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Original article

Effects of replacing maize with mango seed kernel meal on performance, carcass characteristics and economic of production of weaner rabbits

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ABSTRACT

An experiment was conducted to examine the effect of replacing maize with mango seed kernel meal (MSKM) in the diets of Weaner rabbit on performance, carcass characteristics and economic of production. Twenty mongrel rabbits were randomly allocated to four diets in which mango seed kernel meal replaced maize at 0, 33.33, 66.67 and 100% level designed as diets 1, 2, 3 and 4 respectively. The daily feed intake (42.75-49.76), daily weight gain (8.75-9.72) and feed conversion ratio (4.64-5.19) obtained were not significantly ($P < 0.05$) affected by the dietary levels of mango seed kernel meal. Carcass yield and weight of organs expressed as percentage of live weight did not significantly differ between the treatment means. The cost in naira per kilogram gain was highest on diet 1 (0%MSKM) and lowest on diet 4 (100% MSKM) having N338.84 and 245.58 respectively. The result indicates that mango seed kernel meal can replace maize at 100% level in the diet of Weaner rabbit with better performance and tremendous reduction in feed cost.

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1. Introduction

In recent years maize production has not kept pace with demand. This may be attributed to reduced production due to climate change coupled with the food/feed competition for this grain and its increased use for

bio fuel production in the developed countries. Tewe (1989) observed that under the prevailing circumstances it is unlikely that there will be surplus from conventional cereals and pulses upon which livestock production can be developed, he therefore suggested a waste to wealth approach of directing effort towards harnessing and utilizing by products and wastes which are not directly being utilized by man as the most logical step.

Thus the need for research into alternative material like the mango seed kernel. Mango is an important fruit crop grown in the tropics mostly for its pulp. Mango seed represents about 20-60% of the fruits, has limited food or industrial use in most producing countries and is therefore wasted (Diarra, 2014). The kernel is a good source of carbohydrate (58-80%), moderate protein (6-13%) and fat (6-16%) (Diarra and Usman, 2008). It has ability to supplement methionine and lysine which are limiting in plant protein feeds stuffs (Arogba 1989). It has a lysine value of 3.13-5.0g per100g protein compared to 0.26g and 2.22g for maize and soya bean meal respectively (Diarra, 2014). Similarly its methionine of 1.04-2.2g per 100g protein compares favourable to 0.17-0.53g for maize and soya bean meal respectively. The oil is also a good source of stearic acid and linoleic acid. There are few reports on the use of mango kernel in livestock feeding but the level of inclusion in poultry diet has been low due to the presence of antinutritional factors such as tannins, cyanogenic glycosides, oxalates, saponin and trypsin inhibitors (Ravindran et al., 1996). Patil et al. (1982) observed that replacing 14.1% dietary maize with raw MSK had no adverse effect on broiler chickens growth but higher levels (28.2% replacement) caused growth to be adversely affected. Tegua (1995) recorded similar finding with 20% MSK as replacement for maize. Amao and Siyanbole (2013) observed lower feed intake, higher body weight and better FCR in finisher broiler fed 30% dry heat treated MSK as replacement for maize. Several treatments method such as soaking, boiling in HCL or NaoH have been advocated. The more effective proved to be soaking as it removed 61.4% of the tannin and 84.3% of HCL (EL, Boushy et al, 2000). The outstanding factors favouring the use of mango seed kernel meal as feed ingredients are its high energy contents, poor utilization by man and the facts that its production period (April-July) coincides with critical period for grain supply.

2. Materials and methods

This study was conducted at the rabbit unit of Abubakar Tafawa Balewa University Bauchi, Teaching and research farm. Twenty (20) mongrel rabbits of both sexes were used in the experiment. The mango seeds were collected at Bauchi town and surroundings villages during the peak of its production period and kernel detached by cracking the endosperm manually. The kernel were chopped to reduce the size and soaked in water overnight after which it was drained and sundried. Hull was removed manually during processing. The animals were allocated to four (4) diets at five (5) replicate of one (1) rabbit per replicate. The experimental design was completely randomized design. The rabbits were fed the experimental diets containing 0, 33.33, 66.67 and 100% inclusion levels of MSKM as a replacement for maize. The experimental diets and percentage composition of experimental diets are as shown in table 1. Animals were given 5 days of acclimatization before the on set of the feeding trial.

The experimental site is well ventilated. The feeders and waterers were cleaned before the commencement of feeding or watering daily. Data collected were used to compare daily feed intake, daily weight gain and feed conversion ratio. At the end of the six week of feeding trials 3 rabbits per treatment were randomly selected and slaughtered for carcass characteristics and organs analysis. The collected data were subjected to analysis of variance and means separated using SPSS (1995).

3. Results and discussion

The results of performance of Weaner rabbits fed mango seed kernel meal as a replacement for maize were as presented in table 2. The performance characteristics in this experiment revealed that the replacement of maize by mango seed kernel meal at 0, 33.3, 66.7 and 100% recorded on average daily feed consumption of 43.45, 43.74, 42.75 and 49.76(g) for treatment 1, 2, 3 and 4 respectively. There was no significant different amongst the treatment means. This agrees with the finding of Fayeye and Joseph, (2004). They reported that the average daily feed intake were not significantly different ($P<0.05$) for rabbit feed dehulled and sundried MSK meal.

Table 1

Ingredients and Percentage composition of the experimental diets.

Ingredients	Dietary treatment			
	I	II	III	IV
Maize	56.96	37.99	18.97	0
MSKM	0	18.97	37.9	56.96
GNC	11.29	11.29	11.29	11.29
Maize bran	15	15	15	15
Groundnut hay	10	10	10	10
Bone meal	3	3	3	3
Fish meal	3	3	3	3
Salt	0.3	0.3	0.3	0.3
Lysine	0.1	0.1	0.1	0.1
Methionine	0.1	0.1	0.1	0.1
Vitamin premix	0.25	0.25	0.25	0.25
Total	100	100	100	100
Calculated analysis				
CP (%)	16.01	16.15	16.01	15.99
Metabolisable energy (Kcal/kg)	2873.56	2899.67	2923.36	2948.23
Crude fibre%	5.92	6.17	6.14	6.66

The result also revealed that there was no significant different ($P>0.05$) in the average daily weight gain of rabbits fed MSKM as replacement for maize. The values ranged from 8.75 -9.72(g) for treatments 3 and 2 respectively. This also confirms the report of Fayeye and Joseph, (2004). Patil et.al; (1982) reported significant effect on broilers fed MSKMs. The non significant effect of mango seed kernel meal based diets on feed conversion ratio among the treatments means contradicts the findings of Diarra et.al; (2004). There was no mortality through out the trial. The feed cost (N/kg) decreased as the level of mango seed kernel meal increases. This showed that mango seed kernel meal based diets are cheaper than the control diet. The feed cost (N/kg gain) was found highest in diet 1 (0% MSKM) having N338.84 and lowest in diet 4 (100% MSKM) having N245.58. This showed that feed cost decreased per kilogram gain with increasing level of mango seed kernel meal for maize.

Table 2

Performance and economic of production of Weaner rabbits fed dietary levels of mango seed kernel meal.

Parameters	Inclusion levels of mango seed kernel meal				SEM
	1	2	3	4	
DFI (g)	43.45	43.74	42.75	49.76	3.39 ^{NS}
DWG (g)	9.67	9.72	8.75	9.66	0.98 ^{NS}
FCR	4.76	4.64	5.12	5.19	0.54 ^{NS}
FC (N/kg)	17.19	63.24	55.27	47.32	-
FC (N/kg gain)	338.84	293.41	282.96	245.58	-
Mortality	0	0	0	0	-

SEM= Standard error means.

NS = Not significant.

DFI- Daily feed intake.

DWG- Daily weight gain.

FCR- Feed conversion ratio .

FC = Feed cost.

For carcass analysis it also revealed that there was no significant ($P<0.05$) difference in the live weight and carcass weight among the treatment means which agrees with the findings of Agbanah et.al; (2012) they reported non significant different between the control diet and the mango seed kernel meal based diet in rabbits. The non significant effects of mango seed kernel meal based diet on dressing percentage among the treatment means also agree with the finding of Fayeye and Joseph (2004) who reported similar trend on rabbits. The weight of other

organs such as head, legs, skin, kidney, legs, liver, etc. did not show significant different across the dietary treatments.

Table 3

Carcass characteristics of Weaner rabbits fed dietary levels of mango seed kernel meal.

Parameters	Inclusion levels of mango seed kernel meal				SEM
	1	2	3	4	
Live weight (g)	807.67	871.33	787.67	998.33	3.75 ^{NS}
Carcass weight (g)	329.33	375.00	320.33	439.00	8.44 ^{NS}
Dressing (%)	40.37	42.97	40.54	43.73	1.55 ^{NS}
Skin (%)	6.56	6.72	6.31	3.14	0.17 ^{NS}
Leg (%)	3.21	3.15	6.31	7.25	0.54 ^{NS}
Head (%)	10.89	10.98	10.69	10.5	0.21 ^{NS}
Kidney (%)	0.89	0.77	0.88	0.73	0.1 ^{NS}
Small intestine (%)	6.12	6.85	5.80	5.27	0.54 ^{NS}
Large intestine (%)	2.87	2.95	3.72	3.84	0.79 ^{NS}
Heart (%)	0.3	0.23	0.23	0.20	0.08 ^{NS}
Lungs (%)	6.39	6.13	6.2	4.84	0.63 ^{NS}
Liver (%)	3.01	3.03	3.16	2.75	0.25 ^{NS}
Stomach (%)	6.39	6.13	6.2	4.84	0.63 ^{NS}
Caeca (%)	11.69	8.65	10.14	10.54	1.6 ^{NS}
Tail (%)	0.23	0.36	0.44	0.34	0.11 ^{NS}

NS= Not significant.

SEM= Standard error of the mean.

4. Conclusion

It can be concluded that mango seed kernel meal can be used to replace all the maize in the diet of Weaner rabbits, without any negative effect on their performance. This will meet the growth performance requirement of the rabbits there by eliminating the need for costly energy supplements.

Thus mango seed kernel which is a non competing and non-conventional feed stuff for animals was found useful as an economic replacement for energy materials like maize. The use of mango seed kernel meal is there by advocated at up to 100% replacement.

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