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EFFECT OF UREA TREATMENT ON THE UTILIZATION OF COCOA-POD HUSK IN RABBIT DIETS

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Target Audience: Researchers, cocoa producers/farmers.

ABSTRACT

An experiment was conducted to determine the effect of urea treatment on the utilization of cocoa pod husk (CPH) in rabbit diets.

Five isocaloric and isonitrogenous diets containing Og/kg (control), 100g/kg or 300g/kg urea treated and 100g/kg or 300g/kg untreated CPH were formulated and fed to growing rabbits. Results indicated that mean body weight gains of rabbits fed 100g/kg treated CPH were higher than those fed the other diets except those on 300g/kg untreated CPH. The values of feed intake, feed efficiency ratio and weight gain per protein intake followed the same trend although the differences were not significant. The mean values of digesibilities of dry matter, crude protein, crude fibre, ether extract, ash and nitrogen free extract did not vary significantly with the dietary treatments.

It was concluded that rabbits can tolerate up to 300g/kg of untreated CPH in their diets. Treatment of CPH with urea at 100g/kg yielded best results.

Key words: Urea treatment, cocoa pod husk, rabbit diets.

DESCRIPTION OF PROBLEM

Cocoa pod husk (CPH) is a farm waste in many cocoa producing countries like Nigeria, Ghana, Malaysia and Brazil. CPH contains a high energy value, but is low in protein(1). Several reports(2,3) have actually demonstrated the usefulness of CPH as a livestock feed ingredient. A major limitation to the use of CPH in animal feed is the high crude fibre level which hinders its proper utilization especially by monogastrics. Sodium hydroxide had been used to predigest fibrous materials. Specifically for cocoa pod husk, cocoa pod ash

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(CPA) was used as alkali source and an improvement was found in the utilization of CPH by sheep and goats(3). CPA has also been used as CPH treatment for cockrels(4) and broilers(5). Urea is primarily of interest for feeding ruminants because rumen bacteria rapidly hydrolyse urea to ammonia which is incorporated into amino acids. Furthermore, increased microbial activity could lead to reduction in lignin and hemicellulose content, thereby improving the availability of the complex polysaccharides. Rabbits have enlarged caeca which harbour microbes. This anatomical and physiological adaptation confers on rabbits an added ability to utilize fibrous materials over other monogastrics like poultry. The possibilities of rabbits being able to harbour microflora that could cause an enhanced utilization of CPH in the presence of urea cannot be ruled out.

The present study therefore sought to determine the extent of utilization of urea treated and untreated CPH in rabbit diets.

MATERIALS AND METHODS

Urea treatment

Sundried CPH was ground using a hammer mill. A solution of 4% urea was sprinkled on the product which was allowed to dry again before incorporating with other ration components. This treatment was done at the cocoa processing unit of the Cocoa Research Institute of Nigeria, Onigambari village, Ibadan.

Experimental Diets and Experimental units

The feeding experiment was carried out at the University of Agriculture Abeokuta farm annex Kotopo, Abeokuta. Five isocaloric and isonitrogenous diets that contained 0g/kg (control), 100g/kg or 300g/kg treated CPH and 100g/kg or 300g/kg untreated CPH were formulated (Table 1). Forty (40) weaner rabbits were allocated on weight equalization basis to five dietary treatments. Eight animals were used for each treatment. The rabbits were housed individually in wooden hutches 0.3 X 0.25m in size. A five day acclimatization period was allowed before the commencement of the feeding trials which lasted eight weeks. Records of growth rate and feed intake were taken throughout the experimental period. Feed efficiency ratio and weight gain per protein intake were also calculated.

Metabolic Trials

At the end of the eight week feeding trial, four animals were retained per treatment for the metabolic trials. The hutches were fitted individually with removable faecal collection trays which were lined with polythene sheets. The polythene sheets served to prevent contact of voided faeces with the surface of the metal collection tray. Known weights of respective experimental diets were given to each animal for a period of seven days during which faeces voided were also collected daily. The faeces collected for each animal were dried daily

Table 1: Composition of Rabbit Diets containing urea treated and untreated cocoa husk (g/kg)

Diet	1	2	3	4	5
CPH Level g/kg	0	100	300	100	300
	Control	Urea treated		Untreated	
Ingredients					
CPH	0.0	100	300	100	300
Maize	150.0	150.0	150.0	150.0	150.0
Soyabean meal	210.0	210.0	210.0	210.0	210.0
Corn Bran	235.0	270.0	304.5	270.0	304.5
Rice Bran	369.5	234.5	0.0	234.5	0.0
Bone meal	20.0	20.0	20.0	20.0	20.0
Oyster shell	10.0	10.0	10.0	10.0	10.0
Common salt	3.0	3.0	3.0	3.0	3.5
Vit/Min. Premix[a]	2.5	2.5	2.5	2.5	2.5
Determined anaysis (g/kg dry matter)					
Crude protein	192.6	183.9	184.6	192.6	184.3
ME (kcal/kg)[b]	2811.1	2844.3	2837.0	2821.9	2847.31
Ash	123.6	139.5	138.8	139.2	137.8
Crude fibre	111.2	98.7	104.4	114.7	109.8
Ether extract	73.2	78.0	80.7	81.4	81.8
Nitrogen free extract	422.7	429.8	420.8	406.0	421.8

Premix provided (per kg of diet):Vitamin A, 12500i.u, vitamin D_3 2500i.u; vitamin E, 40i.u, riboflavin, 6mg niacin, 35g; pyridoxine 14mg; choline chloride, 300mg; managanese 100mg; iron, 50mg; copper, 20mg; iodine, 1.55mg; selenium, o.10mg; vitamin K_3, 2.5mg; clacium pantothenate, 10mg; vitamin B12, 0.025mg; zinc, 45mg; cobalt, 0.225mg; biotin, 0.05mg; folic acid, 1.00mg; lysine, 125mg; methonine, 65mg; antioxidant, 125mg.

[b] Estimated according to the formula by Pauzenga (1985) (12) i.e. ME (kcal/kg) = (37X% protein) + 81.8% fat + 35.5XNFE.

in the oven at 60°C. Respective dry matter values were determined. At the end of the seven days collection period, the dried faecal samples for an animal were pooled together and representative samples taken for analysis of proximate constituents. The feed samples were also analysed by standard methods (6). The digestibilities of the proximate components of the feeds were then calculated.

Data Analysis

The design was a randomized complete block design and was analysed using analysis of variance procedure. Significant means were separated using Duncans Multiple Range Test (7).

RESULTS AND DISCUSSION

The mean body weights and weight gain of rabbits fed 100g/kg treated CPH diet were higher than those fed the other diets except those fed on diets that contained 300g/kg untreated CPH (Table 2). The same trend was observed for feed intake, feed efficiency and weight gain per protein intake in which rabbits fed 100g/kg treated CPH diet performed relatively better, although the differences were not significant. It has been widely reported that a general decline in animal performance occurred as CPH level increased in the diet (8,9). A level of 100g/kg CPH was recommended for broiler diets beyond which a depression occurred (3). In this study however, there was an indication that rabbits were able to tolerate 300g/kg untreated CPH diets. This finding is in consonance with an earlier study (10) which concluded that it should be possible to formulate rabbit diets containing up to 300g/kg CPH which would sustain acceptable weight gain. It is not unlikely that rabbits can tolerate higher levels of CPH. This ability of rabbits to handle fibrous feeds stems from the physiological modification of the gastrointestinal tract. Rabbits actually require some amount of fibre in their diet to prevent enteritis.

Table 2: Performance of Rabbits fed urea treated and untreated cocoa-pod husk based diets

Diet	1	2	3	4	5	SEM
CPH Level g/kg	0	100	300	100	300	
	Control	Urea treated		Untreated		
Final body weight (g)	565.0^{c}	612.5^{a}	542.5c^{c}	590.0^{b}	600.0^{ab}	10.05
Average weekly feed intake (g)	171.4	193.3	174.8	184.2	173.9	3.88
Average weekly weight gain (g)	17.8^{cd}	28.8^{a}	15.9^{d}	23.8^{b}	23.9^{b}	0.92
Feed efficiency (gain/feed)	0.10	0.15	0.09	0.12	0.14	0.01
Protein efficiency (gain/protein intake)	0.92	1.5	0.86	1.39	1.24	1.03

Means differently superscripted were significantly different ($P < 0.05$).

At the 100g/kg CPH level, urea treatment appeared to enhance the utilization of CPH-based diet. However, the relatively low performance of rabbits on 300g/kg treated-CPH diet compared with the 300g/kg untreated-CPH diet could not be readily explained. It may well be that the urea treatment interfered with the utilization of CPH at that level of inclusion.

The apparent digestibilities of dry matter, ether extract, crude fibre, crude protein, ash and nitrogen free extract are shown in Table 3. The values did not vary significantly with the dietary treatment, although the values were observed to have a slight edge for 100g/kg and 300g/kg urea-treated CPH diets.

Table 3: Apparent Nutrient Digestibilities of urea-treated and untreated cocoa pod husk-based diets fed to Rabbits (%)

Diet CPH Level g/kg	1 0	2 100	3 300	4 100	5 300	SEM
	Control	Urea treated		Untreated		
Dry matter	71.1	74.1	80.4	71.4	70.2	3.2
Ether extract	94.1	93.1	94.3	84.2	87.9	4.3
Crude fibre	72.4	72.6	81.7	72.5	75.3	3.3
Crude protein	75.2	81.1	83.1	76.9	73.8	3.2
Ash	55.3	66.4	73.3	60.8	61.9	2.5
Nitrogen free extract (NFE)	48.2	53.1	65.1	45.9	51.9	2.0

Means of the digestibility values for the different proximate components were not significantly different.

CONCLUSIONS AND APPLICATIONS

The results of the preliminary study indicated the following:

(1) Rabbits may tolerate up to 300g/kg untreated CPH in their diets.

(2) Treatment of CPH with urea at 100g/kg level yielded the best results.

(3) Urea treatment of CPH did not significantly affect the digestibilities of proximate components at either 100g/kg or 300g/kg level of inclusion, although there were indications of slight enhancement by this treatment.

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