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Original Research Article

Effect of Feeding Processed (*Faidherbia Albida*) Pod Meal to Weaner Rabbits in the Guinea Savanna Zone of Adamawa State

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ABSTRACT

A study was conducted to determine the effect of feeding processed *Faidherbia albida* pod (fap) meal to weaner rabbits. Five experimental diets were formulated containing 0%, 15% raw, 15% soaked, 15% boiled and 15% toasted fap meal designated as T_1 T_2 T_3 T_4 and T_5 respectively. A total of forty (40) wearner rabbits were fed with these diets in a completely randomized design. The experiment lasted eight (8) weeks. The diets and fecal sample were analyzed for proximate compositions. The results of growth performance indicated that there were significant differences ($p<0.05$) in final weight (1425.00-1670.00g), total weight gained (826.75-1038.25g) and average daily weight gained (14.76-18.53g). the results on the economics of feeding weaner rabbits with processed fap showed that the cost of feed ranged from 57.58kg in the control to 39.40kg T_3 while cost of total feed in take range from 187.71 control – 109.92 T_3, also rabbits in T_3 feed the soaked F. albida pods was observed to gain more weight 1.03kg compared to other treatments. It was concluded from the study that soaked F. albida pod meal is best for feeding weaner rabbits since it improved weight gain in rabbits and at a reasonably cheaper cost.

Key words: Feeding Processed, Pod Meal, Weaner Rabbits and Guinea Savanna

INTRODUCTION

Rabbits are known to play important role in the supply of good quality animal protein especially in the rural areas. They are very good in converting feed to flesh and can use up to 75% crude fibre as against 10% by most poultry species (Iyeghe-Erakpotobo *et al.*, 2013). Rabbits are one of the prolific animals that can quickly bridge the gap between the supply and demand of protein because of its short generation interval and low feed cost. (Akinmuyisitan *et al.*, 2015). Keeping rabbits is cheap, simple and easy since it does not require heavy capital investment if one start with a pair of rabbits (Oni, 2009). *Faidherbia albida* is a tropical legume that can be used as a potential protein supplement for feeding rabbits. The pods are cheap to buy and they are not consumed by humans. The pods are available during the periods when grasses have all dried out in the guinea and Sudan savanna regions of Nigeria. Pods contain adequate protein and fibre protiles (Adegbola *et al.*, 2012). The objective of this study is to determine the best processing methods of *Faidherbia albida* pods that can be used to feed rabbits in these regions.

MATERIALS AND METHODS

a. ***Experimental site:*** The research was conducted at the Teaching and Research Farm of the Department of Animal

Science and Range Management, Modibbo Adama University of Technology, Yola Adamawa state. The study area lies between latitude 9^0 and 11^oN of the equator and longitude 11^0 and 14^0E of the Greenwich Meridian. Dry season last for a period of five months (November – March) while the rainy season starts from April to October. The region has an average annual rainfall of 700mm-1600mm and relative humidity that ranges from 5-42% with an average maximum temperature of 39^oC (Adebayo, 1999).

b. ***Experimental design and diets :*** Forty weaner rabbits aged between 4-5 weeks old, weighing 575-625g were purchased from the National Veterinary Research Institute (NVRI) Vom, Plateau state Nigeria. The rabbits were randomly allotted to five dietary treatments of 8 rabbits per treatment replicated four times with 2 rabbits per replicate in a completely randomized design (CRD). Five experimental diets were formulated containing 0% *F. albida* pod meal in the control, 15% raw, 15% soaked, 15% boiled and 15% toasted fap meals designated as T_1 T_2 T_3 T_4 and T_5 respectively.

Table 1 Ingredient Composition of Experiment diets processing methods

Ingredients %	Control T_1	Raw T_2	Soaked T_3	Boiled T_4	Toasted T_5
Maize	51.63	41.63	41.63	41.63	41.63
Maize bron	25.00	20.00	20.00	20.00	20.00
FAP meal	0.00	15.00	15.00	15.00	15.00
G/nut cake	18.72	18.72	18.72	18.72	18.72
Fish meal	2.00	2.00	2.00	2.00	2.00
Born meal	2.00	2.00	2.00	2.00	2.00
Salt	0.50	0.50	0.50	0.5	0.50
premixa	0.15	0.15	0.15	0.15	0.15
Total	100.00	100.00	100.00	100.00	100.00
Calculated Analysis (%)					
Crude protein	16.13	16.84	16.55	16.95	16.08
Crude fibre	9.90	9.46	9.51	9.51	9.64
Either extract	3.90	4.90	4.52	4.26	4.61
Ash	3.93	3.81	4.60	3.90	4.29
NFE	62.14	60.99	59.36	57.88	57.38
Calcium	0.96	0.98	1.02	1.07	1.11
Phosphorus	0.53	0.55	0.56	0.58	0.58
Dry malter	94.00	96.00	95.00	94.00	96.00
Me(Kcal/Kg)b	2802.00	2797.95	2746.98	2682.00	2692.64

a= permit manufactured by animal care service consult Nig Ltd Lagos. It supplies the following per/kg vitamin A1, 1500iv; vitaminD_3 3000iv, vitamin E30iv, vitamin K, 2.5mg, Thiamine 3 mg, Riboflavin B_2 6mg, pyridoxine B6, 4kg, Niacine 40mg, vitamin B_{12} 0.02mg pantothetic acid, 10mg, folic acid, 0.3mg, Biotine 0.08mg choline chloride 0.012g, Antioxidant, 0.125g, manganese 0.096, zinc, 0.06g, iron, 0.024g, copper 0.006g, iodie 0.014g, selenium 0.24g and cobalt 0.024g. b-metabolizable energy was calculated using the formula pauzenga (1985) MG=35 x CP% x 81.8 x EE + 35.5 x NFE%.

c. ***Experimental rabbit management:*** The rabbits were quarantined upon arrival and treated against internal and external parasites with broad spectrum Albendazole and Malathion manufactured by (Pfizer limited) and housed in metabolic cages each measuring 80 x 70 x 75 fitted with feeders and drinkers. Clean drinking water and experimental feed were offered ad-libitum throughout the period of the experiment (8 weeks).

d. ***Data collection-growth performance:*** feed intake was determined as the differences between feed offered and feed left over while weight gained and feed conversion ratio was calculated as the ratio of total feed intake to total weight gained.

e. ***Carcass characteristics and internal organs:*** At the end of the experiment (8 weeks) three rabbits were randomly selected from each treatment, starved overnight but had access to drinking water, weighed in the morning to determine their live, slaughtered and weighed again to obtain their slaughter weight. The dressed weight was taken

and expressed as a percentage of the live weight. Each organ was removed and weighed on an electronic scale then expressed as percentage. Dressing percentage was then calculated as

$$\text{Dressing percentage} = \frac{\text{carcass weight}}{\text{Live weight}} \times 100$$

f. ***Hematological and biochemical induces:*** On the last day of the experiment 56 days the rabbits were fasted overnight and bled in the morning. Fasting was done to avoid the temporary elevation of blood melabolites by feeding. One rabbit was randomly selected per replicate and bled from puncture jugular vein to aspirate 7m/s of blood from which 2m/s of each was collected in a separate specimen bottle treated with ethylene diamine tetra acetic acid (EDTA) for harmatological parameters. The remaining blood samples 5m/s was collected into anti-coagulant free tubes and allowed to coagulate to produce sera for blood chemistry measurement which include total protein, albumin, globulin, urea, cholesterol, globulin and creatine.

$$\text{MCV} = \frac{\text{PCV}}{\text{RBC}} \times 10 \qquad \text{MCH} = \frac{\text{H}_\text{b}}{\text{RBC}} \times 10$$

$$\text{MCHC} = \frac{\text{H}_\text{b}}{\text{PCV}} \times 100$$

g. ***Laboratory analysis:*** Proximate analysis of experimental diets were analysed for dry matter, crude protein, crude fibre, either extract and Ash as described by (AOAC, 1990).

h. ***Data analysis:*** All data collected were subjected to one way analysis of variance (ANOVA) in a completely randomized design (CRD) according to (Steel and Torrie 1980) using SPSS version 19. Treatment means were separated using Duncan's multiple range test (DMRT).

RESULT AND DISCUSSION

Growth performance of weaner rabbits fed raw and processed f. albida pod meal: The growth performance of weaner rabbits fed processed faidherbia albida pod meal is presented in Table 2.

Table 2: Growth Performance of weaner rabbits fed raw and processed F. *albida* pod meal

Treatment						
Parameter	T_1 Control	T_2 Raw	T_3 Soaked	T_4 Boiled	T_5 Toasted	SEM
Initial weight (g)	575.00	675.00	625.00	596.00	598.25	11.89^{NS}
Final weight (g)	1596.75^{a}	1670.00^{b}	1663.25^{a}	1500.00^{b}	1425.00^{b}	36.14^{**}
Total weight (g)	1021.75^{a}	995.00^{b}	1038.25^{a}	904.00^{b}	826.00^{b}	28.16^{**}
ADWG (g)	18.24^{a}	17.76^{b}	18.53^{a}	16.14^{b}	14.76^{b}	0.50^{**}
Total feed intake (g)	3263.26	2884.56	2796.36	2990.68	2869.16	125.4^{NS}
ADFI (g)	58.27	51.51	49.93	53.40	51.23	3.29^{NS}
FCR	3.19^{b}	2.89^{a}	2.69^{b}	3.30^{a}	3.47^{a}	0.21^{NS}

a.b. means within the same row bearing different superscripts differ significantly (P< 0.05) ** = (p < 0.01), NS= Not significant, SEM = Standard error mean, ADFI = Average daily feed intake, ADWG= Average daily weight gain, FCR = feed comersion ratio.

The result shows that initial weight (Iw), total weight (Tw) and average daily weight gain, (ADWG) were highly significantly (P < 0.01) affected by the diets. The average daily weight gained was 18.53 in T_3 and lower in T_5 14.76. Superior feed comersion ratio (FCR) were recorded on rabbits in T_3 fed soaked F. albida pod meal. The final weights and total daily weight gained ranged from 1425.00g T_5 to 1670.00g T_2 and 826.75g Ts to 1038.25g (T_3) respectively. Rabbits fed soaked F. albida pod meal recorded higher weights than those on the other diets. The result agreed with the report of (McDonald *et al.*, 2012) that fed brewers' grain to rabbits and recorded improved growth performance. This result shows that soaked *F. albida* pod meal can be used to feed weaner rabbits for improved growth performance.

Table 3 shows the carcass characteristics and internal organs weights of weaner rabbits fed raw and processed *F. albida* pod meal.

Table 3: Carcass Characteristics and Internal organ weight of rabbits fed processed F. albida pod meal Treatments

Parameter	T_1 Control	T_2 Raw	T_3 Soaked	T_4 Boiled	T_5 Toasted	SEM
Live weight	1596.75^{ab}	1268.25^{b}	1663.25^{a}	1300.00^{b}	1283.25^{b}	36.16^{**}
Slaughter not	1560.00^{a}	1220.00^{b}	1663.250^{a}	1260.00^{b}	1242.50^{b}	34.72^{**}
Dressed not	836.500^{b}	613.250^{c}	910.00^{a}	660.00^{c}	626.75^{c}	21.76^{**}
Dressed %	52.29^{b}	48.58^{c}	54.72^{a}	50.41^{bc}	58.85^{c}	0.72
Neck/Ribs	5.42^{a}	4.21^{bc}	4.80^{ab}	3.85^{c}	4.41^{bc}	0.22^{**}
Thigh/hind Legs	22.76	21.04	22.44	18.82	21.29	0.76^{NS}
Shoulder/forages	11.87^{b}	11.54^{b}	13.67^{a}	11.34^{b}	11.70^{b}	0.32
Body length	35.25^{b}	41.75^{a}	39.00^{ab}	37.75^{ab}	38.50^{bc}	1.33^{*}
Ions	12.01^{ab}	10.76^{bc}	13.03^{a}	9.64^{c}	10.90^{bc}	0.61
Head	9.19	9.73	9.62	10.26	10.13	0.30^{NS}
Felt	9.76^{ab}	7.08^{c}	9.65^{a}	8.22^{b}	8.22^{b}	0.35^{x}
Liver	2.96	3.34	2.80	3.23	3.20	0.15^{NS}
Kidney	0.95	0.92	0.79	0.94	0.83	0.06^{NS}
Lungs	0.68^{b}	0.76^{ab}	0.65^{b}	0.91^{a}	0.55^{b}	0.06
Heart	0.36	0.33	0.72	0.36	0.31	0.02^{NS}
S.I. length	20.09^{b}	24.13^{a}	19.33^{b}	23.50^{a}	24.96^{a}	0.58^{**}
S.I. not	5.46	5.98	6.82	6.93	7.26	0.55^{NS}
L.I. length	2.33^{b}	3.16^{a}	2.53^{b}	3.32^{a}	3.29^{a}	0.09^{**}
L.I. not	3.10	2.92	2.59	2.55	2.71	0.33^{NS}
Caecum length	6.91^{b}	0.80^{ab}	2.53^{c}	3.01^{b}	3.29^{a}	0.07^{**}
Caecum not	6.91^{b}	9.92^{a}	9.20^{a}	7.20^{b}	9.72^{a}	0.56^{*}
Stomach length	0.75^{b}	0.80^{b}	0.65^{c}	0.83^{a}	0.87^{a}	0.02^{**}
Stomach not	6.89	6.19	4.20	6.86	6.78	0.68^{NS}

a.b.c = means within the same row bearing different superscripts differ significantly (P<0.05)
*= Significant (P<0.05), **= Highly Significant (P<0.05), NS = Not Significant, SEM = Standard error mean

The result showed that live weight and slaughter weight were highly significant (P<0.01) in T_1 and T_3 while T_2, T_4 and T_5 were statistically the same. The value for live weight and the slaughter weight in this study ranged from 1283.25g (T_5) to 1663.25g (T_3) respectively. The finding from this study showed that soaked *F. albida* pod meal improved live weight and slaughter weights of weaner rabbits. This result is in agreement with (Abubakar *et al.*, 2014) that observed significant difference in live, slaughter and dressed weight respectively for rabbits fed mucuna seed meal. Large intestine length, and weight and caecum length and weight were all highly significantly (P<0.01) different from the rest of the treatment. Some of the body organs head, liver, kidney and heart expressed as percentage of slaughter weights similar in all treatment and ranged from 9.19-10.26, 2.80-3.34, 0.75-0.95 and 0.31-0.72 respectively. The general results on carcass characteristic indicate that growth and development of organs and body components were not seriously affected by the processed *F. albida* pod meal and this is in line with the findings of Adawy (2012).

Table 4: Effects of feeding process F. albida Pod Meal on Hematological and Biochemical indices of weaner rabbits

	Treatments					
Parameter	T_1 Control	T_2 Raw	T_3 Soaked	T_4 Boiled	T_5 Toasted	SEM
RBC x (10^6/ul)	5.85	6.19	5.99	5.63	5.86	0.35^{NS}
WBC x (10^3/ul)	11.32	9.55	9.65	9.85	8.05	0.91^{NS}
PCV (%)	40.60	40.52	38.42	37.72	40.95	5.56^{NS}
HB (g/dl)	11.12	11.25	9.55	9.95	11.05	1.02^{NS}
Mcv (fl)	69.30^{a}	65.20^{b}	64.22^{b}	66.92^{ab}	70.12^{a}	1.20^{*}
MCH (pg)	18.85	17.70	15.30	17.70	18.92	0.94^{NS}
MCHC g/dl	27.20	27.12	23.85	26.45	27.00	1.38^{NS}
PTLS x (1000)	512.00^{c}	688.25^{a}	496.25^{c}	555.50^{bc}	636.50^{ab}	35.0^{*}
Total Cholesterol	43.50	52.50	41.00	36.25	35.25	5.26
Total protein (g/dl)	6.40	66.0	5.95	5.57	5.47	0.45
Albumin (g/dl)	3.72	3.90	3.67	3.47	3.80	0.22
Globulin (g/dl)	2.72	3.30	2.50	2.82	3.07	0.21
Urea m/l	3.15^{b}	2.77^{ab}	3.20^{b}	3.17^{ab}	3.50^{a}	0.33^{*}
Creatine m/l	54.75	43.25	58.50	56.00	52.25	3.50^{*}

a.b.c = means within the same row bearing different superscripts differ significantly (P<0.05)
*=Significant (P<0.05), ** =Highly Significant (P<0.05), NS= Not Significant, SEM = Standard error mean

Table 4 shows the blood profile of rabbits fed raw and processed *F. albida* pod meal. The RBC and WBC values were within the normal range of 4.0 -8.0 and 5.0 – 12.0 respectively for rabbits (Jenkins, 2009). The values of blood components recorded in this research were lower than the values reported by (Ogunkunle, *et al*., 2012). The result of MCV, MCH and MCHC indicates that there was significant P<0.05) difference between the treatment means and ranged from 64.22 (T_3) – 70.12 (T_5), 15.30 (T_3) - 18.92 (T_5) and 23.85 (T_3) – 27.20 (T_4). All values of MCV, MCH and MCHC were within the normal range of 60-73 (fl), 16-73 (pg) and 24.8-35.1 (%) (Ogunkunle *et al.,* 2012). Diets containing poor protein usually result in poor transportation of oxygen from the respiratory organs to the peripheral tissues (Roberts *et al*., 2011). He also stated that there is a strong influence of diet on hematological traits with PCV and HB being very strong indicators of nutritional status of the animal.

Nutrient digestibility of weaner rabbits fed raw and processed *F. albida* pod meal

The dry matter digestibility of weaner rabbits fed raw and processed F. albida pod meal ranged from 52.58 – 55.85%. This value were similar to the value 52.0-79.80% reported by (Adegbola *et al.,* 2012) for rabbits fed concentrated diets. The crude protein digestibility was high 76.80-84.20%. This indicated efficient use of the feed by rabbits. Similar result were shown by Atteh *et al.,* (2013) who reported that non-liqnified materials could have crude fibre digestibility as high as 60% as seen in Table 5.

Table 5: Nutrient Digestibility of Weaner rabbits fed raw and processed F. *albida* pod meal.

Parameter	T_1 control	T_2 Raw	T_3 Soaked	T_4 Boiled	T_5 Toasted	SEM
Crude protein	77.64^{bc}	84.20^{a}	77.74^{bc}	77.99^{b}	76.87^{c}	0.30^{**}
Crude fibre	42.60	41.40	46.03	47.60	43.87	1.96^{NS}
Ether extract	81.66^{c}	85.71^{a}	84.73^{b}	83.32^{d}	83.99^{c}	0.17
Total Ash	63.25^{b}	63.89^{ab}	60.38^{c}	64.92^{a}	64.97^{a}	0.40**
Dry mather	55.85	53.35	53.77	53.75	52.38	0.88^{NS}
NFE	41.27^{b}	41.41^{b}	41.98^{b}	45.35^{a}	38.28^{c}	0.39**

a.b.c = means within the same row bearing different superscripts differ significantly (P<0.05)
*= Significant (P<0.01), NS = Not significant, SEM = standard error mean, NFE = Nitrogen free extract

Economics of feeding wearner rabbits raw and processed *F. albida* pod meal

The reduced feed cost/gain of 106.7 in T_3 was due to the price differential between groundnut cake and soaked *F. albida* pod meal. An added incentive is the total weight gained of 1.03kg (T_3) which was the highest in all the treatments. Weight gained and cost reduction is the major reason advanced by Aro, *et al.,* (2013) for the use of unconventional feed resources.

Table 6: Economics of feeding Rabbits using raw and processed F. albida pod Meal

	Processing methods					
Parameter	T_1 control	T_2 Raw	T_3 Soaked	T_4 Boiled	T_5 Toasted	SEM
Total feed intake (kg)	3.26^{a}	2.88^{b}	2.79^{ab}	2.99^{ab}	2.86^{ab}	0.12^{NS}
Feed cost/kg	57.58^{b}	54.20^{a}	39.40^{a}	41.60^{a}	40.20^{a}	0.40
Cost of total feedintake h/kg	187.71	156.09	148.96	124.38	114.97	7.41^{NS}
Total weight (kg)	1.02^{a}	0.99^{b}	1.03^{a}	0.90^{b}	0.82^{b}	0.02^{**}
Feed cost/kg gain	184.02	157.65	106.91	138.21	190.20	13.00

a.b.c = means within same row bearing different superscripts differ significantly (P<0.05)
*= Significant (P<0.01), NS = Not Significant, SEM = standard error mean

CONCLUSION

Based on this study, soaked *faidherbia* albida pod meal can be used to feed wearner rabbits in the guinea and sudan savanna region of Nigeria without any adverse effects.

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