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REPLACEMENT VALUE OF COCOA HUSK MEAL AS A SUBSTITUTE FOR MAIZE IN RABBITS' RATION

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Target Auduence: Poultry farmers, livestock feed miller and poultry nutritionist.

ABSTRACT

Twenty crossbred weaner (Newzealand x Chinchilla) of six weeks of age were used to determine the effects of replacing maize with graded levels (0, 25, 50, 75 and 100%) of cocoa husk meal (CHM) on the performance of rabbits in a completely randomised design for an eight week period. Feed intake increased correspondingly ($P<0.05$) with dietary levels of CHM. Control and 25% CHM - based diets significantly ($P<0.05$) had lower feed intake, liveweight gain of rabbits on diets were similar ($P>0.05$) but higher ($P<0.05$) and better than the control diet. Crude fibre, crude fat and dry matter digestibilities of CHM - based diets did not differ significantly ($P>0.05$). There was a linear increase in apparent nitrogen utilization which was directly proprotional to incremental CHM levels. However, 100% CHM level depressed nitrogen retention. Apparent nitrogen utilization of 25 and 50% CHM - based diets were similar ($P>0.05$). While rabbits on control diet had lower ($P<0.05$) nutrient retention. CHM can effectively replace 25 and 50% maize in rabits's ration without any detrimental effects on the animal, while 75 and 100% CHM reduced feed conversion ratio of rabbits.

Keywords: Replacement value, cocoa husk meal, maize, rabbits.

DESCRIPTION OF PROBLEM

Since the feed crisis in 1983 to date, efforts have been made to seek alternative feed resources to maize and other conventional feed ingredients in animal nutrition. The potential feed resources that have proved valuable in this respect is agricultural by-products and crop wastes. These feed have proved valuable locally, cheap and are able to replace certain proportion of maize in monogastric diets without any detrimental effects on the performance of animals. The agro-industrial by-products are valuable feeding stuffs or ruminants as well as monogastrics, not only as source of protein, crude fibre, energy and vitamin supplements but its incorporation

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into animal's feed will increase the low feed supply for poultry, rabbit and pig production.

The incorporation of agro-industrial by-products into animal feed holds tremendous potentials in alleviating the existing high cost and inadequate supply of feed (1 and 2). The reports of (3) showed that the available agro-industrial by-products are oil seed meal, abattior by-products, poultry by-products, milling by-products, fruit wastes, starch, sugar processing by-products, cassava peels and cocoa by-products. Cocoa husk, a farm waste available in several of the cocoa producing countries had been proven in various studies to have potential to replace maize in livestock feeds (4, 5). However, information on its utilization by rabbits is scanty, therefore, there is a need to determine CHM replacement value in rabbit's ration.

MATERIALS AND METHODS

Freshly broken cocoa pod husk were collected from fermentation unit of Cocoa Research Institute of Nigeria and were sudried into a constant weight and milled. Graded levels of CHM were incorporated into the experimental diets at 0, 25, 50, 75 and 100% levels.

Twenty crossbred weaner rabbits (Newzealand white Chinchilla) of ana verage of six weeks old were randomly alloted into five dietary treatments A, B, C, D and E in a completely randomised design (CRD) with four rabbits per treatment contained four replicates with one rabbit each. Diet A served as the control with no CHM, while diets B, C, D and E contained 25, 50, 75 and 100% CHM respectively. The composition of experimental diets are shown in Table 1.

Feed and water were provided ad libitum daily and experimental animals were weighed weekly. The experimental diets were introduced after five days of acclimatization. Parameters studied were liveweight, weight gain, feed intake, feed conversion ratio and mortality.

At eight weeks, two rabbits per replicate were placed in a metabolic cage. A three days acclimatization was allowed prior to four days collection period. The wet faeces were collected everyday by total collection method and oven dried. The dried faecal samples of each replicate per treatment were stored for subsequent chemical analysis. Proximate analysis of CHM, experimental diets, urine and faecal samples were determined (6). All data were subjected to analysis of variance and Duncan multiple range test were used to separate mean differentials (7).

RESULTS AND DISCUSSION

The result of the proximate composition of CHM is shown in Table 2. It has high crude fibre content of 26.8%; crude protein, 6.21%; fat, 0.97%;

ash, 11.85% and gross energy of 2100 kcal/kg. Proximate composition of CHM is similar to other previous reports (8, 9).

Table 3 shows the daily feed intake, weight gain, feed conversion efficiency and apparent nutrient utilization of experimental animals fed graded levels of CHM. There were significant differences ($P<0.05$) between the treatment groups in feed intake. Feed consumption could be attributed to an attempt of the animals to satisfy energy intake diluted at CHM incremental levels (10). Significantly lower ($P<0.05$) feed intake was recorded for the control. Daily weight gain of rabbits on 50, 75 and 100% CHM - based diets did not differ significantly ($P>0.05$) from one another, while rabbits on control diet had the least average weight gain and was significantly different ($P<0.05$) from animals on 25% CHM. This could be due to lower feed consumption than other treatments. Higher weight gain of rabbits on 75% CHM could be due to high nitrogen absorbed which was efficiently metabolised and utilised for growth.

Table 1. Composition of Experimental Diets (%)

Ingredients	A(0)	B(25)	C(50)	D(75)	E(100)
Maize	42.73	31.25	19.77	8.29	-
Cocoa pod husks	-	10.68	21.37	32.05	42.73
Groundnut cake	9.02	9.82	10.61	11.41	8.02
Blood meal	2.00	2.00	2.00	2.00	4.26
Palm kernel cake	30.00	30.00	30.00	30.00	30.00
Maize Bran	10.00	10.00	10.00	10.00	10.00
Oyster shell	2.00	2.00	2.00	2.00	2.00
Bone meal	1.00	1.00	1.00	1.00	1.00
Palm Oil	2.00	2.00	2.00	2.00	2.00
Methionine	0.25	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
*Vit/min. mixture	0.25	0.25	0.25	0.25	0.25
Total	100	100	100	100	100
Determined analysis g/100g DM					
Crude Protein	16.02	16.03	16.02	16.04	16.02
Crude fibre	6.31	6.38	6.51	6.61	6.70
Ether extract	7.78	7.53	7.49	6.91	7.42
Total ash	3.87	4.13	4.20	3.98	4.18
Nitrogen free extracts	66.02	65.59	65.14	65.63	64.39
ME (kcal/kg)	2957	2801	2368	2474	2390

*Vitamin/mineral mixture supplied per kg diet : Vit. A, 10,00iu; Vit. E, 10mg; Vit. B1, 1.6mg; Vit. B2, 3.2mg; Vit. B6, 2.4mg; Vit. B12, 8mg; Folic acid, 0.6mg; Pathothenic acid, 14.4mg; chlorine chloride, 80mg; Mg, 0.25mg; Mn. 120mg; Fe, 0.60mg; Cu, 0.4mg; Se. 100mg.

Rabbits on 100% CHM - based diets had higher significant (P<0.05) feed conversion ratio than other treatments. Feed conversion ratio of the control and 75% CHM - based diets were similar (P<0.05), while CHM were effectively converted to flesh at 25 and 50% replacement levels. This is in agreement with (11) that maize could be replaced with CHM at the rate of 25 and 50% in broiler's diets as it nay produce a better performance. It can also be attributed to a better digestibility of dry matter, nitrogen and crude fat contents of the diets.

Table 2. Proximate Composition (DM) of Cocoa Husk meal

Parameters	Composition (%)
Crude protein	6.21
Crude fibre	26.86
Moisture	11.33
Ether extract	0.97
Ash	11.85
Nitrogen free extract	42.77
Gross energy (kcal/kg)	2100.00

Table 3: Fibre intake, liveweight changes, feed conversion efficiency and apparent nutrient utilization of rabbits

Treatments	Daily feed intake g/ rabbits	Daily body weight gain g/rabbit	Feed/ gain	App. dry matter utilization	App. Fat Nitrogen utilization	App. Fat utilization	App. crude fibre utilization
A control	38.84^{e}	9.12^{c}	4.26^{b}	42.33^{b}	71.63^{c}	74.87^{b}	38.52^{b}
B 25%	46.62^{d}	13.17^{b}	3.54^{c}	56.01^{a}	85.89^{b}	79.69^{a}	48.78^{a}
C 50%	77.47^{c}	20.81^{a}	3.72^{c}	57.46^{a}	88.82^{ab}	79.50^{a}	47.93^{a}
D 75%	89.92^{b}	21.49^{a}	4.18^{b}	55.58^{a}	93.08^{a}	77.37^{a}	47.89^{a}
E 100%	98.12^{a}	19.16^{a}	5.12^{a}	54.90^{a}	90.88^{a}	78.89^{a}	47.55^{a}

^{abcd} Means differently superscripted are significantly different from one another (P<0.05).

Dry matter, crude fibre and fat digestibilities of rabbits on CHM-based diets were not significantly different (P>0.05) from one another and they were higher significantly than (P<0.05) control diet. There was a linear increase in apparent nitrogen utilization which was directly proportional to incremental CHM levels but 100% CHM level depressed nitrogen Utilization. The nitrogen utilization of control diet was significantly lower (P<0.05) than other diets. Rabbits on 50, 75, and 100% CHM-based diets had similar (P>0.05) nitrogen utilization but diifer significantly (P<0.05)

from control and 25% CHM-based diet. Apparent nitrogen utilization values increased linearly as dietary level of CHM increased. This was contrary to the report (12) who observed a reduction in nitrogen utilization in growing rats fed fibre diets.

CONCLUSION AND APPLICATIONS

Cocoa husk meal (CHM) can effectively replace 25 and 50% maize in rabbit's ration without any detrimental effects on the animals. 75 and 100% CHM reduced efficiency of feed conversion of the rabbits.

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