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RESPONSE OF SHIKA-BROWN PULLET CHICKS AND LAYERS TO HOME MADE AND COMMERCIAL FEEDS IN ZARIA, KADUNA STATE, NIGERIA.

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ABSTRACT

Two separate experiments were conducted to test the response of Shika brown pullet chicks and layers to home-made and commercial feeds in Zaria metropolis of Kaduna state, Nigeria. In both experiments a home- made chick ration and layer ration were formulated using feed ingredients available in the locality. These were compared with two prominent commercial chick mash and layer mash feeds sold in Zaria. There were three feeds in each experiment and each feed constituted a treatment. Each of the treatments was replicated three times (making a total of 9 replicates in each study) in a complete randomised design. Two hundred and seventy chicks and layers respectively were used in each experiment, with 30 birds in each of the nine replicates. Results obtained for the chick study showed that the final weight, body weight gain, daily feed intake, feed conversion efficiency and feed cost per kilogramme gain in weight were significantly (P<0.05) better for the commercial feed A than for the other two feeds. Results obtained for the layers study showed that although birds fed commercial feed A performed significantly (P<0.05) better in terms of final weight, body weight gain, daily feed intake, feed conversion efficiency and percent hen-day egg production, the birds fed the homemade feed were significantly (P<0.05) better in terms of income above feed expenses, which is a measure of profitability.

Keywords: Homemade feed, commercial feed, pullet chicks, layers, performance.

INTRODUCTION

In the poultry business, farmers are quick to implicate feed when problems arise in their farms. On many occasions the problems may not emanate from the feed. However, because feed constitute over 70% of the cost of production (Kperegbeyi and Onwumere, 2007; Toluen and Igba, 2007 and Akinmutimi, 2003), farmers are very sensitive and critical about the quality of feed they buy. Several factors may be responsible for poor performance in a flock. These may include poor handling practices, poor water quality, poor litter management, irregular feeding intervals, poor health of the birds, poor sanitation in the poultry house and environment and poor supervision of staff among other factors (Oladunjoye *et al.,* 2005; Najime, 2003 and Abeke *et al.,* 2003). This, however, does not mean that poor feed quality has not been implicated. According to Abeke *et al* (2003), proliferation of small feed mills (popularly called toll milling) run sometimes by illiterates and semi literate individuals has compounded the problem of poor feed quality in the market. This situation is thriving in many major cities across Nigeria because of lack of government control of feed quality standards. Farmers are, therefore, left at the mercy of these quacks for supply of feeds and in many cases these feeds are very poor in quality. These feeds are, however, patronized because they are cheaper than those made by well-established government approved feed mill companies (Abeke *et al.,* 2003). This current situation cannot be left to continue. Efforts should be made by all and sundry within and outside the Nigerian feed industry to check this unwholesome

development. One of such efforts necessitated the objective of this study, which was designed to compare home made chick and layer feeds with two prominent commercial chick and layers' mash in Zaria metropolis of Kaduna state of Nigeria.

MATERIALS AND METHODS

This study was carried out at the Poultry Research Unit of the National Animal Production Research Institute (NAPRI), Ahmadu Bello University, Shika, Zaria, Nigeria, from January to April, 2006. Shika is geographically located between latitude 11^{o} 12'N and longitude 7^{o} 33'E at an altitude of 640M above sea level (Akpa *et al* 2002). Shika is located about 20km along the Zaria -Sokoto road in Kaduna state, North Central, Nigeria. It has three distinct climatic seasons. These are the cold dry season (November –February), the hot dry season (March- May) and the wet season (June – October). The total annual rainfall ranges from 617 to 1365mm with a 50-year average of 1041mm. Most of the rains fall between July and September (Oni *et al*.,1991).

Two experiments were carried out to compare the effect of home made chicks' and layers' mashes with two commercial chicks' and layers' mashes on the performance of Shika brown pullet chicks and layers. For the chicks study, a home made chicks' mashes was formulated to contain 20% crude protein and 2800kcal/kg of merabolizable energy. This was compared with two commercial chicks mashes. Also for the layer study, a homemade layers' mash was formulated to contain 17% crude protein and 2600kcal/kg of merabolizable energy and was also compared with two commercial layers' mashes sold in the area. The laboratory analyses of the two commercial feeds (proximate, mineral and amino acids) were carried out according to A.O.A.C (1990) procedure. Each of the two studies had three treatments (a home made feed and two commercial feeds) and each of the three treatments was replicated three times in a completely randomised design. There were 30 birds per replicate in both studies. The chicks were fed *ad-libitum* with provision of light at night throughout the period of the experiment while the layers were not provided with supplementary light at night. The chick experiment lasted for 8 weeks while the layer study lasted for 12 weeks. The initial weights of the chicks were taken before the commencement of the study and they were weighed weekly thereafter. Other records collected for the chick study included feed intake, which was measured weekly and mortality, which was recorded as they occurred. For the layers study, the weights of the layers were taken at the beginning and at the end of the experiment. Records collected for the layer study included egg production, which was recorded daily, feed intake, which was recorded weekly and mortality, which was recorded as it occurred. For three consecutive days at the end of each 28th day period, three freshly laid eggs were randomly picked from each replicate, weighed and broken out in a flat white plate for the analysis of the internal contents. Albumin height, albumin width, yolk height, yolk width and the shell thickness were measured using a pair of vernier callipers. The intensity of the yolk colour was determined using the Rhoche Yolk Colour Fan (RYCF). The shells were weighed with the Mettler 1440 electronic plate form scale after sun drying them for three days. Data collected for albumin height and width as well as yolk height and width were used to calculate Haugh unit value and yolk index respectively. All data collected were subjected to the analysis of variance using the SAS (1985) general linear model procedure. Differences between treatment means were separated using Duncans New Multiple Range Test (Duncan, 1955).

RESULTS AND DISCUSSION

The ingredient and chemical composition of the homemade chicks' mashes and layers' mashes and the laboratory analyses of the commercial chicks' and layers' mashes are presented in Table 1, while the results of the performance of the chicks and layers are presented in Tables 2 and 3, respectively. Parameters measured for determining the quality of eggs of the Shika brown layers are presented in Table 4.

The Table of calculated chemical composition of the various diets (Table 1) shows that the percent crude protein, the metabolizable energy, the calcium and phosphorus are within the range of nutrient requirements recommended for chicks and layers in the tropics. However the performance of the chicks showed that chicks fed commercial feed A were significantly ($P<0.05$) better in terms of final body weight (g/bird), weight gain (g/bird), feed conversion efficiency and feed cost per kilogramme weight gain than chicks which were fed with commercial feed B and the homemade feed. On the other hand, feed cost (N/bird) and total cost (N/bird) were found to be significantly ($P<0.05$) lower for the homemade feed than for the two commercial feeds. There were no significant ($P>0.05$) differences in feed

intake across the feeds but mortality was significantly (P<0.05) higher for the birds on commercial feed A than for the other two feeds.

For the layers, the result showed that birds fed commercial feed A performed significantly (P<0.05) better in terms of feed conversion efficiency and percent hen-day egg production than birds fed with commercial feed B and the home made feed. The home made feed was found to be significantly (P<0.05) better than the other two commercial feeds in terms of percent henhoused egg production, feed cost (N/bird), feed cost (N/egg), income above feed expenses and percent mortality. Feed intake was not significantly (P>0.05) affected by the different types of feed. For the egg quality parameters, it was discovered that apart from the egg weight which was significantly (P<0.05) better for the birds on commercial feed B and RYCF score which was significantly (P<0.05) better for the home made feed, all other egg quality parameters were not significantly (P>0.05) affected by the various types of feeds.

The reduction in cost per kilogramme feed obtained in this study for the home made feed indicates that formulating and mixing feed at the farm level can lower feed cost. According to Bawa *et al* (2003), Abeke (2005) and Ogundipe *et al* (2003), the need to lower feed cost in order to produce affordable poultry meat and eggs for the populace cannot be overemphasized in the face of dwindling standard of living. Kperegbeyi and Onwumere (2007), Toluen and Igba (2007) and Bawa *et al.* (2003) had earlier pointed out that the solution to inadequate protein intake of the populace can easily be achieved if the cost of producing poultry meat and egg (especially feed cost) can be drastically reduced**.**

Table 1: Composition of Homemade and Commercial chick and Layer mash

Ingredients	Homemade Chick mash	Homemade Layer mash	Comm Chick mash A	Comm chick mash B	Comm. Layer mash A	Comm. Layer mash B
Maize	**53.95**	**46.00**	**-**	**-**	**-**	**-**
GNC	**30.70**	**12.90**	**-**	**-**	**-**	**-**
Soyacake		**10.00**	**-**	**-**	**-**	**-**
Wheat offal	**10.00**		**-**	**-**	**-**	**-**
Maize offal		**20.00**	**-**	**-**	**-**	**-**
Limestone	**3.00**	**7.50**	**-**	**-**	**-**	**-**
Bone meal	**1.50**	**2.75**	**-**	**-**	**-**	**-**
Salt	**0.30**	**0.30**	**-**	**-**	**-**	**-**
Methionine	**0.15**	**0.15**	**-**	**-**	**-**	**-**
Lysine	**0.15**	**0.15**	**-**	**-**	**-**	**-**
Premix	**0.25**	**0.25**	**-**	**-**	**-**	**-**
Total	100.00	100.00	**-**	**-**	**-**	**-**
Calculated	Analysis		Laboratory	Analysis		
C.P %	**20.00**	**17.00**	**20.20**	**20.00**	**17.91**	**17.00**
ME kcal/kg	**2800**	**2600**	**2523**	**2550**	**2492**	**2750**
EE %	**3.12**	**3.21**	**3.83**	**5.00**	**4.56**	**4.00**
CF %	**3.64**	**4.49**	**8.94**	**5.00**	**6.73**	**6.50**
Calcium %	**1.14**	**3.75**	**1.12**	**1.10**	**3.78**	**3.50**
Avail. P %	**0.97**	**0.73**	**0.56**	**0.57**	**0.65**	**0.64**
Lysine %	**0.86**	**0.84**	**0.85**	**0.85**	**0.90**	**0.87**
Meth %	**0.37**	**0.42**	**0.42**	**0.35**	**0.42**	**0.43**
Cystine %	**0.34**	**0.33**	**0.30**	**0.31**	**0.32**	**0.31**
M+C %	**0.71**	**0.75**	**0.60**	**0.66**	**0.65**	**0.72**
FC N/kg	**38.50**	**30.42**	**52.00**	**48.00**	**50.00**	**46.00**

Optimix chick premix supplied the following per kg diet: Vit.A, 32000i.u, Vit.D36, 000i.u, Vit.E, 28mg, Niacin 600mg, Vit.B1, 8mg, Vit.B2, 10mg, Vit.B6, 8mg, Vit.B12, 0.04mg, Vit. K, 6mg, Pantothenic acid, 22mg, Folic acid, 2mg, Choline chloride, 700mg, Cobalt 0.8mg, Copper 12mg, Iodine 4mg, Iron 84mg, Manganese 160mg, Selenium 0.8mg, Zinc 124mg.

Layers premix supplied the following per kg diet; Vit.A, 100000iu; Vit.D3; 20000iu;Vit.E, 100iu; Vit.K, 20mg; ThiamineB1, 15mg; RiboflavinB2, 40mg; PyridoxineB6, 15mg; Niacine, 150mg; Vit.B12, 0.01mg; Pantothenic acid, 50mg; Folic acid, 5mg; Biotin, 0.2mg; Choline chloride, 2mg; Anti oxidant, 1.25g; Manganese, 0.8g; Zinc, 0.5g; Iron, 0.2g; Copper, 0.05g; Iodine, 0.12g; Selenium, 2mg; Cobalt, 2mg.

Table 2; Effect of commercial and homemade chick mash on the performance of Shika Brown pullet chicks.

Parameters	Commercial Chick mash B	Commercial chick mash A	Home-made chick mash	SEM
In. weight (g/b)	28.95	28.77	29.03	0.52
Fin.Weight (g/b	205.67[b]	343.33[a]	236.67[b]	23.20
Wt. gain g/b/d	3.16[b]	5.62[a]	3.71[b]	0.38
Feedintakeg/b/d	19.33	21.20	20.87	1.02
Feed conv. eff.	6.12[b]	3.77[a]	5.63[ab]	1.12
FeedcostN/bird	51.96[b]	61.73[c]	45.00[a]	2.21
FC/kg gain)	294.02[b]	196.24[a]	216.72[a]	22.34
Total cost N/b	221.96[b]	231.73[c]	216.00[a]	2.12
Mortality %	9.23[a]	12.82[b]	7.69[a]	1.57

Means within rows with different letter superscripts are significantly (P<0.05) different.
SEM: Standard error of the means. FC: Feed cost.

Table 3: Effect of commercial and homemade feed on the performance of Shika Brown laying hens.

Parameters	Commercial Layer mash B	Commercial layer mash A	Homemade layer mash	SEM
Init.Wt g/bird	1850.00	1870.00	1860.00	68.3411
FinWt g/bird	2300.00[c]	2500.20[a]	2380.00[b]	21.4015
Wt gain g/b/d	5.36[c]	7.74[a]	6.19[b]	0.0110
FI g/b/d	122.14	122.62	121.07	0.6422
FCE g feed/egg	165.89[c]	143.53[a]	157.40[b]	3.4211
HD prod %	82.02[c]	87.89[a]	86.54[b]	0.1171
HH prod %	72.90[c]	81.75[b]	86.54[a]	0.1261
Feedcost N/bird	492.48[b]	535.60[c]	391.55[a]	20.4333
Feedcost N/egg	6.01[c]	5.29[b]	3.77[a]	0.1512
IAFE at N400/ crate of egg	327.72[c]	371.42[b]	646.93[a]	21.3342
Mortality %	16.67[c]	4.17[b]	0.00[a]	2.0112

Means within the rows with different letter superscripts are significantly (P<0.05) different.
SEM: Standard error of the means. FI: Feed intake; FCE: Feed conversion efficiency;
HD: Hen day; HH: Hen housed; IAFE: Income above feed expenses.

Table 4 : Effect of commercial and Homemade layer mash on egg quality parameters of Shika Brown Hens.

Parameters	Commercial layer mash B	Commercial layer mash A	Homemade layer mash	SEM
Egg weight (g)	58.20[a]	56.03[b]	56.17[b]	0.5150
RYCF Score	6.57[b]	6.27[c]	6.95[a]	0.1142
Yolk index	0.49	0.48	0.53	0.1422
Shell weight (g)	5.28	5.33	5.30	0.1410
Shell thick mm)	4.33	4.31	4.28	0.1101
Haugh unit	96.33	94.67	95.00	1.5876

Means with different letter superscripts are significantly (P<0.05) different.
SEM: Standard error of the means.
RYCF: Roche Yolk Colour Fan.

The better performance observed for the chicks fed commercial chick mash A in terms of weight gain and feed conversion efficiency and those of the layers on the same feed in terms of weight gain, feed conversion efficiency and percent henday egg production may be attributed to better ingredient combination or inclusion of other performance enhancers for which information was not provided by the manufacturers. However current trends in feed manufacturing involves the use of bio-acids, enzymes, coccidiostats, toxin binders, antioxidants etc that enhance better nutrient utilization and, therefore promote better performance by birds. According to Etuk *et al* (2003), Akinmutimi (2003), Amaefule and Onwudike (2000), Ani and Okeke (2003) and Esonu *et al* (2003) the most important factor

influencing the performance of poultry birds, all other factors being constant is the quality of the feed offered to the birds. According to the authors, feed constitute not only the most significant cost factor in poultry production, it is also the most critical factor that poultry farmers should pay attention to for optimum production.

The fact that the home made feed was cheaper for the chicks in terms of feed cost (N/kg feed and N/bird) and total cost (N/bird) and for the layers in terms of feed cost (N/kg feed, N/bird and N/egg) and income above feed expenses was not surprising because commercial feed milling involves a lot of cost, which are passed on to the end users of their feeds. According to Najime (2003), Oladunjoye *et al* (2005), Ogundipe *et al* .(2003), Emelalon *et al* (2007), and Igene *et al*. (2002) all efforts should be made to reduce feed cost either by toll milling (similar to home made feed) or the use of well processed but cheap unconventional feed ingredients. The authors pointed out that this is the best way forward for the poultry industry.

The observation that the egg weight was better for layers fed commercial feed B may be related to the fact that birds which lay fewer eggs tend to have bigger egg sizes than birds that lay many eggs. According to Nwagu *et al* (2007) egg number is negatively correlated with egg size. The layers fed commercial feed B laid less number of eggs than the other layers fed on commercial feed A and the home made feed. This may be the reason why they laid bigger eggs. The Roche Yolk Colour Fan (RYCF) score was significantly ($P<0.05$) better for the home made feed than was recorded for the two commercial layer feeds possibly because of the use of yellow maize in the home made feed or the combination of the ingredients used in the feed. Because of the need to protect their formula and to prevent other manufacturers using the same, no information was provided in terms of types and combination of ingredients used in compounding commercial feeds A and B. However other egg quality parameters were not significantly ($P>0.05$) affected by the various diets.

CONCLUSION

Feed quality is very important in the performance of poultry birds. However not all commercially formulated feeds in the market are adequate for the optimum performance of chicks and layers. This study has shown that a well formulated and properly mixed homemade feed will not only reduce cost of production but will increase profit margins of the enterprise.

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