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Dietary Inclusion Rate of Cocoa Husk for Starter Cockerels

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Abstract: Growth performance and economics of production were measured to assess the dietary inclusion rate of cocoa husk for starter cockerels. The study involved 156, 2-week-old cockerels which were reared for 6 weeks on four diets incorporating 0, 10, 15 and 20% cocoa husk meal (CHM) at the expense of maize. Body weight gain and feed conversion were depressed beyond the 10% CHM level. Although cost of feed consumed decreased across treatments, feed cost/kg body weight gain was reduced beyond the 10% CHM level. Ten percent dietary inclusion of CHM appears optimal in cockerel starter diets since beyond this level, growth performance and monetary gains are sacrificed.

Key Words: Cocoa husk meal, cockerel growth performance, economics of production

Introduction

Several studies on the diet of broiler chicks, broiler finisher chickens, growing pullets and laying hens have established the inclusion rate of cocoa husk meal (CHM) in these poultry rations. Ten percent dietary CHM mainly at the expense of maize was found suitable in broiler starter and finisher rations (Atuahene *et al.,* 1985; Sobamiwa and Longe, 1999).

Five to twenty percent dietary CHM supported good egg production performance (Osei *et al.*, 1991; Sobamiwa, 1998). Feeding up to 20% CHM in substitution for maize to growing pullets between 10 and 20 weeks of age did not influence subsequent laying performance (Sobamiwa and Akinwale, 1999; Olubamiwa, 2000).

While so much has been reported on CHM in the diets of broiler, pullets and layers, there is a dearth of information on CHM in cockerel starter rations. The knowledge that will accrue from a study on cockerel starter diets to a major cocoa growing country like Nigeria will be invaluable. There are two main reasons for this. First is the escalating cost and scarcity of maize hence a need to source for cheaper and locally available feed ingredients as alternatives to this cereal grain which makes up 50 - 60% of most commercial poultry feeds in the country. Secondly, most cockerel producers in the country intensively rear hundreds of the birds for the first 6 to 8 weeks before selling to small - holders who rear them to market weight as backyard poultry. The present study was therefore conducted to assess the optimal inclusion rate of CHM in cockerel starter diets.

Materials and Methods

Freshly broken cocoa-pod husks were collected from the Fermentary Unit, Cocoa Research Institute of Nigeria, Ibadan. Processing and sun - drying of the husks were as previously described (Sobamiwa, 1998). Two hundred day-old Nera cockerels were purchased for the experiment from CHI Farm, Ibadan, a reputable poultry enterprise. The birds were batch-reared on deep litter for 2 weeks. At 2 weeks of age, the extremely heavier birds, the runts and unthrifty ones were culled leaving a total of 156 middle - weight range and healthy birds. This was done to lower experimental errors since poor health and poor growth potential lower bird performance. The rest were randomly allocated among 4 dietary treatments containing 0, 10, 15 and 20% CHM mainly at the expense of maize (Table 1).

The birds were kept 13 per deep litter pen. Each pen represented a replicate, three of which were randomly assigned to each dietary treatment. The diets were isonitrogenous containing 22% crude protein. Feed

Table 1: Composition of Cocoa Husk-based Cockerel Starter Diets (%)

Ingredient	1	2	3	4
Cocoa husk meal	-	10.00	15.00	20.00
Maize	40.00	30.00	25.00	20.00
Full fat soya	19.00	20.90	21.75	22.65
Wheat bran	35.00	33.10	32.25	31.35
Common ingredients*	6.00	6.00	6.00	6.00
Total	100.00	100.00	100.00	100.00
Calculated Value (%)				
Crude Protein	18.05	18.07	18.06	18.06
Crude Fibre	5.12	7.07	8.06	9.02
ME (Kcal/kg)	2958	2540	2490	2434

*contained (%): 2.00 Fish meal; 2.50 bone meal; 1.00 oyster shell 0.25 salt (Nacl) and 0.25 vitamin-mineral premix.**

**vitamin/mineral premix (content/kg): vit. A., 5,000,000 i.u., vit. D3, 1,000,000 i.u., vit. E, 16g; vit. K3, 1g; vit. B1, 0.8g; vit. B2, 2.4g; Nicotinic acid, 14g; Calcium D-pantothenate, 4g; vit.B6, 1.4g; vit.B12, 10mg; Folic acid, 0.4g; Biotin, 0.02g; Chloride, 12g; Zinc Bacitrazine, 16g; Mn. 10g; Fe. 20g; Zn, 18g; Cu, 0.8g; Iodine, 0.62g; Cobalt, 0.09g; Selenium, 0.05g.

Table 2: Growth Performance and Economics of Cockerels Fed Cocoa husk-based starter diets

	%Cocoa Husk Meal				
Parameter	0	10	15	20	SEM
Feed Intake (g)*	1282.50	1239.71	1264.86	1267.12	14.24
Weight gain (g)*	423.97^{a}	381.38^{ab}	339.80^{b}	331.05^{b}	18.41
Feed conversion	3.03^{c}	3.25^{bc}	3.72^{ab}	3.83^{a}	0.17
Feed cost (N/kg)**	21.39	19.53	18.59	17.65	-
Cost of feed consumed (N)**	27.43	24.21	23.51	22.36	-
Feed cost/kg gain (N)**	64.70	63.48	69.19	67.54	-

*Amount per bird for 6 weeks (week 3 through week 8) ; ^{abc} Mean in the same row with different superscripts differ significantly (p<0.05). ** Data for the economic analysis were not statistically analysed.

intake was measured weekly. Weight gain was taken as the difference between the weight at the end and start of trial. Data were evaluated by the analysis of variance (ANOVA) (Steel and Torrie, 1980). Differences among means were assessed by the Duncan Multiple Range Test (Gomez and Gomez, 1985).

Results and Discussion

The growth performance and economics of production of the cockerels are shown on Table 2. The 10% CHM diet (CHMD) effected similar (p> 0.05) weight gain and feed conversion ratio (FCR) as the control (0% CHMD). The higher levels of CHM depressed (p < 0.05) both parameters. Though cost of feed consumed increased across treatments, feed cost/kg weight gain was reduced beyond the 10% CHM level.

Two major factors may have mediated the biological responses. These are the crude fibre content which increased and the energy content which decreased as dietary CHM level increased (Table 1). Since poultry birds do not have the full complement of enzymes which could digest dietary fibre, it is apparent that as CHM replaced maize and dietary fibre increased, utilization efficiency was lowered. Also, dietary fibre is known as an energy diluent; energy on the other hand is a dietary component which has been established to have a high positive correlation with body weight gains in young growing birds (Howlider and Rose, 1992; Lott *et al.,* 1992; Gonzalez-A and Pesti, 1993).

These results suggest 10% as the optimal biological level for CHM in diets of starter cockerels which accords with the level that has been established for the broiler starter chick (Sobamiwa, 1999; Olubamiwa and Longe, 1999). This trend contradicts reports on the growing pullet and the laying hen, either of which could suitably utilize up to 20% dietary CHM (Sobamiwa, 1998; Sobamiwa and Akinwale, 1999; Olubamiwa 2000).

This discrepancy between the young birds (broiler and cockerel starter chicks) and the relatively older ones (pullets and layers) are in accordance with the observations of other workers that increasing age of poultry enhances fibre utilization. Almirall *et al.* (1995) noted that viscosity, a factor of soluble dietary fibre, is more limiting with broiler chicks than in cocks. Farrel (1994) found that laying hens can tolerate higher levels of rice bran (a fibrous feed-stuff) than broiler chickens. Warren and Farrel (1990) observed lowered metabolizable energy value of full fat rice bran, for broiler chicken than for adult cockerel.

The critical factor in the economic assessment of the results of the present study is the feed cost/kg body weight gain which is a measure of the economic efficiency of utilization of the diets. The trends of the parameter concur with those of weight gain and FCR of the birds, being similar (p>0.05) on the control and 10% CHMD.

The data of the feed cost/kg body weight gain in this study blend with those of FCR to indicate that the optimal biological and economical level of CHM in cockerel starter diet is 10%, since beyond this level, growth performance and expected monetary gains are sacrificed.

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