PERFORMANCE OF BROILERS FED GRADED LEVELS OF ROASTED FLAMBOYANT (*Delonix regia*) SEED MEAL

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Summary
An experiment was conducted to evaluate the performance of broilers fed roasted flamboyant seed meal (RFSM) using 120 day-old Hubbard broiler chicks. RFSM was used to substitute groundnut cake (GNC) at 0%, 5% and 7.5%. Untreated flamboyant seed meal (UFSM) was also used at 5% level. The four treatments were designated as T_1, T_2, T_3 and T_4 respectively. Parameters measured include body weight, body weight gain, feed intake and feed conversion efficiency as well as nutrient digestibility. The results indicated that there were no significant differences (p>0.05) in the body weight, body weight gain and feed efficiency at the starter phase of the experiment. At the finisher phase, body weight, body weight gain and feed intake were significantly affected (p<0.05) by the treatments. The result of the nutrient digestibility showed that all the parameters evaluated were significantly affected (p<0.05) at both phases of the experiment. The results suggest that RFSM could be used to replace GNC up to 7.5% level in broiler diet without any negative effect on performance.

Introduction

The major problem facing poultry industry in Nigeria today is finding feeding resources at affordable prices in order to meet the basic requirements of nutrients for the different categories of poultry birds. Odili (1997) reported that poultry business attained a boom in the 1970s and early 1980s, but owing to increasing cost of feed, the business has been on the decline. Protein as an important ingredient accounts mainly for growth. Its deficiency therefore leads to growth depression. Other negative effects include abnormal feather development, decline in egg production and reduced egg size in laying birds and increased exposure to disease attack. Therefore, there is the need for animal nutritionists to explore the possibility of incorporating other useful and cheaper sources of protein into poultry diets. Sources such as non-conventional protein feeds could be used to replace the conventional ones such as GNC, soyabean meal (SBM) and cotton seed cake (CSC) in order to reduce the cost of feed and maximize the returns from poultry farming. Yusuf *et al.* (2004) observed that over-dependence on SBM and GNC as major conventional protein concentrates for feeding livestock in Nigeria and other developing countries is a major constraint for the progressive growth of the livestock industry in these countries.

Non-conventional feed resources (NCFR) refer to all those feed resources that have not been traditionally used in livestock feeding or those not usually used in commercially produced rations. Among such non-conventional feed resources is flamboyant (*Delonix regia*) seed meal. Others like *Acacia sieberiana* when well processed can be used as protein supplement in protein ration (Mustapha and Oguntona, 1990). *Parkia biglobosa* has been used to replace 20% protein in poultry ration without any deleterious effect (Ahmed and Olorede, 2003). This study was designed to evaluate the growth performance of broiler birds when fed roasted flamboyant seed meal.

Materials and Methods

The seed of *Delonix regia* used in this trial were collected within and around Minna, Niger State during the dry season. Some portion was washed, dried and then roasted at 105-115°C using open flame for up to 15 minutes in an open pan. During roasting, about 1.5-2.0 Kg of the seeds were added intermittently into the pan set over the burning firewood. A small quantity of sand was added and the content stirred repeatedly to prevent charring. The seeds were considered roasted when about 75-80% of them cracked. The seeds were then spread out to cool after which they were milled into RFSM using a hammer mill with a sieve size of 3 mm. The meal was stored in large bags ready for use. The meal produced was used to formulate four isocaloric and isonitrogenous experimental diets (Table 1).

One hundred and twenty day-old Hubbard broiler chicks were allotted to the four treatment groups of 30 chicks each in a completely randomized experimental design. Each treatment group was further subdivided into 3 replicates of 10 birds each. Warmth was provided using 200 watt electric bulbs. Feed and water were supplied *ad libitum* throughout the trial. Other routine management practices were observed. A digestibility trial was carried out to assess the metabolic response of the birds to the experimental diets. Feed and faecal outputs were analyzed using the method of AOAC (1990). A modified method of AOAC (1984) was used to analyze for cyanide, tannin and trypsin inhibitor activity while, Phytic acid level was analyzed for using the method of Latta and Eskin (1984).

All data collected were subjected to analysis of variance according to Snedecor and Cochran (1980). Significant differences between means were separated by Duncan multiple range test as outlined by Steel and Torrie (1980).

Results and discussion

Table 2 shows the effect of roasting on the anti-nutritional content of RFSM. It shows that roasting led to a decrease in the level of phytic acid, tannin, cyanide and trypsin inhibitor. It therefore exerts a positive effect as anti-nutritional factors are known to affect poultry birds negatively.

The proximate composition of RFSM is shown in Table 3. It shows that dry matter, crude protein, crude fibre and ether extract were elevated as a result of roasting of the seeds while Nitrogen free extract and ash were reduced. Roasting seemed to have concentrated the nutrients in the beans by removing most of the moisture and in effect increasing the dry matter content. Esonu (2001) reported a similar observation when he roasted Jackbeans and Mucuna seeds. The increase observed in ether extract shows that roasting has a positive effect on the crude fat of the bean. This agrees with the report of Okigbo (1975).

Table 4 shows the performance of broilers fed RFSM at the starter and finisher phases of the experiment. There were no significant differences ($p>0.05$) observed in the body weight and body weight gain, although feed intake was significantly increased ($p<0.05$) in broilers fed flamboyant seed meal based diets. At the finisher phase, body weight, body weight gain and feed intake were significantly affected ($p<0.05$) with birds fed the test material performing better than those fed the control diet. The lower final body weight observed in birds fed the UFSM might be due to the effect of the anti-nutritional factors although the difference is not too drastic. Anti-nutritional factors such as trypsin inhibitors, tannins, phytates and cyanide had been reported to interfere with the biological utilization of protein and to a lesser extent available carbohydrate and lipids (Esonu, 2001). The decrease in weight gain with increasing level of RFSM might be due to increasing level of fibre. Ahmed and Olorede (2004) reported a similar decrease in weight gain with increasing level of locust bean meal in broiler diet.

Table 5 represents nutrient digestibility by broilers fed RFSM. With the exception of dry matter and crude protein, crude fibre, ether extract, ash and Nitrogen free extract were poorly digested at the starter phase of the experiment. This might be adduced to age factor. The poor digestibility of these nutrients probably accounted for the lower body weight of the birds at the starter phase. At the finisher phase however, all the nutrients were properly digested, particularly by birds fed flamboyant seed meal based diets. The better crude fibre digestibility observed at this phase could be due to age as older birds are known to have a greater ability to tolerate and digest higher level of dietary fibre.

Conclusion

It was concluded that broilers can tolerate UFSM up to 5% level of inclusion and up to 7.5% level of RFSM. It is a pointer that higher levels of flamboyant seed meal could be used in substituting GNC in broiler diets and this will help in reducing the cost of raising birds to market weight since the seeds can be obtained cheaply and freely.

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Table 1: Composition of experimental diets fed to the birds.

Ingredients	Starter T_1	Starter T_2	Starter T_3	Starter T_4	Finisher T_1	Finisher T_2	Finisher T_3	Finisher T_4
Maize	54.30	54.30	54.30	54.30	56.80	56.80	56.80	56.80
GNC	32.90	27.90	27.90	25.40	26.70	21.70	21.70	19.20
FSM	0.00	5.00	5.00	7.50	0.00	5.00	5.00	7.50
Maize bran	4.45	2.45	2.45	2.45	6.00	5.00	5.00	5.00
Fish meal	3.00	5.00	5.00	5.00	4.00	5.00	5.00	5.00
Limestone	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Bone meal	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Oil	3.00	3.00	3.00	3.00	4.00	4.00	4.00	4.00
Salt	0.10	0.10	0.10	0.10	0.25	0.25	0.25	0.25
Lysine	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Methionine	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Premix	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Total	100	100	100	100	100	100	100	100
CP%	22.00	22.00	22.00	22.00	20.00	20.00	20.00	20.00
Energy(ME)	3138	3049	3052	3029	3240	3132	3134	3007

T_1 = 0% RFSM, T_2 = 5% UFSM, T_3 = 5% RFSM, T_4 = 7.5% RFSM

Table 2: Effect of roasting on anti-nutritive factors of flamboyant seed meal

Parameters	UFSM	RFSM
Phytate (mg/100g)	503.10	469.04
Tannin (g/Kg)	22.64	16.44
Cyanide (mg/100g)	18.07	10.50

Table 3: Proximate composition of the test material (%)

Parameters	UFSM	RFSM
Dry matter	87.80	89.40
Moisture	12.20	10.60
Crude protein	18.10	18.90
Crude fibre	7.50	11.00
Ether extract	7.50	9.00
Ash	3.60	3.40

Table 4: Performance of broilers fed RFSM

Parameters	Treatments T_1	T_2	T_3	T_4	SEM
Starter phase					
Initial body weight (g)	60	61	60	60	
Body weight (g)	279.18	325.71	336.78	334.68	22.38ns
Feed intake (g)	285.42^b	386.00^{ab}	411.42^a	393.22^{ab}	18.95*
Body weight gain (g/wk)	103.81	118.70	128.98	127.73	5.35ns
Feed conversion efficiency	3.34	3.75	3.73	4.13	0.15ns
Finisher phase					
Body weight (g)	1507.07^b	1584.70^{ab}	1595.07^a	1590.16^a	9.26*
Feed intake (g)	738.40^b	907.12^{ab}	920.76^a	919.00^a	18.95*
Body weight gain (g/wk)	210.81^c	266.35^b	308.54^a	268.08^b	11.72*
Feed conversion efficiency	4.12	3.53	3.03	3.42	0.13ns

T_1 = 0% RFSM, T_2 = 5% UFSM, T_3 = 5% RFSM, T_4 = 7.5% RFSM

^{abc} Means denoted by different superscripts are significantly different ($p<0.05$)

Table 4: Nutrient digestibility by broilers fed RFSM

Parameters	Treatments				
	T_1	T_2	T_3	T_4	SEM
Starter phase					
Dry matter	73.95^c	78.86^a	78.91^a	77.04^b	0.84^*
Crude protein	69.60^c	81.45^a	80.09^b	79.05^b	1.81^*
Crude fibre	40.91^c	44.52^a	44.50^a	43.85^b	0.64^*
Ether extract	33.30^c	48.12^a	45.58^b	46.34^b	2.29^*
Ash	37.37^c	48.95^a	47.39^b	46.37^b	1.74^*
Nitrogen free extract	43.26^c	48.86^b	49.46^b	50.76^a	1.57^*
Finisher phase					
Dry matter	75.33^b	81.00^a	81.05^a	76.00^b	1.20^*
Crude protein	79.50^c	91.81^a	89.84^a	84.06^b	1.95^*
Crude fibre	85.13^b	92.81^a	91.87^a	83.62^c	1.77^*
Ether extract	75.01^c	76.41^b	86.70^a	75.95^c	2.10^*
Ash	75.04^c	76.41^b	86.72^a	75.98^b	2.10^*
Nitrogen free extract	68.50^c	82.50^b	86.50^a	81.00^b	2.69^*

T_1 = 0% RFSM, T_2 = 5% UFSM, T_3 = 5% RFSM, T_4 = 7.5% RFSM

abc: Means denoted by different superscripts are significantly different ($p<0.05$)

ns: not significant ($p>0.05$)