Revista Brasileira de Ciência Avícola
ISSN: 1516-635X
revista@facta.org.br
Fundação APINCO de Ciência e Tecnologia Avícolas
Brasil

Anaeto, M; Adighibe, LC
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Revista Brasileira de Ciência Avícola, vol. 13, núm. 2, abril-junio, 2011, pp. 153-156
Fundação APINCO de Ciência e Tecnologia Avícolas
Campinas, SP, Brasil

Brazilian Journal of Poultry Science
Revista Brasileira de Ciência Avícola
ISSN 1516-635X Apr - Jun 2011 / v.13 / n.2 / 153-156

Technical Note

Cassava Root Meal as Substitute for Maize in Layers Ration

■Author(s)

Anaeto M
Adighibe LC

Department of Agriculture
Babcock University
Ilishan Remo
Ogun State

■Mail Adress

e-mail: manaeto@yahoo.com

■Keywords

Cassava root meal, cost benefit, laying hen, performance.

ABSTRACT

The effect of replacing maize with graded levels of cassava root meal (CRM) as energy source in the diet of laying hens was evaluated during the eight weeks of feeding experiment on performance and cost benefits on layers. Forty-five Nera black laying hens of 24 weeks of age were allocated to five dietary treatments, with nine birds per treatment in a completely randomized design. CRM was used to formulate the diets at 0, 25, 50, 75, and 100%. The result showed that the feed intake of birds in the control group was significantly ($p<0.05$) different from those fed the CRM diets. The average weight gain of layers receiving up to 50% CRM was similar to the control birds, but significantly different from layers fed 75 and 100% CRM. No mortality was recorded. Egg production per hen per day and average egg weight were significantly different ($p<0.05$) for birds consuming more than 50% CRM in T4 and T5. Layer feed ration was made cheaper by the replacement of maize with cassava root meal in the diets.

INTRODUCTION

Poultry production in Nigeria has been affected by high cost of feeds, especially of conventional energy and protein feed ingredients. According to Fafiolu *et al*. (2004), a major problem that affects the poultry industries in the tropics is the escalating price of feed ingredients, such as maize and soya bean meal. The seasonal fluctuation in the supply of conventional feed ingredients requires alternative energy sources to be explored to ensure optimum performance of the birds.

Cassava, a high energy crop, is available throughout the year in Nigeria. Nigeria is now ranked as the world's largest producer of cassava with a production capacity of 40 million metric tonnes (Okoli, 2008). According to Calpe (1991), the use of cassava in animal feed accounts for only 2% of cassava utilization in Africa. Smith (2003) stated that the chemical composition of cassava varies according to variety, plant age and processing technology. It should be noted that its protein content (2.5%) is lower than that of yellow maize (8.5%). However, Oruwari *et al*. (2003) stated that with proper protein balance, cassava meal could completely replace maize in poultry diets. The use of cassava as an alternative to conventional energy feed stuffs like maize could help to reduce feed costs (Ukachukwu, 2005). This study was conducted to evaluate the effect of replacing maize by cassava as energy source in layer feeds.

MATERIALS AND METHOD

The study was conducted at the Poultry Unit of the Teaching and

The cassava used for this study was obtained from the Institute of Agricultural Research and Training (IAR&T) Sub zone Station, Ayepe in Ikenne Local Government Area of Ogun State, Nigeria. The fresh cassava roots were peeled, washed and grated. The grated cassava mash was poured into a sack and pressed using a hydraulic pressing machine to remove excess water. The dewatered cassava mash was broken into fine granules and was sun dried on black polyethylene sheets, after which it was milled in a hammer mill and packed in bags as cassava root meal (CRM).

Forty-five Nera black layers were divided according to a completely randomized design into five groups of nine birds each. The birds were habituated for 2 weeks before the beginning of the feeding experiment, when birds were 24 weeks old. The experiment lasted for 8 weeks. The processed CRM was used to formulate four diets such that maize was replaced by CRM at 25, 50, 75 and 100%, which are represented here as T2, T3, T4 and T5, whereas T1 served as the control diet without CRM. The composition of the five formulated diets is presented in Table 1b. Layers were fed twice a day and water was provided *ad libitum*. Feed intake was measured daily. Individual birds were weighed before the beginning of the experiment to obtain initial body weight, and weekly thereafter. Eggs were collected twice a day and recorded. Also, 12 eggs from each treatment were weekly weighed to obtain mean egg weight. Birds were also observed for mortality.

Statistical Analysis

The obtained data were submitted to analysis of variance (SAS, 1999) and significant differences between treatment means were separated at 5% level of significance. The prevailing market price of the feed ingredients at the time of the study were used to calculate the total cost of feed consumed, cost of feed consumed/live weight gain and cost of one crate of eggs.

RESULTS AND DISCUSSION

The results of the feeding experiment with laying birds fed CRM are shown in Tables 2-4. Average weight gain of layers in T1, T2 and T3 were similar, but significantly different ($p<0.05$) from T4 and T5. This agrees with Stevenson & Jackson (1983) and Salami (2000), who found that weight was not affected by a diet containing 50% CRM. Feed intake significantly decreased ($p<0.05$) as the level of cassava root meal increased. Birds in the control diet consumed more feed than layers fed the CRM diets. Eruvbertine & Oguntona, (1997) and Salami & Odunsi (2003) had earlier reported higher feed intake in layers fed a control diet than those fed cassava meal. Farrell *et al*.

Table 1 - Percentage composition of experimental diets.

Ingredients	Replacement level of CRM				
	0%T1	25%T2	50%T3	75%T4	100%T5
Cassava	-	11.13	22.25	33.38	44.5
Maize	44.5	33.37	22.25	11.12	-
Palm kernel cake	9.0	9.0	7.8	6.6	5.1
Corn bran	8.0	8.0	6.8	6.6	5
Wheat bran	10.5	10.5	9.4	8.4	6.4
Ground nut cake	7.0	7.0	10.5	13.5	18.0
Soya bean meal	9.5	9.5	9.5	9.5	9.5
Fishmeal	2.0	2.0	2.0	2.0	2.0
Bone meal	3.0	3.0	3.0	3.0	3.0
Oyster	5.7	5.7	5.7	5.7	5.7
Salt	0.25	0.25	0.25	0.25	0.25
Layer premix	0.25	0.25	0.25	0.25	0.25
Methionine	0.15	0.15	0.15	0.15	0.15
Lysine	0.15	0.15	0.15	0.15	0.15
Total (Kg)	100	100	100	100	100
Calculated composition					
Metabolizable Energy (Kcal/kg)	2,618.73	2,592.76	2,582.43	2,573.73	2,568.31
Crude Protein %	17.92	16.60	16.76	17.78	17.25
Lysine %	0.68	0.68	0.76	0.80	0.82
Metionine +cystine %	0.50	0.48	0.48	0.48	0.48

(1981) also reported that feed and energy intakes were significantly higher when commercial diets and lower in maize and cassava mixture 60:40 ratio were fed than other treatments. No mortality was recorded and the birds were apparently healthy during the experiment.

The replacement of maize by CRM up to 50:50 ratios did not significantly affect the hen-day egg production. However, CRM inclusion above 50% reduced ($p<0.05$) egg production and egg weight. Similar findings were reported by Aderemi *et al*. (2006). However, Akinola and Oruwari (2007) reported an increase in egg production as the level of CRM increased. Smith (2003) observed that replacing corn by cassava up to 50% did not affect the performance of layers or egg quality and that the reduction in yolk pigmentation could be overcome by adding xanthophylls to the feed.

Economics of replacing maize by CRM in layer diets

The feed cost per kg declined from N 63.28 to N 53.32 with increasing levels of CRM, as shown in Table 3. Aderemi *et al*. (2006) had earlier reported a similar finding in layers. Cost of feed intake also declined as the level of CRM increased. Layers fed 75 and 100% CRM promoted higher savings in feed cost and live weight gain. Feed cost accounts for 70- 80% of the total poultry production cost (Durunna *et al*. 1999). The cost of conventional basal energy feedstuffs, particularly maize in livestock feeding, has contributed to the low level of animal production. Therefore, diet formulation must be directed to maximize profits, using least cost feed formulas. A crate of egg was sold for N 550.00 and it was still economically profitable when 100% CRM was used considering the cost of an egg, but birds fed 25% CRM presented the highest profit.

In conclusion, dietary inclusion of CRM did not affect the health of the layers and there was no adverse effect on the measured production parameters. Feed cost was reduced and hence, more savings. Cassava root meal can completely replace maize in layers ration when there is scarcity of maize.

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Table 2 - Performance of layers fed Cassava Root Meal.

	Treatments[1]				
Parameters	**T1**	**T2**	**T3**	**T4**	**T5**
Initial weight (kg/bird)	1.76	1.80	1.76	1.74	1.85
Final weight (kg/bird)	1.86	1.93	1.87	1.81	1.92
Average weight (kg/bird)	.10a	.13 a	.11 a	.07b	.07 b
Feed intake (g/bird/day)	109.02 a	101.97 b	104.78 b	101.2 b	101.60 b
Egg weight (kg/bird)	60.16 a	60.92 a	59.0 a	59.0 a	56.3 b
Hen-day production (kg/bird)	87.9 a	85.7 a	76.9 a	59.60 b	63.7 b
Mortality	0	0	0	0	0

ab - Means within a row with different superscripts differ ($p< 0.05$). Treatments: T1 = control (no CRM); T2 =25% CRM; T3 =50% CRM; T4 =75% CRM; T5 =100%.

Table 3 - Cost of feeding layers with fed Cassava Root Meal.

	Treatments[1]				
Parameters	**T1**	**T2**	**T3**	**T4**	**T5**
Feed cost (₦/kg)	63.28	59.94	57.95	55.37	53.32
Cost of feed /live weight gain (₦/kg)	4.52 a	4.94 a	4.89 a	2.14 b	2.67 b
Total feed intake per treatment/kg	55.00	51.39	52.81	51.00	51.21
Total cost of feed in 56 days (₦)	3,480.40	3,080.32	3,060.34	2,823.87	2,730.52
Crate of egg	14.67 a	14.4 a	12.83 b	10.00c	10.66 c
Gross returns from eggs (₦)	8,123.5	7,920	7,056.6	5,500	5,866.6

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