

RESEARCH ARTICLE

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Growth and Carcass characteristics of the indigenous and exotic cockerel released on free range as influenced by age, strain and location of farmers in South Eastern Nigeria.

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Abstract:

A study was conducted to evaluate the effect of age of release, strain and farmers location on growth and carcass performance of the indigenous, and two exotic strains (Harco[®] and Goldline[®]) cockerels, reared on free range; in order to ascertain the best age of release into free range from brooder houses, as well as the effect of farmers location and strain on their growth and carcass characteristics, in South Eastern Nigeria. A total of 315 cockerels comprising 87 indigenous chicks, 114 Harco[®] chicks, and 114 Goldline[®] cockerels brooded and raised up to 18 weeks of age were used in this experiment. These birds were randomly released to farmers in the villages at three different ages of 4, 8 and 12 weeks to run on free range. There were significant effects ($P < 0.05$) of age of release and strain on the growth characteristics, but none ($P > 0.05$) on the carcass characteristics. However, there was also significant ($P < 0.05$) effect of the zone on both growth and carcass traits measured. It was concluded that the earlier the exotic birds are released from the brooder house, the better their performance on scavenging rearing. This is beneficial as the farmer will save much from the purchase of compounded feed and other veterinary services.

Key words: age, strain, cockerels, free range, performance.

1. Introduction

In Nigerian villages, local chickens are commonly reared under free range system of management which involves roaming and scavenging for their own food. These production systems are typically characterized by low input and low output systems mainly in terms of meat and egg production [5] with no organized housing or the provision of drugs and vaccination. Thus, the local breed of chicken as reported by [3] is allowed to scavenge for food with less management attention. [1] emphasized that the exposure of these chickens to harsh weather conditions affected their performance as a result of short environmental variations in form of weather and management associated with individual hatches. However, the only form of management by farmers is the provision of trees and thatched roofed houses for the resting of the birds at night.

Obviously, it is common to find the exotic cockerels roaming and competing favorably with the hardy indigenous chickens in most of the villages in South-Eastern Nigeria, and the trend is gradually becoming popular near Nigerian urban centres but

there is no available literature on the performance of these exotic breeds nor the age at which these chicken are introduced in the environment. According to [6, 2] and [9]; several studies have been done on egg production of exotic breeds of chicken in tropical areas, but few deals with the performance of their males in tropical and sub-tropical areas.

Therefore, a performance test on the exotic cockerels under free range system of management will give adequate idea of the age appropriate for the introduction of these cockerels into the village setting. This will greatly reduce the cost of feeding, drugs, vaccination and housing, thus leading to the improvement of the local breeds and increase the availability of poultry meat, as everyone will engage in his/her own little way in the production of these chickens with less risk under most economic conditions. As these exotic birds grow in the environment, there is the expectation that there will be genetic x environment interactions with the local environment, leading to genetic improvement.

This study was conducted to investigate the most appropriate age to release these exotic and local

cockerels from brooder houses into the free range on the growth and carcass parameters measured.

2. Materials and Methods

Three hundred and fifteen (315) day – old chicks comprising 87 indigenous chicks, 114 Harco® chicks, and 114 Goldline® were hatched in a commercial hatchery farm in Owerri, South eastern Nigeria, and used for the study. The standard method of brooding as reported by [7] was adopted. The chicks were fed *ad-libitum* with commercial chick mash and water liberally provided until they were four weeks old. At four (4), eight (8) and twelve (12) weeks of age, about 99 birds comprising of 27 of indigenous, 36 of Harco and 36 of Goldline cockerels were randomly selected and shared to each of 3 farmers identified in 3 agricultural (Owerri, Orlu and Okigwe) zones of Imo State. Every farmer received 11 cockerels at 4, 8 and 12 weeks of age comprising of 3 indigenous, 4 Harco and 4 Goldline cockerels, and 2 of each line kept as

control. At the end of the 12th week, a total of two hundred and ninety seven chickens were distributed to the nine co-operating farmers while eighteen (18) were kept intensively as control. The chicks in the control group were maintained on compounded diet comprising of starter diet (0-5weeks) and grower diet (5-18 weeks). The first group of chicks released received the compounded starter diet for 4 weeks, while those released at 8 weeks received the starter diet for 4 weeks and the grower for 3 weeks. The composition of the compounded diets is shown in Table 1. All groups of birds were raised up to the age of 18 weeks.

The parameters measured were daily and weekly feed intake (for control group), and body weight change up to the 18th week. At the end of the 18th week, 4 birds from each scavenging group and 2 from the control group were used for carcass measurements.

Table 1: Percentage composition of feed for starter and grower diets for cockerels prior to release into free range

Ingredients	Starter diet	Grower diet
Maize	50.00	40.00
Soybean meal	20.00	11.00
Groundnut cake	12.50	
Brewers dried grain (BDG)		12.50
Fish meal	3.00	1.00
Wheat offal	10.70	24.70
Bone meal	2.00	2.00
Oyester shell	1.00	8.00
Salt	0.25	0.25
Methionine	0.15	0.15
Lysine	0.15	0.15
Premix*	0.25	0.25
TOTAL	100	100
Calculated composition of diets		
Metabolizable Energy (MJ/Kg)	11.65	10.42
Crude Protein (%)	23.16	16.39
Calcium (%)	1.02	3.68
Fibre (%)	4.13	5.12
Lysine	1.21	1.02
Methionine	0.52	0.45

*Premix to supply per Kg diet, Vit. A 1000IU, Vit. D 2000IU, Vit. E 5 IU, Vit K 2mg, Riboflavin 4.20mg, Nicotinic acid 20mg, Folic acid 0.5mg, Choline 3mg/Mg, 56mg; Fe 20mg, Cu 10mg, Co 125mg, Iodine 0.8mg.

2.1 Data Analysis

The sources of variation due to strains, age of release, and location of farmers were partitioned using the factorial design of randomized completely block design (RCBD) of proc GLM procedure of [8], according to the model below;

$$Y_{ijk} = \mu + B_i + T_j + S_k + TS_{jk} + e_{ijk}$$

Where Y_{ijk} = Individual observation from k th location of farmers, of the j th age of release in the i th strain.

μ = Overall mean

B_i = Effect of i th strain

T_j = Effect of the j th age of release

S_k = Effect of k th location of farmers

TS_{jk} = Effect of the interaction between age of release and location of farmers.

e_{ij} = Error term NIID(0, 1). Preliminary investigations showed no significant interaction effects, but where significant differences were identified, the SNK multiple range test according to [8] was used to separate the means.

3. Results and Discussion

The effects of age of release on cockerels performance on free range at 4, 8 and 12 weeks of release are shown in Table 2. The initial live weight (g) at 4 weeks ranged from 155.61g to 166.06g, while the final body weight at 18 weeks ranged from 949.29g to 1137.78g. The average weekly rate of gain up to 18 weeks ranged from 3.42g to 6.85g, while mortality ranged from 2.25% to 18.60%. Meanwhile the internal organs as affected by age of release have values ranging from 1.96g (weight of spleen) to 167.60g (weight of gizzard).

Table 3 shows the effect of strain on cockerels' performance in free range. The initial live weight at 4 weeks of age ranged from 122.67g (local strain) to

172.71g (Goldline strain) while the final bodyweight at 18 weeks ranged from 879.19g to 1137.78g between local strains to the control groups. The average weekly rate of gain up to 18 weeks ranged from 3.36 g to 6.85g between local strains to control group, while mortality ranged from 2.25% (control) to 19.50% (Goldline) strains. The values of percentage dressed weight and internal organ weights are also shown.

Table 4 shows the effect of location of farmers on cockerel performance in free range. The initial live weight at 4 weeks of age ranged from 124.91g to 166.06g between Okigwe group to control group, while the final body weight at 18 weeks of age ranged from 1074.95g to 1137.78g between Owerri group to control group. The average weekly rate of gain up to 18 weeks ranged from 5.83g to 6.85 g between Owerri group to control group, while the mortality ranged from 2.25% to 17.18% from control group to Owerri groups respectively.

Table 2: Effect of age of release on growth and carcass characteristic of cockerels released on free range

S/ no	Parameters	Treatments			
		Control	4weeks	8 weeks	12 weeks
1	Initial body weight at 4 weeks (g)	166.06±6.68	155.61±6.12	159.75±5.87	160.04±5.91
2	Final body weight at 18 weeks (g)	1137.78±6.33 ^a	1075.10±7.54 ^b	995.23±12.86 ^c	949.29±17.95 ^d
3	Av. Weekly rate of gain up to 18 wks (g)	6.85±2.50 ^a	6.41±1.34 ^a	4.73±2.20 ^b	3.42±1.28 ^c
4	Mortality (%)	2.25	7.45	15.70	18.60
5	% Dressing (hot weight)	82.6±4.33	73.5±2.34	69.7±2.50	68.7±3.11
6	Length of intestine (cm)	171.2±12.20	171±5.66	161±4.88	162±10.52
7	Weight of intestine (g)	119.3±6.85	117±9.50	117±10.00	105±7.50
8	Weight of gizzard (g)	167.6±5.25	151±15.20	145±5.50	150±7.50
9	Weight of heart (g)	6.55±1.50	6.25±0.95	5.68±2.25	6.05±1.56
10	Weight of spleen (g)	2.35±0.45	2.15±0.05	1.96±0.45	2.25±0.55
11	Weight of liver (g)	31.50±3.45	30.00±4.25	31.00±3.30	29.30±4.30
12	Weight of proventriculus (g)	7.50±2.50	6.46±2.56	7.15±2.05	7.16±2.50

^{abcd} = means within rows with different superscripts are significantly different (P<0.05)

Table 3: Effect of strain on growth and carcass characteristic of cockerels released on free range

S/ no	Parameters	Treatments			
		Control	Local strain	Harco®	Goldline ®
1	Initial body weight at 4 weeks (g)	166.06±6.68 ^a	122.67±5.77 ^b	172.71±6.15 ^a	171.74±6.25 ^a
2	Final body weight at 18 weeks (g)	1137.78±6.33 ^a	879.19±16.89 ^c	998.15±9.83 ^b	1006.97±8.63 ^b
3	Av. Weekly rate of gain up to 18 wks (g)	6.85±2.50 ^a	3.36±1.25 ^b	3.56±3.22 ^b	4.58±4.88 ^b
4	Mortality (%)	2.25	5.10	17.15	19.50
5	% Dressing (hot weight)	82.6±4.33	63.05±1.04	78.7±2.90	82.7±3.71
6	Length of intestine (cm)	171.2±12.20	172±5.36	166±3.78	169±9.58
7	Weight of intestine (g)	119.3±6.85	112±9.50	114±10.00	117±8.50
8	Weight of gizzard (g)	167.6±5.25	156±15.20	161±5.50	159±7.50
9	Weight of heart (g)	6.55±1.50	6.55±0.95	5.82±2.35	6.11±1.42
10	Weight of spleen (g)	2.35±0.45	2.15±0.05	1.88±0.45	2.05±0.55
11	Weight of liver (g)	31.50±3.45	32.00±4.25	33.00±3.30	34.30±4.30
12	Weight of proventriculus (g)	7.50±2.50	6.86±2.56	7.10±2.05	7.09±2.50

^{abcd} = means within rows with different superscripts are significantly different (P<0.05)

Among the ages of release, those at 4 weeks showed significantly (P<0.05) higher final body weight at 18 weeks, while those released at 12 weeks performed least (P<0.05). Also the average weekly

rate of gain up to 18 weeks (g) decreased as the age of release increased, implying that the ability of the birds to cope with scavenging life increases with time spent on the field. The mortality values also increased as the ages increased with the control exhibiting the least mortality while 12 weeks was highest. However, there was no significant effect of age of release on the carcass characteristics. These findings implies that brooding exotic cockerels for free range production ie brooding and growth to finish purposes need not be done beyond 8 weeks of age, as the final body weight, average weekly rate of gain and mortality has shown a downward performance as the age of release increased. [5] reported that exotic birds should not be confined for brooding too long or in intensive rearing prior to their release as this could affect adversely their ability to tolerate the harsh environmental conditions and poor husbandry practices (climate, handling, watering and feeding) with possible loss in production. The non significant effect on the carcass characteristics in this experiment is an added advantage in freeing chicks at an early age. The weights of the internal parts (intestine, gizzard and

proventriculus) are not significantly affected by the age of release or strain of the birds.

Meanwhile, the effect of the different strains on growth and carcass characteristics of cockerels released on free range showed that those on control performed better than the other strains in terms of initial body weight, final body weight at 18 weeks and average weekly rate of gain up to 18 weeks (g). However, the Goldline ® and Harco® on free range recorded the highest mortality, while the control group recorded the least. This shows that brooding local and exotic cockerels for breeding and growth to finish purposes has obvious significant effect on final body weight at 18 weeks, average weekly rate of gain up to 18 weeks and mortality as their genetic makeup varies. Control was significantly higher ($P<0.05$) for initial body weight at 4 weeks because it comprises of the average of the 3 strains lumped together. The significant mortality in birds released at 12 weeks compared to those released earlier (4 and 8 weeks) is an indication that the earlier chicks are released, the better they adapt to scavenging conditions.

Table 4: Effect of location of farmers on growth and carcass characteristic of cockerels released on free range

S/n o	Parameters	Treatments			
		Control	Owerri zone	Orlu zone	Okigwe zone
1	Initial body weight at 4 weeks (g)	166.06±6.68 ^a	125.98±6.01	128.07±4.68	124.91±6.90
2	Final body weight at 18 weeks (g)	1137.78±6.33 ^a	1074.95±6.52 ^c	1110.05±11.68 ^b	1112.22±6.68 ^b
3	Av. Weekly rate of gain up to 18 wks (g)	6.85±2.50 ^a	5.83±1.08 ^c	6.50±2.68 ^b	6.52±3.08 ^a
4	Mortality (%)	2.25	17.18	8.25	16.32
5	% dressed weight (Hot carcass wt)	82.6	64.60	65.80	70.07
6	Length of Intestine (cm)	171.2±12.20 ^a	130±11.33 ^c	199±15.09 ^a	164±18.23 ^b
7	Weight of intestine (g)	119.3±6.85 ^a	104.1±9.22 ^c	103.00±9.06 ^b	104.01±6.25 ^b
8	Weight of gizzard (g)	167.6±5.25 ^a	129.7±27.33 ^c	138.30±34.51 ^b	139.4±12.25 ^b
9	Weight of heart (g)	6.55±1.50 ^a	3.87±0.25 ^c	6.30±1.03 ^b	5.73±1.72 ^b
10	Weight of spleen (g)	2.35±0.45 ^a	1.42±0.13 ^b	2.33±0.11 ^a	1.77±0.05 ^b
11	Weight of liver (g)	31.50±3.45 ^b	14.8±2.88 ^c	39.8±3.83 ^a	32.7±7.15 ^b
12	Weight of proventriculus (g)	7.50±2.50 ^a	5.27±2.73 ^c	7.77±0.29 ^a	6.50±1.45 ^b

^{abcd} = means within rows with different superscripts are significantly different ($P<0.05$)

The effect of the location of farmers on growth and carcass characteristics of cockerels released on the free range shows that control was consistently higher ($P<0.05$) for all the traits measured, except mortality and weight of liver. Birds reared in Okigwe and Owerri zones recorded the highest mortality, followed by Orlu zone and the control group being the least. Birds reared in Orlu zone had significantly ($P<0.05$) higher weight of liver than those reared in the other zones.

4. Conclusion

The consistently better performing birds in the control groups is expected as they were fed balanced

diets with regular provision of feed, water and medication, while those handled on free range by farmers were not given the same treatment. However, among the farmer groups, those in Orlu zone had better performing birds and this could be due to the level of management given by them. Although they were instructed to allow them adapt to free range as other local birds, with shed and waterers provided, the feeding regimes or activities adopted by them could not be accounted for. Such very poor performance of the birds could as well be expected if the birds were strictly allowed to scavenge for their own feed and water. Hence, results from Owerri farmers maybe giving a true picture of the performance of the birds on free range.

5. References

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