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Performance Characteristics of Cockerels Federal Different Commercial Feeds

B.A Ayanwale and E.A. Eyo
Department of Animal Production, Federal University of Technology,
P.M.B 65, Minna, Niger State, Nigeria

Abstract: An experiment was conducted for 8 weeks to investigate the performance of cockerels fed different commercial feeds from 8-16 weeks of age and also to examine the quality of the commercial feeds. A total of 240 Anak titan strain cockerels were used. They were raised on deep litter system using the open-sided wall poultry house prevalent in the tropics. The feeds were designated V_i, E_c, A_n and N_a to differentiate them. Feed and water were supplied *ad-libitum*. The results indicated that the commercial cockerel feeds varied in their nutrient composition and were grossly deficient in their supply of micro-nutrients. The different feeds supported the growth performance, carcass values and organ proportions of the cockerels differently due mainly to the differences in their composition. Feed, N_a with greater nutrient balance, higher protein and ash values promoted greater body weight, weight gain and nutrient utilization than others. It was recommended that cockerel diets with similar nutrient composition to that of N_a feed should be preferred to others.

Key words: Performance, characteristics, cockerels, commercial, feed

INTRODUCTION

Unlike broilers, commercial cockerel production in Nigeria, has suffered neglect in spite of the preference for tougher meat in some quarters. This is attributed to the dearth of scientific information especially in the areas of nutrition of feeding when these cockerels are intensively managed. The local cockerel producers have found comfort in the extensive system of management particularly after 4 weeks of intensive rearing.

Although, various factors contribute to profitability in poultry industry, none competes with the provision of high quality feed in the right quantity (Babatunde, 1987). In recent times, because of the scarcity of quality feed ingredients coupled with high demands for finished feeds, many commercial feed millers have formed the habit of substituting large quantities of low quality feed ingredients such as, rice offal, corn offal and ground corn cobs, for maize in order to reduce the cost of the finished feeds. This attitude certainly, tells on the quality of the available commercial feeds. Salami (1999) reviewed, the problems involved in deteriorating quality of commercial feeds. He attributed the problems first to the farmers, who usually adhere to the assumptions on the standard raw material specifications for feed formulation. Secondly, he blamed the problems on the feed millers who in their feed formulation, do not take serious cognisance of the chemical composition of the various feed ingredient substitutes. All these factors combined to give rise to poor and substandard commercial cockerel feeds found in our markets. The increasing cost of commercial feeds creates the obvious needs for these feeds to be tested with a view to determining the most suitable feed for commercial cockerel production in our environment. Consequently, this study was designed to evaluate the performance of cockerels fed four different commercial diets and to examine the quality of the feeds.

MATERIALS AND METHODS

Experimental cockerels: A total of 240 cockerels of Anak titan strain were used for this experiment. They were distributed into 4 treatment groups in 3 replicates of twenty birds per replicate. Initial body weights were recorded from where the mean body weight for each replicate was calculated and recorded. Subsequent weighing was done on weekly basis. The trial period lasted for 8 weeks, that is, from 8-16 weeks of age.

Experimental location: The experiment was carried out in Minna, Niger State, Nigeria. Minna is situated on latitude 9.37° North and Longitude 6.33° East. The town enjoys a mean annual rainfall of 1300 mm. The peak temperature of 40°C occurs in February-Marh and the temperature hardly falls below 22°C.

Corresponding Author: B.A. Ayanwale, Department of Animal Production, Federal University of Technology, P.M.B 65, Minna, Niger State, Nigeria

Table 1: Proximate Composition of the different commercial feeds fed to the cockerels

Feeds	Dry matter	Crude protein	Crude fiber	Ether extract	Ash	Nitrogen free extract
Vi	90.80	14.14	9.00	10.00	13.30	44.36
Ec	93.40	14.25	12.00	15.00	13.70	38.45
An	89.60	15.41	15.00	6.10	18.30	34.79
Na	90.40	15.81	9.00	4.30	14.00	47.27

Table 2: Mean micro-nutrient concentration in the feeds (ppm)

	Experimental commercial feeds				
Nutrients (ppm)	Vi	Ec	An	Na	NRC
Copper (Cu)	0.011	0.109	0.027	0.019	3.50
Iron (Fe)	0.100	0.175	0.152	0.103	80.00
Manganese (Mn)	0.105	0.092	0.093	0.092	25.100
Magnesium (Mg)	59.337	59.87	74.45	59.38	300.00
Zinc (Zn)	0.267	0.297	0.273	0.264	50.00
Iodine (Io)	47.90	13.50	13.40	13.50	40.00
Selenium (Se)	0.00	0.00	0.00	0.00	0.00
Cobalt (Co)	0.00	0.00	0.00	0.00	0.00

* NRC requirement source, Payne (1990), * Table source, Ayanwale and Gado (2001)

Table 3: Performance characteristics of cockerels fed four different commercial feeds

Parameters	V_i	E_c	A_n	N_a
Initian body weight (g bird^{-1})	546.67±40.72	583.33±38.19	525.00±0.00	573.33±50.08
Final body weight (g bird^{-1})	1220.00^{c}±13.23	1375.00^{b}±17.32	1490.00^{ab}±13.23	1645.00^{a}±120.31
Body weight gain (g bird^{-1})	673.33^{c}±36.86	791.67^{b}±44.82	965.00^{ab}±13.23	971.67^{a}±70.95
Mean feed intake (g bird^{-1})	814.42^{a}±27.11	804.08^{b}±16.57	6197.88^{a}±37.23	998.33^{a}±16.45
Feed conversion efficiency	1.21^{a}±0.07	1.02^{b}±0.08	1.03^{b}±0.04	1.03^{b}±0.04
Protein efficiency ration	0.73^{b}±0.00	0.95^{a}±0.03	1.098^{a} ±0.03	1.07^{a}±07

a,b; means with different superscripts are significantly ($p<0.05$) different

Table 4: Apparent nutrient digestibility of cockerels fed different commercial feeds

Feeds	Dry matter	Crude protein	Crude fiber	Ether extract	Ash	Nitrogen free extract
Vi	58.07^{ab}±0.06	86.36±3.46	11.87±5.31	81.03^{a}±2.48	73.33±2.52	51.70±1.14
Ec	59.60^{a}±0.17	89.40±2.60	11.85±12.64	81.03^{a}±3.00	71.73±4.69	54.20±2.62
An	57.00^{b}±0.17	86.73±3.47	26.20±10.41	71.20^{b}±4.16	73.73	51.80±1.23
Na	58.00^{ab}±0.20	89.17±4.23	16.07±11.44	74.97^{b}±5.31	73.33±3.47	53.30±1.41

a,b,c means with different superscripts are significantly ($p<0.05$) different

Management of the cockerels: The cockerels were raised on a deep litter system. Feed and water were supplied *ad-libitum*. The litter materials used were wood shavings. The cockerels were vaccinated against New castle disease. Medications were also provided against both gram negative and gram positive bacteria using a broad spectrum antibiotics. Both intestinal and coecal coccidiosis were taken care of on bi-weekly basis.

Feeds and feeding: Four different commercial feeds, readily available in the locality, were purchased and designated V_i, E_c, A_n and N_a respectively for ease of identification. They were given these experimental feeds from 8 weeks of age. The feeding of the diets lasted for additional 8 weeks when the cockerels have reached appreciable weights, that are acceptable in the market.

Chemical analysis: The different feeds and the faecal samples were analysed according to A.O.A.C. (2000) methods to determine their levels of Crude Protein (CP) Crude Fibre (CF) Ether Extracts (EE), ash and Nitrogen Free Extracts (NFE). The absorbance of copper, iron, manganese, magnesium, zinc, cobalt and selenium was measured by Atomic Absorption Spectrophotometer (AAS). Iodine was analysed using Elinslie-Caldwell methods as described by AOAC. (2000). The results of the Chemical analysis are presented in Table 1 and 2.

Digestibility trial: At 16 weeks of age, two cockerels per replicate were taken and put in the metabolic cage for nutrient digestibility studies. They were allowed 5 days acclimatization period before faecal collection commenced. Total collection method (Longe, 1980) was used. The collected faeces were then oven-dried at 80°C until a constant weight was obtained for each sample. Faecal collection lasted for another 5 days. After oven-drying, the collections for each sample were bucked together, stored in an air-tight container and used for chemical analysis.

Grinding of the samples was done using a mortar and pestle. The nutrient digestibility for each nutrient was then calculated using the chemical analysis of the feeds and the faeces results. The results of the apparent nutrient digestibility are presented in Table 4.

Table 5: Carcass characteristics of cockerels fed different commercial feeds

	Parameters					
Feeds	Live weight (kg)	Slaughter weight (%)	Dressed weight (%)	Eviscerated weight (%)	Breast (%)	Drumstick (%)
Vi	$1.35^{b}\pm0.03$	$94.25^{b}\pm0.13$	$92.59^{c}\pm0.07$	$72.64^{b}\pm0.00$	$10.36^{b}\pm0.51$	$9.32^{b}\pm0.42$
Ec	$1.40^{b}\pm0.00$	$96.43^{a}\pm0.00$	$92.86^{c}\pm0.00$	$68.92^{b}\pm0.68$	$10.60^{b}\pm0.13$	$9.61^{b}\pm0.51$
An	$1.47^{b}\pm0.07$	$94.35^{b}\pm1.07$	$93.37^{b}\pm0.03$	$76.71^{a}\pm0.42$	$13.16^{a}\pm0.57$	$10.87^{ab}\pm0.40$
Na	$1.60^{a}\pm0.00$	$97.60^{a}\pm0.45$	$94.85^{a}\pm00.03$	$77.83^{a}\pm0.59$	$13.42^{a}\pm0.59$	$11.36^{a}\pm0.59$

a,b,c; means with different superscripts are significantly ($p<0.05$) different

Table 6: Organ proportions of cockerels fed different commercial feeds (%)

Feeds	Live	Heart	Kidney	Intestine	Gizzard	Crop	Abdom--inal fat
Vi	$2.12^{b}\pm0.16$	0.52 ± 0.02	0.43 ± 0.36	6.85 ± 0.55	3.55 ± 0.28	$2.57^{b}\pm0.36$	$0.31^{b}\pm0.07$
Ec	$2.22^{b}\pm0.07$	$0.052^{a}\pm0.05$	0.36 ± 0.01	7.25 ± 0.39	3.85 ± 0.08	2.68 ± 0.23	$1.38^{a}\pm0.31$
An	$2.85^{b}\pm0.23$	0.54 ± 0.06	0.32 ± 0.07	6.12 ± 0.43	3.66 ± 0.20	2.41 ± 1.13	$0.23^{b}\pm0.01$
Na	$3.14^{a}\pm0.18$	0.57 ± 0.02	0.43 ± 00.02	6.51 ± 0.60	3.93 ± 0.25	1.34 ± 0.52	0.19 ± 0.08

a,b: means with different superscripts are significantly ($p<0.05$) different

Carcase evaluation: At the end of the trial, two cockerels, medium size, per replicate were taken, fasted over night and then slaughtered. Slaughtering was done manually using a sharp knife and by severing the jugular vein of the birds. Feather removal was done after scalding in warm water for about 120 sec. Each of the cockerels were then manually cut into their different parts and weighed with sensitive electronic balance. Cautions were taken to ensure minimal errors by seeing that the cuttings were done by one and the same person. The organs were also separated, weighed and expressed as the percentage of the respective live weights of each cockerel. Dressed and eviscerated weights were also determined. Eviscerated weight was taken as the weight of the carcass excluding the weights of the intestines and the organs. Dressed weight was taken as the eviscerated weight excluding the weights of the head and the shank. The wings were taken as part of the dressed weight as they are usually consumed in this part of the world. The carcass evaluation results and the organ proportions are shown in Table 5 and 6, respectively.

Data analysis: The data collected were subjected to Analysis of Variance (ANOVA) by the methods of Gomez and Gomez (1984) and the means were separated where there were statistically significant ($p<0.05$) differences by methods of Duncan (1955).

RESULTS AND DISCUSSION

The results of the proximate analysis (Table 1) shows that the dry matter contents of the feeds were within the normal range of 88-90% (Church and Pond, 1982) in all the feeds. A_n and N_a feeds had higher Crude Protein (CP) and ash than the V_i and E_c feeds. V_i and E_c feeds contained higher ether extract than A_n and N_a. The mean micro-nutrient requirements shown in Table 2 indicates that the supplies of these micro-nutrients from the feeds are below the National Research Council (NRC) requirements as pointed out by Ayanwale and Gado (2001).

The performance characteristics shown in Table 3 indicate that cockerels fed N_a feed significantly ($p<0.05$) had higher body weight, weight gain and feed intake than the cockerels given V_i and E_C feeds. V_i cockerels also had significantly ($p<0.05$) poorer feed conversion efficiency and protein efficiency ratio compared to the cockerels fed on other feeds. The better live-weight (1645.00±70.95) observed in cockerels fed N_a feeds compared to cockerels on E_c and V_i could be attributed to higher crude protein and NFE of the diets, although the CP levels of all the diets were below the recommended levels for the Tropics (Babatunde and Fetuga, 1976).

The CP and NFE of the V_i and E_c feeds were poorer. The low EE (4.30%) in N_a feed might have been compensated for by its higher NFE (47.27), which is a measure of the carbohydrate in the feed. Growth in birds requires protein or fat as tissue deposits which are more amply supplied by N_a feed than V_i and E_c feeds.

The poor performance of cockerels on V_i feeds could be due partly to their poor feed conversion efficiency and poor Protein Efficiency Ratio (PER) resulting from inadequate protein and feed intake. One of the factors affecting growth rate in birds is feed intake Pym and Farrell, 1977; Church and Pond, 1982). Protein is metabolised for production of energy less economically as a dietary constituent. So, a restriction in the energy value of the diet or inadequate feed energy intake can therefore be associated with an increased catabolism of labile protein in an effort of the animal to correct the caloric deficiency. A combination of these factors might be the cause of the poor performance of the Vi cockerels.

The apparent nutrient digestibility results (Table 4) indicate no significant ($p>0.05$) differences in crude protein, crude fibre, nitrogen free extract digestibilities and ash (mineral) availability of the feeds. However, Dry Matter (DM) and ether extract digestibilities were best in Ec and Vi feeds, DM digestibility of Ec cockerels was similar to those of N_a cockerels and was least in A_n. The high nutrient digestibility of Vi cockerels did not reflect in their final body weight and weight gain, which were comparably low. This is due to their poor feed conversion efficiency which was found to be significantly ($p<0.05$) poorer than in other groups. The low Protein Efficiency Ratio (PER) in Vi could also be a contributory factor due to nutrient imbalance.

Table 5 and 6 show the results of the carcass evaluation and organ proportions of the cockerels. Cockerels fed on N_a feeds had significantly ($p<0.05$) higher live weight, slaughter weight, dressed weight, eviscerated weight, breast and drumstick proportions compared to Ec and Vi cockerels.

The liver proportion was also significantly ($p<0.05$) bigger in N_a than in Vi and Ec. The high abdominal fat proportion of cockerels fed Ec feed is an indication of high carcass fatness (Sonaiya, 1985; Ayanwale, 1992) resulting from nutrient imbalance and poor nutrient utilization.

CONCLUSION

The different commercial feeds affected the performance of the cockerels differently due largely to the differences in the composition of the feeds. N_a feed was found to be superior in terms of body weight, gain, carcass characteristic and organ proportions while Ec and Vi feeds were superior in terms of DM and EE digestibility which were not translated to superior performance due probably to nutrient imbalance and poor nutrient utilization by the cockerels. For optimum cockerel production, producers are advised to use feeds similar in composition to the N_a feed.

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