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Population, production and improvement of local fowl of southern Nigeria ecotype

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There is paucity of data on local fowls' production in Southern Nigeria. The population and identity of the farmers involved in raising the fowl is lacking. Studies were carried out in the areas that covered Anambra, Oyo and Imo States to ascertain the population, production and improvement of the local fowl. In six hundred households in Anambra State the population of local birds was 4,971. These consisted of 911 (Chicks), 1073 (Growers), 1278 (Cocks) and 1709 (Hens), respectively. Imo State in 6 local government areas (LGAs), 300 households had 2032 local birds comprising 394 (Cocks), 614 (Hens), 478 (Growers) and 546 (Chicks) while in Oyo North LGA feeding trials were conducted to determine nutrient requirements of the fowl. Shank lengths and egg quality showed variations (P<0.05) in different localities. A standard energy and protein levels of 2,700 kcalME/kg of feed and 22% crude protein (CP) at chick phase and 3,000 kcalME/kg of feed and 17% CP at grower phase, respectively, were established for the fowl. Also feed additives such as antibiotics, *prebiotics* and *probiotics* used as growths promoters were assessed. Antibiotics did not show any positive pattern of growth promotion while the *prebiotics* and *probiotics* enhanced performance of local fowl. Plantain peels meal fed at early phase of life moderately enhanced performance of the fowl. To bridge the animal protein deficit in the nutrition of rural populace, local fowl can be used but after improvement of the fowl to commercial birds.

Key words: Local fowl, South Nigeria ecotype, population, production and performance.

INTRODUCTION

The system of managing the local fowl in Nigeria is still the traditional house holder reared mostly by women in a range system where the flocks are allowed to roam in order to feed. The birds appear to be generally heterogeneous with no specific color pattern and non-descriptive both in phenotype and genotype. They have been characterized as hardy highly adapted to the harsh hot and humid native environment (Nwakpu et al., 1999). Some local birds seen in villages may have been crossed with exotic cocks in earlier years through the cockerel exchange programme among others, but such genes may have been dispersed and lost in the population because of unplanned breeding and absence of selection. Thesaurus defined domestic fowl as domesticated gallinaceous bird thought to be descended from the red jungle fowl.

In Nigeria, local fowls are indigenous unselected population of domestic birds that inhabit mostly rural parts of the country. From studies (Ezeokeke and Iyayi, 2001; Ezeokeke, 2008) this stock has not been crossed bred with imported ones. Attempts to improve their

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Table 1. Personal profile of the chicken keepers.

Location	Sex		Education		Occupation		CS	F&T	C&F
	Male	Female	Formal	Informal	Farming	Trading			
Idemili North	12	38	33	17	14	16	5	9	4
Njikoka	39	41	24	26	15	19	6	6	6
Anaocha	12	38	34	16	10	18	10	7	5
Total	63	117	91	59	39	53	21	22	15

CS= Civil Servant; F&T= Farming and Trading; C&F= Civil servant and Farming.

Table 2. Personal profile of the chicken keepers.

Location	Sex		Education		Occupation		CS	F&T	C&F
	Male	Female	Formal	Informal	Farming	Trading			
Anambra East	18	32	33	17	7	5	Nil	19	14
Anambra West	23	27	40	10	8	4	Nil	13	10
Oyi	6	44	41	9	9	6	2	23	10
Total	47	103	114	36	24	15	2	57	34

CS= Civil Servant; F&T= Farming and Trading; C&F= Civil servant and Farming.

Table 3. Personal profile of chicken keepers.

Location	Sex		Education		Occupation		
	Male	Female	Formal	Informal	Farming	Trading	Civil servant
Aguata	30	20	25	15	14	9	12
Onisha	23	27	30	10	14	13	13
Orumba	27	23	20	25	7	13	6
Total	80	70	75	50	35	35	31

Table 4. Personal profile of the chicken keepers.

Location	Sex		Education		Occupation		
	Male	Female	Formal	Informal	Farming	Trading	Civil servant
Ayamelum	25	25	14	36	13	25	12
Idemili South	26	24	15	35	6	29	15
Nnewi	29	21	23	27	18	21	11
Total	80	70	52	98	37	75	38

performance in the past had been by cross breeding them with imported ones in an exchange program failed because heterosis in the offspring was marginal and dismally observed. The inherited traits were lost overtime especially in an uncontrolled breeding environment (Ezeokeke, 2003). The heritability index is low in the fowl and any transferred trait is diminished in the subsequent generation and becomes recessed and eventually lost. Oluyemi and Ogunmodede (1979) described local fowls as a breed or variety of any species of poultry which has developed characteristics peculiar to a geographical location that can be said to be indigenous to that location.

POPULATION AND PRODUCTION OF LOCAL FOWL

The results indicated that most of the household keepers were women (Table 1). This is similar to that published by Gueye (2000); Bagnol (2001) and Das et al. (2008). The highest flock per household was 12 as recorded in Ayamelum (Table 2). The management system was mainly the extensive or scavenging type (Awolola, 1986). But some of the householders provided one type of shelter or another under very unhygienic conditions. Coccidiosis was more rampart than Newcastle (Adler and Damassa, 1980) diseases as observed in these areas (Table 3 to 5). Apart

Table 5. Flock distribution and structure.

Location	Flock distribution					Flock structure/household				
	Cock	Hen	Growers	Chick	Mating ratio	Cock	Hen	Growers	Chick	Total
Idemili North	132	197	71	81	1: 1	2.64	3.94	1.42	1.62	9.62
Njikoka	130	215	79	42	1: 2	2.60	4.30	1.58	0.84	9.32
Anaocha	126	273	110	144	1: 2	2.52	5.46	2.20	2.88	10.18
Anambra East	85	75	71	20	1: 1	1.70	1.50	1.42	0.40	5.02
Anambra West	69	67	78	39	1: 1	1.38	1.34	1.56	0.38	4.66
Oyi	44	42	63	24	1: 1	0.88	0.84	1.26	0.48	3.46
Aguata	74	155	58	36	1: 2	1.48	3.10	1.16	0.72	6.46
Onitsha	80	137	75	69	1: 1	1.60	2.74	1.50	1.38	7.22
Orumba	97	115	51	43	1: 1	1.94	2.30	1.02	0.86	6.12
Ayamelum	137	138	122	172	1: 1	2.74	2.76	2.44	3.44	11.38
Idemili South	146	148	149	171	1: 1	2.92	2.95	2.98	3.42	12.28
Nnewi	158	147	146	70	1: 1	3.16	2.94	2.92	1.40	10.42

from farming most of the keepers engaged in other enterprise (Table 1) and were educated formally and informally. The body weight of chick varied significantly ($P<0.05$) but this might be as a result of having a pull of chicks with different ages (0 to 6wks) together in a group (Tables 7 to 10). Age differential within type might have contributed to the observed differences. The shank lengths differed significantly ($P<0.05$) in all the chicken types (Tables 11 to 17). The flocks were kept by householders who did not keep record of management and production (Table 6). The egg quality was low indicating low management practice no feed and house were provided to the flock in most homes where the birds were raised (Tables 18 to 20).

STUDIES ON IMPROVEMENT OF LOCAL FOWL

Low energy and high protein diet for chicks while high energy and low protein diet for growers enhanced performance of local fowl. The results of the studies are as shown in Tables 21 to 22. For better use of antibiotics, the absorption characteristics of therapeutic antimicrobial substances should be known. The precise mechanism by which antibacterial substances promote growth and mode of action of dissimilar antibiotics as used in combination in the study at sub-optimal level need further investigation (Tables 23 to 26).

Several studies with broilers have indicated that *probiotic* preparations improved live weight gain and feed conversion rate, and markedly reduce mortality (Owings et al., 1990; Jin et al., 1996; Awaad et al., 2001). Dunham et al. (1993) reported that birds treated with *Lactobacillus reuteri* exhibited longer ileal vili and deeper crypts, which are a response, associated with enhanced T cell function, and increased production of anti-salmonella IgM antibodies. *Enterococcus faesium* as used as probiotic like *lactobacillus* could be important in the development of immunity looking at the table of blood metabolites. Immunity resulting from gut exposure to a variety of antigens, such as pathogenic bacteria and dietary protein, is important in defense of young animal against enteric infection (Perdigon et al., 1995). Tables 27 to 29 depicted performance of local birds on diets supplemented with *prebiotics* and *probiotics*. The additives enhanced performance, derived and acquired immunity of the birds. Also on experiment with plantain peels meal at the starter and finisher phases all the parameters measured were not significant ($P>0.05$). But results compared favorably with that reported on broilers by Tewe (1983). The average initial weight of the test birds was 32.00 g and at the end of starter phase attained 133.30 g corresponding to the early stages of growth of the fowl. This potential can be utilized in the improvement of the local birds as table birds. The birds had the capacity to put on weight easily especially when fed with plantain peel meal at the

Table 6. Management practice of local chicken.

Location	Shelter		Medication		Cleaning			Feeding		Water	Not	Diseases encountered	
	Yes	No	Yes	No	daily	Weekly	Monthly	Scavenging	Supplementing	frequent	frequent		
Idemili N	43	7	7	43	9	41	Nil	47	3	24	26	New castle disease	Coccidiosis
												8	Nil
Njikoka	41	9	4	46	10	40	Nil	50	Nil	11	39	Nil	18
Anaocha	43	7	9	41	9	41	Nil	49	1	19	31	Nil	5
Anambra E	45	5	21	29	17	33	Nil	29	21	21	29	2	13
Anambra W	41	9	10	40	19	29	2	41	Nil	12	38	Nil	Nil
Oyi	37	15	17	33	19	30	1	37	15	18	34	Nil	7
Aguata	25	25	11	30	Nil	5	8	39	11	8	24	1	Nil
Onitsha	24	25	9	36	5	5	12	45	5	8	19	Nil	Nil
Orumba	23	27	13	31	6	7	9	40	10	13	17	Nil	Nil
Ayamelum	22	28	20	30	Nil	50	Nil	36	14	15	35	Nil	20
Idemili South	48	2	47	3	45	5	Nil	29	21	30	20	Nil	Nil
Nnewi	20	30	18	32	20	30	Nil	35	15	5	45	15	Nil

Table 7. Weight (kg) of the chickens.

Chicken type	Idemili North	Njikoka	Anaocha	SEM
Cock	1.30[b]	1.43[a]	1.33[b]	0.022
Hen	0.92	0.92	1.00	0.028
Grower	0.33	0.28	0.30	0.032
Chick	0.027	0.026	0.028	0.003

SEM= Standard Error of Mean. Means with different superscript a and b in a row are significantly different (P<0.05).

Table 8. Weight (kg) of the chicken.

Chicken type	Anambra east	Anambra west	Oyi	SEM
Cock	1.73	1.76	1.76	0.02
Hen	1.11	1.11	1.26	0.05
Grower	0.55	0,55	0.51	0.03
Chick	0.026	0.025	0.029	0.0004

SEM= Standard Error of Mean.

Table 9. Weight (kg) of the chicken.

Chicken type	Aguata	Onitsha	Orumba	SEM
Cock	1.90	1.97	1.95	0.05
Hen	1.66	1.74	1.73	0.77
Grower	1.37	1.38	1.37	0.60
Chick	0.02	0.02	0.03	0.01

SEM= Standard Error of Mean.

Table 10. Weight (kg) of the chicken.

Chicken type	Ayamelum	Idemili south	Nnewi	SEM
Cock	2.16	2.03	2.06	0.14
Hen	1.81	1.79	1.83	0.08
Grower	1.96	1.71	1.85	0.17
Chick	0.03	0.02	0.03	0.01

SEM= Standard Error of Mean.

Table 11. Shank length (cm) of the chicken.

Chicken type	Idemili north	Njikoka	Anaocha	SEM
Cock	6.00^{b}	6.40^{a}	6.02^{b}	0.040
Hen	5.40^{ab}	5.58^{a}	5.32^{b}	0.069
Grower	4.32	3.46	3.86	0.322
Chick	0.96^{a}	0.52^{b}	1.16^{a}	0.155

SEM= Standard Error Mean. Means with superscripts, a and b in a row are significantly different (P<0.05).

Table 12. Shank length (cm) of the chicken.

Chicken type	Anambra east	Anambra west	Oyi	SEM
Cock	9.07	9.08	8.99	0.65
Hen	7.33^{a}	7.06^{b}	7.13^{b}	0.05
Grower	4.09	4.05	4.15	0.30
Chick	1.26	1.36	1.27	0.15

SEM= Standard Error Mean. Means with a an b superscripts in a row are significantly different (P<0.05)**.**

Table 13. Shank length (cm) of the chicken.

Chicken type	Aguata	Onitsha	Orumba	SEM
Cock	3.59	3.74	3.84	1.18
Hen	2.83^{b}	3.21^{b}	3.44^{a}	0.10
Chick	0.02	0.03	0.01	
Grower	1.37	1.38	1.37	1.60

SEM= Standard Error of Mean. Means with a and b superscripts in a row are significantly different (P<0.05).

early stages of life. The study substituted maize with PPM at 6% inclusion level fed to indigenous chickens at starter (0 to 4 wks) and finisher (5 to 8 wks) phases in order to achieve with the control the same level of performance at a relatively cheaper cost of the diet. The plantain peels meal enhanced performance at early stage

Table 14. Shank length (cm) of the chicken.

Chicken type	Ayamelum	Idemili south	Nnewi	SEM
Cock	3.04	3.14	2.82	0.31
Hen	2.30	2.26	1.73	0.24
Grower	2.06[a]	1.92[b]	2.06a	0.04
Chick	1.22	1.20	1.20	0.01

SEM= Standard Error of Mean. Means with a and b superscripts in a row are significantly different (P<0.05).

Table 15. Personal profile of local chicken rearers.

LGA	Sex		Education		Occupation				
	Male	Female	Formal	Informal	Trading	Farming	Civil servat	Farming/Trading	All
Ehime Mbano	Nil	50	50	Nil	25	4	2	15	4
Isiala Mbano	Nil	50	50	Nil	20	5	10	10	5
Mbaitolu	Nil	50	50	Nil	15	5	15	10	5

Table 16. Flock structure and distribution of local fowl.

LGA	Flock structure				Mating ratio		FLOCK SIZE/HOUSE HOLD			
	Cock	Hen	Growers	Chick	Hen	Cock	Hen	Cock	Growers	Chick
Ehime Mb.	177	79	307	152	2	1	3.54	1.82	6.36	4.02
Isiala Mb.	182	78	227	149	2	1	3.64	1.98	4.54	4.02
Mbaitolu	121	63	233	152	2	1	2.42	1.40	5.16	4.02

Table 17. Management practices of local fowl.

PRO.O.S.			MEDICATION FCP				FEEDING						FW			CDE		
LG	Yes	No	D	W	M	>M	D	W	M	>M	SCA	SUP	FQ	NF	NDC	COC	CRD	OTR
Eh.	42	8	Nil	Nil	Nil	Nil	42	Nil	Nil	Nil	50	Nil	Nil	50	28	4	8	10
Is.	42	8	Nil	Nil	Nil	Nil	42	Nil	Nil	Nil	50	Nil	Nil	50	25	5	15	5
Mb.	46	4	Nil	Nil	Nil	Nil	46	Nil	Nil	Nil	50	Nil	Nil	50	20	5	10	15

PR0.O.S = Provision of shelter. FCP = Frequent cleaning of pen. FW = Frequent of watering. CDE = Common diseases encountered. D = Daily. W = Weekly. M = Monthly. SCA = Scavenging. SUP = Supplement. FQ = Frequent. NF = Not frequent. NDC = New Castle disease. COC = Coccidiosis. CRD = Chronic respiratory disease. OTR = Others.

Table 18. Weight (kg) of flocks.

Chicken types	Ehime Mbano	Isiala Mbano	Mbaitolu	SEM
Hens	0.797	0.791	0.792	0.004
Cocks	1.419	1.304	1.269	0.035
Growers	0.376	0.380	0.375	0.003
Chicks	0.047	0.049	0.047	0.002

SEM = Standard Error of Mean.

Table 19. Shank length (cm) of birds.

Chicken types	Ehime Mbano	Isiala Mbano	Mbaitolu	SEM
Hens	5.844[b]	5.902[a]	5.448[a]	0.057
Cocks	7.214[a]	7.296[a]	6.848[b]	0.062
Growers	3.596	3.634	3.608	0.002
Chicks	2.292	2.300	2.245	0.021

Means in a row with different superscripts are significantly different (P<0.05).

Table 20. Egg quality of local fowl.

Parameter	Ehime Mbano	Isiala Mbano	Mbaitolu	SEM
Average egg weight (g)	39.27	38.24	41.04	1.77
Yolk colour	8.00	7.50	7.63	0.67
Yolk index	0.45	0.36	0.37	0.05
Albumen index	0.18	0.19	0.14	0.02
Shell weight (g)	3.91	4.03	4.03	0.20
Shell thickness (mm)	0.34	0.38	0.37	0.03
Haugh unit	33.48[b]	37.07[a]	28.02[c]	0.50
Hen day egg production (%)	47.00	47.00	48.00	1.17

Table 21. Gross composition of experimental diets.

Ingredients (%)	Experimental diets					
	1	2	3	4	5	6
Chicks phase						
Maize	56.60	56.40	51.60	72.80	65.60	61.40
Groundnut cake	26.80	32.40	37.00	23.80	29.00	35.00
Bone meal	2.40	2.40	2.40	2.40	2.40	2.40
Salt	0.20	0.20	0.20	0.20	0.20	0.20
*Premix	1.00	1.00	1.00	1.00	1.00	1.00
Grower phase						
Maize	71,30	67.20	63.81	81.10	76.40	72.40
Groundnut cake	11,70	18.00	22.60	9.40	15.60	20.50

*Premix provided the following per kg of feed: Vitamin A, 8,000,000 IU,vitamin D_3, 1,600,000 IU, vitamin E, 5,000 IU, vitamin K, 2,000 mg, thiamin (B_1), 1,50000 mg, niacin, 15,500 mg , vitamin B_{12}, 10mg, pantothenic acid, 5000 mg, folicacid,500 mg, biotin,20 mg, choline chloride, 200 g, antioxidant, 125 g, manganese, 80 g, zinc, 50 g, iron, 20 g, copper, 5 g, iodine, 1.2 g, selenium, 200 mg, cobalt, 200 mg.

of life of the birds and the cost of feed very effective. The experiment was done under intensive management system. Plantain peels meal may be useful as cost effective ingredient in the ration of local birds at relatively

Table 22. Performance of birds on experimental diets.

Parameter	Diets						
	1	2	3	4	5	6	SEM
Chicks phase							
AFI (g/bird/day)	18.10	19.90	16.40	13.90	15.90	20.20	2.23
EFU (gain/feed)	0.17^b	0.19^a	0.14^b	0.17^b	0.16^b	0.22^a	0.03
ME intake (kcal/day)	46.47^b	57.86^b	35.53^b	38.79^b	41.85^b	75.60^a	13.72
Avg. bdy wt (gat 9wks)	102.90^b	118.30^b	76.20^b	86.40^b	80.50^b	224.40^a	18.48
Body wt gain (g/dy)	3.06^b	3.81^b	2.34^b	2.30^b	2.48^b	4.48^a	0.82
Grower phase							
AFI (g/bird/dy)	37.90^b	47.50^a	35.70^b	38.80^b	39.50^b	48.80^a	4.95
EFU (gain/feed)	0.10^a	0.10^a	0.12^a	0.08^b	0.09^b	0.11^a	0.01
ME intake (kcal/dy)	57.32^b	74.41^b	62.69^b	53.06^b	57.70^b	91.27^a	13.12
Avg. bdy wt(g at 20wks)	422.09^b	519.40^a	402.01^b	357.94^b	357.58^b	578.25^a	82.40
Body wt gain (g/dy)	3.78^b	4.90^a	4.13^a	3.15^b	3.42^b	5.14^a	0.80

Diet 1= 2,700 kcalME/kg, 13%CP; Diet 2= 2,700 kcalME/kg, 15%CP; Diet 3= 2,700 kcalME/kg, 17%; Diet 4= 3,000 kcalME/kg, 13%; Diet 5= 3,000 kcalME/kg, 15%CP; Diet 6 = 3,000 kcal/kg, 17%CP. Means with different superscripts in a row is significantly different ($P<0.05$). SEM= Standard error of mean.

Table 23. Gross composition of experimental diets (%) at starter and grower phases of birds treated with or without antibiotics.

Ingredient	Starters			Growers		
	1	2	3	4	5	6
Maize	67.36	62.28	62.63	72.02	76.72	76.07
Groundnut cake	29.06	34.22	34.14	24.40	19.66	20.60
Bone meal	2.38	2.33	2.15	2.38	2.41	2.22
Common salt	0.20	0.20	0.18	0.20	0.20	0.18
*Premix	1.00	0.97	0.90	1.00	1.01	0.93
Total	100.00	100.00	100.00	100.00	100.00	100.00

The formulated percentages of the ingredients were readjusted to as fed percentages. Diet 1= 2700 kcalME/kg, 18%CP; Diet 2= 2,700 kcalME/kg, 20%CP; Diet 3=2,700 kcalME/kg, 22%CP; Diet 4= 3,000 kcalME/kg,13%CP; Diet 5= 3,000 kcalME/kg, 15%CP; Diet 6= 3,000 kcalME/kg, 17%CP.*Premix provided the following per kg of feed: Vitamin A, 8,000,000 IU, vitamin D_3, 1,600,000 IU, vitamin E, 5,000IU, vitamin K, 2,000 mg, thiamin (B_1), 1,50000 mg, niacin, 15,500 mg , vitamin B_{12}, 10 mg, pantothenic acid, 5000 mg, folicacid,500 mg, biotin, 20 mg, choline chloride, 200 g, antioxidant, 125 g, manganese, 80 g, zinc, 50 g, iron, 20 g, copper, 5 g, iodine, 1.2 g, selenium, 200 mg, cobalt, 200 mg.

Table 24. Gross composition of experimental diet (%) at starter and grower phases.

Ingredient	Starters			Growers		
	1	2	3	4	5	6
Maize	67.36	62.28	62.63	72.02	76.72	76.07
Groundnut cake	29.06	34.22	34.14	24.40	19.66	20.60
Bone meal	2.38	2.33	2.15	2.38	2. 41	2.22
Common salt	0.20	0.20	0.18	0.20	0.20	0.18
*Premix	1.00	0.97	0.90	1.00	1.01	0.93
Total	100.00	100.00	100.00	100.00	100.00	100.00

The formulated percentages of the ingredients were readjusted to as fed percentages. This accounted for the variations in the percentages of the ingredients especially the fixed ones (Bone meal, common salt and premix). *Vitamin mineral premix contained the following per kilogram of diet: Vitamin A (1250 IU), vitamin D3 (2750 IU), vitamin E (15 IU), vitamin K (2 mg), riboflavin (6 mg), pantothenic acid (10 mg), niacin (35 mg), vitamin B12 (0.02 mg), choline (300 mg), biotin (0.05 mg), folic acid (1 mg), thiamine (1.50 mg), pyridoxine (3.50 mg), vitamin C (25 mg), manganese (100 mg), zinc (45 mg), iron (50 mg), copper (2 mg), iodine (1.55 mg), selenium (0.10 mg) and cobalt (25 mg).

Table 25. Performance of birds given diets with or without antibiotics in water at starter phase.

Parameter	With antibiotic			Without antibiotics			
	1	2	3	4	5	6	SEM
MBW (g/bird at 9wk)	130.10^{c}	200.00^{bc}	132.33^{c}	284.30^{b}	318.80^{a}	376.20^{a}	36.76
MBWG (g/bird at 9wk)	1.76^{c}	2.63^{c}	1.62	4.69^{ab}	5.70^{a}	6.78^{a}	1.73
MDFI (g/bird at 9wk)	11.20^{c}	20.72	7.14	39.80^{a}	43.20^{a}	47.80^{a}	4.02
EFU (gain/bird/day)	0.18	0.17	0.19	0.26	0.23	0.24	0.05
MEI (kcal/bird/day)	35.04	39.11	33.63	36.34	39.95	42.30	7.81

MBW= Mean body weight; MBWG= Mean body weight gain; MDFI= Mean daily feed intake; EFU= Efficiency of feed utilization; MEI= Metabolizable energy intake for body maintenance. Means with superscripts a, b and c in a row are significantly (P<0.05) different. SEM= Standard error of mean. SEM= Standard error of mean.

Table 26. Performance of birds given diets with or without antibiotics in water at growers' phase.

Parameter	With antibiotics			Without antibiotics			
	1	2	3	4	5	6	SEM
MBW (g/bird at 14wks)	283.63^{b}	351.75^{b}	279.50^{b}	362.20^{b}	469.70^{a}	533.30	34.59
MBWG (g/bird/day)	6.35	5.39	4.15	4.02	4.85	5.25	2.59
MDFI (g/bird at 14wk)	24.33^{c}	24.33^{c}	20.50^{c}	38.40^{b}	47.20^{a}	44.30	2.71
EFU (gain/feed/bird)	0.33	0.21	0.23	0.11	0.11	0.12	0.13
MEI (kcal/bird/day)	54.44^{c}	69.83^{b}	61.40^{bc}	73.94^{b}	92.21^{a}	102.48^{a}	6.29

MBW= Mean body weight; MBWG= Mean body weight gain; MDFI= Mean daily feed intake; EFU= Efficiency of feed utilization; MEI= Metabolizable energy intake. Means with superscripts a, b and c in a row are significantly (P<0.05) different. SEM= Standard error of mean.

Table 27. Gross composition of experimental diets (%).

Ingredient	Starter diet	Finisher diet
	Diet 1	Diet 2
Maize	51.49	51.91
Soya bean meal	16.11	16.24
Groundnut cake	13.99	2.98
Cassava meal	10.07	20.30
Fish meal	4.93	4.97
Bone meal	2.27	2.28
*Premix	0.90	0.91
Common salt	0.18	0.18
Lysine	0.01	0.13
Methionine	0.05	0.10
Total	100.00	100.00

*Vitamin mineral premix contained the following per kilogram of diet: Vitamin A (1250 IU), vitamin D_3 (2750 IU), vitamin E (15 IU), vitamin K (2 mg), riboflavin (6 mg), pantothenic acid (10 mg), niacin (35 mg), vitamin B_{12} (0.02 mg), choline (300 mg), biotin (0.05 mg), folic acid (1 mg), thiamine (1.50 mg), pyridoxine (3.50 mg), vitamin C (25 mg), manganese (100 mg), zinc (45 mg), iron (50 mg), copper (2 mg), iodine (1.55 mg), selenium (0.10 mg) and cobalt (25 mg).

safe level during the early stages of life of the bird. Therefore, PPM can be used in profitable poultry production.

The composition of feed and performance of the birds fed plantain peels meal are shown in the Tables 30 to 33.

Table 28. Performance of birds on experimental diets at starter and finisher phases.

Parameter	Starter diets			Finisher diets		
	1(+)	2(-)	SEM	3(+)	4(-)	SEM
Average initial bdy wt(g/wk)	31.25	37.50	4.41			
Average body wt (g at 7&12wks)	108.89[a]	75.44[b]	13.92	270.00	186.00	33.45
Average daily feed intake (g/day)	45.35[a]	23.21[b]	7.28	32.78	29.29	5.98
Average body wt gain (g/day)	2.22	1.10	1.04	4.17	3.29	1.29
Efficiency of feed utilz (gain/feed)	0.13	0.09	0.05	0.22	0.16	0.10
*Metz energy intake (cal/day)	20.35	18.04	3.73	34.94	27.64	7.70

Mean with different superscripts in a row are significantly different (P<0.05). += With *prebiotics* and *probiotics* (Inclusion level of 20 mg (*prebiotics*)/kg feed for 3 days and 1g (*probiotics*)/kg of feed *ad libitum*; -= Without *prebiotics* and *probiotics;* SEM= Standard error of mean.

Table 29. Blood metabolites of chicks at finisher phase.

Parameter	Experimental diets			
	1(+)	SEM	2(-)	SEM
Packed cell volume (%)	25.00	0.58	27.33	1.45
Hemoglobin (mg/100ml)	8.13	0.13	9.07	0.52
Red blood cell (x1012/l)	4.04	0.02	4.17	0.08
White blood cell (x109/l)	10.15	0.05	10.37	0.22
Lymphocyte (%)	40.00	2.89	46.67	7.27
Neutrophil (%)	57.33	2.19	53.00	7.23
Total protein (g/l)	5.53	0.27	4.60	0.15
Albumin (g/l)	2.00	0.06	1.33	0.15
Globulin (g/l)	3.53	0.29	3.27	0.29

+= With *prebiotics* and *probiotics*; -= Without *prebiotics* and *probiotics*; SEM= Standard error of mean.

Table 30. Gross composition of experimental diets at starter phase.

Ingredient	Starter diets (%)	
	Control	Test
Maize	46.96	39.54
Groundnut cake	36.93	37.99
Wheat offal	5.00	5.00
Fish meal	2.00	2.00
Bone meal	3.00	3.00
Oyster shell	2.00	2.00
Lysine	1.25	1.25
Methionine	0.86	0.86
Common salt	1.00	1.00
*Premix	1.00	1.00
Plantain peels meal	0.00	6.36
Total	100.00	100.00

*Premix provided the following per kg of feed: Vitamin A, 8,000,000 IU, vitamin D_3, 1,600,000 IU, vitamin E, 5,000IU, vitamin K, 2,000 mg, thiamin (B_1), 1,50000 mg, niacin, 15,500 mg , vitamin B_{12}, 10mg, pantothenic acid, 5000mg, folicacid,500 mg, biotin,20 mg, choline chloride, 200g, antioxidant, 125g, manganese, 80 g, zinc, 50 g, iron, 20 g, copper, 5 g, iodine, 1.2 g, selenium, 200 mg, cobalt, 200 mg.

Table 31. Gross composition of experimental diets at finisher phase.

Ingredient	Finisher diets (%)	
	Control	Test
Maize	57.05	49.53
Groundnut cake	26.84	28.00
Wheat offal	5.00	5.00
Fish meal	2.00	2.00
Bone meal	3.00	3.00
Oyster shell	2.00	2.00
Lysine	1.25	1.25
Methionine	0.86	0.86
Common salt	1.00	1.00
*Premix	1.00	1.00
Plantain peels meal	0.00	6.36
Total	100.00	100.00
Price per kg of feed (N)	95.05	93.05

*Premix produced the following per kg of feed: Vitamin , 8,000,000 IU, vitamin D_3 1,600,000 IU, vitamin E 5,000 IU, vitamin K, 2,000 mg, thiamin (B_1), 1,500 mg, riboflavin (B_2), 4,000 mg, pyridoxine (B_6), 1,500 mg, niacin, 15,500 mg, vitamin B_{12},10 mg, pantothenic acid, 5,000 mg, folic acid, 500 mg, biotin, 20 mg, choline chloride, 200 g, antioxidant, 125 g, manganese, 80 g, zinc 50 mg, iron, 20 g, copper, 5 g, iodine 1.2 g, selenium, 200 mg, cobalt, 200 mg.

Tables 32. Performance of local birds on experimental diets at the starter phase.

Control test	Experiment diets		
			SEM
Initial body wt/ bird(g)	43.75	32.00	8.30
Average body wt/bird at 5wks (g)	134.54	133.30	24.43
Average feed intake/bird/day (g)	16.88	22.4	3.95
Average body wt gain/bird/wk (g)	22.70	25.33	10.91
Average feed conversion ratio/bird	6.05	5.20	1.35

Table 33. Performance of local birds on experimental diets at the finisher phase.

Control test	Experiment diets		
			SEM
Average body wt/ bird at 10wks (g)	423.00	341.70	66.82
Average feed intake/bird/day (g)	35.05	29.52	3.91
Average body wt gain/bird /wk (g)	76.25	44.47	27.48
Average feed conversion ratio	3.89	5.91	2.09

CONCLUSION

The local fowl has suffered neglect until now and may likely be extinct in future since there is no plan in place to sustain their production in Nigeria. At present there is global dwindling of poultry genetic resources attributable to the intense industrialization and near monopoly of industrial stock by a few (Rose, 1997). There is a growing concern and a felt need for conservation (Crawford, 1999). The local fowl in Nigeria is endangered and possesses traits of current and future economic importance and scientific interest. Data on population are

necessary in planning selection and breeding programs aimed at improving the productive potentials and conservation of native chicken. The bulk of animal protein that is consumed in the rural areas is mostly derived from the local fowl.

To bridge the gap in shortage of animal protein, ensure food security and alleviate poverty of rural population in Nigeria, local fowl improvement and production are keys to open doors to better nutrition and rural economic empowerment. Malnutrition, disease and poverty ravage the rural dwellers where an average family lives on an income of less than a dollar per day (FAO, 2008; UNDP, 2007). Domestic chickens essentially contribute to human nutrition, play a crucial role in fundamental and applied research, and provide an enjoyable source of human entertainment and leisure time activities (Delany, 2000). The review presented efforts made towards providing information, establishing standards and enhancing performance on the fowl.

Conflict of Interest

The authors have not declared any conflict of interest.

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