NUTRITIVE VALUE OF MUCUNA *(Mucuna pruriens)* SHELL MEAL IN WEANER RABBIT DIET

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ABSTRACT

The study evaluated the nutritive value of Mucuna Shell Meal (MSM) on growth performance of weaner rabbits. Five dietary treatments were formulated to contain 0, 10, 20, 30 and 40% level of MSM. Thirty (30) weaner rabbits of mixed breeds and sexes were used for the experiment. They were randomly divided into 5 groups of 6 replicates, in a Completely Randomized Design (CRD). Results indicated significant ($P<0.05$) differences in growth performance. Rabbits fed diet containing 30% MSM had significantly ($P<0.05$) better final weight, average daily gain and feed conversion ratio compared to those on other dietary treatments. There was significant ($P<0.05$) difference in feed intake. Rabbits fed the 40% MSM had the highest total feed intake (2690.33g), followed by those fed 20 and 30% inclusion levels of MSM in the diet, which were similar and the least was recorded in control diet (2300.33g). A significant ($P<0.05$) difference was observed in feed conversion ratio. Rabbits on control and 30% MSM had similar and a better feed conversion (3.63 and 3.16 respectively), followed by 10 and 20 which were similar and poorest was in those fed 40%MSM (6.43). It was therefore concluded that Mucuna Shell Meal can be included in the diets of weaner rabbits up to 30% to improve the growth performance of the rabbits without any deleterious effect.

Keywords: Diet, Mucuna shell, performance, rabbits, weaner.

INTRODUCTION

The demand for protein of animal origin in developing countries like Nigeria has far outstripped the supplies. An average Nigerian for instance consumes only about 3.24g per day of the minimum daily intake of 27g as the animal protein daily requirement for human being (FAO, 2000). However the intake per average Nigerian and other tropical countries is grossly inadequate (FAO, 2000).

Rabbits (*Oryctolagus cuniculus*) production is one of the options to bridge this gap in animal protein intake, as it is said to play an important role in supplying animal protein. Rabbits are efficient converters of feed to meat and can utilize up to 30% crude fibre as against 10% by most poultry species (Makinde *et al.,* 2015). According to Odunsi (2003), the rapid human growth and livestock population, which is creating increased needs for food and feed in the less developed countries, demand that alternative feed resources must be identified and evaluated. The recommended policy now is to identify and use locally available feed resources to formulate diets that are as balanced as possible (Guèye and Branckaert, 2002).

Leguminous crop residues have higher protein contents ranging from 13 to 19%.crude protein and they constitute a major source of livestock feed (Singh *et al.*, 2003). Mucuna (*Mucuna pruriens*) as leguminous crop has a feeding value comparable to other well known legumes. Shell of mucuna is obtained after threshing as a residue and there is little information available on its use as unconventional feed resource, especially as an alternative protein supplement for rabbit production. It is against this background that this experiment was undertaken to evaluate the nutritive value of Mucuna shell meal in weaner rabbit diet.

MATERIALS AND METHODS

Experimental site

The experiment was conducted at the Rabbittary Unit of the Department of Animal Science Farm, Ahmadu Bello University, Samaru Zaria, located within the Northern – Guinea savannah zone between latitude $11^0 33'$ N, longitude 07^0 37' E and at an altitude of 686m above sea level

(Ovimaps, 2016).The maximum temperature varies between 27-30°C, with an average rainfall of 1100mm and mean dry and wet season relative humidity of 21% and 72%, respectively (IAR, 2017).

Source of Mucuna Shell and Experimental Diets

The *Mucuna pruriens* shell was obtained from the Department of Animal Science, Teaching and Research Farm, Ahmadu Bello University, Zaria. The Mucuna shells were obtained after threshing to obtain the seed. The shells were milled using hammer mill before incorporation into the experimental diets. The experimental diets consisted of Mucuna Shell Meal (MSM) included at 0, 10, 20, 30 and 40% levels. Other ingredients in the diet include; maize, SBC, Maize offals, salt, bone meal and premix (Table 1).

Experimental Animals management and Design

Thirty rabbits of mixed breeds and sexes were purchased from the National Animal Production Research Institute Shika. The rabbits were randomly allotted to the 5 treatment diets with 6 rabbits per treatment in a completely ramdomised design. The rabbits were individually housed in cages measuring 40 x 40 x 60cm^3. All the rabbits were given prophylactic treatment against internal and external parasites (Ivomec Ivomevtin® at 0.2ml/rabbit) and broad-spectrum antibiotic (oxytetracycline L.A® at the rate of 0.2ml/rabbit). The rabbits were allowed to adjust to the diets for 14 days before the commencement of the experiment. The rabbits were provided feed and fresh, clean, water *ad libitum* throughout the experimental period, which lasted for 8 weeks.

Laboratory and Statistical Analysis

The MSM and experimental diets were analysed for proximate composition (Dry matter, Nitrogen, Ash, Ether extract and Crude fibre) at the Animal Science Biochemistry Laboratory Ahmadu Bello University, Zaria according to the AOAC (2005) procedure. All the data obtained were subjected to ANOVA procedure of SAS (2002). Initial weight of rabbits was considered as a covariable in the analysis. Significant treatment means were compared using the DMRT option of the same software. The model for the statistical analysis is as follows:

$$\mathbf{Y_{ij} = \mu + T_i + Cov_{(inwt)} + e_{ij}}$$

Where Y_{ij} = Dependent Variable, μ = overall mean, T_i = effect of treatment, $Cov_{(inwt)}$ = initial weight as covariant, e_{ij} = Random error

RESULTS AND DISCUSSION

The results of the proximate composition of the MSM and the experimental diets are presented in Table 1. The result showed the crude protein (CP) content of the MSM to be 14.94%, which is high when compared to cereal crop residues (Abdu *et al.*, 2015). This is within the range of 13 to 19%.CP reported by Singh *et al.* (2003) for most legume crop residues, while the crude fiber level of 21.08% is similar to (Abdu *et al.*, 2015) in cowpea. The nutrient composition of the experimental diets is within the dietary recommended levels for growing rabbits in the tropics (Aduku and Olukosi, 1990).

Growth performance result is presented in Table 2. Inclusion of MSM had significant (P<0.05) effect on growth performance characteristics (final weight, average daily weight gain). Rabbits fed the control had higher ADWG (15.42g/d), while those fed 20 and 30% MSM had similar gain (14.17 and 14.94g/d, respectively), followed by those fed 10%MSM and the least was recorded in those fed 40% MSM (10.0g/d). The ADWG did not follw any pattern. There was significant (P<0.05) difference in feed intake. Rabbits fed the 40% MSM had the highest total feed intake (2690.33g), followed by those fed 20 and 30% inclusion level of MSM in the diet, which were similar and the least was recorded in those fed the control diet (2300.33g) and average daily feed intake followed similar pattern. This agrees with Aduku *et al.* (1988) who reported higher feed intake with increasing level of crude fibre (CF) in the diets of rabbits. This is also in line with the assertion that Rabbits eat to meet their energy requirement to sustain rapid growth and development, hence the increased feed intake. A significant (P<0.05) difference was observed in the the feed conversion ratio. Rabbits fed the 30% MSM had better feed conversion (3.16), which is similar to the control (3.63), followed by 10 and 20 which were similar and the poorest was in those fed 40%MSM (6.43).

CONCLUSION AND RECOMMENDATIONS

From the result of this study, it can be concluded that Mucuna shell could be included in the diet of rabbit up to 30% without adverse effects on growth performance of weaned rabbits.

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Table 1. Percentage gross composition and proximate composition of experimental diets containing graded levels of *Mucuna Shell* meal

Feed Ingredients	Graded level of *Mucuna Shell* meal (%)					MSM
	0	10	20	30	40	
Maize	55.54	46.33	39.11	31.88	24.67	
Mucuna shell meal	0.00	10.00	20.00	30.00	40.00	
Soybean Meal	32.66	29.87	27.09	24.32	21.53	
Maize offal	16.00	10.00	10.00	10.00	10.00	
Bone meal	2.50	2.50	2.50	2.50	2.50	
Salt	0.30	0.30	0.30	0.30	0.30	
Lysine	0.10	0.10	0.10	0.10	0.10	
Methionine	0.15	0.15	0.15	015	0.15	
Vitamin Premix*	0.25	0.25	0.25	0.24	0.25	
Total	**100**	**100**	**100**	**100**	**100**	
Cost/Kg (₦)	65.36	61.08	58.74	55.44	51.00	
Proximate composition						
Dry matter	93.81	94.20	96.84	96.87	96.80	94.88
Organic matter	79.76	87.01	82.11	78.62	80.09	88.48
Crude protein	18.04	17.98	18.10	17.86	18.13	14.94
Crude fibre	7.96	7.22	7.36	6.94	7.94	21.08
Ether extract	4.02	4.17	4.22	4.16	4.38	8.51
Ash	8.01	6.11	5.70	7.14	7.29	6.40
NFE	78.06	71.29	74.82	70.68	69.46	49.88

*** Premix supplied per type kg diet: Vit. A, 100,00 IU; Vit. D 2,000,000 IU; Vit. E, 23,00mg; Vit K3 2,000mg; Vit. B, 3,000 mg; Vit. B2, 6,000 mg; Niacin, 50,00 mg; Calcium. 800 mg; Panthotenate, 10,000 mg; Vit. B6, 5,000 mg; Vit B12, 250 mg; Folic acid, 100 mg; Biotin, 50 mg; choline chloride, 40,000 mg; Selenium, 120 mg and Anti oxidant, 120,00 mg NFE Nitrogen free extract**

Table 2. Growth performance of weaner rabbits fed diets containing graded levels of *Mucuna Shell* Meal

Parameter	Graded levels of *Mucuna Shell* Meal (%)					SEM	LOS
	0	10	20	30	40		
Initial weight (g)	600	683	533	667	667	5.70	*
Final weight (g)	1525.00^{a}	1450.00^{b}	1383.33^{c}	1583.00^{a}	1267.67^{d}	6.87	*
TWG (g)	925.12^{a}	767.14^{bc}	850^{b}	937.21^{a}	600.23^{c}	26.13	*
ADWG (g)	15.42^{a}	12.78^{c}	14.17^{b}	14.94^{b}	10.00^{d}	0.50	*
TFI (g)	2300.33^{d}	2440.33^{c}	2610.00^{b}	2610.00^{b}	2690.33^{a}	0.13	*
ADFI (g)	41.07	43.57	46.60	46.60	48.04	0.12	*
FCR	3.63^{a}	4.64^{b}	4.40^{b}	3.16^{a}	6.43^{c}	0.04	*

[abc] means within the same row differed significantly (P<0.05), SEM = Standard error of means, LOS = Level of significance, TWG= Total weight gain, ADWG = Average daily weight gain, TFI= Total feed intake, ADFI= average daily feed intake, FCR = Feed conversion ratio.