.L.K. Prasal, P.B. Reddy, G.V. Reddy and B.D. Reddy, 1987. Persistence of maternal antibodies against Newcastle disease virus in chicks from immune parents and its effect on vaccination. Ind. J. Comp. Microbiol., Immunol. and Inf. Dis., 8: 105-110.

Spradbrow, P., 1992. Newcastle disease in village chickens, control with thermostable oral vaccines. In: Spradbrow, P. (Ed), Proc. Int. Workshop on the control of Newcastle disease in village chickens. Kuala Lumpur, Malaysia, October 1991.