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Reproductive Performance of Rabbit Does Fed Graded Levels of Moringa Oleifera Leaf Meal Based Diet

Amao Emmanuel Ayodele[1], Jimoh Rasaq Adeola[1], Adeoti Temitope Mayowa[1]

[1]Department of Agricultural Technology, the Polytechnic Ibadan, Saki Campus Oyo State Nigeria.

Abstract: In a fourteen-week trial, twenty rabbit does and five bucks of mixed breed (for mating) weighing between 1874.50 and 1891.00 were allotted to four experimental diets in a completely randomized design to evaluate the reproductive performance of rabbitsdoes fed *Moringa oleifera leaf meal* as a replacement for soyabean meal in their diet. Pregnancy was detected by abdominal palpation at 14th and 21st days and nest boxes were provided for expectant does at the 28th day. Measurement were taken on Percent conception, Gestation length, Litter size at birth, Litter weight at birth , Average individual kit weight , Llitter size at weaning , Litter weight at weaning and Average kit weight at weaning . The study showed significant difference ($p<0.05$) on percentage conception with animals on 10% moringa leaf meal having the lowest value of 80%. Litter weight at birth showed significant difference ($p<0.05$) in favour of animals placed on moringa leaf meal as the the moringa leaf inclusion increses. Litter size at wening had highest value ($p<0.05$) for animals on 10% moringa leaf meal. Litter weight at weaning and average kit weight at weaning had highest value for animals on 20% moringa leaf meal. Based on these results inclusion of moringa leaf meal in breeding does diet pose no negative effect on the reproductive performance of the animals. To promote production in rabbit enterprise especially breeding aspect, moringa oleifera leaf meal could favorably replace soyabean meal up to 20%.

Keywords : Rabbit does, reproductive performance, moringa oleifera, diet

Introduction

Rabbit meat production has been on the increase in Nigeria in recent years. The rabbit (*Oryctolagus cuniculus*) is the most productive meat producing among all domesticated animals. The feeding habits offer no appreciable competition with man. This is because it can subsist on green as basal diets. The combinations of these characteristics are unique. In addition to this, rabbits have a number of other characteristics that might be advantageous to subsistence farming system, such as their small body size, short generation interval with a relatively short gestation period average of 30-31 days. The daily weight gain is high in proportion to the body weight which gives them a rapid growth rate, and sexual maturity is early. These factors result in the rabbit reaching the weight of a sexually mature animal 30% faster than other animals (Ajayi *et al.*, 2005, Odeyinka *et al*, 2008) and also make rabbits suitable as meat producing small livestock in developing countries (Arijeniwa, *et al*., 2000 , Odeyinka *et al*, 2008).Although rabbits can survive on all forage diet, optimum performance can only be ensured in a mixed feeding regime involving forage and formulated feeds (Harries *et al*., 1984; Cheeke *et al*., 1987; Arijeniwa *et al*., 2000, Odeyinka *et al*, 2008).

The use of forage and other agroindustrial by-products have become an area of interest for many researchers because of the challenges posed by the high cost of conventional feedstuff. Recently, there has been interest in the utilization of Moringa (*Moringa oleifera*) commonly called horse radish tree or drum stick tree, as potential inexpensive protein source for livestock feeding (Terzungwe *et al*,2013). It is rich in carotene, ascorbic acid, iron and in the two amino acids generally deficient in other feeds i.e methionine and cystine (Terzungwe *et al*,2013). *Moringa oleifera* (Lam) is a multi-purpose tree that has been used in ruminant feeding especially in the dry season when there is shortage of grasses and tropical legumes (Ramachandran *et al*., 1980; Sarwatt *et al.*, 2002).

The profitability of rabbit production as an enterprise depends on the number of rabbits kindled per doe per year and the postnatal survival of the kids. Nutrition is one of the factors that could limit productivity especially during pregnancy and lactation (Lukefahr *et al*., 1983; Raharjo *et al.*, 1986, Odeyinka *et al*, 2008). Therefore this study was carried out to evaluate the reproductive performance of rabbits fed

Amao Emmanuel Ayodele (Correspondence)
ayodele_amao@yahoo.com
+234-08059529136, +234-08038075483

Moringa oleifera leaves meal as a replacement for soyabean meal as the cheif plant protein source in breeding rabbit diets.

MATERIALS AND METHODS

Site: The experiment was carried out at the Rabbitry unit of the Teaching and Research farm, The Ploytechnic Ibadan, Saki Campus, Oyo State, Nigeria. Saki is in the savannah zone of Nigeria. The study area is located on Latitudes 8° 04'N and 8° 12'N and Longitudes 3° 15'E and 3° 20'E. The mean annual rainfall is 1500mm with a relative humidity of between 75 and 95%. It is situated at about 600 m above sea level with a mean annual temperature of 26.2°C.

Test ingredient- *Moringa* leaves were harvested within Saki town and air dried under shade to prevent the leaves from being denatured until they were crispy to touch. The leaves were thereafter crushed with a blender before incorporation in the test diets. Four (4) experimental diets were formulated. Diet 1 designated as T1 served asthe control diet and contains no (0%) *Moringa oleifera* leaf meal. Diet 2 designated as T2, Diet 3 as T3, and Diet 4 as T4 containing *Moringa oleifera* leaf meal at the levels of 10%, 20% and 30% respectively (Table 1).

Table 1: Percentage composition of experimental diets

Ingredients	**T 1**	**T 2**	**T 3**	**T 4**
Maize	32.00	32.00	32.00	32.00
MOLM	0.00	2.40	4.80	7.20
Soyabean meal	24.00	21.60	19.20	16.80
Wheat Offal	40.00	40.00	40.00	40.00
Fish meal	0.5	0.5	0.5	0.5
Bone meal	2.0	2.0	2.0	2.0
Oyster shell	1.0	1.0	1.0	1.0
Salt	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25
	100	100	100	100
Calculated Values				
Crude Protein %	17.44	17.31	16.66	16.51
Crude Fibre %	9.24	9.25	9.34	9.51
Dry Matter %	95.69	95.42	94.34	93.39
Calcium %	1.20	1.16	1.20	1.28
Phosphorus %	0.51	0.51	0.50	0.50
ME (Kcal/kg)	2506.50	2521.51	2514.80	2499.10

*Premix composition per kg feed: vit. A, 1500 IU, vit. D 2500 IU, vit. E20,000mg; vit. B2 10 mg; vit. B3 40 mg; vit B6 20 mg; choline chloride 400 mg;
Mn 120 mg; fe 70 mg; Cu 10 mg, Iodine 2.2 mg, Se 0.2 mg. Zn 45 mg,
Co 0.02 mg.

Experimental animal and management: Twenty nulliparous rabbits does of mixed breeds and five bucks obtained from the Rabbit unit, Teaching and Research farm were used in this studyexperimental feed and water were supplied *ad-libitum*. The animals were between 3 – 4 months old with initial live weight ranging between 1874.50 and 1891.00. The rabbits does were randomly allocated to four (4) treatment groups with five (5) rabbits per treatment. Each rabbit served as a replicate while the bucks were used randomly for natural mating. Which was carried out during the early and evening hours of the day. Pregnancy was detected by abdominal palpation at 14th and 21st days and nest boxes were provided for expectant does at the 28th day. Does were closely monitored to take note of stillbirth and immediate mortalities at kindling..

Measurement were taken on percent conception (PC) which was taken as the ratio of pregnant does to non-pregnant does multiplied by 100. Gestation length (GL) was read as the difference between date of last mating and kindling date. Litter size at birth (LSB) was measured by direct counting of kits immediately after kindling. It included number of still birth. To measure litter weight at birth (LWB) kits in a litter were carefully transferred with gloved hand into adjusted (zero) weighing pan and their weight were read off from the scale. Average individual kit weight (AKW) at birth was calculated as the ratio of the weight of litter at birth to litter size, while litter size at weaning (LSW) was the number of fryers in each litter at 6th week. Litter weight at weaning (LWW) was measured by weighing all the fryers (weaners) in a litter individually and summing up their weight. Average kit weight at weaning (AKW) was calculated as the litter weight at weaning divided by the litter size at weaning..

Statistical Analysis
Data obtained were statistically analyzed with the general linear model of SAS (1998) and meansseparated by Duncan multiple range tests.

RESULTS AND DISCUSSION

Table 2 : Reproductive performance of rabbit does fed gradede levels of *Moringa oleifera* leaf meal

Parameters	T1	T2	T3	T4	SEM
Initial Weight (g)	1865.00	1863.50	1891.00	1874.50	0.01
Final Weight (g)	2183.00	2319.5	2177.25	2257.25	0.17
Percent Conception (%)	100^{a}	80^{b}	100^{a}	100^{a}	0.22
Gestation Period (days)	30.67	30.00	31.00	29.33	0.01
Litter Size at Birth	6.50	7.00	6.50	6.00	0.57
Litter Weight at Birth (g)	297^{d}	633.56^{a}	390.63^{b}	304.02^{c}	2.12
Average Kit Weight at birth(g)	49.72^{b}	100^{a}	58.40^{b}	50.67^{b}	0.46
Litter Size at Weaning	4.00^{b}	7.00^{a}	5.50^{ab}	5.00^{b}	0.51
Litter Weight at Weaning (g)	729.36^{d}	975.00^{b}	1267.00^{a}	803.13^{c}	0.52
Average Kit Weight at Weaning (g)	182.46^{b}	150.00^{d}	225.08^{a}	160.17^{c}	0.07

a, b, c Different letters in the same column indicate significant differences among groups at the 5% level.

Table 2 shows the reproductive performance of rabbits fed graded levels of *moringa oleifera* leaf meal in place of soyabean meal.

The initial and final weight shows no siginificant difference ($p>0.05$) and this reveals that weight of the use for the study was not a source of biasness in relation to other results from the study. Percentage conception showed significant difference ($p<0.05$) with animals on 10% moringa oleifera leaf meal having the lowest conception percentage of 80. This might be a resultbof unsuccessful mating or an intrinsic factor with one of the does on 10% moringa oleifera leaf meal. Other does placed on moringa oleifera leaf meal (20% and 30%) compete favourably with those on 100% soyabean meal, based on this fact it can be predicted that moringa oleifera leaf meal had no negative implication on rabbit does conception. This is in agreement with the work of Odeyinka *et al* (2008) who fed moringa leaf in place of *Centrosema pubescens*. Gestation period ranges between 29.33 and 30.67 days and this falls within the gestation period observed by Odeyinka *et al* (2008). Litter size at birth shows no significant difference ($p>0.05$) across the treatments but the value for animals placed on 10% moringa oleifera had highest numerical value of 7. This shows that replacement of soyabean meal with moringa oleifera leaf meal had no negative influence on the litter size of rabbit does. Litter weight at birth showed significant difference ($p<0.05$). The litter weight at birth increases progressively as the level of moringa oleifera leaf meal increases in the diet of the rabbit does. The value of animals on control diet (100% soyabean) had the least weight of 297g. This result shows that there is a factor in moringa leaf that contributed to the increase in litter birth weight. This might be the availability of methionine and cystine in moringa leaf that is deficient in soyabean meal as documented by Terzungwe *et al* (2013). Litter size at weaning shows significant difference ($p>0.05$) with animals on control diet having the lowest value of 4. Values for animals placed on moringa oleifera leaf meal decreases as the inclusion of moringa oleifera leaf meal increases. Average weaning weight reveals significant difference ($p<0.05$) across the treatments. Animals on 20% moringa oleifera leaf meal had the highest weight of 225.08g followed by animals on control diet, animals on 30% moringa oleifera leaf meal and animals on 10% moringa oleifera leaf meal with respesctive values of 182.46, 160.16 and 150.00. This might be influenced by the litter size, since the larger the litter size the minimal the milk availability to each kit and vice versa. Tthe average kit weight at

birth with animals on 10% moringa oleifera leaf meal having the highest value ($p<0.05$) with no significant difference ($p>0.05$) among animals on control diet, 20% and 30% moringa oleifera leaf meal. Though the numerical values of animals on moringa oleifera leaf meal were higher than control. It can be predicted from this result that moringa oleifera leaf meal contributed positively to average kit weight at birth. The litter weight at weaning. Animals on moringa oleifera leaf meal had better performance then animals on control diet ($p<0.05$). animals on 20% had the best result followed by animals on 10% and 30% moringa oleifera leaf meal. This might result from the high crude protein content of moringa made available in the milk before the kits were weaned.

Conclusion

Moringa oleifera leaf meal is an excellent subtitude for soyabean meal in the diet of breeding does as revealed by the result of this study. It does not show any negative effect on the reproductive performance of the animals. Conception percentage, average kit weight, litter size at birth, litter size at weaning, litter weight at weaning and other parameters are factors to determine the productivity of a rabbit enterprise, moringa oleifera leaf meal does not affect any of these parameters negatively. To promote production in rabbit enterprise especially breeding aspect, moringa oleifera leaf meal could favorably replace soyabean meal up to 20%. Milk yeild of lactating does fed moringa oleifera leaf meal should be investigated in subsequent studies.

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