

Performance and Digestibility of Nutrients by Broiler Finishers Fed Graded Levels of *Mucuna pruriens* Seed Meal

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ABSTRACT

A four week feeding trial was conducted to evaluate the effect of boiled Mucunaseed meal (BMSM) on the growth performance and the digestibility of nutrients by broiler finisher chicks. To achieve this three hundred and fifteen (315) broiler chicks were randomly allocated to five experimental treatment diets in a completely randomized design (CRD). Each treatment was replicated thrice having twenty-one (21) birds per pen. BMSM was prepared and fed in graded levels of 10.0, 20.0, 30.0, and 40.0% alongside control diet of 0.0 BMSM. Feed and water were served *libitum*. The parameters measured and calculated include final bodyweight, weight gain, feed intake, feed to gain ratio and feed cost per kilogram gain. Digestibility of dry matter, crude protein, crude fibre, ether extract, ash and nitrogen free extract were also calculated. The data collected were subjected to analysis of variance (ANOVA). The results showed that the final body weight, the weight gain, feed intake as well as feed to gain ratio of birds fed 0%, 10% and 20% BMSM were statistically ($P > 0.05$) similar. They were however, significantly ($P < 0.05$) higher than those from 30% and 40% levels of inclusion. Feed cost per kilogram weight gain and feed cost per bird were lower for all BMSB diets when compared to the control diet. Digestibility of nutrients was similar and better for the birds fed the control, 10.0 and 20.0% BMSM based diets than those on 30 and 40% BMSM based diets. It was concluded that inclusion of BMSM in the diets of broiler finisher chicks up to 20% has beneficial effects.

Key words: Broiler chicks, *Mucuna pruriens*, Digestibility, Graded levels,

INTRODUCTION

The global demand for livestock products will require increasing amounts of feed protein supplies and sources which usually come with its attendant high cost Akinola *et al.*, (2020).

In Nigeria, the Livestock industry has not been able to supply sufficiently the much needed animal protein by the populace. Poultry production, especially the broiler chickens remains one of the dynamic ways of attaining sustainable and rapid production of high quality protein to meet the increasing demand of the Nigeria teeming populace (Apata and Ojo, 2002), due to short generation interval of 6-8 weeks of broiler chickens (Akinmutimi, 2004), but one of the main challenges in poultry enterprise is high cost of feed which is estimated to be about 78.8% of the total cost of production (Akure *et al.*, 2020). This high cost has been attributed to the over-dependence on the expensive conventional feed stuffs such as soybean and groundnut cake which are mainly used in poultry feed formulation (Emenalon and Udedibie, 1998). A high demand for these feed ingredients has resulted in an increase in their prices and consequently, cost of poultry feeds and its products (Akinmutimi and Okwu, 2006). This necessitates research into non-conventional feedstuffs (NCF) that are readily available, cheap and nutritionally safe.

One of these NCF is *Mucuna pruriens* seeds (Akure, 2013) which is a widely available leguminous seed found in the forest, it thrives well where others fail due to excellent adaptability to extreme climatic conditions. It yields about three to four tonnes of seed per hectare. It is a potential source of protein because it is very high in crude protein. It has a crude protein of about 29.89% (Akure, 2013). This research aims at evaluating the effect of feeding Boiled *Mucuna* seed meals on the growth performance and nutrient digestibility when included at different levels in the diet of broiler finishers.

MATERIALS AND METHODS

The experiment was conducted at the poultry section, Department of Livestock, Ministry of Agriculture, Mariri, in Kumbotso Local Government Area of Kano State. Five experimental diets of boiled *Mucuna* seed meal at 0.10.0, 20.0, 30.0 and 40.0% levels for T1, T2, T3, T4 and T5 were formulated respectively. The feed composition for the chicks is shown in Table 1. The birds were randomly assigned to pens in a completely randomized design (CRD). There were five treatments and three replications of the five treatments each with 21 birds per pen. The management of the birds was carried out according to the standard procedures for brooding, vaccination and medication (NRC, 1994). The birds and feed were weighed weekly. The performance characteristics were measured in terms of final weight, weight gain, feed intake, and feed to gain ratio. Faecal droppings per bird to calculate the apparent nutrient digestibility were collected. At the end of the 7 days, the faeces for each bird were bulked, thawed, weighed and oven dried at 60°C for seventy two (72) hours and subjected to proximate analysis. The result obtained from performance was subjected to analysis of variance (ANOVA) using procedure of SAS (2002), significant levels of differences among treatment means were determined using the Duncan's multiple range test.

Table: 1 Gross composition of experimental diet (Broiler finisher) % containing Boiled *Mucuna* seed meal (BMSM)

Ingredients (%)	Levels of BMSM, %				
	0	10.00	20.00	30.00	40.00
Maize	55.05	51.80	46.95	39.00	32.25
Groundnut cake	25.00	18.25	13.10	11.05	7.80
<i>Mucuna</i> seed meal	0.00	10.00	20.00	30.00	40.0
Soybean meal	8.00	8.00	8.00	8.00	8.00
Maize offal	5.00	5.00	5.00	5.00	5.00
Fish meal	2.00	2.00	2.00	2.00	2.00
Bone meal	3.00	3.00	3.00	3.00	3.00
Limestone	1.00	1.00	1.00	1.00	1.00
Common salt	0.30	0.30	0.30	0.30	0.30
Methionine	0.30	0.30	0.30	0.30	0.30
Lysine	0.10	0.10	0.10	0.10	0.10
*Vitamin/trace min.premix	0.25	0.25	0.25	0.25	0.25
Total	100	100	100	100	100
Calculated Analysis (%)					
ME (Kcal/kg)	3001	3000	3112	3020	3025
Crude Protein	20.00	20.00	20.00	20.00	20.00

RESULTS AND DISCUSSIONS

Table 2 shows the performance of broiler finisher fed *Mucuna* seed meal. The final weight, weight gain, feed intake and feed to gain ratio, of birds fed 0 and 10.0 and 20.0% boiled *Mucuna* seed meal (BMSM) were similar, higher and better than those on other treatments, this could be an indication that finishers were able to efficiently utilize BMSM at 10.0 and 20.0% better than other levels. This result of better feed to gain ratio observed for birds fed 10.0 and 20.0% BMSM could also be due to the fact that there were sufficient digestible nutrients that were better utilized at this level. The results of the feed intake from this study agreed with the findings of Akinmutimi and Okwu, (2006) who reported reduced feed intake in cooked *Mucuna* seed meal as dietary levels of inclusion of cooked *Mucuna* seed meal increased in the diets of broiler chickens. There was significant ($P < 0.05$) decrease among treatment means for feed cost per bird and cost per kilogram gain, which decreased as the dietary levels of BMSM increased. The feed cost per bird and per kilogram gain were significantly ($P < 0.05$) better for all the BMSM diets compared to the control diet, This was because *Mucuna* seeds were cheaper and readily available without much competition from humans as they are not cherished as human food.

Table 2: Effects of feeding diets containing boiled *Mucuna* seed meal on performance of Broiler finishers

Measurements	Levels Of BMSM%					SEM
	Control	10.0	20.0	30.0	40.0	
Initial weight (g/bird)	104.00	104.00	104.00	104.00	104.00	0.00
Final weight (g/bird)	861.11 ^a	857.67 ^a	850.00 ^a	729.67 ^b	680.60 ^c	4.11
Weight gain (g/bird)	757.11 ^a	753.67 ^a	756.00 ^a	625.67 ^b	571.67 ^c	4.21
Feed intake (g/bird)	1455.17 ^a	1440.28 ^a	1444.82 ^a	1400.25 ^b	1350.12 ^c	9.42
Feed to Gain Ratio	1.90 ^a	1.90 ^a	1.90 ^a	2.10 ^b	2.24 ^c	0.01
Feed cost/bird (₦)	380.44 ^d	367.58 ^c	365.24 ^{bc}	362.48 ^b	356.32 ^a	0.47
Feed cost/Kg weight gain (₦)	175.73 ^e	154.03 ^d	149.87 ^c	139.22 ^b	129.61 ^a	0.88
Mortality (%)	-	-	-	-	-	-

^{abcd}Means within the same row with different superscripts differ significantly ($P < 0.05$)

SEM standard error of means

Table 3 shows the results of the nutrient digestibility by broiler finishers fed diets containing graded levels of BMSM respectively. There were significant ($P < 0.05$) differences among the treatment means for the digestibility of dry matter (DM), crude fibre (CF), ether extract (EE), ash, nitrogen free extract (NFE) and crude protein (CP) retention. The digestibility of all the nutrients were similar and higher for birds fed control and those fed 10.0 and 20% BMSM diets but decreased significantly ($P < 0.05$) as the level of inclusion of boiled *Mucuna* seed meal increased from 30 to 40% levels. This could be due to the fact that the birds digested and utilized the diets containing 10.0 and 20% BMSM efficiently as evidenced by better gain on those diets. The significantly higher weight gain of the birds fed 0, 10 and 20.0% BMSM diets compared to other levels might have resulted from high nutrient intake and efficient nutrient digestion,

absorption and utilization in the diets. The significant ($P < 0.05$) decrease in nutrient digestion as the dietary inclusion level of BMSM increased, could be attributed to low digestible carbohydrate and high residual effect of anti-nutritional factors such as tannin and hydrocyanic acid which could reduce digestive efficiency at high levels of BMSM hence low feed intake recorded. Akure, (2013) reported that high residual MSM has negative effects on digestion absorption and utilization of nutrients.

Table 3: Effects of boiled *Mucuna* seed meal based diets on nutrients digestibility by broiler finishers (%)

Constituents (%)	Levels of BMSM, %					SEM
	0.0	10.0	20.0	30.0	40.0	
Dry matter	92.65 ^a	92.30 ^a	92.56 ^a	90.76 ^b	87.61 ^c	0.02
Crude protein	87.87 ^a	87.86 ^a	87.83 ^a	82.53 ^b	80.79 ^c	0.03
Crude fibre	62.04 ^a	62.82 ^a	62.26 ^a	52.36 ^b	49.36 ^c	0.01
Ether extract	85.77 ^a	85.75 ^a	85.50 ^a	79.79 ^b	71.17 ^c	0.03
Ash	72.30 ^a	72.33 ^a	72.34 ^a	55.87 ^b	50.20 ^c	0.04
NFE	91.67 ^a	91.47 ^a	91.02 ^a	85.63 ^b	80.80 ^c	0.22

^{abcd} Means within the same row with different superscripts differ significantly ($P < 0.05$ SEM = standard error of means NFE).

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