International Journal of
AGRICULTURE AND BIOSCIENCES
www.ijagbio.com P-ISSN: 2305-6622 E-ISSN: 2306-3599 editor@ijagbio.com

RESEARCH ARTICLE

Performance and Carcass Characteristics of Broiler Finishers Fed On-Farm Premixes

Oyewole BO, OY Ganiyu and II Dafwang

Department of Animal Production, Kogi Sate University Anyigba, Anyigba

ARTICLE INFO

Received: April 10, 2014
Revised: June 15, 2014
Accepted: July 20, 2014

Key words:
Broiler
Performance
Premix

***Corresponding Address:**
Oyewole BO
benjowole@yahoo.com

ABSTRACT

One hundred and eighty 35-day old broilers were used in a 21 days feeding trial to determine the effect of premixes prepared from locally sourced ingredients on the performance and carcass characteristics of broiler finishers. Five (5) broiler finisher diets were formulated such that Diet 1 was the control and contained the commercial premix. Diets 2 and 3 contained 2.3% and 4.6% of premix 1 respectively. Premix 1 was formulated with blood meal, fish meal, wood ash and *Moringa oleifera* leaf meal. Diets 4 and 5 had 2.3% and 4.6% of premix 2 respectively, prepared from blood meal, fish meal and poultry litter ash. The birds were randomly allotted to the five diets in a Completely Randomized Design. Each treatment comprised of three replicates of 12 birds per replicate. The results showed live weight (1538.00-1702.00g), daily feed consumed (75.04-112.08g), and feed: gain ratio (2.42-4.01) were significantly ($P<0.05$) affected by the treatments. Cost of feed/kg and cost of feed consumed per bird were affected ($P<0.05$) by the type of premix. Feed cost /kg gain was not significantly ($P>0.05$) influenced, the control (diet1) was the least economical in terms of economy of utilization. This may indicate that production of premix from locally sourced materials could result in higher profit margin for poultry farmers. The experimental diets had no significant ($P>0.05$) effects on carcass weight, dressing percentage, intestinal weight and intestinal length of the sacrificed birds.

Cite This Article as: Oyewole BO, OY Ganiyu and II Dafwang, 2014. Performance and carcass characteristics of broiler finishers fed on-farm premixes. Inter J Agri Biosci, 3(4): 158-160. www.ijagbio.com

INTRODUCTION

Most developing nations of the world including Nigeria continue to grapple with the challenge of low intake of protein from animal sources occasioned by the high cost of livestock products, which is mostly due to the high costs incurred in production. Livestock feed cost is one of those variables that have contributed to the high cost of production, especially of broilers. Broiler chickens remain one of the fastest sources of readily available animal protein for human consumption because of their rapid growth, when given good nutrition and management (Oyewole *et al*., 2013). The provision of vitamins and minerals through the inclusion of premix is critical in the nutrition of broilers. Hence Oyewole *et al*. (2013) opined that one of the ways of reducing the cost of poultry feed is by preparing vitamin-mineral premix from materials sourced locally. According to Aduku (1992), as critical as the presence of premix is in the ration of monogastric animals in enhancing their performance and well being, information on how to assemble premix is limited because such is the manufacturer's trade secret. Consequently, the evaluation of a number of premixes compounded from locally available ingredients relative to commercial premix became relevant.

Objective of the study

The study was to determine the effect of premixes prepared from locally sourced ingredients on the performance, carcass characteristics and economics of production of broiler finishers.

MATERIALS AND METHODS

The feeding trial was conducted at the Poultry Unit of the Department of Animal Production Teaching and Research Farm located at Kogi State University Anyigba. Anyigba is located between latitudes 7^0 15' - 7^0 29' N of the equator and longitudes 7^0 11' - 7^0 32'E of the Greenwich meridian (Ifatimehin *et al*., 2009).

Experimental diets

Poultry litter ash, *Moringa oleifera* leaf meal, wood ash, blood meal and scrap fish meal were used to prepare two different premixes (Oyewole *et al*., 2013). Five (5) broiler finisher diets (Table 1) were formulated such that

Diet 1 was the control containing the commercial premix. Diets 2 and 3 contained premix formulated with blood meal, fish meal, wood ash and *Moringa oleifera* leaf meal (premix 1), containing 2.3% and 4.6% of premix 1. Diets 4 and 5 had premix 2 prepared from blood meal, fish meal, poultry litter ash and contained 2.3% and 4.6% of premix 2 (Oyewole *et al*., 2013).

Experimental birds and management

One hundred and eighty five-week old broilers were used for the feeding trial. The birds were divided into five dietary groups of thirty-six birds. Each treatment/dietary group was further split into three (3) replicates of twelve (12) birds each. Experimental diets and water were supplied *ad libitum*. Birds in each treatment were weighed at the beginning of the study and on a weekly basis thereafter. Feed intake was determined by obtaining the difference between quantity of feed supplied and the leftover every week. The duration of the feeding trial was twenty one days. Performance indices that were computed include average daily feed intake per bird. The average daily intake per bird was obtained by dividing the weekly intake by 7 days and the number of birds. Average weight gain per bird was obtained by subtracting initial weight from final weight and then dividing by the product of the number of birds and the number of days of the feeding trial. Feed gain ratio or feed conversion ratio was computed by dividing the average daily intake by the average daily weight gain.

Economic analysis

The considered economic parameters were determined using prevailing market price of each of the feedstuffs at the time the experimental diets were formulated.

Carcass and organ evaluation

At the end of the feeding trial, one bird per replicate was randomly selected, weighed, tagged and starved overnight prior to slaughter. The birds were again weighed before being killed by severing the jugular vein and then allowed to bleed freely for 10minutes, scalded in hot water at 65^0C for 15seconds. Defeathering and evisceration were done manually. Measurements taken include carcass weight, neck weight, dressing percentage, gizzard weight, liver weight, heart weight and intestine length.

Data analysis

All data collected were analyzed using one-way analysis of variance (ANOVA) as outlined in the Minitab Statistical Software (Minitab, 1991).

RESULTS AND DISCUSSION

Table 2 summarizes the performance of the experimental birds. Feed intake was significantly (P<0.05) affected by the treatments. Birds on the control diet (commercial premix based) had higher feed intake. This may indicate that the diet was more acceptable and palatable than locally produced premix based diets, or perhaps the birds ate more to meet their needs for nutrients. Blood meal, a component of the locally produced premixes might also have resulted in depressed intake, due to reduced palatability, of the diets they were used to compound. Feed/gain ratio was significantly (P<0.05) influenced by treatments. The best value of 2.42 was obtained with birds on Diet 5 while the worst value of 4.01 was observed with birds on the control (diet 1). The observed values for feed-to-gain ratio reflect the ability of the birds to utilize the experimental diets. Daily weight gains for the five diets were not statistically different (P>0.05), although birds on the locally prepared premixes had daily weight gains that were numerically superior to that of control birds. Better performance observed with birds on locally prepared premixes might be explained by the observation of Oyewole *et al.* (2013), who said that the minerals and vitamins in the locally prepared premixes were more active due to their freshness, hence promoted better performance despite less feed consumption. Moreso, the dietary inclusion levels of the locally prepared premixes might also be responsible since the levels of individual nutrients in them were not determined. The feed cost/kg gain was higher (P<0.05) with the commercial premix. According to Oyewole *et al.* (2013), the lower cost for the locally prepared premixes despite higher dietary inclusion levels is an advantage because feed cost/kg is the determinant of how much profit accrues to the farmer after production and sales. The workers further opined that the reduction in feed cost/kg might indicate that preparing premix, using locally available materials can lower feed cost.

Table 1: Composition of Broiler Finishers Experimental Diets

Ingredients (%)	Diet 1	Diet 2	Diet 3	Diet 4	Diet 5
Maize	40.00	43.00	40.60	43.00	40.60
Fullfat soyabean	41.80	41.70	41.80	41.70	41.80
Maize offal	6.00	9.00	9.00	9.00	9.00
Cassava peel meal	8.00	0.00	0.00	0.00	0.00
Bone meal	3.50	3.50	3.50	3.50	3.50
Methionine	0.20	0.25	0.25	0.25	0.25
Common salt	0.25	0.25	0.25	0.25	0.25
Commercial premix	0.25	0.00	0.00	0.00	0.00
[1]Premix 1	0.00	2.30	4.60	0.00	0.00
[2]Premix 2	0.00	0.00	0.00	2.30	4.60
Total	100.00	100.00	100.00	100.00	100.00
*Calculated analysis					
Crude protein	20.55	20.75	20.56	20.75	20.56
Crude fibre	4.17	3.61	3.55	3.61	3.55
Ether extract	9.68	9.38	9.26	9.38	9.26

[1]Premix formulated with blood meal, fish meal, wood ash and *Moringa oleifera* leaf meal; [2]Premix formulated with blood meal, fish meal, poultry litter ash; *Without contribution from Premixes 1 and 2.

Carcass and organ characteristics of broilers

The carcass and organ characteristics of the experimental birds are presented in Table 3. The experimental diets had no significant (P>0.05) effects on carcass weight, dressing percentage, intestinal weight and intestinal length of the sacrificed birds. This is an indication that the locally prepared premix promoted similar development of these body parts. However, significant (P<0.05) differences were observed in liver

Table 2: Performance of Broiler Finishers Fed Locally Prepared Premix

Parameters	Diet 1	Diet 2	Diet 3	Diet 4	Diet 5	SEM	LOS
Initial body weight(g)	1070.00	1050.00	1050.00	1050.00	1050.00		
Final body weight(g)	1538.00^{d}	1681.00^{b}	1638.00^{c}	1676.00^{b}	1702.00^{a}	23.66	
Daily weight gain(g)	27.95	30.05	28.00	29.81	31.05	1.09	NS
Daily feed intake(g)	112.08^{a}	79.63^{b}	75.04^{c}	86.72^{b}	75.14^{c}	2.24	
Feed/gain ratio	4.01^{c}	2.65^{ab}	2.68^{ab}	2.91^{b}	2.42^{a}	0.15	
Feed cost/kg gain (₦)	283.00^{d}	189.00^{bc}	193.00^{bc}	208.00^{c}	142.00^{a}	10.65	

abcd = means on the same row followed by different superscripts differ significantly (P<0.05); NS=Not significant (P>0.05); SEM = Standard error of mean; LOS = Level of significant

Table 3: Carcass and OrganCharacteristics of Broilers Fed Locally Prepared Premix

Parameters	Diet 1	Diet 2	Diet 3	Diet 4	Diet 5	SEM	LOS
Live weight(kg)	1.63	1.77	1.63	1.73	1.90		
Carcass weight(kg)	1.06	1.06	1.15	1.10	1.27	0.06	NS
Dressing percentage (%)	65.14	60.27	70.33	64.00	67.00	2.95	NS
Neck (%LWT)	2.76^{a}	2.17^{b}	1.88^{c}	2.47^{a}	2.00^{b}	0.08	
Gizzard(%LWT)	2.38^{a}	1.62^{b}	1.00^{c}	1.10^{c}	0.72^{d}	0.22	
Liver weight (%LWT)	2.83^{a}	2.04^{bc}	2.98^{a}	1.27^{c}	1.79^{c}	0.21	
Liver (%LWT)	1.77^{a}	1.62^{ab}	1.27^{b}	1.02^{c}	0.63^{d}	0.18	
Heart (%LWT)	0.70^{a}	0.30^{b}	0.30^{b}	0.30^{b}	0.39^{b}	0.08	
Intestine weight (%LWT)	0.64	0.59	0.61	0.61	0.61	0.12	NS
Intestine length(cm)	172.00	169.00	172.00	190.00	189.00	10.58	NS

abc = means on the same row followed by different superscripts differ significantly (P<0.05); NS = Not significant (P>0.05); SEM = Standard error of mean; LOS = Level of significance; (%LWT) = Percentage of live weight

weight, neck weight, gizzard and heart weights, an indication that these organs responded differently to the different diets.

Conclusion

From the results obtained in this experiment the use of locally available materials to prepare expensive vitamin-mineral premix is viable and could lead to drastic reduction in the cost of poultry production. It is therefore strongly recommended that poultry farmers should prepare their own vitamin-mineral premix, using materials that are available in their area.

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