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## GROWTH PERFORMANCE AND COST BENEFIT ANALYSIS OF YANKASA RAMS FED COMPLETE DIETS CONTAINING GRADED LEVELS OF *FAIDHERBIA ALBIDA* PODS MEAL

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### ABSTRACT

A feeding trial was conducted for 84 days to evaluate the growth performance and cost of Yankasa rams fed complete diet containing graded levels of apple-ring acacia (*Faidherbia albida*) pods. Sixteen Yankasa rams of about 5–7 months, weighing averagely  $17 \pm 1.5$  kg were randomly allotted to four (4) dietary treatments, four (4) replication in randomized complete block design (RCBD). Animals were fed the complete diets at 3.5% body weight. The results of growth performance revealed no significant ( $P > 0.05$ ) differences in final body (FBC), and feed conversion ratio (FCR). However Live Weight Change, Average Daily Gain, and Total Feed Intake were significantly ( $P < 0.05$ ) affected. The results obtained from the cost of feed per kilogram live weight gains of inclusion levels of *Faidherbia albida* Pod meal also indicated significant ( $P < 0.05$ ) differences in the cost per kg live weight gains of diets across the treatments. It is therefore, recommended that farmers can feed a complete diet containing graded levels of apple-ring Acacia (*Faidherbia albida*) pods up to 30% to Yankasa rams with optimum performance.

**Keywords:** *Faidherbia albida*, Diets, Growth, Pods and Yankasa rams

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### INTRODUCTION

Small ruminants play a key role in bridging the wide gap in the supply of animal protein for human consumption (Ahmed *et al.*, 2019). Yankasa is one of the important sheep breed in Nigeria, it is the most widely distributed and most numerous sheep breed in Nigeria (Umar, 2020). It is also called Hausa breed, while the ram have curved horns which are short or absent in ewes. The *Faidherbia albida* tree is dormant during wet season and drops its leaves to fertilize associated crops. Its leaves only grow during dry season and provide nutritious livestock fodder during critical period of drought. *Faidherbia albida* pods contain about 17–19% crude protein (Ahmed *et al.*, 2019) and the pods are used traditionally in the tropics as protein supplements especially for small ruminants during the dry season. However, this study was designed to determine growth performance and cost benefit analysis by Yankasa rams fed diets containing graded levels of *Faidherbia albida* pods.

### MATERIALS AND METHODS

#### Experimental area

The experiment was conducted at Federal University Dutse Teaching and Research Farm. Dutse is the capital city of Jigawa State. The site is located at latitude  $11^{\circ}$  N to  $12^{\circ}$  N and longitudes  $9^{\circ}$  E at an altitude of 485m above sea level. Jigawa State has an estimated land size of 23,154 km<sup>2</sup> (Google Earth, 2012).

#### Experimental materials

*Faidherbia albida* dry pods used in this research were collected from Federal University Dutse Teaching and Research Farm, and from neighboring villages such as, Hausawa village, and Yargaba village.

#### Experimental animals

Sixteen (16) Yankasa rams of about 5 – 7 months, weighing  $17 \pm 1.5$  kg were purchased from markets in Jigawa State.

#### Experimental design

The experimental animals were randomly allotted to four (4) dietary treatment groups with 4 animals as replicates per treatment in a randomized complete block design (RCBD).

**Table 1 Composition of Experimental Diets Containing Graded Levels of *Faidherbia albida* pods**

| Ingredients                   | T1            | T2            | T3            | T4            |
|-------------------------------|---------------|---------------|---------------|---------------|
| <i>Faidherbia albida</i> pods | 0             | 10.00         | 20.00         | 30.00         |
| Groundnut haulms              | 15.00         | 15.00         | 15.00         | 15.00         |
| Rice milling residue          | 13.00         | 10.00         | 10.00         | 12.00         |
| Cowpea chaff                  | 30.00         | 23.00         | 15.00         | 10.00         |
| Sorghum husk                  | 21.00         | 21.00         | 19.00         | 17.00         |
| Wheat offal                   | 20.00         | 20.00         | 20.00         | 15.00         |
| Bone meal                     | 0.50          | 0.50          | 0.50          | 0.50          |
| Common salt                   | 0.50          | 0.50          | 0.50          | 0.50          |
| <b>Total</b>                  | <b>100.00</b> | <b>100.00</b> | <b>100.00</b> | <b>100.00</b> |
| <b>Calculated analysis</b>    |               |               |               |               |
| Crude protein (%)             | 17.00         | 17.00         | 17.00         | 17.00         |
| Energy Kcal /Kg               | 2300.01       | 2289.21       | 2272.65       | 2268.50       |
| Fiber (%)                     | 12.59         | 12.64         | 13.06         | 13.87         |

**Data Collection**

**Initial body weight:** The experimental animals were weighed individually prior to the commencement of the experiment and subsequently at weekly intervals by 8:00am.

**Daily feed intake (DFI):** A known quantity of feed offered in the morning and the left over measured the next day, the differences were determined to compute daily feed intake.  $DFI = \text{feed offered} - \text{leftover}$

**Body weight change (BWC)**

The actual body weights were subtracted from the weight of the previous week.

$BWC = \text{Actual body (g)} - \text{Previous weight (week)}$

**Final body weight:** Live weight of the animal at the end of the experiment gives the final body weight

**Average daily gain:** Average daily gain (ADG) were obtained by subtracting the initial weight from the final weight and divided by the number of days of the experiment.  $ADG = \frac{\text{Final weight} - \text{Initial weight}}{\text{Number of days of the experiment}}$

**Feed conversion ratio:** Feed conversion ratio (FCR): This is defined as the quantity of feed consumed to affect a unit weight gain.  $\text{Feed conversion ratio} = \frac{\text{Feed intake}}{\text{Body weight gain}}$

**Statistical Analysis**

Data generated were expressed as a means with standard errors and were subjected to one-way analysis of variance (ANOVA) using standard procedure of General Linear Model (GLM) procedure of statistical system (SAS, 2013). Least significant difference (LSD) was used to separate means.

**RESULTS AND DISCUSSION****Results****Chemical compositions of the experimental diet containing graded level of *Faidherbia albida* pods meal**

The results of the chemical composition of the experimental diets were presented in Table 2. There were significant ( $P < 0.05$ ) differences between the treatment means in all the parameters evaluated.

**Growth performance of Yankasa rams fed *Faidherbia albida* Pod Meal**

The results of the growth performance of Yankasa rams fed *Faidherbia albida* pod meal were presented in Table 3. There results shows that there were significant ( $P < 0.05$ ) differences between all the parameters evaluated except final body changes (FBC) and feed conversion ratio (FCR).

**Table 2. Chemical compositions of the experimental diet containing graded levels *Faidherbia albida* pods meal**

| Parameters | T1 (0%)                   | T2 (10%)                  | T3(20%)                   | T4 (30%)                  | P-value |
|------------|---------------------------|---------------------------|---------------------------|---------------------------|---------|
| DM         | 95.64 ± 0.13 <sup>b</sup> | 95.48 ± 0.12 <sup>b</sup> | 95.36 ± 0.26 <sup>b</sup> | 96.62 ± 0.09 <sup>a</sup> | 0.002   |
| CP         | 11.93±0.04 <sup>d</sup>   | 12.82 ± 0.01 <sup>b</sup> | 12.44±0.08 <sup>c</sup>   | 16.27 ± 0.01 <sup>a</sup> | 0.000   |
| CF         | 18.62 ± 0.20 <sup>c</sup> | 23.24 ± 0.04 <sup>b</sup> | 24.54 ± 0.41 <sup>a</sup> | 22.76 ± 0.06 <sup>b</sup> | 0.000   |
| EE         | 7.59 ± 0.03 <sup>c</sup>  | 7.56 ± 0.01 <sup>c</sup>  | 7.93 ± 0.06 <sup>b</sup>  | 10.15 ± 0.01 <sup>a</sup> | 0.000   |
| Ash        | 1.70 ± 0.03 <sup>b</sup>  | 1.93 ± 0.02 <sup>b</sup>  | 2.06 ± 0.06 <sup>a</sup>  | 1.89 ± 0.01 <sup>b</sup>  | 0.001   |
| NFE        | 50.75 ± 0.39 <sup>a</sup> | 49.93±0.17 <sup>a</sup>   | 48.38 ± 0.68 <sup>b</sup> | 45.53 ± 0.14 <sup>c</sup> | 0.000   |
| ADF        | 24.65 ± 0.08 <sup>b</sup> | 24.45±0.03 <sup>b</sup>   | 25.69 ± 0.19 <sup>a</sup> | 23.95 ± 0.03 <sup>c</sup> | 0.000   |
| NDF        | 36.95 ± 0.03 <sup>b</sup> | 36.67 ± 0.03 <sup>b</sup> | 38.44 ± 0.09 <sup>a</sup> | 35.91 ± 0.03 <sup>c</sup> | 0.000   |
| ADL        | 8.53 ± 0.01 <sup>c</sup>  | 10.69 ± 0.01 <sup>b</sup> | 11.21 ± 0.02 <sup>a</sup> | 10.47 ± 0.01 <sup>b</sup> | 0.000   |

abc: Means on the same row having different superscripts are significantly different = significant at P<0.05; and not significant at P>0.05, P – Parameters, DM-Dry matter, CP-Crude protein, CF-Crude fibre, EE-Ether extract NFE-Nitrogen free extract, NDF - neutral detergent fiber, ADF – acid detergent fiber, ADL – acid detergent lignin, T1= control diet contain 0% *Faidherbia albida* pods, T2 = diet contain 10% *Faidherbia albida* pods, T3 = diet contain 20% *Faidherbia albida* pods, T4 = diet contain 30% *Faidherbia albida* pods, ±SEM = Standard Error of Mean

**Table 3 Growth performances of Yankasa rams fed complete diets containing graded levels of *Faidherbia albida* pod meal**

| Parameters   | T1 (0%)                  | T2 (10%)                 | T3(20%)                  | T4 (30%)                 | P-value |
|--------------|--------------------------|--------------------------|--------------------------|--------------------------|---------|
| IBW(kg)      | 17.30                    | 17.40                    | 18.25                    | 18.00                    | 0.096   |
| FBC(kg)      | 20.83 ± 1.7              | 20.33 ± 1.4              | 21.20 ± 1.9              | 21.30 ± 2.6              | 0.982   |
| LWG(kg)      | 3.58 ± 0.4 <sup>a</sup>  | 2.95 ± 0.01 <sup>c</sup> | 3.03 ± 0.1 <sup>b</sup>  | 3.80 ± 0.5 <sup>a</sup>  | 0.026   |
| ADG (g/day)  | 51.07 ± 5.6 <sup>b</sup> | 42.14 ± 1.2 <sup>c</sup> | 43.21 ± 2.1 <sup>c</sup> | 53.93 ± 7.2 <sup>a</sup> | 0.026   |
| DFI (kg/day) | 0.69 ± 0.1 <sup>c</sup>  | 0.75 ± 0.1 <sup>b</sup>  | 0.79 ± 0.1 <sup>b</sup>  | 1.01 ± 0.1 <sup>a</sup>  | 0.037   |
| TFI (kg/day) | 57.96 ± 0.1 <sup>c</sup> | 63.00 ± 0.1 <sup>b</sup> | 66.36 ± 0.1 <sup>b</sup> | 84.84 ± 0.1 <sup>a</sup> | 0.024   |
| FCR          | 8.43 ± 1.2               | 10.60 ± 0.5              | 10.87 ± 0.8              | 10.14 ± 0.8              | 0.266   |

abc: Means on the same row having different superscripts are significantly different = significant at P<0.05; and not significant at P>0.05, IBW- Initial body weight, FBC- Final body change, ADG- Average daily gain, TFI- Total feed intake, FCR- Feed conversion ratio Intake, T1= control diet contain 0% *Faidherbia albida* pods, T2 = diet contain 10% *Faidherbia albida* pods, T3 = diet contain 20% *Faidherbia albida* pods, T4 = diet contain 30% *Faidherbia albida* pods, ±SEM = Standard Error of Mean

#### Cost of feed per kilogram live weight of varying inclusion levels of *Faidherbia albida* pod meal to Yankasa rams

The results obtained from the cost of feed per kilogram live weight gains from complete diets containing graded levels of *Faidherbia albida* pod meal in diet of Yankasa rams were presented in Table 4. The result reveal significant decrease in cost of feed consume per kilogram and cost of feed per kilogram live weight gains of the diets fed to the experimental animals.

**Table 4 Cost of feed per kilogram live weight of varying inclusion levels of *Faidherbia albida* pod meal to Yankasa rams**

| Parameters               | T1 (0%)        | T2 (10%)       | T3 (20%)       | T4(30%)        | P-Value |
|--------------------------|----------------|----------------|----------------|----------------|---------|
| Cost of F/kg diet (₦/kg) | 65.43          | 64.83          | 62.67          | 58.91          | --      |
| Cost of F/day (₦/kg)     | 48.14 ± 2.4    | 47.72 ± 3.6    | 41.84 ± 3.5    | 38.68 ± 5.7    | 0.803   |
| Cost of F/kg LWC (₦)     | 2219.2 ± 286.6 | 2073.5 ± 220.4 | 2037.8 ± 163.5 | 1909.7 ± 196.1 | 0.304   |

abc: Means on the same row having different superscripts are significantly different = significant at P<0.05; and not significant at P>0.05, T1= control diet contain 0% *Faidherbia albida* pods, T2 = diet contain 10% *Faidherbia albida* pods, T3 = diet contain 20% *Faidherbia albida* pods, T4 = diet contain 30% *Faidherbia albida* pods, ±SEM = Standard Error of Mean

## DISCUSSION

### **Growth performance of Yankasa rams fed complete diets containing graded levels of *Faidherbia albida* pods meal**

There was an improvement in the growth performance in all the experimental animals fed complete diets containing graded levels of *Faidherbia albida* pods. The values of average daily gain (ADG) obtained in the present study were lower than the values (163 – 270g/d) reported by Maigandi and Bibi-Farouk (2008) when *Faidherbia albida* leaves were fed to growing Uda lambs. The total feed intake was higher in experimental animals fed complete diets containing 30% and 20% inclusion of *Faidherbia albida* pods meal and lower in a control 0% treatment group fed complete diet with *Faidherbia albida* pods meal. The higher feed intake observed on animals fed *Faidherbia albida* pods meal could be an indication of increased palatability of *Faidherbia albida* pods meal to Yankasa rams. The total weight gain in present study were lower than the result obtained (5.30, 8.59) kg by Beshir and Babiker (2009) for Sudan desert sheep for 45 days. Total weight gain increases as the levels of *Faidherbia albida* pods meal, the maximum gain was attained at 30% *Faidherbia albida* pods meal inclusion, followed by groups fed 0%, 20% and 10% inclusion. Feed conversion ratio (FCR) of ration is an important factor reflecting the nutritive value of the feed fed to the animal (Hassan *et al.*, 2012). However, age or weight of an animal may affect the feed conversion ratio, as the requirements for growth differ from those of fattening. The results of FCR agreed with Hassan *et al.* (2012), who observed ( $11.20 \pm 1.06 - 9.24 \pm 0.35$ ) FCR for Sudanese Desert lambs fed different graded levels of Roselle seeds.

### **Cost of feed per live weight gain of Yankasa rams fed complete diets containing graded levels of *Faidherbia albida* pods meal**

The decrease cost of feed/kg live weight gains of the experimental diets implies that, inclusion of 10%, 20% and 30% *Faidherbia albida* pods were inexpensive and decrease cost of feed compared to 0% *Faidherbia albida* pods which influence the cost of feed/kg live weight gain in Yankasa rams. This agreed with the findings of Komwihangilo and Mlela (2012) who reported on social and economic feasibility for using selected indigenous browses as protein supplements for goat.

## CONCLUSION AND RECOMMENDATION.

Conclusively, *Faidherbia albida* pods are nutritionally sufficient to support growth and development of Yankasa rams without any health issues. The cost of feed per kg diet in the present study showed that inclusion of *Faidherbia albida* pods lowered the cost of the diets and cost of feed per kg live weight gain of 20% and 30% were best. It is therefore recommended that farmers can feed a complete diet containing graded levels of Apple-ring *Acacia* (*Faidherbia albida*) pods up to 30% to Yankasa rams without any deleterious effect.

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