



EVALUATION OF GROWTH PERFORMANCE AND SOME HAEMATOLOGICAL CHARACTERISTICS OF WEANED RABBITS FED PAWPAP PEEL MEAL BASED DIETS IN CROSS RIVER RAIN FOREST ZONE

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ABSTRACT

A study to evaluate the growth performance and some haematological characteristics of weaned rabbits fed pawpaw peel meal based diets was undertaken. Twenty four (24) cross bred rabbits of mixed sexes between 5-6 weeks old; weighing 516.67 – 583.33g were randomly assigned to four (4) experimental diets after weight equalization, with six (6) rabbits per dietary treatment. The feeding trial lasted nine (9) weeks after two initial weeks of acclimatization and the rabbits were given diets with crude protein levels ranging from 17 – 18% and energy levels ranged from approximately 2400 – 2700Kcal/Kg ME. The four dietary treatments were designated T₁, T₂, T₃ and T₄ with 0%, 15%, 30% and 45% levels of pawpaw peel meal (PPM) respectively. Results obtained from the study showed that all growth parameters recorded no significant difference ($p > 0.05$) between dietary treatments. Average daily feed intake (ADF) fluctuated with increasing levels of PPM, with T₄ (45%) recording the highest value of 55.36g and T₂ (15%) the least value of 45.72g. The average daily weight gain (ADG) also recorded a fluctuating trend. Treatment T₃ (30%) PPM was the best utilized diet as it recorded the least FCR (4.28) compared to other treatment groups. Apart from the white blood cell counts (WBC), all other hematological parameters recorded no significant difference ($p > 0.05$) between treatments. The packed cell volume (PCV) and haemoglobin (Hb) increased marginally as the levels of PPM increased in the diets. All the haematological parameters were within the normal ranges for rabbits. Therefore, findings from this study suggest that feeding PPM up to 45% may not adversely influence the growth performance and haematological characteristics of rabbits.

KEYWORDS: Rabbits, Pawpaw peel meal, Growth performance, Haematology.

INTRODUCTION

In today's world, the importance of animal protein to mankind cannot be over emphasized. Dietary animal protein is necessary for maintaining tissues and for sustaining growth, because of its high biological value (Egbewande, 2010). According to Staal *et al.* (1997), animal protein is one of the most expensive food components and many consumers are financially handicapped to afford it, thereby resorting to the consumption of cheaper but less digestible plant protein sources. Adewumi *et al.* (2004) reported that the level of animal protein intake is of greatest concern in developing countries such as Nigeria, where there is a supply deficit in meat and other animal products. Nigeria is richly blessed with a variety of animal protein sources; but the problem is that the animal protein is not sufficiently produced to meet the requirements of Nigerians (Ibe, 2000), judging from the fact that most Nigerians consume less than 10g of animal protein daily as against the minimum requirement of 28g/caput/day (FAO, 1985). Furthermore, FAO (2006) gave daily protein requirement of an average adult as 65g/caput/day and of this amount, 35g is expected to be of animal origin. Egbewande (2010) reported that in Nigeria, the available protein is given at 45g/caput/day with animal protein accounting for 8g/caput/day, representing a short fall of about 77% in animal protein recommended by FAO (2006). The short fall in animal protein intake can be bridged via intensive rabbit production and other micro

livestock species. Rabbit alone has been reported to have enormous potentials in alleviating the problem of animal protein supply in developing economies (Biobaku and Dosumu, 2003). Its attributes include ability to strive on forage, high reproductive potential with short gestation period and fast growth rate (Odimba, 2006). However, intensive rabbit production in Nigeria has been hampered by the perennial problem of feed availability. The high cost of conventional protein and energy ingredients have grossly undermine the potentials of rabbit production. This has made feed alone to account for about 70% of the total cost of rabbit production (Akinmutimi and Ezea, 2006). Hence, the need to explore locally available, non-conventional, low cost but nutritionally adequate feedstuffs for rabbits (Akinmutimi and Obioha, 2010). One of such locally available feedstuffs is pawpaw and its parts. Preliminary report by Bitto *et al.* (2006) affirmed the inclusion of 30% pawpaw peel in rabbit diets with no adverse effects on growth performance of female rabbits in Makurdi, North Central Nigeria. This study was therefore designed to investigate the effect of higher level of inclusion of pawpaw peel in rabbits of mixed sexes on growth and haematological responses in Calabar, Cross River Rain Forest Zone of Nigeria.

MATERIALS AND METHODS

Location of Study

The study was carried out at the Rabbitry Unit of the Teaching and Research Farm, Department of Animal

Science, University of Calabar, Calabar. The area has a tropical climate and vegetation with a lot of pawpaw trees and abundant fruits.

Animals, Experimental Design, Management, Pawpaw Peel Meal and diets

Twenty four (24) weaned rabbits of mixed breeds and sexes of 5 – 6 weeks old weighing 516.67 – 583.33g were used for the study. The animals were randomly assigned to individual cages using a Completely Randomized Design (CRD), after balancing for body weight. The animals were allowed to acclimatize in the rabbitry facility for two weeks; during this period they were placed on the control diet before the actual commencement of the experiment which lasted for another nine (9) weeks. Unripe pawpaw fruits were obtained from different locations in Calabar metropolis. The peels were processed by methods earlier reported by Bitto *et al.* (2006) before being incorporated into the experimental diets at 0%, 15%, 30% and 45% respectively, for T₁, T₂, T₃ and T₄.

Feed Intake, Body Weight Changes and Feed Conversion Ratio

Each rabbit was offered a weighed amount of feed daily supplemented with wilted *Tridax procumbens*. The rabbits were fed in the morning hours between 7:00 - 8:00am daily. The animals had access to fresh and clean drinking water *ad libitum*. Left over feed was collected into clearly labeled envelopes and weighed with a digital scale. The feed intake was computed by deducting from the quantity served, the weight left over. The rabbits were weighed individually at the beginning of the study and weekly

thereafter using a sensitive weighing scale. Body weight changes were determined by difference.

Blood Collection & Statistical Analysis

At the end of the feeding trial, which lasted for Nine (9) weeks, twelve (12) rabbits (three per treatment) were taken to the laboratory and sacrificed by stunning and followed by severing of the jugular vein as described by Aduku and Olukosi (1990); after they had been starved of feed for twelve (12) hours but had access to adequate drinking water. Blood samples per rabbit were collected into clean EDTA bottles for Haematological analysis. All haematological parameters were evaluated by methods described by Bitto and Gemade (2001). All results obtained in this study were subjected to one-way analysis of variance (ANOVA) as outlined by Steel and Torrie (1980) for CRD. DMRT was used to separate significant mean values where necessary.

RESULTS AND DISCUSSION

The result of growth characteristics of rabbits fed pawpaw peel meal (PPM) based diets are shown in Table 1. The initial and final live weights of the rabbits ranged from 516.67 – 583.33g and 1000.00 – 1150.00g respectively. All growth parameters recorded no significant difference ($p > 0.05$) between dietary treatments. The average weight gain (ADG) increased marginally with increasing levels of PPM in the diets, while other parameters recorded a fluctuating trend with no regular pattern. The ADG values obtained in this study are comparable to the values earlier reported by Malik, *et al.*, (2011), who fed sweet potato peel meal supplemented with and without molasses.

TABLE 1: Growth Performance of Weaned Rabbits fed Pawpaw peel meal based diets

Performance trait	Dietary Treatments				S.E.M
	T ₁ (0%)	T ₂ (15%)	T ₃ (30%)	T ₄ (45%)	
No. of rabbits/diet	6	6	6	6	
Initial live wt. (g)	516.67	516.67	583.33	583.33	19.24 ns
Final live wt.(g)	1150.00	1130.00	1008.33	1000.00	39.46 ns
ADF (g)	50.77	45.72	54.38	55.36	2.18ns
ADG (g)	9.31	10.00	12.71	12.04	0.81ns
FCR	5.32	4.57	4.28	5.15	0.24ns
Mortality	2(33.33%)	1(16.67%)	0	1(16.67%)	-

X = mean, s.e.m = Standard Error of Mean, ns = not significant
Means on the same row are not significantly different ($p > 0.05$)

However, the average daily feed (ADF) intake values obtained in this present study are slightly lower than the corresponding values reported by the above workers due to differences in test ingredients, as PPM contains papain which may limit its utilization by animals. ADF values were however similar to the values obtained by Onyekwere, *et al.*, (2010) who fed boiled Bambara nut waste to weaned rabbits, this comparable findings may be attributed to the used of mixed sexes of weaned rabbits in the two independent studies, though with different feed resources. The low mortality recorded in this study may not be attributed to the diets but other unidentified factors as the control diet without PPM also recorded a mortality of 2 (33.33%). Results of haematological characteristics of rabbits fed PPM are shown in Table 2. All haematological parameters except White Blood Cell Counts recorded no significant difference ($p > 0.05$) between treatments. This

however contradicts the reports of Bitto and Gemade (2001); Bitto, *et al.*, (2006) who fed PPM to male and female rabbits respectively and recorded no significant ($p > 0.05$) effect in WBC counts. The values of WBC obtained in this study are slightly higher than the corresponding values recorded by the earlier workers. This disparity may be due to differences in sex and age of the rabbits (Bitto *et al.* 2006), as these factors among others are responsible for variation in haematological values in rabbits (Mitruka and Rawnsley, 1977). All haematological values obtained in this study are within the normal ranges for rabbits reported by Medirabbit (2011). The Packed Cell Volume (PCV), Haemoglobin and WBC counts increased marginally with increasing levels of PPM in the diets with no adverse effects. The increasing number of white blood cells (leucocytes) as the level of PPM increased is an indication of leucopoiesis to form more

WBCs to counter any adverse effect of papain in the blood system of rabbits. Other possible factors that may affect

WBC count are age, sex, nutrition and diurnal variation (Mitruka and Rawnsley, 1977).

TABLE 2: Haematological Characteristics of Rabbits fed Pawpaw peel meal based diet ($\bar{x} \pm \text{s.e.m}$)

Parameter	Diets			
	T ₁ (0%)	T ₂ (15%)	T ₃ (30%)	T ₄ (45%)
PCV (%)	38.33±4.71	38.67±2.34	40.67±3.72	45.67±2.61
Hb (g/dl)	12.80±1.56	12.90±0.76	13.57±1.23	15.23± 0.87
ESR (mm/hr)	11.67± 4.18	6.60± 0.31	7.00± 0.58	6.00± 0.58
WBC ($\times 10^9/L$)	4.23± 0.47 ^{bc}	3.90± 0.26 ^{bc}	5.40±0.60 ^{ab}	7.10±1.00 ^a
Differential WBC Counts (%)				
Neutrophils	61.33±6.65	62.33±4.85	48.33±6.57	58.00±7.22
Lymphocytes	35.00±7.24	33.00±5.04	48.33±5.79	38.67±7.13
Monocytes	1.67±0.33	2.33±0.33	2.33±0.33	1.33±0.33
Eosinophils	2.00±0.58	2.00±0.58	1.00± 0.41	1.60±0.33
Basophils	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00

a,b,c: means on the same row with different superscripts are significantly different ($p < 0.05$).

PCV: Packed Cell Volume, Hb: Haemoglobin, ESR: Erythrocyte Sedimentation Rate and WBC: White Blood Cells

CONCLUSION

From the results obtained in this study, it is therefore concluded that feeding pawpaw peel meal at 45% inclusion level may not adversely affect the growth performance and haematological characteristics of rabbits. Further research is advocated with the determination of actual papain content in the pawpaw peels and its implication in other physiological aspects of rabbits.

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