



The effects of Newcastle disease and infectious bursal disease vaccines, climate and other factors on the village chicken population in North-Eastern Nigeria

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Abstract

The effects of viral vaccines, climate and other factors on the population of scavenging village chicken was carried out in four village units (designated A, B, C and D) in the North-Eastern Nigeria between the months of October, 1999 and February, 2000. Newcastle disease (ND), infectious bursal disease (IBD) and a combined ND and IBD vaccines were administered to birds in the villages A, B and C respectively, while the birds in village D served as the unvaccinated control. A gradual insignificant ($P > 0.05$) decline in the chicken population was observed over the study period within each village unit. However, marked decrease in population was observed in the control village D, indicating that the use of ND and/or IBD vaccines significantly reduced the losses in the flock of chickens in the vaccinated village units. In addition, the effects of the two vaccines on chicken population were comparable. A considerable decrease in the population of birds in all villages (significant at $P < 0.05$ in village D) was generally observed between the months of November, 1999 and January, 2000 that coincided with the cold, dry harmattan season in the study area. The population of chicks was significantly ($P < 0.05$) higher than those of growers, layers and cockerels within each village unit. In addition, within a village unit, significant proportion of pigeons and ducks are usually raised with chickens when compared to populations of Guinea fowls and doves. Besides ND and IBD virus infections, sudden death, slaughter, missing and sale of chickens are important factors in the reduction of chicken population in the study village units.

Key words: Village chickens, Newcastle disease, infectious bursal disease, vaccines, climate, Nigeria.

Introduction

The village chickens are characterized by such survival traits as small body size, slow growth rate, late maturity, poor production ability and high degree of adaptability to prevailing climatic conditions^{6,8,3}. Nevertheless, they provide an important source of high quality animal protein with little or no capital investment^{1,5}, reserves for times of celebration, religious and other socio-cultural purposes as well as a major source of cash income from the sale of eggs and chickens. Such incomes are used for food, school fees and other unexpected expenses. The village chicken production constitutes an extreme case of extensive system of management, whereby the birds are exposed to a variety of disease agents^{2,4,9}, against which vaccination is rarely carried out⁵. Other predisposing factors to infection include unrestricted intermingling of the chickens with other susceptible birds⁷ and a variety of climatic conditions⁹. Consequently, because they are unprotected from infections, high mortality and morbidity rates are usually experienced when the birds are exposed to virulent infectious agents¹⁰. In this study, we investigated the physical and biological factors contributory to the incessant reduction in village chicken populations in North-eastern Nigeria.

Materials and Methods

Study area: The study was carried out in a semi-arid zone of the North-eastern parts of Nigeria, characterized by shrubs and thorny trees with grasses on the lowland areas. The areas are sparsely populated and the inhabitants are predominantly farmers. The climate of the area is divided into two distinct

seasons made up of the dry season extending from October to May and the rainy season from June to September. The areas have an average temperature of 39°C.

Experimental birds: The birds studied in this investigation were the scavenging village chickens in four different village units. The birds had no previous history of vaccination against any of the endemic infectious diseases of poultry.

Vaccines used: Newcastle disease (La Sota) and infectious bursal disease vaccines used in this study were obtained from the National Veterinary Research Institute (NVRI), Vom, Nigeria, with the batch numbers 7/97 and 1/97 respectively.

Experimental design: The free range scavenging village chickens of different age groups were located in designated households in the different village units studied. The villages were designated A through D and each household in each village unit was numbered. The birds in each of the village units were treated as follows: birds in village A were vaccinated with ND vaccine alone, those in village B with IBD vaccine alone, while those in village C were administered with the combined ND and IBD vaccines (the two vaccines were administered simultaneously). The birds in village D served as the unvaccinated control. All the vaccines were administered orally through drinking water and owners were advised to deprive the chickens of water overnight prior to vaccination. Structured questionnaires on independent variables including causes of chicken population

reduction, system of poultry management, rearing of other birds, seasonality in chicken population dynamics etc. were administered to farmers in each household pre- and post-vaccinations.

Data analysis: Data on different variables were computed statistically using analysis of variance (ANOVA) at 5% statistical level of significance.

Results

The effects of vaccination and the factors influencing the village chicken population dynamics in the study village units in North-eastern Nigeria were investigated. There was a gradual insignificant ($P>0.05$) reduction in the vaccinated chicken population in each of the village unit when compared with chickens in the control village, where marked decrease in chicken population was observed (Table 1). This indicates that the use of ND and/or IBD vaccines significantly protected the vaccinated chickens against the two diseases in the study villages. The period of November 1999 to January 2000 which coincided with the cold and dry harmattan season in the study area recorded a significant reduction in the chicken population. There was a general decrease (significant at $P< 0.05$ in village units B and D) in chicken population during the period in all the village units (Table 1). The population turnover of chicks was higher than that of the other age groups of chickens studied in all the village units (Table 2) which correlated positively with the reduction due to slaughter observed among the mostly consumed older chickens (Table 3). Slaughter, disease, sale, theft and predation were significant means of village chicken population reduction in the study areas (Table 3). Significant numbers of pigeons and ducks are usually reared with the village chickens when compared to Guinea fowls and doves. Consistent with the effect of season on village chicken population, there was also a general decrease in the population of other birds during the cold harmattan period in the village units studied (Table 4).

Discussion

This study has revealed some of the factors contributing to the reduction in village chicken population in the North-eastern part of Nigeria. The reductions recorded over the study period within each village unit could be associated with diseases, frequent slaughter for food, sale and theft of chickens in addition to predation by carnivores and birds of prey. This is consistent with what was observed by Eidson et al. ⁴ and Dipeolu et al. ³ who attributed losses in the village chicks to predation, diseases and accidents. The reduction due to diseases was observed to be exacerbated by the dry, cold harmattan season, since significant reductions were recorded during the period November, 1999 to January, 2000 in all the

Table 1. Population of village chickens in the different experimental villages in North-eastern Nigeria.

Village	Number of birds per month					Total
	Oct.	Nov.	Dec.	Jan.	Feb.	
A	169	163	107	104	113	656
B	202	175	116	139	150	782
C	123	147	101	104	120	595
D	120	65	34	40	37	294
Total	614	548	358	387	420	2327

Village A: Birds were vaccinated against Newcastle disease (ND)

Village B: Birds were vaccinated against infectious bursal disease (IBD)

Village C: Birds were vaccinated against both ND and IBD simultaneously

Village D: Birds were not vaccinated against either of the diseases (unvaccinated control)

Table 2. Age distribution of village chickens in the different experimental villages in North-eastern Nigeria.

Age groups	Monthly number (%) of each age group in each of the village unit				
	Oct.	Nov.	Dec.	Jan.	Feb.
Village A					
Chicks	73(43)	54(33)	52(49)	44(43)	27(24)
Growers	40(24)	58(36)	28(26)	33(32)	46(41)
Layers	29(17)	25(15)	14(13)	14(14)	23(20)
Cockerels	27(16)	26(16)	13(12)	12(12)	17(15)
Total	169	163	107	103	113
Village B					
Chicks	77(36)	48(27)	46(40)	73(53)	63(42)
Growers	59(28)	61(35)	33(29)	27(19)	42(28)
Layers	47(22)	41(23)	24(21)	26(19)	30(20)
Cockerels	29(14)	25(14)	13(11)	13(9)	15(10)
Total	212	175	116	139	150
Village C					
Chicks	57(46)	64(44)	42(42)	46(44)	35(29)
Growers	24(20)	40(27)	34(34)	34(33)	42(25)
Layers	27(22)	27(18)	17(17)	17(16)	27(23)
Cockerels	15(12)	16(11)	8(8)	7(7)	16(13)
Total	123	147	101	104	120
Village D					
Chicks	60(50)	19(29)	14(41)	18(45)	13(35)
Growers	30(25)	27(42)	13(38)	13(33)	13(35)
Layers	17(14)	9(14)	4(12)	4(10)	5(14)
Cockerels	13(11)	10(15)	3(9)	5(13)	5(14)
Total	120	65	34	40	37

village units under study. The vaccination of chickens in the different village units with ND and/or IBD vaccines considerably reduced the losses due to the disease (especially ND) among the village chickens. This observation is consistent with the report that ND and IBD infections are among the most important viral diseases of the village ^{1,9}. The period of cold, dry and dusty harmattan season recorded the highest losses in the village chickens as a result of diseases; in consonance with the earlier reports ⁹ on the severity of infectious diseases such as ND during

Table 3. Causes of reduction in village chicken population in the different village units of North-eastern Nigeria.

Diseases	Number (%) losses in individual villages							
	Slaughter	Sold	Sacrifice	Gift	Accident	Theft	Prey	TN %L*
A	57(8.7)	98(14.9)	32(4.9)	5(0.8)	2(0.3)	3(0.3)	31(4.7)	258(39.3)
B	48(6.1)	85(10.9)	70(9)	6(0.8)	2(0.3)	32(4.1)	41(5.2)	344(44.9)
C	22(3.7)	40(6.7)	23(3.9)	10(1.7)	0(0)	4(0.7)	20(3.4)	133(22.9)
D	41(14)	63(21.4)	36(12.3)	2(0.7)	9(3.1)	3(10)	10(3.4)	168(57.9)

Key: TN%L = total number (%) losses

Table 4. Records of other birds reared with village chickens in the different experimental village units per month.

Months	Number (%) of other birds				Total
	Duck	Pigeon	Guinea fowls	Dove	
Village A					
Oct.	71(29)	169(68)	8(3)	0(0)	248
Nov.	60(2)	176(70)	14(7)	0(0)	250
Dec.	24(12)	170(85)	6(3)	0(0)	200
Jan.	20(11)	159(83)	6(3)	0(0)	185
Feb.	26(14)	154(83)	6(3)	0(0)	186
Total	201	828	40	0	1069
Village B					
Oct.	117(40)	73(59)	2(1)	0(0)	292
Nov.	102(36)	78(63)	2(1)	0(0)	282
Dec.	47(26)	130(73)	2(1)	0(0)	179
Jan.	44(23)	130(73)	2(1)	0(0)	176
Feb.	35(30)	80(68)	2(2)	0(0)	117
Total	345	691	10	0	1046
Village C					
Oct.	69(89)	0(0)	6(8)	2(3)	77
Nov.	82(85)	0(0)	12(13)	2(2)	96
Dec.	91(90)	0(0)	8(8)	2(2)	101
Jan.	86(90)	0(0)	8(8)	2(2)	96
Feb.	70(88)	0(0)	8(10)	2(3)	80
Total	398	0	42	10	450
Village D					
Oct.	36(42)	50(58)	0(0)	0(0)	86
Nov.	78(53)	69(47)	0(0)	0(0)	147
Dec.	51(37)	88(63)	0(0)	0(0)	139
Jan.	46(34)	90(66)	0(0)	0(0)	136
Feb.	32(30)	75(70)	0(0)	0(0)	107
Total	243	372	0	0	615

the dry season period.

The turnover of chicks was found to be higher than those of other age groups in a population of chickens. This could be attributed to frequent slaughter and sale of matured chickens when compared to chicks which usually serve as replacement stock in a flock. In a particular village flock, it is common to find other species of birds being reared together with the chickens. In this study, we found that the rearing of ducks and pigeons with chickens is more common and their population in some cases are comparable. The rearing of ducks, pigeons, Guinea fowls and doves (which are natural fliers) together with village chickens further compounds the difficulty in controlling ND and IBD among the village population of birds, since they are difficult to immunise using the classical needle and syringe method. In addition the flying birds usually serve as source of infection to other birds due to their migratory nature; by spreading infections from one location to another. Apart from frequent slaughter for food, factors like disease, sale, theft and predation arising from poor management are contributory to the incessant reduction in the population village chickens in this environment.

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