Cocoa Husk /Cassava Leaf Inclusions in Layers Mash Produced Quality Cheap Feeds

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Summary

A 10-week trial was conducted to investigate the effects of cocoa husk meal (CHM)/ cassava leaf meal (CLM) mixtures in layers mash on laying hen production performance and egg quality. Results were compared with those obtained using two locally popular standard commercial feeds (CFDs). CHM/CLM mixtures were included in the two test diets in the following order: Diet 1 (7.3 CHM/ 2.7% CLM) and Diet 2 (14.6 CHM/5.4 CLM). Forty 6-month-in-lay individually caged Black Nera hens were randomly allocated to the four diets. Feeding was ad libitum

Feed intake, egg weight and percentage egg production were reduced (P< 0.05) on Diet 2 relative to the CFDs. The reduction in egg weight was however marginal while the values were in line with the 56-58 g in the literature. Similarly, the value of 65% percent egg production was considered not poor. Feed efficiency, yolk colour index, shell thickness and yolk percentage were not influenced by diet. On average, feed cost of the CHM/CLM diets were 60% of those of the CFDs while the feed cost/kg egg was roughly doubled on the latter. It was concluded that the inclusion of CHM/CLM in layers mash promises to be a very economically rewarding venture where the two farm by-products are available.

Résumé

Incorporation de noix de coco/feuilles de manioc dans la fabrication à bon marché d'aliments composés de qualité pour pondeuses

Un essai de 10 semaines a été mené pour étudier les effets des rations contenant un mélange de farine de la gousse de cacao (RGC) et des feuilles de manioc (RFM) sur les performances de production des poules pondeuses et la qualité des oeufs. Les résultats ont été comparés avec ceux obtenus en utilisant deux mélanges commerciaux standards (MCS) connus localement. Un mélange de RGC/RFM a été incorporé dans des rations test comme suit: Ration 1 (7,3 RGC/2,7 % RFM) et ration 2 (14,6 RGC/5,4 % RFM). Quarante poules „Black Nera" dans le sixième mois de ponte ont été gardées en cage de ponte individuelle et soumises à 4 différentes rations. L'alimentation était ad libitum. *L'ingestion, le poids de l'oeuf ainsi que le pourcentage de production ont été diminués avec la ration 2 en comparaison avec le MCS. La diminution du poids de l'oeuf était malgré tout marginale et reste dans les limites de 56-58 g rapportées dans la littérature. De même, le pourcentage de production des oeufs (65%) n'est pas très bas. L'efficacité alimentaire, l'index de la couleur du jaune de l'oeuf, l'épaisseur de la coquille ainsi que le pourcentage du jaune de l'oeuf ne sont pas significativement influencés par la ration. En moyenne, les rations contenant le mélange RGC/RFM coûtent 60% moins cher que les rations MCS alors que le coût/kg d'oeuf est globalement doublé pour ces dernières. Il a été conclu que l'incorporation du mélange MCS est économiquement intéressante là ou les deux sous-produits de ferme sont disponibles.*

Introduction

Considerable achievement has been made in the diversion of agro-allied by-products (AAPs) into livestock feeds. Groundnut cake, palm-kernel cake, brewers' spent grain, wheat and rice brans are few among the AAPs that have attained commercial usage in animal feeds in Nigeria. Among the commercially unexploited AAPs with huge potentials as livestock feed ingredient in Nigeria and other cocoa producing countries of West Africa is cocoa-pod husk (CPH). By proportion, CPH is three quarters of the cocoa fruit (8).

Vast numbers of studies conducted in Nigeria and Ghana have indicated the potentialities of CPH as a poultry feed ingredient (7, 18, 19, 22). However, the low crude protein and high crude fibre contents of CPH have been shown to limit its utilization in these studies. Where available CPH could be supplemented with cassava leaf meal (CLM) to upgrade the low crude protein and partially lower the crude fiber contents.This is possible because CLM contains higher crude protein and lower crude fiber than CPH (21, 25). The mixture can then be fed to older poultry birds like laying hens which have been shown to tolerate higher dietary fibre con-

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Table 1: Experimental diets

Ingredients	Diet 1	Diet 2	Diet 3	Diet 4
Maize	42.00	32.00	Na	Na
Cocoa husk meal	7.30	14.60	Na	Na
Cassava leaf meal	2.70	5.40	Na	Na
Common	48.00	48.00	Na	Na
ingredients*	100.0	100.00	Na	Na
Determined analysis (%)				
Crude protein	14.97	14.89	15.93	14.94
Crude fibre	6.09	7.01	7.28	6.96
Crude fat	2.96	3.12	3.31	3.01
Total Ash	11.21	13.02	10.81	13.09
N.F.E.	61.02	54.87	60.23	59.04
Calculated analysis				
ME (kcal/kg)**	2610	2565	2600	2500

* Common ingredients %: full-fat soya (13.0); brewers dried grain (4.0); wheat bran (8.0); fish meal (2.0); maize bran (2.0); groundnut cake (6.5); oyster shell (8.0); bone meal (2.0); salt NaCl (0.25); Vit. Min. premix (0.25)***

** Calculated through the formular of Pauzenga (1985), viz; ME (kcal/kg) = 37.7 x % crude protein + 81.8 x % ether extract 35.5 x % Nitrogen free extracts (NFE).

*** Agricare – Mix, Pfizer Nigeria PLC, Ikeja, Lagos, Nigeria.

Na= Not available.

Cocoa husk, proximate composition(%); crude protein (5.90); crude fat (1.20); crude fibre (22.6); total ash (9.1); nitrogen-free extracts (61.2) – Source: Sobamiwa and Longe (1994).

Cassava leaf, proximate composition (%): crude protein (26.5), crude fibre (6.4), nitrogen free extract (51.0) – Source: Omole (1977)

tents than younger ones like the broiler chicken (3, 9). Cassava cultivation is widespread in the West African sub-region and Nigeria is the largest producer worldwide with an estimated 30 million tonnes annually (27). The cassava leaves are left to rot on the farms after the tubers have been harvested and remain a farm waste to-date.

The present study investigated the effect of supplementing cocoa husk meal (CHM, the dried ground form of CPH) with cassava leaf meal (CLM, the dried ground form of cassava leaf) on the production performance and egg quality of laying hens.

Material and methods

Ten-week experiment was conducted at the Teaching and Research Farm, University of Ibadan, Nigeria. A total of forty 6-month-in-lay Black Nera hens housed individually in battery cages were used in the trial. The birds were distributed ten per dietary treatment. Feeding was done *ad libitum*. The trial involved four diets two of which were compounded rations containing 7.3/2.7% and 14.6/5.4% respectively of CHM and CLM. The other two diets were the two most patronized standard commercial feeds (CFDs) in the Ibadan metropolis.

The CHM was processed according to the methods of Olubamiwa and Longe (18). The CLM was processed by harvesting fresh cassava leaves and drying in the sun. Data were analyzed by ANOVA (26). Means where significant were separated by the Duncan Multiple range test (12).

Proximate compositions of the four diets were analysed according to A.O.A.C. methods (4).

Results and discussion

The nutrient contents of the diets are shown in Table 1. Generally, the data on the proximate composition and metabolizable energy (ME) are either very close for the diets or within acceptable limits. As examples, the crude protein and ME values of 15-16% and 2500-2600 kcal/kg respectively are suitable for laying hens in a tropical environment (2, 10). What these imply is that each dietary treatment was of a good standard.

The productive performance of the birds and their egg quality are summarized in Table 2. Feed intake, egg weight and mass and percentage egg production were lower ($P< 0.05$) on Diet 2 (14.6 CHM/5.4 CLM) than on the CFDs. It is well known that cassava leaves contain variable amounts of cyanogenic glucosides which are hydrolysed to hydrogen cyanide (HCN) by the endogenous enzyme linamarase (6). Cassava products with high cyanide content are very unpalatable, reducing feed intake appreciably (5).The lowered feed intake on Diet 2 therefore may have been mediated by the higher CLM inclusion through higher content of HCN.

However, feed efficiency, shell thickness, yolk colour and percentage yolk were not influenced by dietary treatments.

Though egg weight was significantly lower on Diet 2 , the reduction was very marginal, roughly 2% , and was in line with the range (56- 57.6 g) given in the literature (15, 20).

The marginal decrease in egg weight was conceivable since birds of the same age and strain are expected to have similar egg weight (20). It should be noted however, that individual variability among birds is another possibility of the slight variance in egg weight.

Similarly, egg production though lower on Diet 2 was not poor considering the figure of 65%. The reduction in egg mass presumably resulted from the relatively lower egg weight and percent egg production. From the feed efficiency data it was apparent that all diets were utilised to the same ($P> 0.05$) extent biologically.

The trend of shell thickness hinted that the egg shells were of similar strength across treatments. Egg shell quality continues to be a major concern with laying hens (1). Halminton (14) indicated the annual loss to the

Table 2
Production performance, egg quality and economic analysis of laying hens on experimental diets

Parameters	DIET				S*
	1	2	3	4	S.D.
Feed intake (gm/bird/day)	112.1[ab]	104.9[b]	118.5[a]	126.1[a]	11.8
Egg production (%)	77.4[a]	64.9[b]	78.7[a]	79.7[a]	4.8
Egg weight (gm)	57.5[ab]	56.7[b]	58.2[a]	57.5[a]	0.9
Egg mass (gm/bird/day)	44.5[a]	36.8[b]	45.8[a]	45.8[a]	1.4
Feed efficiency (Egg mass/feed/intake)	0.40	0.35	0.39	0.36	0.02
Shell thickness (mm)	0.44	0.44	0.44	0.44	0.02
Yolk colour (Roche Colour Fan No.)	2.9	4.3	4.5	1.9	1.0
Yolk percentage (%)	28.7	29.6	28.5	28.4	1.8
Feed cost (N/kg)	15.3	15.0	24.6	24.8	–
Feed cost (N/25kg bag)	381.5	373.9	615.0	620.0	–
Feed cost/kg egg (N)	29.8	24.2	50.2	54.4	–

Diet 1 contained 7.3 and 2.7% of cocoa husk and cassava respectively
Diet 2 contained 14.6 and 5.4% of cocoa husk and cassava leaf respectively
Diets 3 and 4 are the most patronized standard commercial feeds in Ibadan metropolis in 1999.
N= Naira

American egg producers was $100m. Highly negative correlations (r = -.94) were found between percentage of cracked eggs and percentage of shell (1) . Shell percentage on the other hand is highly correlated with egg shell thickness (11).

Yolk colour is an important egg quality trait influencing consumer acceptance (16). Since this parameter was not influenced by the dietary treatments, it means none of the diets is likely to produce eggs of higher yolk colour attraction. Generally, the values (1.9- 4.5) appeared to be low. Sobamiwa (24) who worked on cocoa husk-based diets recorded values of 8.3- 9.8 for yolk colour index. The discrepancy may have been mediated by the vitamin-mineral premix used in the latter, which contained a yolk colourant. It is important to note that egg consumers in Ibadan metropolis are not likely to be egg yolk colour biased since the CFDs which produced low yolk colour index are very popular.

The values of feed cost of the CHM/CLM diets were 60% of those of the CFDs showing that the test diets were very cheap in comparison to the commercial feeds. The feed cost/kg egg values which were doubled on the CFDs did not only confirm that the test diets were cheap but further expressed their economic rewarding nature. This is so since the success of the egg producer is judged by the income minus feed cost (9).

In conclusion, it is worthwhile to say that the inclusion of the mixtures of CHM/CLM in layers mash promises to be a very economic rewarding venture. Where these farm wastes are available together, the smallholder poultry farmers who mix own feeds would find their use financially beneficial. It is also worthwhile to call attention to the significant negative effect of higher CHM/CLM inclusion rate on egg production parameters. The possibility of higher hydrogen cyanide content at this level and consequently concomitant lowered feed intake and reduced egg production, cannot be ruled out. It may therefore be safer if farmers that will use this technology stick to the lower dietary CHM/CLM combination of 7.3/2.7%.

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AVIS

Nous rappelons à tous nos lecteurs, particulièrement ceux résidant dans les pays en voie de développement, que TROPICULTURA est destiné à tous ceux qui oeuvrent dans le domaine rural pris au sens large.

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Nous pensons ainsi, grâce à votre aide, pouvoir rendre un grand service à la communauté pour laquelle vous travaillez.

Merci.

BERICHT

Wij herrineren al onze lezers eraan, vooral diegenen in de ontwikkelingslanden, dat TROPICULTURA bestemd is voor ieder die werk verricht op het gebied van het platteland en dit in de meest ruime zin van het woord.

Daarom zou het nuttig zijn dat u ons de adressen zou geven van de Instellingen, Scholen, Faculteiten, Centra of Stations voor landbouwonderzoekvan het land of de streek waar U zich bevindt. Wij zouden ze kunnen abonneren, zo dit niet reeds gebeurd is.

Met uw hulp denken we dus een grote dienst te kunnen bewijzen aan de gemeenschap waarvoor u werkt.

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