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# Effects of Feeding of Graded Levels of Soaked *Faidherbia albida* Pod Meal to Weaner Rabbits in the Guinea Savanna Zone of Adamawa State

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## ABSTRACT

The study was conducted to determine the effect of utilizing varying levels of soaked Faidherbia albida pod meal in performance, carcass, hematology and nutrient digestively of weaner rabbits. Five diets were formulated and graded with soaked f. albida pod meal at 0, 5, 10, 15, 20% levels designated as $T_1$ $T_2$ $T_3$ $T_4$ and $T_5$ respectively. A total of forty wearer rabbits were fed the diets in a completely randomized design. The experiment lasted 8 weeks. The diets, fecal samples and blood were analyzed for proximate composition. The result of growth performance indicated that there were significant differences ($P<0.05$) in the find weight (fw) (1337.00-1420.00g), weight gained (wg) (672.50-815.00g) average daily weight gained (ADWG) (12.00-14.55g). Total feed intake (TFI) (2412.0-2813.00g), average daily feed intake (ADFI) (43.07-50.23g) and feed conversion ratio FCR (2.95-4.01). The result on carcass parameter also showed significant ($P<0.05$) difference in live weight, slaughter weight, dressed weight, and cercal weight. Hematological and Biochemical component showed significant differences ($P<0.05$) in mean corpuscular volume, mean corpuscular hemoglobin concentration, globulin and urea. While most of the parameters measured in nutrient digestibility were significantly ($P<0.05$) different from each other, the feed comerson ratio was found to be better for rabbits fed 15% soaked F. albida pod meal (2.95). Based on this study, soaked F. albida pod meal can be supplemented in weaner rabbits diet up to 15% without any depression in growth, nutrient digestibility and at a very cheap cost.

***Key words:*** Feeding, Graded Levels, Pod Meal, Weaner Rabbits and Guinea Savanna

## INTRODUCTION

The problem of malnutrition particularly protein related is common in developing countries of the world. These countries are mostly found in the savanna and warm humid tropical areas where the level of animal protein represents about 6.8g/day (ILCA, 2014). This protein shortage sometimes leads to nutritional disorders such as Kwashiorkor and marasmus in weaned children in savanna Africa (Adegbola *et al.,* 2012). Udedibe *et al.,* (2006) reported that the reduced animal protein intake has far reaching implication on the well being and health status of the people that the aliment linked to inadequate protein and energy intake is now showing its ugly face in many household in Africa so there in the need to improve on the nutritional level of the people by increasing meat production at a cheaper rate to provide adequate protein to the populace. Adjare, (2012) reported that rabbits are easy to keep, highly prolific and can utilize roughage feed efficiently. Other attributes of the rabbits are short generation interval, rapid growth rate and short gestatun period of 31-35 days. The rabbit meat is tasty, low in cholesterol, energy and fat but very adequate in protein source. Despite all these advantages its potentials are yet to be fully exploited (Odunsi *et al.,* 2014). *Faidherbia albida* pods are cheap to buy but not consumed by humans and its protein content of 26-28% is sufficient for feeding rabbits. The objective of this study is to determine the effect of

feeding graded levels of soaked *F. albida* pod meal to wearer rabbits.

## MATERIALS AND METHODS

### Experimental site

The experiment was conducted at the Teaching and Research Farm of the Department of Animal Science and Rage Management, Modibbo Adama University of Technology Yola, located in Girei Local Government Area of Adamawa State. Girei is located in the Guinea Savanna zone of Nigeria and lies between latitude $9^{o}$ and $11^{o}$N of the equator and longitude $11^{o}$ and $14^{o}$E of the Greenwich Meridian. The state has a tropical climate with rainfall from the month of April-October while the dry season starts from October to April (Adebayo, 1999).

**Table 1 Ingredient Composition of Experimental Diets**

| Inclusion levels of soaked *F. albida* pod meal | | | | | |
|---|---|---|---|---|---|
| **Ingredie%** | **0** | **5** | **10** | **15** | **20** |
| Maize | 48.35 | 48.35 | 48.35 | 48.35 | 48.35 |
| Maize offal | 27.00 | 27.00 | 27.00 | 27.00 | 27.00 |
| Soaked F.albida pod meal | 0.00 | 5.00 | 10.00 | 15.00 | 20.00 |
| G/nut cake | 20.00 | 15.00 | 10.00 | 5.00 | 0.00 |
| Fish meal | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Bone meal | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Salt | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| Premix* | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 |
| Total | 100 | 100 | 100 | 100 | 100 |
| ***Calculated Analysis (%)*** | | | | | |
| Crude protein | 16.99 | 16.67 | 16.55 | 16.49 | 1639 |
| Crude fibre | 9.55 | 9.05 | 9.25 | 9.45 | 9.30 |
| Ether extract | 4.20 | 4.50 | 4.90 | 3.80 | 3.30 |
| Ash | 3.60 | 4.30 | 4.20 | 4.50 | 3.1 0 |
| NFE | 59.66 | 58.48 | 56.70 | 58.86 | 57.41 |
| Calcium | 0.84 | 0.95 | 0.97 | 0.97 | 0.96 |
| Phosphors | 0.42 | 0.44 | 0.44 | 0.44 | 0.44 |
| Dry matter | 92.12 | 92.37 | 92.37 | 92.56 | 92.36 |
| ME (Kcal/kg)** | 2800.22 | 2768.64 | 2719.43 | 2644.00 | 2604.48 |

Before the commencement of the experiment, 0.2ml ivermectin was subcutaneously injected into the rabbits against internal and external parasites. Coccidiosis was routinely controlled using embazin forte.

### Experimental Diets, Design and Management of Animals

Forty wearer rabbits aged between 5-6 weeks old, weighing 592.50-607.50g were used for the experiment. The rabbits were randomly assigned to five dietary treatments of 8 rabbits per treatment. Each group was replicated four times with 2 rabbits per replicate in a completely randomized design (CRD). The rabbits were dewormed with broad spectrum albendazole and housed in metabolic cages measuring 50x70x75cm. The cages were fitted with feeders and drinkers clean drinking water and experimental diets were offered ad-libitum throughout the period of the experiment. Five experimental diets were compounded using soaked *F. albida* pod meal. Diets 1 served as the control without soaked *F. albida* pod meal, while diets 2, 3, 4 and 5 contained 5, 10, 15 and 20% inclusion levels as shown in Table 1.

### Data Collection

Feed intake, weight gained, feed conversion ratio were effectively monitored. At the end of the feeding trail, three rabbits per treatment with a rabbit per replicate were randomly selected and transferred to metabolic cages for digestibility study. A two-day adjustment period was allowed before commencing the study. Faeces were collected during a five day period, dried, bulked and proximate analysis carried out using AOAC (2006) method. On the last day of the experiment, blood samples were collected from the ear vain of each rabbit into two sets of labeled bottles one contained Ethylenediaminetetraacetic acid (EDTA) an anticoagulant for hematological analysis while the other set without EDTA was used for serum biochemical analysis as described by Ewuola and Egbunike (2008). For carcass characteristics, the rabbit were then bled, dressed and weighed individually. Dressed weight was taken and expressed as percentage of live weight. The body components and visceral organs were carefully severed, cleaned, measured, weighed and expressed as percentage live

weights. The dressed carcasses were then splitted into retail cuts as described by Blasco *et al.,* (1993). Data collected were subjected to statistical analysis of variance (ANOVA) as described by steel and Torrie (1980). Significant means were detected and separated using Duncan Multiple Range Test, (Duncan, 1955).

**Result and Discussion**

The performance of weaner rabbits fed graded levels of *Faidherbia albida* pod meal showed significant differences (P<0.05) in final weight(g), weight gained(g), Average daily weight gained(g), Total Feed intake and average daily feed intake (g). rabbits in (T4) fed 15% *F. albida* pod meal had the highest final weight gained, highest average daily weight gained, average daily feed intake and lowest total feed intake (1420.00g, 14.55g, 43.07g and 2412.0g respectively) compared to others. This agrees with the report of Bamikole *et al.,* (2013) who reported that increase in the crude fibre levels of diets in rabbits feed resulted in increases in their dry matter intake. The enhanced feed intake at higher levels was to compensate for the reduced energy density of such feeds (Oyewole and Ogunkunle, 2012). The feed intake reported here were lower than 60-62g/day reported by (Bamikole, 2013). The lower feed intake observed could be responsible for the relative poor growth of the rabbits in all the treatments. The feed conversion ratio was found to be better for rabbits fed $T_4$ 15% *F. albida* pod meal (2.95). This agrees with the report of (Onyezilli *et al.,* 2012) who stated that the lower the feed conversion, the better the diet in monogastric animals as seen in Table 2.

**Table 2 Growth Performance of Rabbits fed Graded levels of soaked *F. albida* pod Meal**

| | | | Treatments | | | |
|---|---|---|---|---|---|---|
| **Parameters** | **T1** | **T2 (5%)** | **T3 (10%)** | **T4 (15%)** | **T5 (20%)** | **SEM** |
| Initial weight(g) | 607.50 | 592.50 | 596.25 | 605.00 | 606.25 | $7.1^{ns}$ |
| Final weight (g) | $1386.00^{ab}$ | $1265.00^{c}$ | $1314.00^{bc}$ | $1420.00^{a}$ | $1337.00^{abc}$ | 31.5* |
| Weight gained (g) | $778.50^{ab}$ | $672.50^{c}$ | $717.75^{bc}$ | $815.00^{a}$ | $730.75^{bc}$ | $23.50^{**}$ |
| ADWG(g) | $13.90^{ab}$ | $12.00^{c}$ | $12.81^{bc}$ | $14.55^{a}$ | $13.05^{bc}$ | $0.41^{**}$ |
| TFI(g) | $2813.0^{ab}$ | $2696.0^{c}$ | $2784.0^{ab}$ | $2412.0^{a}$ | $2793.0^{abc}$ | $51.48^{*}$ |
| ADFI (g) | $50.23^{ab}$ | $48.14^{c}$ | $49.71^{b}$ | $43.07^{a}$ | $49.87^{bc}$ | $1.23^{**}$ |
| FCR | $3.61^{b}$ | $4.01^{b}$ | $3.87^{b}$ | $2.95^{a}$ | $3.82^{b}$ | 0.14 |

**a b c = Means within the same row bearing different superscripts differ significantly (P<0.05), , **= Highly significant (P<0.01), NS= Not significant (P>0.05), SEM=Standard error mean.**

**Table 3: Carcass Parameters of Rabbits fed Graded levels of Soaked *F. albida* pod Meal**

| | | | Treatments | | | |
|---|---|---|---|---|---|---|
| **Parameters** | **T10%** | **T2 (5%)** | **T3 (10%)** | **T4 (15%)** | **T5 (20%)** | **SEM** |
| Live weight (kg) | $1.38^{ab}$ | $1.26^{c}$ | $1.34^{bc}$ | $1.42^{a}$ | $1.33^{abc}$ | 31.5* |
| Slaughter weight (kg) | $1.34^{ab}$ | $1.22^{c}$ | $1.27^{bc}$ | $1.37^{a}$ | $1.29^{abc}$ | 31.30* |
| Dressed weigh t(g) | $764.25^{a}$ | $623.00^{b}$ | $670.50^{ab}$ | $771.00^{a}$ | $688.50^{ab}$ | 31.14* |
| Body length (cm) | $37.50^{ab}$ | $34.50^{b}$ | $35.00^{b}$ | $41.00^{a}$ | $34.50^{b}$ | 1.24** |
| Thigh/hind legs (g) | $20.58^{b}$ | $20.20^{b}$ | $20.87^{b}$ | $22.12^{a}$ | $21.07^{b}$ | 0.35* |
| Shoulder/forelegs (g) | 11.16 | 11.30 | 11.37 | 11.55 | 10.75 | $0.25^{ns}$ |
| Rack/ribs as % | 4.39 | 4.57 | 4.50 | 4.72 | 4.27 | $0.15^{ns}$ |
| Loins | $11.12^{bc}$ | $11.20^{bc}$ | $11.42^{ab}$ | $12.30^{a}$ | $10.42^{c}$ | 0.3* |
| Head | $10.10^{ab}$ | $10.65^{ab}$ | $11.47^{a}$ | $11.53^{a}$ | $9.47^{b}$ | 0.47* |
| Felt | $7.65^{b}$ | $7.12^{b}$ | $7.82^{b}$ | $9.22^{a}$ | $7.20^{b}$ | $0.40^{ns}$ |
| Liver | $2.60^{b}$ | $2.72^{b}$ | $2.77^{b}$ | $3.75^{a}$ | $2.97^{b}$ | 0.16* |
| Kidney | $0.62^{b}$ | $0.82^{b}$ | $0.87^{b}$ | $1.45^{a}$ | $0.97^{b}$ | 0.13* |
| Lungs | $0.53^{b}$ | $0.64^{b}$ | $0.65^{b}$ | $1.28^{a}$ | $0.65^{b}$ | 0.07** |
| Heart | $0.30^{b}$ | $0.23^{b}$ | $0.35^{b}$ | $0.42^{a}$ | $0.30^{b}$ | 0.3* |
| Small Intestine length (cm) | 17.5 | 19.5 | 17.7 | 23.5 | 19.15 | $0.87^{ns}$ |
| Small Intestine weight (g) | 4.17 | 4.70 | 4.02 | 5.75 | 4.75 | $0.52^{ns}$ |
| Large Intestine length (cm) | 1.97 | 1.02 | 1.77 | 1.40 | 1.15 | $0.28^{ns}$ |
| Large Intestine weight (g) | 2.25 | 2.72 | 2.25 | 2.52 | 2.37 | $0.17^{ns}$ |
| Caecal weight (g) | $2.50^{c}$ | $5.52^{b}$ | $5.75^{b}$ | $7.55^{a}$ | $5.80^{b}$ | 0.40** |
| Caecal length (cm) | $2.50^{bc}$ | $2.65^{ab}$ | $2.35^{bc}$ | $2.87^{a}$ | $2.25^{c}$ | 0.10* |
| Stomach length (cm) | $0.45^{b}$ | $0.50^{b}$ | $0.50^{b}$ | $0.80^{a}$ | $0.55^{b}$ | 0.05* |
| Stomach weight (g) | $4.57^{b}$ | $4.50^{b}$ | $4.57^{b}$ | $5.75^{a}$ | $4.20^{b}$ | 0.34* |
| Dressing % | $55.12^{a}$ | $49.23^{c}$ | $50.85^{bc}$ | $54.13^{ab}$ | $51.44^{abc}$ | 1.16* |

**abc= Means within the same row bearing different superscripts differ significantly (P<0.05), ,**= Highly significant (P<0.01), NS= Not significant (P>0.05), SEM= Standard error mean**

The slaughter weight (1.22-1.34kg) reported in this study were slightly higher than 1.12 -1.11kg reported by (Eustace, *et al.,* 2013). However the values were lower than 1.43-1.44kg reported by (Olabonyi, *et al.,* 2014). Higher weights of liver and kidney on *F. albida* pod meal could be attributed to the decrease in the presence of anti nutritional factors in *F. albida* pod meal (Table 3).

**Table 4: Hematological and Biochemical Parameters of Rabbits fed Graded Levels of Soaked *F. albida* pod Meal**

| | | | Treatments | | | |
|---|---|---|---|---|---|---|
| **Parameters** | **T1** | **T2 (5%)** | **T3 (10%)** | **T4 (15%)** | **T5 (20%)** | **SEM** |
| RBC X $10^6$/ µl | 5.59 | 5.95 | 6.05 | 5.67 | 5.37 | $0.31^{ns}$ |
| WBC X $10^3$/µ I | 10.22 | 9.02 | 10.10 | 10.32 | 11.82 | $0.65^{ns}$ |
| PCV (%) | 38.82 | 41.15 | 41.25 | 40.77 | 43.10 | $1.79^{ns}$ |
| Hb (g/dl) | 10.47 | 10.45 | 9.10 | 10.47 | 10.02 | $0.65^{ns}$ |
| MCV (fl) | $66.67^{a}$ | $62.90^{bc}$ | $61.50^{c}$ | $65.85^{ab}$ | $64.95^{abc}$ | 0.93* |
| MCH (pg) | 17.70 | 16.67 | 16.97 | 17.40 | 15.92 | $0.41^{ns}$ |
| MCHC g/dl | $26.17^{ab}$ | $24.82^{bc}$ | $23.85^{c}$ | $27.27^{a}$ | $26.65^{a}$ | 0.48** |
| PTLS X (1000) | $492.50^{c}$ | $580.00^{ab}$ | $480.50^{c}$ | $632.50^{a}$ | $527.50^{bc}$ | 19.58** |
| Total cholesterol | 48.50 | 54.50 | 47.00 | 56.50 | 56.00 | $2.73^{ns}$ |
| Total protein (g/dl) | 6.00 | 6.75 | 6.25 | 6.50 | 5.50 | $0.27^{ns}$ |
| Albumen (g/dl) | 39.25 | 38.50 | 35.50 | 42.25 | 35.00 | $0.17^{ns}$ |
| Globulin (g/dl) | $31.00^{b}$ | $31.25^{b}$ | $29.00^{b}$ | $38.25^{a}$ | $26.50^{b}$ | 0.18* |
| Urea (m/l) | $3.75^{b}$ | $4.97^{ab}$ | $4.70^{ab}$ | $6.07^{a}$ | $5.57^{a}$ | 0.45* |
| Creatine (m/l) | 56.25 | 61.50 | 46.75 | 62.00 | 55.00 | $3.95^{ns}$ |

**a b c= Means within the same row bearing different superscripts differ significantly<0.05) **= (P<0.01), NS=Not significant (P>0.05)SEM=Standard Error Mean, PTLS= Platelets**

Table 4, Shows the haematological and Biochemical results of rabbits fed graded levels of soaked F. albida pod meal. The result showed significant (P<0.05), influence on mean corpuscular volume, Globuline and urea, but majority of the parameters were insignificant. This means that the levels of F. albida pod do not affect the status of the blood parameters as all were still within the normal range for rabbits (Mitruka and Rawnsley 1981).

The digestibility of nutrients by weaner rabbits are presented in Table 5.

**Table 5: Mean Apparent Nutrient Digestibility of Rabbits fed Graded levels of Soaked *F. albida pod* Meal**

| | | | Treatments | | | |
|---|---|---|---|---|---|---|
| **Parameters** | **T1** | **T2 (5%)** | **T3 (10%)** | **T4 (15%)** | **T5 (20%)** | **SEM** |
| Crude protein | 75.65 | 78.02 | 73.12 | 80.10 | 74.80 | $1.71^{ns}$ |
| Crude fiber | $41.50^{b}$ | $40.92^{b}$ | $42.75^{b}$ | $48.97^{a}$ | $43.32^{b}$ | 1.54* |
| Ether extract | $80.82^{b}$ | $81.35^{b}$ | $81.27^{b}$ | $84.12^{a}$ | $81.27^{b}$ | 0.74* |
| Total ash | $81.77^{b}$ | $81.62^{b}$ | $80.90^{b}$ | $84.05^{a}$ | $81.95^{b}$ | 0.48* |
| Dry matter | $53.22^{b}$ | $52.17^{b}$ | $51.32^{b}$ | $57.87^{a}$ | $51.95^{b}$ | 0.94** |
| NFE | $45.45^{a}$ | $44.15^{b}$ | $42.77^{c}$ | $40.29^{d}$ | $39.85^{d}$ | 0.28** |

**a b c= Means within the row bearing different superscripts differ significantly (P<0.05)**
**** = Highly significant (P<0.01), NS = Not significant (P>0.05)SEM= Standard Error Mean**

There were significant difference (P<0.05) in the digestibility of crude fibre, extract, total ash, dry matter and nitrogen free extract. The crude fibre digestibility was better and similar in $T_1$, $T_2$, $T_3$ and $T_5$ compared to $T_4$. The total ash digestibility was significantly (P<0.05) better for rabbits fed $T_4$ (15%) *F. albida* meal while the dry matter digestibility ranged from 51.17 to 57.87%. The dry matter digestibility was very high in $T_4$ 15% *F. albida* inclusion while the other treatments were relatively similar. Total ash digestibility was significantly (P <0.05) higher in $T_4$ (84.05). Though there were significant differences (P<0.05) in nutrient digestibility across the treatments for most of the nutrients evaluated, it did not follow a particular pattern. The NFE which in the relatively available carbohydrate in the diet decreases with increases in the amount of soaked *F. albida* pod meal, it ranged from (39.85-45-45). The values reported in this study were

however similar to the values reported by (Ogunleke *et al.,* 2012). However the NFE digestibility was lower in all the treatments compared to other nutrients, this could be attributed to the fact that rabbits are less efficient in digesting fibre than goats and sheep, also the lower crude fibre digestibility (40.92 to 48.97) could be attributed to the type of fibre in the diet since fibre from different sources could vary in their digestibility depending with the proportion of cellulose, lignin and hemicelluloses (Taiwo *et al.*, 2013).

**Table 6: Economic Analysis of Rabbits fed Graded levels of Soaked *F. albida* pod Meal**

| | Treatments | | | | |
|---|---|---|---|---|---|
| **Parameters** | **T1** | **T2 (5%)** | **T3 (10%)** | **T4 (15%)** | **T5 (20%)SEM** |
| Total feed intake kg/rabbit | 2.81 | 2.69 | 2.78 | 2.41 | 2.79 5.14** |
| Feed cost₦/kg | 57.57 | 53.40 | 54.40 | 60.50 | 61.423.1 |
| Cost of total feed intake ₦/kg | 161.77 | 143.64 | 151.23 | 145.80 | 171.362.9** |
| Total weight (kg) | 1.38 | 1.26 | 1.31 | 1.42 | 1.3323.5** |
| Feed cost₦/kg gain | 117.22 | 114.00 | 115.44 | 102.67 | 128.843.92 |

**a b c= Means within the row bearing different superscripts differ significantly (P<0.05)**
**** = Highly significant (P<0.01), NS = Not significant (P>0.05)SEM= Standard Error Mean**

Table 6 shows the economics of feeding graded levels of soaked *F.albida* pod meal. The result showed that total feed intake (TFI) ranged from 2.41-2.81kg/rabbit. The TFI was lowest in $T_4$ (15%) *F. albida* inclusion and highest in $T_1$ 0% inclusion, while the total weight kg gain was highest in $T_4$ 15% and lowest in $T_2$ (5%) *F. albida* inclusion. Weight gained and cost reduction in feeding is the major reason advanced by Aro *et al.*, (2013) for use of unconventional feed resources.

## CONCLUSION

It can be concluded that the inclusion of soaked *Faidherbia albida* pod meal up to 15% level in the diets of wearer rabbits has no adverse effects but helps to promote growth and weight gain.

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