

Effects of Fermented Locust Bean Seed (*Pakia clapatoniana*) As a Replacement for Full Fat Soybean Meal on the Performance and Haemathological Parameters of Weaner Rabbits

Samuel O. Akpet^{1*}, Ukorebi, B. A., Orok, E. E.¹, Ayuk, E. A.¹ and Essien, A.¹, Kevin U. Anoh²,

1. Cross River University of Technology Obubra, Nigeria.

2. Ahmadu Bello University Zaria, Nigeria.

*E-mail: kevin2us.man@Gmail.com Tel- 08063465088

Abstract

A feeding trial was conducted with twenty four (24) unsexed weaner rabbits, with mean initial weight of 776g for eight weeks, to evaluate the effect of replacing full fat soybean with fermented locust bean seed at 0%, 25%, 50% and 75% levels of inclusion (for control, T₂, T₃ and T₄, respectively). The animals were distributed into four treatment groups of six rabbits each, sub-divided into three replicates of two animals each, in a completely randomized design. Each treatment group received 120g of *Tridaxprocumbens* and one of the experimental diets. Feed intake, water intake, weight gain and feed conversion ratio, as well as some hematological parameters were determined. Feed conversion ratio, RBC, Hb and PCV were not significantly ($P > 0.05$) affected by treatments. However, average final weight, average weight gain, average feed and water intake, WBC and TP all showed significant ($P < 0.05$) treatment effects. Results of the experiment suggests that dietary inclusion of fermented locust bean in the diets of weaner rabbits should not exceed 25%, as performance of experimental animals were adversely affected above this level.

Key word: Fermented Locust Bean Seed, Feed Intake, Haemathology.

1.0 Introduction

The key to abundant animal production is the availability of cheap and balanced feed. Feed dictates how many animals you can grow and how fast they can mature for the market (Aduku, 1992). There is therefore, the need to intensify research into alternative feed sources that are affordable and available to cut down the cost of production. Soy bean has witness a geometric increase in price in recent times owing to its numerous potentials and high demand as feed raw material for livestock, raw material to industries and food for man. Soy bean seed has been reported to play a great role in the supply of protein and energy to rabbits although there are a lot of anti-nutritional factors limiting its usage (Okagbare and Akpodiete 2006). McDonald (1995) reported that the seeds contain a number of toxic stimulatory and inhibitory substances including allergenic, goitrogenic and anticoagulant factors. This factors according to the author is responsible for growth retardation in farm animals. The retardation has been attributed to inhibition in protein digestion. The methods of processing the seeds against this anti-nutrient have been a major challenge to most farmers (Okagbare and Akpodiete 2006). If the seeds are not properly processed, you may end up denaturing the protein in the seed. In this study, the potential of including fermented locust bean (*Pakia clapatoniana*) seed in weaner rabbit diets was explored. The Africa locust bean is a spreading tree of medium size with compound leaves and numerous leaflets. The fruits are represented by bunches of pods which form the nutritive part of the plant. Each pod, which may vary between 5 and 11 inches in length, contains a yellow dry powdery pulp inside which is embedded a number of dark brown and black seed (Oyenuga 1978). About 20% of the seeds are made up of semi-liquid oil of which 54% of the fat is unsaturated with linoleic acid predominating, while 32% consist of palmitic acid. It is low in sulphure amino acid, methionine and cystine and similarly low in histidine but high in lysine (Oyenuga 1978; Ogundun, 2007). The fat content of the seed is appreciable lower than that of groundnut. The seeds are also known to contain 30.36% crude protein, 5.3% ash, 20.3% ether extract and 8.82% crude fiber. The content of it crude fiber and carbohydrate is fairly high for all classes of livestock (Oyenuga 1978; Ogundun, 2007). This study was aimed at ascertaining the effects of replacing full fat soy bean meal with fermented locust bean seed on the performance and haematological parameters of weaners rabbits.

2.0 Materials And Methods

2.1 Experimental Site and Experimental Materials

This study was carried out at the Teaching and Research Farm of the Department of Animal Science, Cross River University of Technology, Obubra Campus, Cross River State. Fermented locust bean seeds commonly called (Dawa-Dawa) were purchased from a local market within Ogoja, Cross River State, Nigeria. Soybean and other feed raw materials were purchased from a feed vendor within Ogoja. The seeds were toasted until they became light brown. This was done to destroy the anti-nutritional factors that may be present in soybean seed.

2.2 Experimental Diets

Four experimental diets were formulated to be iso-caloric and iso-nitrogenous and also to meet the NRC (1995) nutrient requirement for weaner rabbits. Diet one was the control while diets 2, 3, and 4 had 25% 50% and 75% of the protein source (fermented locust bean-full fat soy bean seed). (Table 2). Samples of fermented locust bean seeds were analyzed for proximate composition following the methods of A.O.A.C. (2000) (Table 1).

2.3 Experimental Animals and Management

A total of twenty four (24) weaner rabbits (crosses) of mixed sexes purchased from Ogoja were used. The rabbits were randomly distributed into four (4) treatment groups. There were six rabbits per treatment with two rabbits per replicate in a completely randomized design. Rabbits were housed in wooden cages, dewormed with piperazine prior to the commencement of the experiment. Feed and cool drinking water were given *ad-libitum* for eight weeks.

2.4 Parameters Monitored and Statistical Analysis

Parameters monitored included; feed intake, weight gain, water intake and feed to gain ratio was estimated by dividing feed consumed by weight gain. On the last day of the research, 1.5ml of blood was obtained from the ear vein into an EDTA bottle and taken for haematological analysis. The PCV, Hb, WBC, RBC and TP were analyzed following the methods of Bush (1991). Data obtained was analyzed for variance using the general linear model in the SAS soft ware (SAS, 2002). Significant means were separated using Duncan Multiple Range Test in the soft ware.

3.0 Results and Discussion

Table 3 shows the growth performance of weaner rabbits fed fermented locust bean seed based diet. There were significant ($P < 0.05$) difference in all the parameters monitored except for feed to gain ratio which was not significant. Final weight and average daily weight gain followed the same trend. Values of treatment 2 and 3 with 25 and 50% replacement levels were higher than the control and treatment 4. There was a linear increase in the average daily feed intake with a decline in treatment 4. Treatment 3 (50%) had the highest feed intake; this was similar to treatment 2. The water intake in this experiment increased as the levels of fermented locust bean seed in the diet increases.

The increase in feed intake observed in this study could be attributed to the aroma and improved palatability of the diets. At 75% replacement level, the smell of the fermented locust bean seed masked the smell of other ingredients, making the diet unattractive and unpalatable to the rabbits. Abubakar and Yusuf (1991) reported a similar observation when they fed rumen content to broilers. This finding is similar to the earlier report of Odunsi (2003). He reported that feed intake increases in animals if the aroma of their diet is pleasant. This could be because animals dictate their feed through smell. The weight gain of this experiment was a reflection of the feed intake. The daily water intake observed in this study could be attributed to varying inclusion levels of fermented locust bean seed. It is possible that more water is required to metabolize the high levels of fermented locust bean in the diets.

The results of the haematological analysis (Table 4) observed in this experiment showed that the PCV, Hb and WBC were not significantly ($P > 0.05$) different. There were significant difference in WBC and TP. Treatment 4 (75%) recorded the highest values, while treatment one (control) recorded the least values.

All parameters recorded in this experiment were within the normal range for healthy rabbits (Schalm *et al.*, 1975 and Anon 1980). Hachathet *al* (1983) found that there is a strong influence of the diet on the haematological traits with PCV and HB being strong indicators of the nutritional status of the animals. Abnormal values may be an indication of anemia (Bush, 1991; Onifade and Tewe, 1993 and Abu *et al.*, 1999).

4.0 Conclusion

Inclusion level of fermented locust bean seed should not exceed 25% of the entire diet of weaner rabbits as above this level, there was a decline in performance of rabbits. Using fermented locust bean seed had no implication on the health of the rabbits as all the haematological parameters analyzed for all fell within the normal range for healthy rabbits. This research therefore suggest that fermented locust bean seed can be included up to 25% in the diet of weaner rabbits without any adverse effect.

Reference

Abu, O.A, Igwebuikwe, J.U., Bikoi Bell, D., Mbaya, M. Y. and Umaru, R.S. (1999). Growth

performance and economy of production of rabbits fed urea-treated or untreated rice husk-base diets. 26th Nigeria society of animal production proceeding. University of Ilorin PP. 140 – 143.

Abubakar, M. M. and A. O. Yusuph, (1991). Effectiveness of rumen content in poultry rations. *Nigeria Journal of Animal Production P: 78-79.*

Aduku, A.O. (1992). Practical livestock feeds production in the tropics. S. Asekome and co.publisher, Samara Zaria.

Anon, (1980). Guide to the Care and Use of Experimental Animal Vol. 1. Canadian Council on Animal Care, Ottawa, Ontario, Canada. Pp. 85 – 90.

AOAC (2000). Association of Official Analytical Chemist 17th Revised edition. In: Official methods of analysis, Washington DC PP. 210-240.

Bush, B. M. (1991). Interpretation for Laboratory Manual. William Heinema Medical Book Ltd. London, UK. P. 447.

McDonald, P. (1995). Animal Nutrition (fifth ed.). Longman press.

Odunsi, A.A (2003). “Blend of blood and rumen digesta as a replacement for fish meal and groundnut cake in layer diets”. *International Journal of poultry science 2 (1): 58-61*

Ogundun, N.J. (2007). Replacement of maize with locust bean seed as energy sources in the diet of rabbit. 32nd NSAP conf. Unical. 18th – 21st March Pp; 455-456.

Okagbare, G. O. and Akpodiete, O. J. (2006). Soybean in preruminant nutrition: A review. *Nigeria Journal of Animal Production. 33 (1) 83-86.*

Oyenuga, V.A. (1978). Nigeria feed and feeding stuffs. Ibadan University press, Ibadan.

S.A.S. (2002). Statistical Analysis System, User guide. 6th edition. North Carolina, USA.

Schalm, O.W., N.C. Jain, and E.J. Carol. (1975). Textbook of veterinary hematology. 3rd ed. 193 p. Lea and Febiger, Philadelphia, Pennsylvania, USA.

Table1: PROXIMATE COMPOSITION OF FERMENTED LOCUST BEAN SEED

PARAMETERS	DM	CP	EE	CF	ASH	NFE
Values	87.08	31.26	21.30	7.22	5.50	21.8

Table2: COMPOSITION OF EXPERIMENTAL DIET(%)

INGREDIENTS	Treatments			
	T1	T2	T3	T4
Full fat soybean	36.00	24.00	18.00	12.00
Ferm. Locust bean	-	12.00	18.00	24.00
Maize	50.00	50.00	50.00	50.00
Rice meal	10.00	10.00	10.00	10.00
Bone meal	3.00	3.00	3.00	3.00
Vit. Premix *	0.25	0.25	0.25	0.25
Salt	0.50	0.50	0.50	0.50
Methionine	0.10	0.10	0.10	0.10
Lysine	0.15	0.15	0.15	0.15
Total	100.00	100.00	100.00	100.00
CALCULATED ANALYSIS				
ME (K/Cal/kg)	2907.50	2948.60	2959.70	2957.50
Crude protein (%)	18.48	18.00	18.06	18.04
Crude Fiber (%)	8.85	10.65	10.78	11.02

* To provide the following per kg of diet: Vit. A, 10,000 iu; Vit. D3, 2000 iu; Vit. E, 5 iu; Vit. K, 2mg; Riboflavin, 4.20mg; Vit. B₁₂, 0.01mg; Pantothenic acid, 5mg; Nicotinic acid, 20mg; Folic acid, 0.5mg; Choline, 3mg; Mg, 56mg; Fe, 20mg; Cu, 10mg; Zn, 50mg; Co, 125mg.

Table3: PERFORMANCE EVALUATION OF WEANER RABBITS FED DIETS CONTAINING FERMENTED LOCUST BEAN SEED AT VARYING PROPORTIONS

PARAMETER	Treatments				SEM
	T1	T2	T3	T4	
Initial wt. (g)	776	776	775	776	
Final wt. (g)	1540 ^b	1750 ^a	1800 ^a	1370 ^c	88.00
A.V weight gain (g/day)	13.57 ^b	17.32 ^a	18.65 ^a	10.54 ^c	0.75
A.V. Feed Intake (g/day)	70.97 ^{ab}	77.87 ^{ab}	79.84 ^a	60.50 ^b	3.98
Feed to Gain Ratio	5.30	4.50	4.30	5.8	0.21
A.V. Water intake (ml/day)	89.17 ^b	71.46 ^c	114.42 ^{ab}	120.88 ^a	6.41

^{abc}Means on the same row with different superscripts are significantly different (P<0.05)

A.V : Average.

Table4: HEMATOLOGICAL CHARACTERISTICS OF WEANER RABBITS FED DIETS CONTAINING FERMENTED LOCUST BEAN SEED AT VARYING PROPORTIONS

PARAMETERS	Treatments				SEM
	T1	T2	T3	T4	
PCV (%)	40.30	42.50	42.60	39.50	1.44
Hb (mg/dl)	13.71	14.90	14.20	14.00	0.60
TP (mg/dl)	4.40 ^c	5.40 ^b	6.00 ^a	6.10 ^a	0.42
WBC (10 ³ /ml)	8.50 ^a	7.71 ^b	9.25 ^a	9.76 ^a	0.35
RBC (10 ⁶ /ml)	6.67	6.80	6.77	6.50	0.7

^{abc}Means on the same row with different superscripts are significantly different (P<0.05)

PCV: Pack Cell Volume

Hb: Haemoglobin

TP: Total Protein

WBC: White Blood Cells

RBC: Red Blood Cells

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