EFFECTS OF REPLACING MAIZE WITH PROCESSED MANGO SEED KERNEL MEAL ON PERFORMANCE, NUTRIENTS DIGESTIBILITY AND ECONOMIC OF PRODUCTION OF WEANER RABBITS

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ABSTRACT

This experiment was conducted to determine the effect of replacing maize with processed mango seed kernel meal (PMSKM) in the diets of weaner rabbit on performance, nutrient digestibility and economic of production. A total of thirty two (32) mongrel rabbits (8 rabbits per treatment, 2 per replicate) were randomly allotted to four experimental diets in which processed mango seed kernel meal replaced maize at 0, 20, 40 and 60% level designed as diets 1, 2, 3 and 4 respectively. The experiment lasted for eight weeks. The result showed that the Average initial weight (500.00-518.75), average final weight (1393.75-1412.50), average daily feed intake (52.98-55.05), average daily weight gain (15.74-16.19) and feed conversion ratio (3.29-3.48) obtained were not significantly (P<0.05) affected by the dietary levels of processed mango seed kernel meal. All the digestibility parameters analyzed were significantly (P<0.05) affected by the graded level of inclusion of the PMSKM. The lowest feed cost per kg weight gain was recorded in rabbits fed die 3(40%). Similarly, the rabbits fed diet 3 (40%) showed higher/better cost saving of ₦22.34. It was therefore concluded that processed mango seed kernel meal can replace maize at 40% level in the diet of weaner rabbit with better performance and tremendous reduction in feed cost.

Keywords: Mango seed kernel, Maize, Digestibility, Economic of production, Weaner rabbits

Introduction

Feed is one of the constraints to intensive rabbit production in Nigeria due to competition between man, animals and industries for conventional feed materials. This has lead to the escalating cost of conventional feed ingredients and has made feed cost to account for about 70% of total cost of production Akinmutimi (2008). This problem has been the prime stimulant for the continues search for alternative feed stuffs that can meet the nutritional requirement of micro-livestock, reduce the cost of feed and animal production (Olorede *et al*., 2011). It is recommended that such a feed stuffs should be one that has low human food preference and of low industrial usage.

Mango seed kernel meal (MSKM) has been reported to be a good non conventional ingredient. Faniyi (1997) reported its importance in poultry production while Arogba (1997) provided the physical, chemical and functional properties of Nigerian mango *(Mangifera indica)* kernel and it processed flour. Chemical analysis and metabolizable energy of mango seed kernel meal as determined by Arogba (1997) revealed that it contains Tannin an astringent compound, thus necessitate processing the seed before it could be safely fed to animals. The nutrient composition of Mango seed kernel on dry matter basis was estimated in Nigeria to be 6.16% crude protein, 13.63% ether extract, 2.23% ash and 73.35% nitrogen free extract (Farinu *et al.* 1999) while EI-Alaily *et al.* (1996) reported that the gross energy is 4.7Kcal/g. This study was designed to evaluate the growth performance, nutrient digestibility and economic of production of weaner rabbits fed diets containing processed mango seed kernel meal.

Materials and Methods

Experimental Site:

The experiment was conducted at the Rabbitery Unit of Bauchi State College of Agriculture Teaching and Research farm, Bauchi State. Bauchi State occupies a total land area of 49,119 km² representing about 5.3% of Nigeria's total land mass and is located between latitudes 9° 3' and 12° 3' North and longitudes 8° 50' and 11° East.

Collection and Processing of Mango Seed into Mango Seed Kernel Meal

The mango seeds were collected at Bauchi town and surroundings villages during the peak of its production period. They are readily available in the area of study. The collection was done during the months of April and May which represents the peak of the mango season in Bauchi town. The kernel were obtained by cutting the seed coat using a knife or crushed with a stone. The Mango Seed Kernel (MSK) obtained was then processed through soaking and boiling

Soaking of Mango Seed Kernel for 24 Hours

Mango Seed Kernel was soaked in water for 24 hours at the rate of 100g per liter of water in containers. There was change of water at regular intervals of 8 hours for 1 day. The Mango Seed Kernels were then removed and boiled.

Boiling of Mango Seeds Kernel

The Mango Seeds Kernel was then put in boiling water at the rate of 100g per litre of water at 100^{o}C temperature for 30 minutes. The Mango Seed Kernel was then removed, drained, sun dried, and milled before incorporation into the diets.

Experimental Diets

Four diets were compounded manually. The diets contain 0, 20, 40, and 60% replacement level of proceed mango seed kernel meal for maize coded diets 1, 2. 3 and 4 respectively. The feed were prepared by mixing the various ingredient together at Abubakar Tafawa Balewa University feed mill.

Experimental Design and Management of Birds

A total of thirty two weaner rabbits were used for the experiment. They were randomly assigned into four dietary treatment groups of 8 rabbits per group in a completely randomized design (CRD) consisting of four replicates of 2 rabbits each. Feed and water were provided *ad libitum*

Digestibility Trial

During the seven weeks of the experiment, the weights of the rabbits were measured and a known quantity of feed was given to them. Total droppings from each treatment were collected on daily basis. The digestibility trial lasted for one week. From the total droppings voided, samples were taken for proximate analysis.

Economic analysis

The economics of production of weaner rabbits on the experimental diets were calculated base on the price of the ingredients in the market as at the time of the experiment

Determination of the Proximate Composition of Mango Seed Kernel

The proximate composition (Table 2) was obtained by analyzing the different samples of Mango seeds kernel according to the methods described by AOAC(1990).

Results and Discussions

Proximate Composition of Processed Mango Seed Kernel

The proximate composition of the test ingredients is presented in Table 2. The PMSKM used in the study contained 89.61, 2.23, 5.39, 9.62 and 3.87% for dry matter, ash, crude protein, ether extract and crude fibre respectively This contradict the values reported by Faniyi (1997) and El-Alail *et al*. (1976).

Performance of Weaner Rabbit Fed PMSKM Based Diets.

The results of performance of Weaner rabbits fed processed mango seed kernel meal (PMSKM) as replacement for maize were as presented in table 3. The performance characteristics in this experiment revealed that the replacement of maize by processed mango seed kernel meal at 0, 20, 40 and 60% recorded on average daily feed consumption of 52.98, 53.06, 54.45 and 55.05 (g) for treatment 1, 2, 3 and 4 respectively. There was no significant different amongst the treatment means. This agrees with the finding of Saleh *et al.*, (2015) and Shitu et al., (2013). They reported that the average daily feed intake were not significantly different (P<0.05) for weaner rabbit feed mango seed kernel meal and for growing crossbreed rabbit fed PMSK meal respectively. The result also revealed that there was no significant different (P>0.05) in the average daily weight gain of rabbits fed PMSKM as replacement for maize. The values ranged from 15.74-16.19g obtained in this study is higher than 10.1g reported by Adama and Nma (2002) when groundnut leaves were fed to rabbits. This also confirms the report of (Saleh *et. al*., 2015) and (Fayeye and Joseph, 2004). Shitu *et.al*; (2013) reported no significant effect on growing crossbreed rabbits fed processed mango seed kernel meal. The non significant effect of processed mango seed kernel meal based diets on feed conversion ratio among the treatments means contradicts the findings of Diarra *et.al;* (2004) but similar to the finding of Saleh *et al*., (2015).

Nutrient Digestibility of Rabbits Fed PMSKM Based Diets

The results of nutrients digestibility of weaner rabbits fed processed mango seed kernel meal (PMSKM) as replacement for maize were as presented in table 4. The dry matter digestibility varied from 69.09% to 72.37% in diet 1 and 4 respectively. All the DMD observed were significantly difference (P>0.O5) among the treatments. Also crude protein digestibility, there was significant difference (P>0.O5) between the treatments. The highest CPD of 81.13% was obtained in diet 3 and the lowest of 79.07% in diet 2. For ether extract digestibility also there was significant difference (P>0.O5) among the treatments. The highest EED of 97.28% was obtained in diet 4 and the lowest of 96.94% in diet 1. There was significant difference (P>0.O5) among the treatments. Highest CFD of 57.82% was obtained in diet 4 and lowest of 50.36% in diet 1. However, the ash digestibility observed range between 79.28% and 81.51% in diets 3 and 4 respectively. Also there was significant difference (P>0.O5) among the treatments. Although the digestibility values are too close to each other, the significant differences among the dietary treatment may be due to the variation of inclusion level of mango seed kernel meal in the diets.

Economic Analysis of Weaner Rabbit Fed PMSKM Based Diets.

Economic analysis of weaner rabbit fed varying level of processed mango seed kernel meal shown in table 5. Feed cost (₦/kg) decreased with increasing level of processed mango seed kernel meal in the diets, the values range from ₦87.50/kg for diet 1 (0% PMSKM) to ₦83.75/kg for 4 (60% PMSKM). This showed that mango seed kernel meal based diets are cheaper than the control diet. This also confirms the report of (Saleh *et. al*., 2015) reported decreased in feed cost (₦/kg) with increasing level of mango seed kernel meal for maize. The cost (₦) of total feed consumed equally decreased with increasing level of processed mango seed kernel meal from ₦269.50 in control diet to ₦252.42 in diet 3. The feed cost (₦/kg gain) was found highest in diet 1 (0% PMSKM) having ₦302.81 and lowest in diet 3 (100% MSKM) having ₦280.47. This showed that feed cost decreased per kilogram gain with increasing level of mango seed kernel meal for maize up to 40% level of inclusion. This also agreed with the finding of Shitu *et.al;* (2013) which reported similar trend on rabbits. However, highest cost saving was recorded in diet 3 (40% PMSKM).

Conclusion and Recommendation

It can be concluded that processed mango seed kernel meal can be use to replace maize in the

diet of weaner rabbits up to 40% level of inclusion as an energy source without any negative effect on their performance and nutrients digestibility with concomitant reduction in cost, thereby reducing competition and improving consumer access to animal protein.

Table 1: Ingredients and Percentage Composition of Experimental Diets

	Diets			
Parameters	**T_1 (0%)**	**T_2 (20%)**	**T_3 (40%)**	**T_4 (60%)**
Maize	31.32	25.06	18.79	12.53
Soya bean	17.98	17.98	17.98	17.98
MSKM	0.00	6.26	12.53	18.79
Maize brand	25.00	25.00	25.00	25.00
Groundnut hay	20.00	20.00	20.00	20.00
Fish meal	2.00	2.00	2.00	2.00
Bone meal	3.00	3.00	3.00	3.00
Salt	0.25	0.25	0.25	0.25
Lysine	0.10	0.10	0.10	0.10
Methionine	0.10	0.10	0.10	0.10
Premix	0.25	0.25	0.25	0.25
Total (%)	**100**	**100**	**100**	**100**
Calculated composition (%)				
Crude protein	18.00	17.85	17.69	17.55
Crude fiber	9.33	9.46	9.49	9.57
ME (kcal/kg)	2552.66	2542.84	2532.99	2523.16

Table 2: The Proximate Composition of Mango Seed Kernel Meal

Parameters (%)	**Mango Seed Kernel Meal**
Dry matter	89.61
Ash	2.23
Crude protein	5.39
Ether extracts	9.62
Crude fibre	3.87

Table 3: Performance of Weaner Rabbit Fed Processed Mango Seed Kernel Meal Based Diets

	Dietary treatment					
Parameters	**T_1 (0%)**	**T_2 (20%)**	**T_3 (40%)**	**T_4 (60%)**	**SEM**	**LOS**
Average initial weight (g)	500.00	500.00	512.50	518.7	61.18	NS
Average final weight (g)	1393.75	1400.00	1412.5	1406.25	21.35	NS
Total weight gained (g)	893.75	900.00	900.00	887.50	20.40	NS
Average daily feed intake (g)	52.98	53.06	54.45	55.05	1.57	NS
Average daily weight gain (g)	15.74	15.96	16.07	16.19	0.75	NS
Feed conversion ratio	3.29	3.31	3.45	3.48	4.51	NS

LOS: Level of significance

NS: Non significance difference (P<0.05)

Table 4: Nutrient Digestibility of Rabbits Fed Processed Mango Seed Kernel Meal Based Diets

	Dietary Treatment					
Parameters	**T_1 (0%)**	**T_2 (20%)**	**T_3 (40%)**	**T_4 (60%)**	**SEM**	**LOS**
Dry matter Dig. %	69.09^{d}	71.67^{b}	71.37^{c}	72.37^{a}	0.07	*
Crude protein Dig. %	79.38^{c}	79.07^{d}	81.13^{a}	79.82^{b}	0.07	*
Crude fiber Dig. %	50.36^{d}	57.30^{b}	56.42^{c}	57.82^{a}	0.09	*
Ether extract Dig. %	96.94^{c}	97.13^{b}	96.89^{d}	97.28^{a}	0.06	*
Ash Dig. %	80.15^{b}	79.28^{d}	81.51^{a}	79.41^{c}	0.07	*

^{abc}: means within the same row bearing different superscript are significantly different (P<0.05)

SEM: Standard Error of Mean

LOS: Level of significance

Table 5: Economic Analysis of Weaner Rabbit Fed Processed Mango Seed Kernel Meal Based Diets

Parameters	**T_1 (0%)**	**T_2 (20%)**	**T_3 (40%)**	**T_4 (60%)**
Total feed intake (kg)	3.08	2.96	2.97	3.05
Feed cost (₦/kg)	87.50	86.25	84.99	83.75
Total feed cost (₦)	269.50	255.30	252.42	255.44
Total weight gain (kg)	0.89	0.90	0.90	0.89
Feed cost (₦/kg gain)	302.81	283.67	280.47	287.01
Cost saving (₦)	-	19.14	22.34	15.80

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