NOTA BREVE

RESPONSE OF BROILER CHICKENS TO CASSAVA PEEL AND MAIZE OFFAL IN CASHEWNUT MEAL-BASED DIETS

RESPUESTA DE POLLOS BROILER A LA ADICIÓN DE PELADURAS DE MANDIOCA Y RESIDUOS DE MAÍZ EN DIETAS A BASE DE HARINA DE ANACARDOS

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ADDITIONAL KEYWORDS

Cereal-free diets. Performance.

PALABRAS CLAVE ADICIONALES

Dietas sin cereales. Productividad.

SUMMARY

The effect of combinations of cassava peel meal (CPM) and maize offal (MO) in cashewnut meal (CNM) based diets was investigated using unsexed day old Anak 2000 broilers. Control maize-based diet: without CPM, MO and CNM. Each of diets 2, 3 and 4 contained 300 g/kg CNM and (g/kg): 300 MO + 100 CPM; 200 MO + 200 CPM and 100 MO + 300 CPM, respectively. Feed intake increased ($p<0.05$) while weight gain decreased compared to the control. Diet 3 gave the best ($p<0.05$) feed to gain ratio. Protein intake was highest ($p<0.05$) on diets 2 and 4. Crude fibre digestibility decreased while the cost of producing a kg of broiler reduced in the MO + CPM diets ($p<0.05$). The 200 g/kg MO + 200 g/kg CPM combination can replace maize in broiler diets without adverse effects.

RESUMEN

En broilers Anak 2000, no sexados, de un día, se investigó el efecto de combinaciones de harina de peladuras de mandioca (CPM) y residuos de maíz (MO) en dietas a base de harina de anacardos (CNM). Dieta control a base de maiz: sin CPM, MO y CNM. Las dietas 2, 3 y 4 contenían 300 g/kg de CNM y respectivamente (g/kg): 300 MO +100 CPM; 200 MO + 200 CPM y 100 MO + 300 CPM. La ingestión aumentó ($p<0,05$) y disminuyó la ganancia de peso respecto al control. La dieta 3, originó la mejor ($p<0,05$) relación alimento/ganancia. La ingestión de proteína fue mayor ($p<0,05$) en las dietas 2 y 4. La digestibilidad de la fibra bruta y extracto etéreo disminuyó ($p<0,05$). Se redujo el coste de producción de un kg de broiler en las combinaciones de MO y CPM. La combinación de 200 g/kg MO + 200 g/kg de CPM puede reemplazar al maíz en dietas para broilers sin efectos adversos.

INTRODUCTION

Cassava *(Manihot esculenta)* is an all-season crop of the humid tropics and ranks among the top 10 food crops in the world. The peels account for 10-13 percent of the tuber by weight. Agunbiade and Bello (1997) observed that when dry CPM was used to replace maize, there is the need to fortify the

diet for energy and protein. Cashewnut meal (CNM) appears to be a cheap protein source to do it; it is a by-product from processing *Anarcadium occidentale* seeds, with moderate protein and excellent energy contents, and compare favourably with groundnut or soybean cakes in nutritional terms (Fetuga *et al.*, 1974). Its protein value is equal to that of soybean but higher than that of groundnut (Ohler, 1979).

The purpose of this study was to determine the response of broiler chicks to cassava peel and maize offal in cashew nut meal based diets.

MATERIALS AND METHODS

One hundred and forty-four unsexed day old Anak 2000 broiler chicks were randomly allotted to the four dietary treatments (36 birds with 3 replicates of 12 birds each, and reared in deep litter house). Feed and water was available at all times.

The CNM was obtained as rejects or broken scorched kernels from a processing factory in Ibadan, Nigeria. CPM and MO, respectively, were obtained from IITA and Eagle Flour Mills in Ibadan. Each of the test diets 2, 3 and 4 contained 300 g/kg CNM and (g/kg): 300 MO + 100 CPM; 200 MO + 200 CPM and 100 MO + 300 CPM respectively. The CNM-based diets did not contain any maize, the principal dietary energy source in the control diet **(table I)**.

The experiment was conducted as a completely randomized design, with experimental periods of 56 days. For apparent nutrient utilization, two birds per replicate at 7 weeks were kept in metabolic cages. There were 4 days of adaptation followed by 3 days of total collection of droppings. Feed, test ingredients and droppings samples were analysed for their proximate composition (AOAC, 1990). Data were subjected to analysis of variance, and means separated using Duncan's Multiple Range Test (Daniel, 1991).

***Table I**. Composition of experimental diets (g/kg).* (Composición de las dietas).

Diets	1	2	3	4
Maize	550.0	-	-	-
Maize offal	-	300.0	200.0	100.0
Cassava peel meal	-	100.0	200.0	300.0
Soybean meal	240.0	135.0	160.0	190.0
Cashewnut meal	-	300.0	300.0	300.0
Wheat offal	125.0	80.0	55.0	25.0
Fish meal[1]	30.0	30.0	30.0	30.0
Blood meal	20.0	20.0	20.0	20.0
Bone meal	20.0	20.0	20.0	20.0
Oyster shell	10.0	10.0	10.0	10.0
Premix[2]	2.5	2.5	2.5	2.5
Salt	2.5	2.5	2.5	2.5
Chemical composition				
Dry matter	910.0	905.0	911.0	908.0
Crude protein	218.7	223.2	216.6	220.9
Crude fibre	30.0	60.0	60.0	70.0
Ether extract	140.0	130.0	150.0	150.0
Ash	40.0	51.0	48.0	49.0
NFE	571.3	535.4	525.4	510.0
ME (MJ/kg)[3]	12.20	13.74	13.73	13.73

[1]72 percent CP. [2]Provided per kg diet:1500 IU vitamin A; 1500 IU vitamin D; 3000 IU vitamin E; 3.0 g vitamin K; 2.5 g vitamin B_2; 0.3 g vitamin B_6; 8.0 mg vitamin B_{12}; 8.0 g nicotinic acid; 3.0 g Ca-pantothenate; 5.0 mg Fe; 0.2 g Cu; 3.5 mg Zn; 0.15 mg I; 0.02 g Co; 0.01 g Se. [3]ME: calculated metabolizable energy.

***Table II**. Composition of ingredients (g/kg).* (Composición de los ingredientes).

	CNM	CPM	MO
Dry matter	925.0	900.0	913.5
Crude protein	236.2	67.8	124.2
Ether extract	453.0	34.0	21.2
Crude fibre	33.0	90.0	88.0
Ash	45.0	64.0	34.2
Gross energy (MJ/kg)	30.13	15.01	14.90
HCN (mg/kg)	-	26.50	-

RESULTS AND DISCUSSION

CPM **(table II)** showed very high crude fibre but low crude protein contents as reported by Agunbiade and Bello (1997). CNM has high ether extract with moderate crude protein according to the findings of Onifade *et al*. (1999).

The final body weight and daily weight gain of birds fed diets 1 and 2 were similar, however, both were ($p<0.05$) higher than birds on diets 3 and 4 **(table III)**. This indicates the possibility of the birds to attain mature body weight on CNM based diets containing no maize as well as the adequacy of the use of the combinations of CPM and MO as seen in diet 2. The weight gain decreased as the level of cassava increased confirming the Ikurior and Onuh (1996) findings. The least ($p<0.05$) feed intake on the control diet could be traceable to its low fibre content. Increased fibre in diets 2, 3 and 4 leads to reduce available

***Table III**. Growth performance, apparent nutrient utilization and cost- benefits analysis of birds fed the experimental diets.* (Crecimiento, utilización aparente de nutrientes y análisis coste-beneficio de las aves alimentadas con las dietas experimentales).

Diets	1	2	3	4	SEM
Growth performance					
Final liveweight (g)	1927.20^{a}	1935.10^{a}	1797.20^{b}	1807.40^{b}	25.00
Weight gain (g/day)	33.50^{a}	33.57^{a}	31.11^{b}	31.18^{b}	0.45
Feed intake (g/day)	81.75^{c}	96.38^{a}	82.59^{bc}	92.00^{ab}	2.26
Feed/gain	2.44^{c}	2.87^{ab}	2.66^{bc}	2.95^{a}	0.07
Protein intake (g)	17.88^{b}	21.51^{a}	17.89^{b}	20.32^{a}	0.55
Protein efficiency ratio	1.87^{a}	1.57^{b}	1.74^{ab}	1.54^{b}	0.04
Mortality (No)	0.00	1.00	1.00	2.00	0.14
Apparent nutrient utilization					
Dry matter digestibility (percent)	92.00	83.97	82.62	84.93	1.45
Crude protein retention (percent)	57.62	58.22	54.87	53.77	1.66
Crude fibre digestibility (percent)	94.66^{a}	87.98^{b}	86.38^{b}	88.16^{b}	1.20
Cost- benefits analysis (N= Nigeria naira)					
Cost of feed consumed/bird (N)	200.00^{a}	161.64^{b}	126.17^{c}	166.64^{b}	0.65
Cost of feed/kg (N)	43.67^{a}	30.10^{b}	27.25^{c}	32.42^{b}	0.38
Cost of feed/kg weight gain (N)	106.41^{a}	86.28^{b}	72.39^{c}	95.64^{ab}	0.64

Means on the same row with different superscripts were different ($p<0.05$). 1 US$= 142 N.

energy, and birds must eat more a mount to satisfy their energy requirements. The substitution of CPM for maize will expectedly result in dilution of dietary energy and increased dustiness. The CNM, rich in fat, was employed as an energy booster and as an aid in reducing dustiness as Spear (1976) reported, while Fuller (1981) stated that it was possible to alleviate the growth depressing effect of heat stress by the use of high level of dietary fat in poultry rations. The best ($p<0.05$) feed-to-gain ratio was obtained for birds on the control diet while the lowest protein intake gave the best feed to gain ratio. Birds on diet 2 had the highest ($p<0.05$) protein intake (21.5 g) while diets 1 and 3 had the lowest value (17.9 g). The CNM based diets had the best ($p<0.05$) protein efficiency ratio.

Crude fibre has high digestibility values **(table III).** It was best ($p<0.05$) for the control diet. No difference was observed in the CP retention and the values were generally low. The cost of feed per kg weight gain decreased as expected in the cereal free diets. There was a reduction of N34 ($0.24) in cost of feed per kg weight gain in diet 3 compared to the control diet. Despite the lower feed intake observed with birds fed the control diet, the cost of feed consumed per day was higher than for MO and CPM diets because of the cost of maize which was more than twice the cost of MO and CPM. The relatively cheaper diet (3) also brought about the most efficient economy of feed conversion, with the least cost of producing one kilogramme liveweight gain. The results showed that 20 g/kg MO and 20 g/kg CPM in CNM-based diet was the most efficient in terms of the economy of feed conversion.

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Recibido: 8-4-05. Aceptado: 21-3-06.