

EFFECTS OF REPLACING MAIZE WITH GRADED LEVELS OF MANGO-SEED KERNEL MEAL ON THE PERFORMANCE CHARACTERISTICS OF BROILER CHICKS AND CHICKENS

G.F. FANIYI

Animal Science Unit, Department of Agriculture, School of Vocational and Technical Education, St. Andrew's College of Education, P.M.B. 1010, Oyo, Nigeria.

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ABSTRACT

Eighty day-old broiler chicks were fed diets in which maize was replaced weight-for-weight with mango seed-kernel meal at 0, 10, 20 and 30% levels during starter and finisher phases of four weeks each. No significant differences ($P > 0.05$) were observed in final body weight, body weight gain, feed intake, mortality, feed conversion efficiency and feed efficiency ratio among the chickes. During the starter phase, the highest feed intake value (2001.81 g/bird) was recorded for diet IV and the least value was obtained for diet I (control diet). During the finisher phase, however, the least feed intake value (773.24 g/bird) was obtained in respect of diet I while feed intake values were similarly high for other diets. It was, therefore, concluded that mango seed-kernel meal could be utilized by broiler chicks during the starter and finisher phases and it could serve as an alternative energy source to maize in broiler starter and finisher diets.

Key words: broiler, mango seed-kernel meal, performance, alternative energy source.

INTRODUCTION

Apart from many attempts whereby utilization of different cereals have been tested and reported (Sharma *et al.*, 1979; Reddy *et al.*, 1979; McNab and Shannon, 1974), Sweet potato (Job *et al.*, 1979; Fetuga and Oluyemi 1976) cassava peel (Tewe, 1981), mango seed kernel (El-Alaily *et al.*, 1976), have been fed to poultry to replace maize as source of energy in their diets. Some time in the UK, diets for laying hens contained cereals at levels of at least 700g/kg (McNab and Shannon, 1994) even though choice of cereal may vary from locality to locality depending on availability, choice and cost.

The usual competition between man, poultry and livestock for maize coupled with the attendant high cost of maize grains necessitates the search for alternative feedstuffs to maize. In the light of this circumstance, the effect of replacing maize mango-seed kernel meal on performance of broiler chicks starter and finisher phase was investigated.

MATERIALS AND METHODS

Eighty day-old broiler chicks were allotted to four dietary treatments in a completely randomised block design and replicated once. The birds were reared on deep litter.

Mango seeds were collected and dehulled. The kernels were chopped, oven-dried, ground at the mills and incorporated into experimental diets to replace equal weight of maize at 0, 10, 20 and 30% levels in broiler starter and finisher diets (Table 1 and 2 respectively). All diets were made iso-nitrogenous (23-24% crude protein) and iso-caloric (2,900-3,000 k cal kg⁻¹).

The chicks were fed a farm ration during the first week and test diets were administered to the birds for eight (1-9) weeks. During the feeding trial antibiotics like furazolidone, furataldone and Esb₃ 30% were applied to their water occasionally and interchangeably. Biovit (multivitamin) was also added to water as the anti-stress whenever any antibiotic drug was used. No other premix was used in the feed given to the birds. During feed formulation, chemical composition reported by EL-Alaily *et al.* (1976) was assumed for mango-seed Kernel meal. The chicks were given lasota (oral) on the twelveth day.

During the experiment, data were collected on feed intake, body weight and mortality while efficiency of feed conversion, feed

TABLE 1 COMPOSITION OF EXPERIMENTAL STARTER DIETS (g/KG)

Ingredients	DIETARY		TREATMENTS	
	I	II	III	IV
	Control 0%MSKM	10% MSKM	20% MSKM	30% MSKM
Yellow maize	400	360	320	280
Mango seed kernel meal	-	40	80	120
Groundnut cake	300	300	300	300
Fish meal	70	70	70	70
Wheat offal	100	100	100	100
Rice bran	70	60	50	40
Bone meal	25	25	25	25
Oyster shell	5	5	5	5
Salt (Nacl)	25	35	45	55
Calculated chemical composition (g/kg):				
Crude Protein	245.80	243.30	240.80	238.30
Crude Fibre	41.00	39.00	37.90	36.40
Ether extract	74.30	86.60	98.70	11.09
Calcium	16.00	16.00	16.00	16.00
Phosphorus	7.40	7.10	7.30	7.20
Metabolizable energy (k cal kg ⁻¹)	2977	2974	2971	2968
Caloric to Protein ratio	11	12	12	12

TABLE 2 COMPOSITION OF EXPERIMENTAL FINISHER DIETS (g/KG)

Ingredients	DIETARY		TREATMENTS	
	I	II	III	IV
	Control 0%MSKM	10% MSKM	20% MSKM	30% MSKM
Yellow maize	450	405	360	315
Mango seed kernel meal	-	45	90	135
Groundnut cake	270	270	270	270
Fish meal	40	40	40	40
Wheat offal	110	100	100	100
Rice bran	60	60	50	40
Bone meal	25	25	25	25
Oyster shell	5	5	5	5
Salt (Nacl)	5	5	5	5
Palm oil	35	45	55	65
Calculated chemical composition (g/kg):				
Crude Protein	218.30	215.10	212.50	219.80
Crude Fibre	39.80	38.60	37.10	35.50
Ether extract	47.40	50.80	53.50	56.00
Calcium	14.40	14.40	14.40	14.40
Phosphorus	2.80	2.70	3.10	2.60
Metabolizable energy (Kcal kg ⁻¹)	3064	3063	3051	3040
Caloric to Protein ratio	14	14	14	14

MSKM = Mango seed kernel meal

MANGO SEED KERNEL MEAL FOR BROILERS

efficiency ratio, protein efficiency ratio, body weight gain, cost of feed/kilogram and cost of feed/kilogram live weight gain were estimated. Data collected were subjected to analysis of variance (Steel and Torrie, 1980) and means were sorted with Duncan's multiple range tests (Duncan, 1955).

RESULTS AND DISCUSSION

It was observed that during the starter phase feed intake increased slightly as the mango-seed kernel meal content of the diets increased. Feed efficiency ratio, body weight gain and feed conversion efficiency were highest for control diet and least with diet containing 30% mango-seed kernel meal

TABLE 3 PERFORMANCE OF THE BROILER CHICKS FED STARTER DIETS

Parameters	DIETARY		TREATMENTS		SEM
	I Control 0%MSKM	II 10% MSKM	III 20% MSKM	IV 30% MSKM	
Average feed intake (g/bird)	1737.44 ^b	1943.30 ^a	1896.25 ^a	2001.81 ^a	56.69
Average final body weight (g/bird)	884.09 ^a	905.00 ^a	817.50 ^c	843.00 ^b	19.74
Average body weight gain (g/bird)	788.64 ^b	976.114 ^a	715.00 ^b	712.31 ^b	22.79
Average Feed to gain ratio	2.20 ^b	2.44 ^b	2.65 ^a	2.81 ^a	0.13
Feed efficiency ratio	0.45	0.41	0.38	0.36	0.02
Daily Protein intake (g/bird)	61.00	67.54	65.23	68.29	1.63
Protein efficiency ratio	1.85	2.06	1.57	1.46	0.21
Average Mortality (%)	0 ^b	0 ^b	0 ^b	2.25 ^a	0.14
Cost of Production:					
Feed cost/kg of diet (₦)	14.44	14.86	15.29	15.71	-
Average feed cost/ Kg liveweight gain (₦)	31.77	36.26	40.52	44.15	-

MKSM = Mango Kernel seed meal

SEM = Standard error of mean

TABLE 4 PERFORMANCE OF BROILER CHICKS FED FINISHER DIETS

Parameters	DIETARY		TREATMENTS		SEM
	I Control 0%MSKM	II 10% MSKM	III 20% MSKM	IV 30% MSKM	
Average feed intake (g/bird)	773.24 ^b	918.81 ^a	910.63 ^a	867.98 ^a	32.06
Average final weight gain (g/bird)	1734.09 ^a	1788.75 ^a	1614.44 ^b	1661.25 ^b	53.91
Average body weight gain (g/bird)	1069.98 ^a	1101.25 ^a	863.54 ^b	949.39 ^b	19.94
Average feed to gain ratio	1.39 ^b	1.20 ^b	1.86 ^a	1.04 ^b	0.40
Feed efficiency ratio	0.72 ^c	0.83 ^b	0.53 ^d	0.96 ^a	0.03
Daily protein intake (g/bird)	24.11 ^c	28.23 ^a	26.35 ^b	28.59 ^a	0.92
Protein efficiency ratio	6.34 ^a	5.57 ^a	4.68 ^b	4.74 ^b	0.13
Average mortality (%)	0 ^b	0 ^b	2.25	0 ^b	0.14
Cost of production:					
Feed cost/kg of diet (₦)	13.70	14.11	14.56	15.00	-
Feed cost/kg liveweight gain (₦)	18.91	16.93	27.08	15.64	-

(MSKM). In fact feed conversion efficiency (feed to gain ratio) decreased and daily protein intake increased. Protein efficiency ratio was highest in diet II and least in diet IV.

During the finisher phase, however, values obtained for average feed intake, final body weight and daily protein intake were highest in dietary groups II and IV whereas they were least in group I and III. (Table 3). Protein efficiency ratios for groups I and II were similar just like they were similar for groups III and IV. Feed to gain ratio was highest in group III. In both phases, mortality among the chicks was low across feeding groups.

There were no significant differences ($P > 0.05$) in average body weight, average feed intake, average body weight gain, feed conversion efficiency, feed efficiency ratio, protein efficiency ratio, daily protein intake and mortality among the broiler birds that were fed maize-based and maize-mango seed kernel meal-based diets. The differences in the cost of feed per kilogram and cost of feed per kilogram live weight gain (Table 4) arose from the unusual hike in the price of palm oil that occurred in the country during the experimental period.

The performance of the broiler chicks as expressed above was a little different from the observations reported by Al-Alaily *et al* (1976) that feeding 10 or 20% MSKM to broiler chicks led to reduced efficiency of feed utilization during the same period of time. However, the performance of the chicks in the starter phase even when substitution of maize with MSKM was extended to 30% agreed with Bose *et al* (1952) who fed MSKM along with Jaman seed meal and posited that the Kernels could substitute for up to 20% of maize in the chick starter diet.

It could be stated that keeping the calorie-Protein ratio (Tables 1 and 2) of the diets fed to the birds at reasonably uniform limits led to the good performance of the birds. This observation agreed with the view of Lee and Blair (1974) that with overall amino acid balance and high metabolizable energy, superior growth and efficiency of food conversion would be obtained.

Similar performances as obtained in each phase were expected from birds fed maize-based and maize-MSKM-based diets because Barrier- Guilliet *et al* (1993) reported that heat drying processing had no effect on the chemical composition of corn and that treatment temperature had no effect on the digestibility of starch. This implies that sun-drying maize and oven drying MSKM may not have adverse effect on their starch contents.

Observations reported in this work were further supported by the report of Lewis and Morgan (1963) that increased energy coupled with increased protein level led animals to attain maximum growth. It was observed that as the substitution of maize with MSKM increased, oil supplementation also increased and the greyish colouring imparted by MSKM on diets deepened. The red colour of palm oil and yellowish colour of maize enhanced the presentation of the diets to the birds. It therefore, means that since broiler birds could successfully make use of MSKM up to 30% level in a maize-based diet, solution may be in sight to reduce the usual competition between man and farm animals for maize and, thereby bring about some appreciable reduction in the cost of feeds and poultry products.

In conclusion therefore, broiler birds can utilize up to 30% level of mango-seed kernel meal as an energy source during starter and finisher phases up to 30% inclusion rate. Mango-seed kernel meal can serve as an alternative feedstuff to maize but appropriate protein and metabolizable energy requirements of the birds should be ensured in the diets so prepared for them.

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