

PERFORMANCE AND HAEMATOLOGICAL PROFILES OF CROSSBRED MALE RABBITS FED YAM AND CASSAVA BY-PRODUCTS IN THE HUMID TROPICS

Abstract

This study was conducted to evaluate the potentials of yam peels, cassava peels and the combination of these peels as energy sources in rabbit diets. Thirty-six crossbred weaner rabbits (male) aged 5-6 weeks were randomly allocated to 4 dietary treatments. Each treatment having 3 replicates with 3 rabbits per replicate in a completely randomized design. Diet 1 which had maize (37%) served as control. The maize proportion in diet 1 was replaced with yam peel, cassava peel, and yam – cassava peel mix in diets 2, 3, and 4 respectively. The experiment lasted for 12 weeks. Results obtained revealed that rabbits that received diets 2 performed better ($P<0.05$) than those that were fed diets 1, 3 and 4 in terms of daily weight gain. Haematological parameters assessed indicated no treatment effect ($P>0.05$) among the groups, though T_2 had the highest numerical values in packed cell volume, haemoglobin and red blood cell. It is concluded that yam peel, cassava peel, and yam – cassava peel mix could successfully replace maize in rabbits diets.

Key words: yam peel, cassava peel, growth, haematology, rabbit.

Introduction

Rabbits in the tropics are raised at ambient temperatures ranging between 27.44°C and 28°C which is outside their comfort zone of 21-23°C (Nwagu and Erakpotobor, 2013). Yet, rabbit production has been identified as one of the means of attaining sufficiency in the supply of animal protein to the diets of average Nigerians (Ekpo *et al.*, 2008).

They have potential as meat-producing animals in the tropics even as the new impetus for rabbit production in Africa amongst a wide range of people creates the need for alternative cheap sources of rabbit feed to replace cereals in rabbit diets in order to make rabbit production profitable. Among such alternatives are cassava and yam peels which are readily available with little cost. A successful replacement of conventional feed ingredients should reduce feed cost in rabbit production. Rabbit production provides a rapid means of increasing animal protein supply because they are known to have such attributes as short generation interval, rapid growth rate and ability to utilize forage agro-industrial by-products and kitchen waste (Ekpo *et al.*, 2008). The present study was designed to evaluate growth rate and haematological profile of crossbreed weaner rabbits fed cassava and yam peel meal diets in the tropics.

Material and Methods

Source and Processing of Test Materials: The test feedstuffs (yam and cassava peels) which were collected as kitchen waste from the Akwa Ibom State University environs, were sundried for 4 days before milling in a hammer mill to produce cassava peel meal (CPM), and yam peel meal (YPM) respectively. Four diets were formulated such that diet1 (control) contained 37.00% maize as the main energy source. The 37.00% maize in diet 1 was replaced with yam peel meal in diet 2, cassava peel meal in diet 3 and mixture of yam and cassava peel at equal ratio in diet 4. The experimental diets were supplemented with legume (centrosema). The ingredient composition of the diet is shown in Table 1. The diets supplied approximately 17.50% crude protein.

Site of Experiment: The experiment was conducted at the teaching and research farm of Akwa Ibom State University situated on latitude 5° 28¹N and longitude 7°32¹E. Akwa Ibom State has mean annual rainfall of 2200mm and mean annual humidity which ranges between 75% to 95% with average temperature of 27°C (Ansa, 2010).



Experimental Animals

A total of thirty-six cross breed (Dutch x Newzealand) rabbits aged 5-6 weeks having an average weight of 582.00g were used for the experiment. The rabbits were conditioned for weeks before randomly allotted to the four dietary treatments in groups of 9 rabbits each. Each treatment group was replicated three times with three (3) rabbits per replicate. Each rabbit was housed in a hutch measuring 70cm x 40cm. The entire hutch system was of the three-tier model. The rabbits were given both experimental diets and clean water ad libitum throughout the experimental period of 12 weeks.

Data Collection and Analysis

Feed samples were analysed for proximate composition according to the procedure of AOAC (2002). Daily feed consumption was obtained by subtracting the weight of the leftover feed each morning from the weight feed offered the morning of the previous day. Initial weight of the rabbits were taken the first day of the experiment and subsequently on weekly basis.

At the end of the 12 weeks feeding trial, a total of twenty-four rabbits (two per replicate) were randomly selected, starved overnight. Blood samples for haematological analysis was collected through marginal ear vein into bottles containing ethylene diaminetetracetic acid (EDTA). The blood samples were analyzed for packed cell volume

(PCV), haemoglobin concentration (Hb), and white blood cell count (WBC) using the methods described by Monica (1984). The mean corpuscular haemoglobin concentration (MCHC), mean corpuscular haemoglobin (MCH) and mean corpuscular volume (MCV) were calculated.

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Table 1: Composition of Experimental Rabbit Diets

Ingredients	Treatments			
	T ₁ (Control)	T ₂ (YPM)	T ₃ (CPM)	T ₄ (Combined)
Maize	37.00	-	-	-
Yam peel	-	37.00	-	18.50
Cassava peel	-	-	37.00	18.50
Soybean meal	14.00	12.00	16.00	16.00
Wheat offal	30.00	30.00	27.00	28.50
Palm kernel cake	14.50	16.50	14.00	14.00
Fish meal	1.00	1.00	2.50	1.00
Bone meal	1.50	1.50	1.50	1.50
Oyster shell	1.50	1.50	1.50	1.50
Vit/premix*	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25
Total	100	100	100	100
Calculated Nutrient Composition				
Crude protein	17.67	17.87	17.46	17.87
ME(Kcal/g)	2.52	2.35	2.06	2.23
Fibre	5.67	8.78	8.79	8.80
Ash	3.94	6.80	5.86	6.33
Ether	4.60	3.77	5.48	4.62

* Each kg contained vit A, 8,500,000 I. U; vit D₃, 2,000,000 I. U; vit E, 8,000 I. U; vit K₃, 1,500mg; vit B₁, 3,200mg; vit B₆, 1,800mg; vit B₁₂, 10meg; pantothenic acid, 5,500; folic acid, 500mg; biotin, 20mg; choline 200,000mg; manganese, 75,000mg; zinc, 45,000mg; Iron 20,000mg; Copper, 3,500mg; Selenium, 200mg; Cobalt, 200mg; Antioxidant 125,000mg.

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86 RESULT AND DISCUSSION

The performance of rabbits in the feeding trial is shown in table 3. There were significant differences ($P<0.05$) among treatments in final body weight, daily weight gain and daily feed intake. Rabbits fed diet 2 had the highest final body weight gain (1798.95g) while those fed diet 1 had the lowest final body weight gain (1622.87g). Similarly, rabbits fed diet 2 had the highest daily weight gain (14.62g) while the rabbits fed diet 3 had the lowest daily weight gain (12.35g). The poor performance in weight gain of rabbits fed diet 3 may be

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attributed to the low dietary energy with higher fibre content of diet 3 (Table 1). This is because increased dietary fibre with reduced dietary energy often limits growth in monogastrics including rabbits (Summer, 2000 and Xicatto 1999). On the contrary, weight gain was significantly higher ($P<0.05$) in rabbits fed diet 2. This could be invariably linked to the relatively increased dietary energy in relation to diets 3 and 4; higher protein and fibre level compared to the diet 1 (Table 2). Pesti (2009) had earlier observed that increase dietary protein could contribute to increased growth of animals.

Feed intake value of 66.98g obtained from rabbits fed diet 3 was observed to be highest while the lowest value of 61.00g was obtained from rabbits fed diet 1 (control). The significant increase in feed intake of rabbits fed diet 3 may be attributed first to the low dietary energy content of diet 3 in relation to diets 1, 2 and 4. This is in agreement with Ekpo *et al.*, (2008) who observed that rabbit usually consume more of low energy feeds such as cassava peel meal to satisfy their energy needs. Another plausible reason for the high feed intake could be the high crude fibre content of cassava peels, even as Lebas (1983) and Deblas and Wiseman (2003) reported that increase crude fibre invariably attract increase voluntary feed intake and vice versa in growing rabbits. The result of this study corroborate Olorusanya *et al.*, (2007) who observed highest daily feed intake when 100% maize was replace with sun-dried cassava peel meal.

Feed conversion, values obtained indicated statistical similarity ($P>0.05$) although the highest value (5.42) was obtained from rabbits fed diet 3 and the lowest value (4.31) from rabbits fed diet 2. The similarity in feed conversion ratio of the rabbits on this trial is an indication that replacement of maize with cassava peel meal or yam peel did not impair nutrient utilization in the growing rabbits.

Haematological Indices

The results of the haematological indices are presented in Table 4. The value for packed cell volume (PCV) was highest (38.50%) in rabbits fed diet 2 while those fed diet 3 had the lowest (36.30%). Similarly, highest Hb concentration (12.16g/dl) was obtained from rabbits fed diet 2 while the lowest Hb value (10.70g/dl) was obtained from rabbits fed diet 3. There were no significant difference ($P>0.05$) among the treatment means. The packed cell volume (PCV) and haemoglobin (Hb) concentration values obtained compared favourably with the normal ranges for PCV (33.00 – 35.00%) and Hb (9.4 – 17.4g/dl) reported by Hillyer (1994) and Fudge (1999) respectively for growing rabbits. The red blood cell (RBC) values obtained showed that animals given diet 2 had the highest (5.75) while those fed diet 3 had

the lowest (4.50) but were statistically similar ($P>0.05$) The values were within the range of 3.07 to $7.50 \times 10^6/\text{mm}^3$ reported by Fudge (1999). The apparent increase in values of PCV, Hb and RBC for rabbits fed diet 2 (YPM) seems to be an influence of the high dietary protein in yam peel (Table 2) even as Hackbath et al (1983) and Tuleun et al (2007) observed that increased in dietary protein could lead to increase in RBC, PCV and Hb. Similarly, Maxwell et al (1990) reported that blood parameters are important in assessing the quality and suitability of feed ingredients in farm animals. For the WBC, MCV, MCH and MCHC values obtained, there were no significant differences ($P>0.05$) between the treatment groups even as their values were within range of 5 to $13 \times 10^3/\text{mm}^3$ for WBC, 18 to 24 pg for MCV, 50 to 75 um^3 for MCH, and 26 to 34% for MCHC as reported by Hillyer (1994) and Anon (1980). The similarities ($P>0.05$) for all the haematological parameters in all the treatments and within normal ranges reveal that yam peel, cassava peel and yam – cassava mix meal can successfully replace maize in rabbit diets as far as nutritional and health status of rabbits are concern.

CONCLUSION

Based on the comparable results obtained from growth performance and haematological indices, it can be deduced that maize can be successfully replaced with either cassava peel meal, yam peel meal or yam – cassava mix meal. Relatively, yam peel meal diet is most preferred due to its significance influence on rabbits weight gain.

Table 2: Proximate Composition of Yam Peel and Cassava Peel

Parameter (%)	Yam Peel	Cassava Peel
Dry Matter	89.90	91.24
Crude Protein	11.14	5.19
Crude Fibre	6.30	19.72
Ash	7.30	7.26
Ether Extract	4.12	5.02
NFE	71.14	62.81

Table 3: Effects of Experimental Diets on Performance of Weaner Rabbits

Parameters	T ₁ (Control)	T ₂ (Yam Peel)	T ₃ (Cassava Peel)	T ₄ (Yam/Cassava)	SEM
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Initial body height	580.98	570.81	584.98	589.89	1.11
Final body weight	1,692.91 ^c	1,798.95 ^a	1,622.87 ^d	1,683.89 ^b	3.33
Total weight gain	1,111.93 ^b	1,228.14 ^a	1,037.89 ^d	1,094.00 ^{bc}	3.30
Daily weight gain	13.24 ^b	14.62 ^a	12.35 ^d	13.02 ^{bc}	0.67
Daly feed intake	61.00 ^c	63.00 ^b	66.98 ^a	62.50 ^{bc}	0.36
Feed conversion ratio	4.61	4.31	5.42	4.80	0.15

^{abc} means along the same row having no superscript are not significantly different (P>0.05)

SEM = Standard error mean.

Table 4: Effects of Experimental Diets on Haematological Indices of Rabbits

Parameter	Treatments				SEM
	T ₁ (Control)	T ₂ (YPM)	T ₃ (CPM)	T ₄ (YPM/CPM)	
Packed cell volume (%)	37.42	38.50	36.80	37.40	0.34
Haemoglobin (g/dl)	11.45	12.16	10.70	11.40	0.26
Red blood cell (x10 ⁶ /mm ³)	5.68	5.75	4.50	5.20	0.15
White blood cell (x10 ³ /mm ³)	7.36	6.82	7.26	6.98	0.25
MCV (F1)	6.59	6.69	8.20	7.19	0.22
MCH (Pg)	20.16	21.15	23.78	21.92	0.23
MCHC (g/100ml)	30.59	31.58	29.10	30.48	0.31

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