

Evaluation Of Performance Indices and Some Physiological Parameters Of Broilers Finisher Fed with Cooked Mucuna (*Mucunacochinchinensis*) Seed Meal In Graduated Quantities

Victoria Terkumbur Pillah

Department of Academic Standards, National Universities Commission, Abuja, Nigeria
pillahv@gmail.com

Tuleun, C. D.,

Department of Animal Nutrition, University of Agriculture, Makurdi, Nigeria

Adenkola, A. Y.

Department of Physiology Pharmacology and Biochemistry, University of Agriculture,
Makurdi, Nigeria

Abstract

This study was carried out to evaluate the performance indices and some physiological characteristics of broiler finishers fed with graduated levels of cooked mucuna (*Mucunacochinchinensis*) seed meal. Mucuna seed was soaked for 12 hours and cooked for 90 minutes. Diets were formulated to meet standard requirements. Six iso-nitrogenous diets were formulated and mucuna seed meal (MSM) replaced full fat soybean at the rate of 0, 7.88, 15.76, 23.64, 31.52, and 39.40 %; these were designated T1, T2, T3, T4, T5 and T6 respectively. One hundred and eighty 7 – day old broiler chicks of Anak breed were randomly allocated to six treatments of 10 chicks each and fed with the experimental diets containing 20 % crude protein. Performance indices, haematological and biochemical determinations were carried out using standard procedures. The results indicated that treatment diets had significant ($p < 0.05$) effects on all the parameters measured. The highest final live weight of 2846.33 ± 116.4 g was observed in birds put on T1. Birds on T5 and T6 treatments had the lowest average final live weight compared to birds placed on other feed treatments. The feed conversion ratio recorded for birds on the mucuna diets were significantly ($p < 0.05$) better than the control diet. Protein efficiency ratio was also significantly ($p < 0.05$) better in the mucuna diets compared with the control group. The cost per kilogram feed numerically decreased as the rate of dietary mucuna seed meal increased. The hematological and biochemical parameters were not significantly different ($p > 0.05$) across the treatment groups. This study revealed that broiler finisher chicken fed with cooked mucuna seed for 90 minutes diet gained weight with a reduction in feeding cost without any adverse effect on the health of the birds.

Key Words: Performance indices, Broiler finisher chicken, Soaked and cooked mucuna seed meal, Physiological parameters,

Introduction

The demand for conventional plant protein origin like soybean and groundnut cake has brought a competition between man and animals, these has led to high cost of livestock feed in Nigeria. Hence, there is need for increasing protein supplies to promote sustainable livestock production

(Aderemi *et al.* 2017). One of such legume is Mucuna seed meal. The average Nigerian does not consume enough animal protein that is needed for nourishing of the body, tissue development, repairs and healthy living. This is because animal production in Nigeria has not been able to meet animal protein need of the increasing Nigeria's population (Jiya *et al.*, 2016). This resulted in malnutrition experienced among vulnerable groups (children and low income earners). A major cause of low level of poultry production in the country is the high cost of poultry feed. There is therefore the need to develop alternative feed resources which are cheap and readily available. Therefore, the aim of this study was to evaluate the potential of using cooked Mucuna seed meal (MSM) in graduated quantities as a replacement for soybeans in the diets of broiler chickens

Materials and Methods

Location of the study area

The study was carried out at the Teaching and Research Livestock Farm of the University of Agriculture, Makurdi (07^o 41'N, 08^o 37' E) in the Central Zone of Nigeria.

Experimental Design

Mucuna seed was soaked for 12 hours and thereafter cooked for 90 minutes. Poultry diets were formulated to meet standard requirements as outline by (Jiwuba and Onunwa 2018). Six iso-nitrogenous diets were formulated and mucuna seed meal (MSM) replaced full fat soybean at the rate of 0, 7.88, 15.76, 23.64, 31.52, and 39.40 %. One hundred and eighty (180) 7 – day old broiler chicks of Anak breed (Anak 2000 strain) were randomly allocated to six treatments of 10 chicks each and fed the experimental diets containing 20 % crude protein. Each treatment was replicated three times. Complete randomised design was used to allow valid statistical analysis to be carried out on the resulting data. Feed and water were provided *ad libitum*. All standard routine managements were adhered to. The experiment lasted for four weeks. Performance indices, haematological and biochemical determinations were evaluated using standard procedures.

Statistical Analysis

All data collected were statistically analyzed using the Analysis of Variance (ANOVA). The mean differences were compared for significance at $p < 0.05$ using the Duncan's Multiple Range Test. All analyses were done using the MINITAB statistical software (Version 16).

Results

The performance of broiler finisher chickens fed with graded dietary levels of cooked MSM is presented in Table 1. All treatment diets had significant ($p < 0.05$) effects on all the parameters measured. The highest final live weight of 2846.33 ± 116.4 g was observed for birds on T1 feed which compared favourably with T2 group. Birds fed with diets T5 and T6 had the lowest average final live weight compared to other treatments. Feed conversion ratio recorded for birds on the mucuna diets were significantly better ($p < 0.05$) better than the control diet in this order: (T3) > 1.12 (T6) > 1.18 (T4) > 1.31 (T2) > 1.36 (T5) > 2.07 (T1). Protein efficiency

ratio was also significantly ($p < 0.05$) better in the mucuna diets compared with the control group.

Table 1: Effects of Dietary Levels of Boiled MSM on the Performance of Broiler Finisher Chickens

Parameters	T 1	T 2	T 3	T 4	T 5	T 6	SEM
Initial weight (g)	1136.67 ^a	1020.00 ^a	766.67 ^{bc}	796.67 ^b	656.67 ^c	470.00 ^d	42.05*
Final weight (g)	2846.33 ^a	2633.67 ^{ab}	2441.33 ^b	2357.0 ^b	1799.67 ^c	1593.33 ^c	116.4*
Average Daily Feed Intake (g)	128.68 ^a	75.92 ^b	66.08 ^b	66.10 ^b	55.97 ^b	45.12 ^b	13.26*
Average Daily Weight Gain (g)	61.07 ^a	57.62 ^a	59.88 ^a	55.83 ^a	40.95 ^b	40.24 ^b	4.11*
Feed Conversion Ratio	2.07 ^a	1.31 ^b	1.12 ^b	1.18 ^b	1.36 ^b	1.12 ^b	0.15*
Average Daily Protein Intake (g)	25.74 ^a	15.19 ^b	13.21 ^b	13.22 ^b	11.19 ^b	9.02 ^b	2.65*
Protein Efficiency Ratio	2.54 ^b	3.91 ^a	4.51 ^a	4.25 ^a	3.68 ^a	4.54 ^a	0.26*

^{abc} Means in the same row with different superscripts differ significantly ($P < 0.05$) SEM=standard error of means; T1 – Control diet; T2- Mucuna seed meal 7.95% inclusion level; T3 - Mucuna seed meal 15.89 %inclusion level T4 - Mucuna seed meal 23.84%inclusion level; T5 - Mucuna seed meal 31.78 %inclusion level; T6 - Mucuna seed meal 39.73% inclusion level

Economic effects of Feeding Finisher Broiler Chickens with Mucuna Seed Meal

The cost per kilogram feed numerically decreased as the rate of dietary mucuna seed meal increased. There was a significant ($p < 0.05$) decrease in cost of daily feed intake across the dietary treatment groups (Table 2).

Table 2: Economic effects of Feeding Finisher Broiler Chickens with Mucuna Seed Meal

Economics indices	Experimental diets starter						SEM
Parameters	T 1	T 2	T 3	T 4	T 5	T 6	SEM
Feed cost /(N/kg)	31.60	30.75	24.35	21.47	15.27	14.04	-
Average daily feed intake(g)	128.68	75.92	66.08	66.10	55.97	45.12	13.26*
Cost of daily feed intake (₦)	4.07 ^a	2.82 ^b	1.61 ^c	1.42 ^d	0.86 ^e	0.63 ^f	0.001*
Feed / g a i n	2.07 ^a	1.31 ^b	1.12 ^b	1.18 ^b	1.36 ^b	1.12 ^b	0.15*
Feed cost per gain/wt gain	65.41 ^a	40.28 ^b	27.27 ^c	25.33 ^d	20.77 ^e	15.72 ^f	0.40*

^{abc} Means in the same row with different superscripts differ significantly ($P < 0.05$) SEM=standard error of means; T1 – Control diet; T2- Mucuna seed meal 7.95% inclusion level; T3 - Mucuna seed meal 15.89 %inclusion level; T4 - Mucuna seed meal 23.84%inclusion level; T5 - Mucuna seed meal 31.78 %inclusion level; T6 - Mucuna seed meal 39.73% inclusion level

Hematological and biochemical parameters of broiler chickens fed graded levels of Mucuna

The hematological and biochemical parameters of broiler chickens fed graded levels of mucuna diets are presented in Table 4. The lowest of PCV and Hemoglobin Concentration of 17.00 ± 4.63 % and 5.67 ± 1.54 gm/dl respectively were obtained in T2 while the highest value of 32.5 ± 4.63 % and 10.83 ± 1.54 gm/dl were obtained in T6. However, there were no significant differences ($p < 0.05$) across the treatment groups in these parameters. The values of SGPT (47.00 ± 7.28) obtained in T2 was significantly ($p < 0.05$) higher than the values obtained across the treatment groups (Table 3).

Table 3: Hematological and Biochemical Parameters of Broiler Chickens Fed Diets Containing Graded Levels of Mucuna Seed Meal

Parameters (gm)	T 1	T 2	T 3	T 4	T 5	T 6	SEM
Packed Cell Volume (%)	25.00	17.00	21.50	30.50	22.00	32.50	4.63 ^{ns}
Hemoglobin concentration (gm/dl)	8.34	5.67	7.17	10.17	7.34	10.83	1.54 ^{ns}
R B C (x 1 0 ⁶ μ l)	1.05	1.03	1.08	1.29	1.10	1.10	1.73 ^{ns}
Total protein (g / d l)	56.39	65.93	51.98	52.18	60.23	47.58	6.93 ^{ns}
A l b u m i n (g / d l)	35.08	30.13	19.88	19.48	28.58	22.08	5.26 ^{ns}
G l o b u l i n (g / d l)	21.31	35.80	31.60	32.70	31.65	25.50	7.15 ^{ns}
S e r u m G l u t a m a t e							
Pyruvate Transaminase (μ/ml)	8.00 ^b	47.00 ^a	11.00 ^b	22.00 ^{ab}	28.00 ^{ab}	21.00 ^{ab}	7.28 [*]
S e r u m G l u t a m a t e							
Oxaloacetate (SGOT) (μ/ml)	29.00	58.00	34.00	49.50	27.00	54.00	20.82 ^{ns}

^{abc} Means in the same row with different superscripts differ significantly ($P < 0.05$) SEM=standard error of means; T1 - Control diet; T2- Mucuna seed meal 7.95% inclusion level; T3 - Mucuna seed meal 15.89 % inclusion level; T4 - Mucuna seed meal 23.84%inclusion level; T5 - Mucuna seed meal 31.78 % inclusion level; T6 - Mucuna seed meal 39.73% inclusion level.

Discussion

The reduction in performance as the level of mucuna increases agrees with the findings of Nathalie *et al.* (2020) who reported a significant ($p < 0.05$) lower value of feed intake, average daily gain, protein efficiency ratio. He attributed it to the effect of residual anti – nutritional factors which became pronounced as the dietary levels of test feedstuff increased. The significant decrease in feed intake could be an indication of poor palatability associated with the presence of tannin. Birds placed on cooked mucuna seed meal had better feed and protein utilization efficiency values. This could imply that the adult or matured birds were able to handle the residual anti nutritional factors better than the younger birds. The better feed conversion ratio observed in birds fed mucuna seed meal based diets is an indication of better

nutrients utilization. The lower feed cost / kg meat produced on the BMSM suggests that the feedstuff is an economically viable alternative material. The haematological results in this study fell within the normal range as documented by Vermsey and Ahemen, (2019) studied the Effect of *Mucuna pruriens* (Velvet Bean) Seed Meal Diet at Varying Levels on Blood Profile and Reproductive Performance of Rabbit Bucks and reported that the hematological parameters evaluated showed no significant ($P > 0.05$) difference on PCV, RBC, MCV, MCH, WBC and leukocytes differential count. This indicated that processing mucuna seed as it was done could have possibly detoxified the ANFs and make amino acids available in the diets, which tends to support haematopoiesis. The result of this study indicated that the serum protein level, globulin and albumin were within the normal range documented for chickens in the tropics by Jiwuba and Onunwa, (2018) who investigated the Dietary Effect of Velvet Bean (*Mucuna utilis*) Leaf Meal on Haematology and Serum Biochemistry of Broiler Finisher Birds and reported that the haematological parameters evaluated showed no significant difference ($p > 0.05$) on PCV, Hb, RBC and WBC while MCHC was improved. Total protein, albumin and globulin showed better ($p < 0.05$) values for the treatment groups when compared with the control group. This study revealed that broiler finisher chicken fed soaked cooked mucuna seed for 90 minutes diet gained weight with a reduction in feeding cost without any adverse effect on the health status of the bird.

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