Utilization of diets containing cashew-nut reject meal by weaner pigs

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Abstract

A trial was conducted to assess the performance and digestibility of weaner pigs fed diets containing cashew nut reject meal (CNM). A control diet was formulated without cashew nut reject meal while two other diets were also formulated to contain either 50g or 100g/kg diet. The CNM replaced soybean meal in the control diet and the three diets were isocaloric and isoproteinous. Twelve six weeks old weaner pigs (7.5 ± 0.89 kg) were assigned on weight equalization basis to the three dietary treatments. Records of performance and some haematological parameters were taken. The digestibility of dry matter and the proximate fractions of feed were also determined. Feed intake of pigs on the CNM diets were lower ($P < 0.05$) than those in the control group but there were no significant effect ($P > 0.05$) of CNM inclusion on weight gain and feed:gain ratio. Protein efficiency ratio and apparent protein digestibility were highest in the soybean meal control diets. Pigs fed CNM diets had higher creatinine levels in their serum compared with the control diet. There were no significant differences among the dietary treatments for total protein, albumin, globulin, urea and cholesterol. It was concluded that CNM can be included in the diets of weaner pigs to replace soyabean meal up to 10% level with little or no deleterious effect on rate of gain.

Key words: Cashew nut meal, weaner pigs

Introduction

The supply of protein concentrates for non-ruminant feeding in Nigeria, over the year have been grossly inadequate. This is mainly due to high cost of such items like fish meal and to the scarcity of the more conventionally used oil seed meals, groundnut cake and soyabean meal. The need therefore for nutritionist to direct attention to possible use of alternative protein sources in non-ruminant (pig) feed cannot be over emphasized. Research on how best to use, as favourably as possible the alternative sources to achieve sustainable diets for pig production seem reasonable.

Cashew nut meal (CNM) is a by-product of the processing of the seed of *Anacardium occidentale* and has been reported (Piva *et al.*,

1971, Fetuga *et al.*, 1974) to compare favourably with groundnut and soyabean meals in terms of nutritional value. CNM has a protein content of 212g/kg, a high ether extract value of 489g/kg and 33 – 100g/kg of essential amino acids (Fetuga *et al.*, 1974). The CNM can be regarded as a moderate source of protein and energy because of the high fat content. the crude protein was reported to be qualitatively and quantitatively comparable to those of peanuts and soyabean meals.

Ohler (1979) reported that the protein value of cashew nut is equal to that of soyabean (84.9%) but higher than that of groundnut (66.0%). It is rich in vitamins B,C and Iron. In this study, CNM was include in the diet of weaner pigs at 50 and 100g/kg. This paper, therefore, reports

the performance, serum metabolites and apparent nutrients digestibility of weaner pigs fed the CNM diets and compares them to that of pigs fed on a conventional maize – soyabean meal – based diets.

Materials and Methods

The study was carried out in the College of Animal Science and Livestock Production Farm, University of Agriculture, Abeokuta, Nigeria (latitude 7°5.5'N – 7°8'N, longitude 3°11.2'E altitude 76 MASL) situated in the Derived Savanna vegetation zone. The area has a humid

climate with mean annual rainfall and temperature of 1037mm and 347.7°C respectively. Relative humidity average 82% throughout the year.

Diets

Three diets were formulated, a control and two others with 50 and 100 CNM/kg inclusion respectively. The cashew nut was purchased as rejected or broken scorched kernels from cashew processing factory in Eleyele, Ibadan, Nigeria. The reject nuts were later milled to make the meal which was mixed with other feed ingredients (Table 2).

Table 1: Chemical composition of cashew nut meal (g/kg)

Dry matter	954.6
Crude protein	215.0
Ether extract	455.0
Ash	38.0
Crude fibre	23.0
Gross energy (MJ/kg)	30.33

Table 2: Composition of experimental diets (g/kg)

	Inclusion level of CNM g/kg		
	0	50	100
Maize	350	350	350
Soyabean meal	184.5	134.5	84.5
Cashew nut meal	0.0	50.0	100.0
Fish meal	20.0	20.0	20.0
Wheat bran	200.0	200.0	200.0
Palm kernel cake	300.0	300.0	300.0
Oyster shell	20.0	20.0	20.0
Bone meal	20.0	20.0	20.0
Salt	3.0	3.0	3.0
Vit-mineral premix	2.5	2.5	2.5
Determined analysis (fresh weight basis)			
Dry matter	928.5	913.0	921.6
Crude protein	190.0	189.6	186.8
Crude fibre	87.8	81.9	93.6
Ether extract	71.6	88.6	105.0
Ash	87.9	91.2	93.9
Calcium	5.1	5.3	5.4
Phosphorus	4.2	4.3	4.4
Gross energy (MJ/Kg)	12.17	12.35	12.58

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Animals

Twelve (12) mixed breed weaner pigs, weaned at six weeks of age with a mean initial weight of 7.5 ± 0.89 kg, were blocked according to initial weight and are randomly assigned to three dietary treatments. The pigs were housed in concrete floor pens. The house is open sided with a low brick wall of about 1.5m high. The watering and feeding troughs were also made of concrete. Pig weight and feed consumption were recorded weekly on individual animal throughout the seven week trial.

Blood collection

Two (1 male and 1 female) out of the 4 experimental pigs per treatment were bled at the last week of the experiment. Animals were weighed and bled before the morning feeding. About 10ml of blood was withdrawn from the pinnae artery of each pig into a sample bottle. The sample were allowed to clot by putting them into a refrigerator at 4°C for 3 hours. They were then centrifuged at 1006 for 10 min and the serum was separated and stored frozen at -10°C until analysed. Blood parameters were measured as follows: total protein (Wechselbaun, 1946), Albumen and Globulin (Dumas and Briggs, 1972), Creatinine (Slot, 1965), Urea (Caraway, 1955) and cholesterol (Roshlan *et al.*, 1974)

Digestibility trial

Two pigs from each treatment were allocated to the experimental diets for a digestibility trial at the end of the seven weeks. Faeces from each pig were collected on days 5, 6 and 7 of the feeding trials. During the collection period, the pigs received 5% equivalent of their body weight as their daily feed allowance. They were fed two times a day – morning and evening. Water was supplied *ad libitum*.

Faecal output of each animal was collected and weighed daily, while equal parts of each faecal sample were preserved in a deep freezer. At the end of the trial, samples were pooled together and thoroughly mixed for chemical analysis.

Diets and faeces were analysed for their proximate constituents using the methods of the A.O.A.C. (1990)

Statistical analysis

Following the experimental design, all data collected were subjected to analysis of variance (ANOVA) as outlined by Daniel (1995) and means were considered different at $P < 0.05$ after Duncan's multiple range tests.

Results and Discussion

The performance of the weaner pigs on the treatments are summarized in Table 3. Feed intake of the pigs on the CNM diets were, on average 10% lower ($P < 0.05$) than those in the control group. It appeared that adequacy of dietary energy counteracted the effect of increasing fibre on feed intake. Also there was a marginal increase in energy of the diets with inclusion of CNM. Monogastric animals eat primarily to satisfy their energy requirement.

Despite the differences in the feed intake, there were no significant ($P > 0.05$) effect of CNM inclusion on the weight gain and feed:gain ratio. This is contrary to the finding of Blair *et al.*, (1969) and Hammond *et al.*, (1971) that feed conversion efficiency in pigs is inversely related to increased feed intake level because higher intake allows for increased body fat deposition. Protein efficiency ratio, which is a measure of the value of protein in feed, is highest in the soyabean meal control diets. This showed that the protein in the three diets was relatively of the same value (Table 4). It is possible that the high fibre content of the CNM diets interfered negatively with nutrient availability at the tissue level (Onifade, 1993, Onifade and Babtunde, 1997). Crude fibre digestibility increased ($P < 0.05$) with the inclusion level of CNM in the diets.

Table 3: Performance characteristics of weaner pigs fed experimental diets

	CNM inclusion level (g/kg)			SEM
	0	50	100	
Initial weight (kg)	7.5	7.5	7.5	0.89
Final weight (kg)	19.8	18.8	18.4	1.05
Feed intake (g/day)	1000 ^a	910 ^b	900 ^b	0.31
Weight gain (g/day)	251.0	230.6	222.4	0.71
Feed/gain	3.98	3.95	4.05	0.60
Protein efficiency ratio(PER)	1.32	1.34	1.32	0.04

a,b means without common superscript in each row are significantly different (P<0.05)

Table 4: Apparent nutrient utilization by weaner pigs fed the experimental diets (%)

	CNM inclusion level (g/kg)			SEM
	0	50	100	
Dry matter	58.08	55.09	57.27	0.77
Crude protein	67.55 ^a	60.21 ^b	56.49 ^b	2.66
Ether extract	86.19	90.87	91.41	1.40
Ash	38.82 ^a	29.49 ^b	45.03 ^a	3.70
Crude fibre	17.44 ^b	34.26 ^a	36.65 ^a	4.95

a,b means without common superscript in each row are significantly different (P<0.05)

The serum chemistry (Table 5) showed that pigs fed CNM diets had higher (P<0.05) creatinine level as compared with the control diets. Eggum (1970) has reported that the serum creatinine indicates extent of muscle wastage and subsequent degradation of muscle phospho-creatinine to form creatinine. Therefore, the low values recorded for CNM diets signified no observable muscular wastage brought about by inadequacy of protein. This means that although

there was higher digestibility of the protein in the control diet, there was no significance in the weight gain as compared to CNM diet because of the muscular wastage. The cholesterol level of 196 – 199.25g/l from this study fell within the normal value of cholesterol gave by Murray *et al.*, (1998). It was concluded that CNM can be included in diets of weaner pigs to replace soyabean meals up to 10% level with little or no deleterious effect on rate of gain.

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Table 5: Serum metabolites of weaner pigs fed the experimental diets

	CNM inclusion level (g/kg)			
	0	50	100	SEM
Total protein (g/l)	68.25	68.75	69.75	0.37
Albumin (g/l)	40.50	41.25	40.75	0.32
Globulin (g/l)	27.75	27.50	29.00	0.21
Creatinine (g/l)	1.55 ^a	1.25 ^b	1.30 ^b	0.08
Urea (mg/l)	32.50	27.75	31.25	1.31
Cholesterol (g/l)	197.25	196.25	199.25	1.09

a,b means without common superscript in each row are significantly different ($P < 0.05$)

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