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# GROWTH PERFORMANCE OF WEANED RABBITS FED *GMELINA ARBOREA* SEED MEAL

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## ABSTRACT

*Dry season weight gain loss, high cost of feeding resources and concentrates are challenges of rabbit production in developing countries, therefore, necessitating the search for alternative feed resources with comparable nutritive values to the conventional feed resources in rabbit diet. Hence, this research was designed to evaluate the effect of replacing wheat offal (WO) with Gmelina arborea seed meal (GASM) on the performance of growing rabbit. Thirty-six (36) weaned rabbits (647.92±98.92g) of mixed breeds were exposed to four (4) experimental diets of partial/total replacement of WO with GASM at 0%, 33.33%, 66.67% and 100% for eight (8) weeks in a CRD laid out in three (3) replicates. Daily feed intake (FI) and weekly weight gain (WG) were collected while specific growth rate (SGR), feed conversion ratio (FCR) and protein efficiency ratio (PER) were determined and subjected to analysis of variance test using DMRT to separate significant means. Results revealed that rabbits on 33.33% GASM substitution had similar performance with 0%GASM diet. Rabbits fed 100% GASM had significantly the highest (86.51) FI while the control diet (0%GASM) had significantly the best WG (18.45), FCR (3.69), PER (1.56) and SGR (0.02) with the rabbits on 0%GASM having significantly the lowest FI (67.86) implying that GASM only enhanced FI in rabbits fed GASM substituted diet. Therefore, substitution at 33.33% could be beneficial and lower levels of substitutions could be tried to ascertain substitution level that could enhance growth with better feed intake.*

**Key words:** Rabbits, wheat offal, *Gmelina arborea* seed meal, growth performance

## INTRODUCTION

Rabbit has been identified as an economic livestock for small-scale rural farmers/dwellers, capable of producing enough meat to solely meet the animal protein requirements of a medium-sized family (Abudulmalik, 1994; Hassan and Owolabi, 1996. They are efficient converters of feed to meat and can utilize up to 30% crude fibre as against 10% by most poultry species (Egbo *et al.,* 2001). Mailafia *et al.* (2010) and Makinde *et al.* (2015) reported that rabbits can be identified for their potentials and good qualities which include: relatively cheaper management cost,small bodied size, short generation interval, efficient converter of forage and agricultural by products to meat, high growth rate, nutritious meat with low cholesterol, sodium and fat level and they can adapt to wide range of weather conditions. Production of rabbit is a means of ensuring food security in tropical regions, the fur is used in manufacturing felts, and the pelt is used for coats and hats, while the brain is used for blood clothing agent (Oluwatusin, 2014). Rabbit production in Nigeria is mired with lots of challenges. Dry season weight gain loss, high cost of feeding resources and concentrates among others have necessitated the search for alternative feed resources with comparable nutritive values to the conventional feed resources that can be incorporated in rabbit diet.*Gmelina arborea* is a fast growing tree with an ovoid shaped drupe fruit usually glossy yellow when ripe. At all stages of growth, the drupe fruit is reported (Amata, 2012) as a good amino acids source. However, its' potential as food resources had received little attention as a result of inadequate research work and scarcity of information on the nutritional value and chemical composition of the plant parts. Therefore, this research was designed and executed to evaluate the effect of replacing wheat offal with *Gmelina arborea* seed meal on the performance of growing rabbit.

## MATERIALS AND METHODS

The research work was carried out at the Rabbitary Unit of Animal Production Technology Department of Lagos State Polytechnic, Ikorodu, Lagos State, Nigeria. And *Gmelina arborea* seeds were picked from Crop Production and Horticulture Department of Lagos State Polytechnic, Ikorodu. The seeds were sun dried to reduce the moisture content and milled to produce *Gmelina arborea* seed meal (GASM), stored in a sack under room temperature prior to laboratory analysis and subsequent incorporation into the experimental diets.

Thirty-six (36) weaned rabbits (647.92±98.92g) of mixed breeds were obtained from a reputable farm and fed growers mash and Tridax for acclimatization period of two (2) weeks. The rabbits were subsequently exposed to four (4) experimental diets of partial/total replacement of wheat offal with *Gmelina arborea seed* meal at 0%, 33.33%, 66.67% and 100% in a basal diet (44% maize, 13% ground nut cake, 2% blood meal, 5% palm kernel cake, 3% bone meal, 1,1% oyster shell, 0.25% of salt and premix, 0.1% lysine and 0.3% methionine) for eight (8) weeks in a completely randomized design laid out in three (3) replicates. Feed and water was also provided to the rabbits *ad libitum*, and other management practices was observed religiously throughout the study period.

Daily feed intake and weekly weight gain were collected, specific growth rate, feed conversion ratio and protein efficiency ratio were determined as specific growth rate (SGR) by multiplying the difference of the natural logarithm of the final weight and the natural logarithm of the initial weight with 100 divided by the days between the final and initial weighing; Feed conversion ratio (FCR) as the ratio between mean feed intake and mean weight gain while Protein efficiency ratio (PER) as the ratio between mean body weight gain and mean protein intake. Data were subjected to analysis of variance test and significant means separated with Duncan multiple range test of Assistat software developed by Silva and Alzevedo, (2016).

## RESULTS AND DISCUSSION

The performance of rabbits fed substituted *Gmelina arborea seed* meal (GASM) is shown in Table 1. Statistical analysis revealed that there were significant ($p<0.05$) differences in all performance parameters measured. The average feed intake of the rabbits fed substituted *Gmelina arborea seed* meal (GASM) was significantly ($p<0.05$) increasing (21%) with increasing level of GASM. Rabbits fed Diet 4 had the highest (86.51g) feed intake while the lowest (67.86) feed intake was observed among rabbits fed with Diet 1. The high consumption of rabbits fed GASM based diets might be attributed to the relatively high palatability of the GASM because Alam *et al.*, (1985) earlier reported that the ripe glossy yellow drupe fruit of the *Gmelina arborea* that seated on a large calyx, bony endocarp and mesocarp is succulent with aromatic scent The sweet aroma could encourage more consumption. Generally the experimental feeds were well consumed by the rabbits probably due to the fact that the feed are fed as pellets which agrees with the findings of Caliskaner *et al*. (1996) who reported that rabbits preferred pellet to all other mash diet and generally the feed were consumed well by the rabbits. However, the weight gain of rabbits fed GASM substituted diet had a reverse trend as experienced in feed intake.

The highest (18.45) weight gain was recorded among the rabbits fed the control Diet 1, followed by those fed Diet 2 and Diet 4, while the lowest (12.90) weight gain was recorded among the rabbits fed with Diet 3. The reduction in weight gain with varying level of GASM might be as a result of the presence of some chemical anti-nutrients such as, benzoic and butyric acids, tannins, tartaric acids which might have hindered increase in weight (Little, 1983).

The feed conversion ratio of rabbits fed varying level of GASM were significantly ($p<0.05$) different. The highest (6.56) FCR was observed in rabbits fed on Diet 3, while the lowest (3.69) was in the rabbits fed on Diet 1. The lowest level of GASM substituted Diet 2 increase feed utilization. The low feed

utilization in rabbits fed with GASM might be attributed to the high crude fibre of GASM. High level of fibre in rabbits' diet has been reported to leads to decreased retention time of ingesta and an increase of caecotrope production because of increasing bacterial fibrolytic activity, which in turn results in a reduction of diet digestibility (Perez *et al*.,1996; De Blas and Gidenne1998) and hence utilization. This result confirms the findings of Nguyen and Nguyen, (2008) that there are no nutritional benefits from offering higher fibrous feed to rabbits.

The protein efficiency ratio Statistical analysis revealed that there was significant ($p<0.05$) differences in the protein efficiency of rabbits fed on varying levels of GASM. Rabbits on Diet 1 had significantly ($p<0.05$) the highest (1.56) PER which is not significantly ($p>0.05$) from rabbits on Diet 2 (1.43) while those on Diet 3 had significantly ($p<0.05$) the lowest (0.93) PER that is not significantly ($p>0.05$) different from Diet 4 (1.07). This implies that rabbits fed on control diet (0% GASM) and Diet 2 utilized the protein in the feed better than those on higher level of inclusion of GASM in their diet and this reflected in the FCR, the Average Weight Gain of the rabbits and the specific growth rate (SGR). Statistical analysis also revealed that there exist significant ($p<0.05$) differences in the specific growth rate of the rabbits fed on varying level of GASM. Rabbits fed on Diets 1, 2 and 4 had significantly ($p<0.05$) the highest (0.02) specific growth rate while rabbits fed with Diet 3 had significantly ($p<0.05$) the lowest (0.013) SGR. The better protein utilization in the control diet (0% GASM) might be attributed to the fact that, the GASM in the other diets have some anti-nutritional contents like tannins, which decreases protein quality by reducing digestibility, palatability and also damage the intestinal tract (Butler, 1989).

**Table 1: Growth Performance of Rabbits fed Diets Containing GASM**

| Variables | Diets (%GASM) | | | | SEM |
|---|---|---|---|---|---|
| | $D_1$ (0) | $D_2$ (33.33) | $D_3$ (66.67) | $D_4$ (100) | |
| Feed intake | $67.86^{b}$ | $69.64^{b}$ | $82.94^{a}$ | $86.51^{a}$ | 7.3 |
| Weight gain | $18.45^{a}$ | $17.06^{a}$ | $12.90^{b}$ | $15.28^{ab}$ | 3.27 |
| Initial weight | 591.67 | 700 | 758.33 | 541.67 | 215.63 |
| FCR | $3.69^{b}$ | $4.11^{b}$ | $6.56^{a}$ | $5.69^{a}$ | 1.3 |
| Protein intake | $11.81^{b}$ | $11.92^{b}$ | $13.94^{a}$ | $14.28^{a}$ | 1.24 |
| PER | $1.56^{a}$ | $1.43^{a}$ | $0.93^{b}$ | $1.07^{b}$ | 0.28 |
| SGR | $0.020^{a}$ | $0.020^{a}$ | $0.013^{b}$ | $0.020^{a}$ | 0.01 |

$^{abc}$mean on the same row with different superscript differed significant ($P<0.05$)

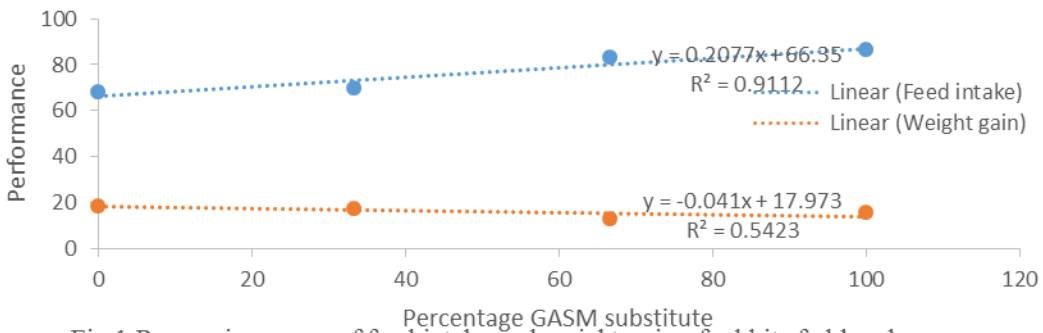



Fig.1 Regression curve of feed intake and weight gain of rabbits fed levels GASM substitute

## CONCLUSIONS AND RECOMMENDATION

The substitution of wheat offal with *Gmelina arborea seed* meal (GASM) does not improve the growth performance of rabbits fed varying levels of GASM inclusion except feed intake. However, rabbits on 33.33% GASM substitution of had similar performance with rabbits on control diet. Therefore, substitution at this level could be beneficial and lower levels of substitutions could be tried to ascertain the substitution level that could enhance growth with better feed intake for other feed formulations.

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