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GROWTH PERFORMANCE AND CARCASS QUALITY OF BROILER CHICKENS AS INFLUENCED BY PROPRIETARY SOURCE OF FEED

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ABSTRACT

This study investigated the quality of selected popular poultry feeds available in Nigerian poultry feed market, using growth performance and carcass quality of broiler chickens as indices. Day old broiler chicks were fed with diets obtained from four different commercial feed manufacturers (coded FTE,GFE,PFE and SFE to protect the manufacturers) and control diet (formulated in conformity with recommended nutrient requirements for broiler chickens) over an eight week trial period . There were significant differences ($P<0.05$) in crude protein, fat and fibre contents of feeds. Crude protein contents of the commercial feeds were found to be below the recomendation level. In some of the feeds the crude fat and fibre contents were higher than the standard levels. The variation in feed quality resulted in reduced feed intake, lower average daily live weight gain, higher feed: gain ratio and lower nutrient retention (protein, fat, fibre) in broilers fed commercial diets when compared with birds on control diet. Live and carcass weight of birds placed on commercial diets FTE, PFE and SFE were significantly lower ($P<0.05$) than those placed on control diet. Since live and carcass weights of birds are the two major price indices in broiler chicken market, it was therefore concluded that most of the commercial feeds in Nigerian market were substandard.

Key Words: Broiler Chicken, Source of Feeds, Preformance, Carcass Quality
Short Title: Proprietary Source of Feed And Performance of Broilers

INTRODUCTION

The problems of livestock production in Nigeria have always been attributed to the cost and quality of livestock feeds. For birds to perform optimally in terms of lean meat or egg production they must be given good quality feed containinig feed ingredients that will meet the animals' nutrient and physical needs when consumed in adequate quantities (Orr and Hunt, 1984). The inclusion level of the essential ingredents in livestocks feeds must meet the recommended standard (NRC, 1984). Poor quality feeds will lead to weight loss, reduced fertility, slow growth rate, susceptability to diseases and even death of the animal (Church, 1977).

The commercial feed-millers argue that they are best equipped to handle everything pertaining to feed milling. They claimed to have the resources to stock

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new materials in large quantities and the machinery to manufacture good quality feeds on a large scale, have effective distribution system and that the farmers need not bother themselves about sourcing for feed ingredients and compound feeds (Ijalana, 1998). Although commercial feedmilling started in Nigeria with the opening of the first commercial feedmill by Livestock Feed Plc at Ikeja in 1963 (Oyediji, 1996), the quality of poultry feeds available in the Nigeria market today is questionable. In most cases, the performances claimed by the manufacturers are never obtained by poultry farmers. It is therefore doubtful if some of the manufacturers have quality control units for routine checks on the nutrient content and quality attribute to their products. There is therefore need for a broad based confirmation of this observation. This study was hence designed to evaluate the quality of selected popular poultry feeds available in Nigerian poultry feed market using the performance and carcass quality of broiler chickens as indices.

MATERIALS AND METHODS

One hundred and twenty day-old broiler chicks were randomly allocated to five treatment groups, housed in an electrically heated battery brooder and fed starter feeds from five different sources (coded PFE,TFE,GFE and SFE to protect the manufacturers). Diet CFE was control diet formulated in conformity with the recommended nutrient requirement for broiler birds in a tropical environment (Balogun *et al.*, 1995). Diets PFE, TFE, GFE, and SFE were popular commercial feeds available in the market. Each treatment consisted of 24 birds (eight birds per three replications). The birds were fed broiler starter rations for the first four weeks, followed by finisher rations during the remaining four weeks of the eight week trial period. The diets and water were supplied *ad libitum* and all necessary vaccination programmes were carried out during the trial period.

Average feed intake and live weight gains were measured weekly for each replicate and feed: gain ratios were then computed from the data obtained from average feed intake and live weight gain. Nutrient retention values for protein, fat and fibre were determined three weeks after the start of the trial. Known weight of feed were supplied and faecal samples collected over a 72h period using the total collection procedure. The faecal samples were oven-dried at 70^{0}C weighed and ground before chemical analysis.

At the end of the feeding trial, three birds per treatment were randomly selected and starved for 12 h (Joseph *et al.*, 1996a). The body weights of the birds were then recorded before slaughtered which was by severing of the carotid artries and jugular veins. Each slaughtered bird was dipped in scalding water for one minute before defeathering. The defeatherd birds were weighed, dissected, and all internal organs and abdominal fat were carefully removed, after which the carcass was weighed to obtain eviscerated weight and dressing-out percentage computed on live weight. The weights of head, gizzard, liver, kidney, heart and drumsticks were also taken. Each eviscerated carcass was split into two equal longitudinal halves. Half a carcass was weighed and carefully dissected into fat, bone and muscles (lean meat). The muscle, fat and bones were then weighed separately and percentage muscle, fat and bone computed as carcass weight (Joseph and Abolaji, 1997).

Analytical procedures

pH readings were taken 24h (chilled meat) post-mortern by inserting the electrodes (Standard Kent El 7020 pH meter) into the thigh muscles. Dry matter, fat, crude protein, fibre and ash contents were determined as described by A.O.A.C (1980). Water holding capacity of the muscles was assessed using the filter press method described by McDougall and Disney (1967). Cooking losses were determined by comparing weight of meat before and after 18 minutes of broiling (Joseph *et al.*, 1996b).

Data collected were subjected to analysis of variance using the model for a completely randomised design. The least significant differences between sample means were determined by Duncan's Multiple Range Test (Duncan, 1955).

RESULTS

The percentage crude protein, fat and fibre contents on the labels, analysed data of commercial diets (starter and finisher) and the control diet are shown in Table 1. The analysed crude protein contents of commercial broiler starter feeds were lower (P<0.05), than that of the control diet. The crude protein contents of GFE and PFE were above 20 % but significantly different (P<0.05) from each other while crude protein contents of SFE and TFE were below 20 %.There were similar variations in broiler finisher's crude protein contents. PFE broiler finisher diet had higher (P<0.05) crude protein content than the other diets which were similar with the control with the exception of GFE which was the lowest (P<0.05).

Table 1: Percentage nutrient composition of experiental diets

	Proprietary source of Feed								
	Control	TFE		GFE		PFE		SFE	
Nutrient	(CFE)	Label	Analysed	Label	analysed	Label	Analysed	Label	Analysed
(a) Broiler starter									
DM(%)	94.32	NA	94.19	NA	94.12	NA	94.03	NA	94.22
CP(%)	22.60^{a}	20.0	19.75^{cd}	21.0	21.20^{b}	21.0	20.10^{c}	20.00	18.80^{d}
Fat (%)	3.60^{c}	3.00	3.50^{c}	7.00	6.50^{a}	3.50	4.00^{c}	4.50	5.00^{b}
Fibre (%)	3.50^{c}	5.50	6.50^{a}	4.40	4.00^{c}	5.00	5.50^{b}	5.50	5.00^{b}
Ash(%)	2.21	NA	2.43	NA	2.37	NA	2.46	NA	2.48
NFE(%)	62.41	NA	63.01	NA	59.65	NA	61.97	NA	62.94
(b) Broiler finisher									
CP(%)	18.20^{b}	18.00	17.50^{bc}	19.0	16.60^{c}	18.00	19.30^{a}	18.00	18.20^{b}
Fat(%)	3.60^{bc}	3.00	3.50^{bc}	5.00^{a}	5.00^{a}	3.50	4.00^{b}	3.50	3.00^{c}
Ash(%)	2.48	NA	2.47	NA	2.46	NA	2.48	NA	2.27
NFE(%)	66.13	NA	64.9₄	NA	64.95	NA	62.85	NA	6320

Different superscripts within a row indicate significant difference (P<0.05)
NA= Not available

The crude fat content (Ether extract) of the control, TFE, PFE for the broiler starter diets were not significantly different, but GFE diet had higher (P<0.05) fat content that the rest of the diets. Also the crude fat content of the finisher diets of control, TFE, PFE, and SFE were not significantly diffferent but the fat content of GFE diet was higher (P<0.05).

The crude fibre content of the starter diet of TFE was higher (P<0.05) than PFE and SFE while PFE and SFE had higher (P<0.05) crude fibre contents than control and GFE. There were wide variations in fibre contents of the finisher diets; SFE had the highest, followed by TFE, PFE GFE and control in that order.

There was no significant difference in average daily feed intake of birds on control, GFE and PFE diets (Table 2). But birds fed TFE and SFE had lower (P<0.05) feed intake. The lowest (P<0.05) feed intake was recorded in birds fed SFE diet. The highest (P>0.05) average live weight gain was recorded in birds placed on control and GFE diets followed by birds on PFE, TFE and SFE diets in that order. There was no significant difference in feed: gain ratio of all the diets.

TABLE 2: Effects of different feeds on performance of broilers chickens

	Sources of Feed				
Parameters	Control	TFE	GFE	PFE	SFE
Ave. daily feed intake(g)	76.88^{a}	71.42^{b}	77.63^{a}	71.69^{b}	66.38^{c}
Ave.daily live wt. gain(g)	26.25^{a}	24.11^{b}	25.54^{b}	24.46^{b}	22.32^{c}
Feed: Gain ratio	2.93	2.96	3.04	2.93	2.97
Protein Retention(%)	64.47^{a}	62.80^{a}	59.90^{b}	63.03^{a}	60.53^{b}
Fat Retention(%)	65.40^{a}	60.50^{c}	60.27^{c}	63.60^{b}	61.60^{c}
Fibre Retention(%)	44.20	42.63	41.53	43.67	41.63
Mortality (%)	4.20	0.00	12.50	0.00	4.20

Different superscripts within a row indicate significant difference (P<0.05)

All the diets had protein retention close to 60% (Table 2). The protein retention of birds placed on control, TFE and PFE diets were not significantly different but they were higher than those of birds fed SFE and GFE diets. Fat retention of birds placed on any of the diets was above 60%. There was no significant difference between fat retention of birds placed on TFE, GFE and SFE diets . Birds placed on PFE had higher (P<0.05) fat retention than birds placed on TFE, GFE and SFE diets but lower (P<0.05) than that of control diet. Fibre retenton of birds placed on TFE diet was lower than those placed on control and PFE diets but higher (P<0.05) than those of SFE and GFE diets. Mortality did not follow any pattern and was within a tolerable level.

Table 3 shows the effect of the diet obtained from different sources on carcass characteristics of broiler chickens. There was no significant difference between the live weight and carcass weight of birds fed control and GFE diets. Although the values were lower (P<0.05) than those of control and GFE there was also no significant difference between the live weight and carcass weight of birds fed

Table 3: Effects of different feeds on carcass characteristics of broilers

	Source of feed				
Parameters	Control	TFE	GFE	PFE	SFE
Live wt (kg)	1.47[a]	1.35[b]	1.43[a]	1.37[b]	1.25[c]
Carcass wt. (kg)	1.00[a]	0.95[b]	1.05[a]	0.98[b]	0.87[c]
Dressing out (%)*	68.03	70.00	73.43	71.53	69.60
Head (%)*	3.09	3.25	3.33	3.14	2.97
Gizzard (%)*	2.33	2.15	2.43	2.39	2.29
Liver (%)*	1.58	1.65	1.69	1.81	1.72
Kidney (%)*	0.56	0.69	0.64	0.59	0.70
Heart (%)*	0.65	0.75	0.71	0.66	0.69
Drumstick (%)*	12.10	10.89	10.95	11.04	11.34
Muscle (%)**	63.82	62.59	60.08	63.63	62.80
Bone (%)*	28.91	31.63	35.29	30.29	31.86
Fat (%)*	4.63[a]	4.05[b]	3.09[c]	4.51[a]	4.08[b]
Ultimate pH	5.61	5.70	5.65	5.59	5.63
Cooking Losses (%)	33.15	33.03	32.95	34.32	32.88

* Percentages computed as a ratio of live weight
** Percentages computed as a ratio of carcass weight
Different superscripts on means within a row indicate significant difference ($P<0.05$)

TFE and PFE. The dressing out percentage, percentage weights of head, internal organs (gizzard, liver, kidney, heart) drumstick, muscle (lean meat) and bone of the birds placed on the different diets were not significantly different. The ultimate pH and cooking losses of meat obtained from the carcass of the birds fed the different diets were also not significantly different.

DISCUSSION

These results show that the feeds available in Nigeria market vary in nutrient composition (Table 1). It also shows that the actual crude protein contents are lower than the recommended levels for a tropical environment (NRC, 1984; Balogun *et al.*, 1993). For instance, the recommended avarage protein requirement for broiler starters and finishers in a tropical environment was put at 22 % and 18% respectively (Balogun *et al.*, 1993) while NRC (1984) recommended 23% (starter) and 20% (finisher). The crude fat contents of some of the feeds were also on the high side. For example the crude fat content of GFE diet was 6.50% (for starter) while that of SFE was 5.0% (Starter). Ideally the crude fat content of broiler diets should be about 3.6% (Summers and Lesson, 1985). The same trend was observed for crude fibre content which should be less than 5.0% (Summers and Lesson, 1985). These variations in nutrient contents of commercial feeds available in the Nigerian market could be attributed to high cost and scarcity of conventional feed ingredents like fishmeal, soya bean meal and maize. The feed millers therefore try to use all sort of alternative feed ingredients to compund commercial feeds.

The consequences of the variation in nutrient composition and quality of feeds were reflected in reduced feed intake of birds, low average daily live weight gain, high feed: gain ratio and low nutrient retention (Table 2), which indicates poor efficiency of feed utilisation. The effect was also evident in the reduced live weight and carcass weight of birds (Table 3) which are the major indices of price in a broiler chicken market. Although vitamin assay of the feeds was not carried out it was realised that variation in vitamin content could have accounted for the results obtained in this study.

CONCLUSION

From the result of this work, it is apparent that some of the popular commercial feeds in the market are substandard. There is therefore an urgent need to protect the poultry farmers who out of frustration have resorted to compounding thier own feeds, by:

I making it compulsory for all commercial feedmillers to have quality control unit for routine check of their products.

II establishing a department of feed quality control under the Ministry of Agriculture to routinely monitor and assess the quality of commercial feeds.

III establishing an agency or office where poultry farmers can register their complaints against feedmillers and claim damages. This agency should also be able to sanction dishonest feed manufacturers in the market.

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