

GROWTH RESPONSE, MEAT YIELD AND CARCASS CHARACTERISTICS OF BROILERS FED BENISEED (*Sesamum indicum*) AND DRUMSTICK (*Moringa oleifera*) LEAVES AS SOURCES OF LYSINE

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ABSTRACT

Aims: An eight weeks experiment was carried out using One hundred and thirty five day old Arbor Acres broiler chicks with an average weight of 40.00g were fed beniseed and drumstick leaves as sources of lysine during eight weeks in order to evaluate growth response, meat yield and carcass characteristics of broilers fed beniseed and drumstick leaves as sources of lysine.

Study design: The trial design was completely randomized (CRD).

Place and duration of study: the trial was conducted between June-July 2010 in the Poultry unit at the Teaching and Research Farm of the Department of Animal Production, School of Agriculture and Agricultural Technology, Federal University of Technology Minna, Niger State, between June-July 2010.

Methodology: The birds were randomly allocated into three experimental treatment groups with forty five birds per treatment. Each treatment had three replicates with fifteen birds per replicate. The dietary treatments were designated as T₁, T₂ and T₃. T₁ contained 0.2 % lysine (T₁), T₂ had 6 % beniseed powder (T₂), and T₃ had 15 % drumstick leave powder (T₃). The amount of 6 % beniseed powder and 15 % drumstick leave powder included was calculated to supply the same lysine level that the control diet (0.2 % lysine), which was the control.

Results: At the end of the The result of the experiment at the end of the seventy days feeding trial were not significantly ($P > 0.05$) different in body weight, body weight gain and feed conversion ratio were not significantly among experimental groups ($P > 0.05$). The crude fibre digestibility was significantly ($P < 0.05$) different ($P < 0.05$). The average live weight of the birds, breast, back and wing were significantly ($P < 0.05$) different among groups ($P < 0.05$).

Conclusion: It was concluded that 6 % beniseed powder and 15 % drumstick leave powder can substitute 0.20 % industrial lysine in broilers diets for optimum broilers performance of broilers.

Key words: Beniseed, Broilers, Carcass, Drumstick leaves, Lysine.

1. INTRODUCTION

Poultry is one of the most popular industry/enterprise that is the source of animal protein to the ever growing Nigerian population, thus, contributing significantly to human nutrition and economic development [1]. The industry is said to be contributing more than 75% of the total livestock production in Nigeria [2]. Feeding has a great effect in poultry growth, production and meat quality. This situation has created the need to look for cheap, locally available and less

competitive source of protein rich in lysine, an essential amino acid required for the normal and proper utilisation of feed by broiler chicken. In recent years, the use of leguminous multipurpose trees and shrubs has been suggested to be a viable alternative source of lysine, methionine, vitamins and minerals for poultry feeding [3]. Beniseed (*Sesamum indicum*) and drumstick leaves (*Moringa oleifera*) are good sources of lysine and methionine. They are natural amino acid sources compared to the industrial lysine and methionine [4]. Beniseed is an herbaceous plant growing up to 15m high, it has purple, pink or white flower and fruits are cotton capsule which contain several seeds from 2-5mm long. It contains protein rich in lysine, methionine, leucine and arginine. Seed contains 0.35% lysine and 0.75% methionine [5]. Drumstick leaves are usually small in diameter and retain its greenish colour when properly processed by drying. The drumstick leaves are highly nutritious containing significant quantities of lysine, methionine, vitamins A, B and C, calcium, iron, phosphorus and protein. Drumstick leaves are outstanding as a source of vitamin A and when raw in vitamin C. The composition of amino acids in the leaf protein is well balanced. Laboratory analysis has shown that the protein concentrate in leaf is about 27% and 29%, methionine of 0.35% and lysine of 1.32% respectively with a negligible amount of tannins (1-23g/kg) in all fraction of the drumstick plant [4]. Amino acids requirements of broilers have been widely studied and interactions with crude protein level [6]. The importance of utilizing correct amount of balanced dietary protein and amino acid for poultry is of high priority issue [7]. The authors attributed this to two issues. The first being the most expensive cost of protein and amino acids in feeds per unit weight and the second as the environmental concerns about nitrogen losses in poultry wastes. Lysine requirements of broiler chicks during different growth phases have been well established [8, 9, 10, 11, 12]. Most of these studies are conducted under the "standard" conditions i.e. feeding high nutrient-density basal diets (3,200 kcal per kg ME; 20-23-% CPcrude protein) to chickens kept under thermo-neutral conditions. But actual raising and feeding conditions can be much different from these "standard" conditions, which would affect lysine requirement [13]. The authors recorded in their results that feed intake, body weight gain and feed efficiency were significantly ($P<0.05$) depressed when animal were fed on by the un-supplemented basal diets. Lysine supplementation of increments of lysine to the basal diets improved feed intake, body weight gain and feed conversion ratio. Furthermore, chickens are mostly reared in open sided houses and are exposed to chronic heat stress during the summer season. Therefore, the aim and objective of this study was to determine the growth performance, meat yield and carcass characteristics of broilers fed on beniseed powder and drumstick leave powder as sources of lysine.

2. MATERIALS AND METHODS

A total of one hundred and thirty five (135) Arbor Acres chicks were used for the trial experiment. The birds were randomly allocated into three experimental treatment (Table 1) groups of 45 birds, and each group assigned to one of the dietary treatment of T₁ containing 0 % beniseed and drumstick leave powder, T₂ containing 6 % beniseed powder and T₃ containing 15 % drumstick leave powder, respectively in a completely randomized design. Each experimental treatment group was further subdivided into three replicates of 15 birds each. Feed and water were provided *ad-libitum*, uniform light were provided 24 hours and proper vaccinations and medications was taken while body weight was recorded weekly. Feed conversion ratio and body weight gain were determined to used as assess measures for birds growth performance of birds. The experiment lasted for 8weeks, the starter period covered the first four weeks and the last four weeks covered the finisher period. The birds were managed under a deep litter system. The birds were managed purely on concrete floor with wood shavings on it, demarcated with wire mesh. The pen was thoroughly cleaned and disinfected before the

commencement of the feeding trial-experiment. Heat was provided for the chicks during the brooding period with the use of charcoal pot and electric bulbs which were lit every evening and left all night. Vaccination and medication program were strictly adhered to. Other routine management procedures included, weighing of birds on arrival before the commencement of the experiment and subsequently at weekly intervals. Feed and clean water were supplied ad-libitum. Records of mortality, weight changes and feed intake were kept. The daily operation performed includes removal of left over feeds, cleaning of the drinkers and replacing the feeder and drinker with new feed and water. The beniseed, maize and palm oil used were purchased from Central Market Minna. Other feed ingredients such as fish meal, groundnut cake, rice offal, bone meal, limestone, industrial lysine, methionine, broilers premix and salt were purchased from Dominion feed mill Minna. The beniseed was of the early planting grown in part of Niger state, the beniseed was subjected to roasting to remove the anti nutritional factors. The drumstick trees were planted, harvested and sundried by the local farmers. The dried drumstick leaves were grinded to powder. The powder beniseed and drum stick leaves were stored in air tight bags until when ready to use. The following data were collected:

2.1 Data Collection

Data collected for ascertaining the performance of the birds include: initial body weight which was collected by taking the weight of the day old birds at arrival in the farm using a weighing scale; final body weight was collected at the last day of the experiment using the same weighing scale; body weight gain was calculated by subtracting the initial body weight from the final body weight; feed intake was also calculated by subtracting the amount of feed refused from the amount of feed offered the birds and feed conversion was calculated by dividing the feed intake by the body weight gain.

2.2 Digestibility Trial

The digestibility trial was conducted by selecting two birds from each replicate of the treatments which were weighed and transferred into the metabolism cages. The birds continued to receive their diets for five days of the trial, the faecal droppings from each replicate was separately collected daily and were weighed and oven dried at 104°C until a constant weight was obtained. After drying, the droppings from each treatment were grouped together and sub-samples were taken for proximate analysis [14].

2.3 Carcass characteristics

The meat yield and carcass characteristics were determined at the end of the experiment according to the methods described by [15], by selecting randomly, one bird from each replicate. The selected birds were starved of feed and water over night. Before slaughtering, the individual weight of the birds was recorded. Thereafter, the birds were slaughtered by cutting the jugular vein around the neck. The birds were immediately scalded in warm water and the feathers were manually removed. Thereafter, the fully dressed weights of the carcasses were taken and recorded. The carcasses were then separated into breast, back, upper back, thigh, shank, neck, arm, wing, drumstick, head and the internal organs (viscera). The parts were individually weighed and the weights were expressed as percentage of the live weight of the carcass. In addition, the length of the intestine of each carcass was taken and recorded. The dressing percentage and percentage weight of body in relation to the live weights of the birds were calculated.

2.4 Statistical Analysis

Data obtained from the experiment were subjected to the analysis of variance (ANOVA) in a completely randomized design using the procedure of [16].

Table 1. Composition of experimental diets used in the feeding trial with fed-to Arbor Acres broilers.

Ingredients	Starter phase			Finisher phase		
	T1	T2	T3	T1	T2	T3
Maize	50.65	47.62	43.43	51.73	48.52	44.94
Groundnut cake	36.50	33.73	28.92	28.42	25.83	20.41
Fish meal	3.00	3.00	3.00	2.00	2.00	2.00
Drumstick leaves	0.00	0.00	15.00	0.00	0.00	15.00
Beniseed	0.00	6.00	0.00	0.00	6.00	0.00
Rice offal	3.00	3.00	3.00	12.00	12.00	12.00
Bone meal	2.00	2.00	2.00	2.00	2.00	2.00
Limestone	1.00	1.00	1.00	1.00	1.00	1.00
Lysine	0.20	0.00	0.00	0.20	0.00	0.00
Methionine	0.20	0.20	0.20	0.20	0.20	0.20
Broiler premix	0.25	0.25	0.25	0.25	0.25	0.25
Palm oil	3.00	3.00	3.00	2.00	2.00	2.00
Salt	0.20	0.20	0.20	0.20	0.20	0.20
Total	100	100	100	100	100	100
Calculated						
Protein (% dw)	23.00	23.00	23.00	20.00	20.00	20.00
Energy (kcal/kg)	3,033.31	3,157.50	3,037.75	2,874.00	2,996.57	2,878.43

Supplied per kg: 800 IU vitamin A; 1200 IU vitamin D3; 13mg vitamin E; 2mg vitamin K; 3mg riboflavin; 10mg cobalamin; 1.5mg folic acid; 0.25mg biotin; 125mg antioxidant (ethoxysatequin); 25mg Fe; 80mg Mn; 50mg Zn; 2mg Cu, 0.2mg Co; and 0.1mg Se.

T₁: 0% beniseed; drumstick leaf powder, T₂: 6% beniseed powder, T₃: 15% drumstick leaf powder.

3. RESULTS AND DISCUSSION

The results of performance of broilers fed beniseed and drumstick leaf powder as sources of lysine at the starter and finisher phases are shown in Table 2. Final body weight, body weight gain, feed intake and feed conversion ratio. The values obtained in the results were not statistically ($P > 0.05$) different among experimental groups in final body weight, body weight gain, feed intake and feed conversion ratio. This fact could be an indication that broilers fed beniseed and drumstick leaf meal ingested the same amount of lysine compared well to chick fed the control feed, which is an indication that the plants lysine contained in this plants are readily available source of this amino acid lysine for the broiler birds. The result corroborated the report of [17] who used yeast as source of lysine in the diets of broilers.

Table 2. Growth performance of broilers fed beniseed and drumstick leaves as sources of lysine at the starter and finisher period.

PARAMETER	T ₁	T ₂	T ₃	SEM	
Starter period					
Initial body weight (g)	40.09	40.09	40.90	0.00	NS
Final body weight (g)	690.09	620.09	583.33	25.79	NS
Body weight gain (g)	23.24	20.74	19.40	0.92	NS
Feed intake (g)	57.986	58.93	56.986	0.88	NS
FCR	2.50	2.85	3.00	0.12	NS

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Finisher period

Initial body weight (g)	690.00	620.00	583.33	25.79	NS
Final body weight (g)	1883.30	1693.30	1675.00	54.53	NS
Body weight gain (g)	21.34	19.247	19.549	0.66	NS
Feed intake (g)	96.245	96.00	91.986	5.25	NS
FCR	4.54	5.051	4.766	0.26	NS

Mean values in the same row were not significantly ($P > 0.05$) different.

FCR= Feed conversion ratio, SEM = Standard error of the mean.

Table 3 showed the results of the nutrient digestibility values in broilers fed beniseed and drumstick leaves as sources of lysine. Dry matter, crude protein, ash, ether extract and nitrogen free extract digestibility values. The results were not significantly ($P > 0.05$) among experimental groups different in the nutrient digestibility of dry matter, crude protein, ash, ether extract and nitrogen free extract. However, the results of crude fibre digestibility values were higher ($P < 0.05$) in broilers fed diets containing drumstick leaf powder than those obtained from broilers fed diets containing beniseed powder, though both were similar to those of the control group. The broilers fed the control diets were also similar to those fed the beniseed powder diets. This might be due to the fact that drumstick leaves have higher crude fibre content compared to beniseed and industrial lysine preparation, which agrees with the study of [18] who reported that nutrient digestibility of protein, crude fibre and dry matter enhances body weight.

Table 3: Nutrient digestibility of broilers fed beniseed and drum stick leaves as sources of lysine.

Parameter (%)	T1	T2	T3	SEM	LS
Dry matter	95.02	95.73	94.21	0.72	NS
Crude protein	96.91	97.63	95.91	0.49	NS
Crude fibre	94.50 ^{ab}	93.04 ^b	97.96 ^a	0.86	*
Ash	97.28	97.40	95.60	0.50	NS
Ether extract	98.08	96.72	97.31	0.37	NS
Nitrogen free extract	91.66	94.77	91.90	1.14	NS

^{ab}: Mean values with different superscript in the same row are significantly different ($P < 0.05$)

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The result of carcass characteristics of the cut-up parts of broilers fed beniseed powder and drumstick leaf powder as sources of lysine is shown in Table 4. Results obtained revealed that only the average live weight, breasts, backs, and wings differed significantly ($P < 0.05$) among experimental treatment groups. The result of the live weight was higher in the control group, though similar to those of the broilers fed diets containing beniseed powder but different from those fed drumstick leaf powder. Though the average growth performance was not statistically different this might be as a result of better feed utilization by the birds. The result of breast percent was higher in broilers fed drumstick leaf powder meal followed by those fed diets containing beniseed powder meal and the lower value was found in the control. This result is in agreement with the report of [19] who concluded that dietary sulphur-containing amino acids are requirements to obtain maximum efficiency of feed utilization and maximum breast meat yield. The values of backs were higher in broilers fed diets containing beniseed powder meal, although similar to the control diets but different from those fed drumstick leaf powder. The broilers fed drumstick leaf powder are similar to the control. This is however in line with the report of [20] who reported that the cut-up pieces of meat yield are significantly affected by the diet. The significant ($P < 0.05$) increase of breast meat of broilers fed drumstick leaf powder (19.35%) might be as a result of high quality content of drumstick in lysine compared to beniseed powder.

(17.85%) and the industrial lysine (16.51%). [21] observed an increase in breast meat yields of broilers as dietary lysine level was increased in the diet. Although the lysine content of this experiment was at the same level in all dietary treatment, it could be established that drumstick is superior. The results obtained showed that plant-lysine derived from plant sources, specially from drumstick, could produce better breast meat yield than lysine industrial preparation.

Table 4: Carcass characteristics of cut-up parts visceral organs of broilers fed beniseed and drumstick leaves as sources of lysine.

Parameter	T1	T2	T3	SEM	LS
Live weight (g)	2066.70 ^a	2050.00 ^a	1750.00 ^b	57.40	*
Dressed weight (%)	59.49	60.28	59.43	0.73	NS
Breast (%)	16.51 ^c	17.85 ^b	19.35 ^a	0.44	*
Back (%)	11.12 ^{ab}	11.54 ^a	10.11 ^b	1.27	*
Thigh (%)	12.94	12.01	11.33	0.36	NS
Shank (%)	4.69	3.56	4.81	0.12	NS
Neck (%)	6.09	6.16	5.81	0.12	NS
Wing (%)	7.19 ^b	7.66 ^b	8.06 ^a	0.94	*
Drumstick (%)	9.80	9.33	10.09	0.19	NS
Head (%)	2.61	2.32	2.65	0.83	NS
Intestinal weight (%)	4.95	4.79	5.00	0.14	NS
Kidney (%)	0.07	0.11	0.11	0.01	NS
Lungs (%)	0.49	0.46	0.45	0.04	NS
Liver (%)	1.91	1.96	1.93	0.06	NS
Spleen (%)	0.73	0.74	0.71	0.07	NS
Gizzard (%)	3.40	3.41	3.13	0.20	NS
Heart (%)	0.56	0.52	0.56	0.03	NS
Abdominal fat (%)	0.73	2.19	0.58	0.42	NS

abc: Mean values with different superscript in the same row are significantly different ($P < 0.05$).

4. CONCLUSION

It can be concluded that a dietary inclusion level of 6% beniseed and 15% drumstick leaf powder can be used efficiently included in the diets of broilers to and or replace 0.20 % industrial lysine without affecting growth performance and carcass yield in Arbor Acres broiler chicks for optimum efficiency.

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AUTHORS' CONTRIBUTIONS

Authors EZJ and BAA designed the study, EZJ wrote the protocol, analyzed the data and edited the paper after peer review. Author ABI and HA managed the literature searches, supervised the data collection. All authors read and approved the final manuscript. Author EZJ wrote the first draft. This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.

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