REPRODUCTIVE PERFORMANCE OF RABBITS FED *MORINGA OLEIFERA* AS A REPLACEMENT FOR *CENTROSEMA PUBESCENS*

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ABSTRACT

In a twenty-week trial, forty does of heterogeneous stocks of rabbits (derived primarily from New Zealand White, California White and Chinchilla breeds) aged one to two years and weighing between 1.5 and 2 kg were allotted to five experimental diets in a completely randomized design to evaluate the reproductive performance of rabbits fed *Moringa oleifera* as a replacement for *Centrosema pubescens*. Freshly harvested *C. pubescens* and *M. oleifera* leaves were offered to the animals at 2% of their live weights at the ratios of 100:0 (M0), 75:25 (M25), 50:50 (M50), 25:75 (M75) and 0:100 (M100), respectively in addition to the concentrate feed offered to the animals.
There were significant differences in the total DM intake of does on the different treatments ($P<0.05$). The M25 does had the highest DM intake (131.6 g/day) followed by M50 does (125.5 g/day) and M0 does (122.5 g/day), while M100 does had the lowest (112.1 g/day). However, there was no significant difference in CP intake among the groups.
M0 and M100 does had the highest litter size at birth of 5.12 and 5.81 respectively (though not significantly different). M50 does had the lowest litter size at birth (4.06) and this was significantly different from that of M100 does (5.81). There was no significant difference in the initial average body weight and gestation length of the does on the different treatments as well as in the litter weight at birth. Both litter size and litter weight at weaning were highest in M0 and M100 groups recording a litter size of 5.00 for both treatments and a significant ($P<0.05$) difference in litter size at weaning across all treatments. The average daily weight gains per kit were 6.99, 8.06, 8.64, 8.13 and 6.78 g/day for M0, M25, M50, M75 and M100 treatments, respectively. There was a significant difference ($P<0.05$) in average daily weight gain per kid and in milk yield across all the treatments. Milk yield was higher in M0, but not significantly different in M75 and M100 does. It can be concluded that *M. oleifera* can be used to replace *C. pubescens* without adverse effect on the reproductive performance of rabbits.

Key words: Centrosema, Moringa, Reproductive performance, Rabbit.

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) and also make rabbits suitable as meat producing small livestock in developing countries (Arijeniwa, *et al*., 2000).

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). 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). *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 nutrition of rabbit in Nigeria is primarily based on *Tridax decumbens* and or *Centrosema pubescens* whose growth and availability in the dry season cannot sustain all-year rabbit production (Odeyinka *et al*., 2007). Therefore this study was carried out to evaluate the reproductive performance of rabbits fed *Moringa oleifera* leaves as a replacement for *Centrosema pubescens*.

MATERIALS AND METHODS

Animals and experimental design

The experiment was conducted at the Rabbit unit of the Obafemi Awolowo University Teaching and Research Farm, Ile-Ife, Nigeria. The experiment lasted a period of five months, spanning from February to July, 2006. A total of forty does comprising of heterogeneous stocks of the three common breeds found in Nigeria (New Zealand White, California White and Chinchilla) were used for this experiment. The does were allocated randomly into five treatments balancing the groups for age and live weight and each treatment had eight does. The ages of the does ranged from 1 to 2 years while their weights ranged from 1.5 to 2 kg. The animals were caged individually. The cages were made of galvanized wire mesh with an approximate dimension of 76 x 62 x 42 cm. The cages were raised above the concrete floor with wooden stand about 90 cm high.

Freshly harvested *Centrosema pubescens* and *Moringa oleifera* leaves were offered to the animals at the ratios of 100:0 (M0), 75:25 (M25), 50:50 (M50), 25:75 (M75) and 0:100 (M100) of *C. pubescens* and *M oleifera* respectively. The *Centrosema pubescens* and *Moringa oleifera* leaves were collected from established plots on T & R farm at Obafemi Awolowo University, Ile-Ife, Nigeria. Basal concentrate which made up 50% of the diets was also fed. The animals were offered 4% of their body weight on dry matter basis daily (2% concentrate and 2% forage). Animals were flushed (the does were allowed to rest and given the same experimental diets) for two weeks prior to mating. The forty does were weighed prior to mating (does were taken to the buck for service) and at parturition for the two litters and final weight at the end of the experiment. Kids were weaned at 4 weeks of age. The kids were weighed at birth and weekly till weaning. The does were re-mated after weaning for another litter production. The re-mating took place after two weeks of flushing. Feeds and refusals were weighed daily, and samples were analysed for proximate components using the methods of AOAC (1990). Measurements taken included: daily feed intake, litter size at birth and weaning, litter weight at birth, weekly body weight. Milk yield was calculated using the proposed formula by Lebas *et al*. (1986): Milk production of does = (Live weight new born at 21 days of age - Live weight of new born)*1.18

Statistical Analysis

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

RESULTS AND DISCUSSION

Table 1 shows the chemical composition of the diets. The results shown in Table 2 indicate that there were significant differences in the total DM intake of does on the different treatments ($P<0.05$). The does in M25 had the highest DM intake (131.6 g/day) followed by does on M50 (125.5 g/day) and M0 (122.5 g/day) while does on M100 had the least (112.1 g/day). However, there was no significant difference in CP intake among the groups. Reproductive performance (Table 3) shows no significant

difference in the mating weights (initial doe weight) of the animals, ranging between 1852 and 1882 g. Average gestation length for all the animals also falls within 28-31days with no significant difference across the treatments. This is in agreement with the findings of Aleksandrov and Liticherskii (1982) and Nguyen *et al*. (2006)

Table 1: Chemical composition of experimental diets (% of DM)

Parameters	Concentrate	Moringa	Centrosema
Dry matter	91.4	82.7	89.3
Crude Protein	19.1	23.5	20.9
Crude Fibre	10.5	28.2	14.5
Ether Extract	18.7	5.5	10.2
Ash	6.5	5.9	7.6
Organic Matter	93.5	94.1	92.3

Table 2: Dry matter intake (g/d) of rabbit does fed *Moringa oleifera* and *Centrosema pubescens*

DM intake	M0	M25	M50	M75	M100	SEM	Prob.
Concentrate	53.5^{c}	61.1^{a}	61.7^{a}	56.6^{b}	61.6^{a}	0.93	0.0001
Centrosema	69.0^{a}	51.2^{b}	34.2^{c}	14.2^{d}	-	6.12	0.0001
Moringa	-	19.3^{d}	29.6^{c}	44.9^{b}	50.5^{a}	3.72	0.0001
Total	122.5^{c}	131.6^{a}	125.5^{b}	115.7^{d}	112.1^{e}	1.89	0.0001
CP intake	24.7	26.9	25.9	24.3	23.6	1.33	0.46

Table 3: Reproductive performance of rabbit does fed *Moringa oleifera* and *Centrosema pubescens*

Parameters	M0	M25	M50	M75	M100	SEM	Prob.
Initial weight of doe (g)	1867	1852	1882	1861	1867	14.61	0.69
Final weight of doe (g)	2046	1810	1678	1943	1959	99.36	0.06
Gestation length (days)	30.3	28.1	29.3	30.4	30.0	1.21	0.10
Litter size at birth	5.12^{ab}	4.56^{ab}	4.06^{b}	4.66^{ab}	5.81^{a}	0.28	0.05
Litter size at weaning	5.00^{a}	2.87^{c}	3.40^{bc}	4.46^{ab}	5.00^{a}	0.48	0.03
Survival rate (%)	97.6	62.9	83.7	95.7	86.1		
Litter weight at birth (g)	228	195	185	225	232	15.21	0.06
Litter weight at weaning (g)	1173	742	947	1170	1116	98.22	0.08
Av weight gain/kid/day (g)	6.99^{b}	8.06^{a}	8.64^{a}	8.13^{a}	6.78^{b}	0.22	0.006
Total milk yield (g)	836^{a}	517^{b}	646^{ab}	807^{a}	788^{a}	55.30	0.03

Means within each row with different superscript are significantly different ($P<0.05$)

Does in M0 and M100 recorded the highest litter size at birth of 5.12 and 5.81 (though not significantly different), respectively (Figure 1). Does on M50 had the lowest litter size at birth (4.06) and this was significantly different from that of M100. These values of litter size are in agreement with the report of Odubote and Akinokun (1991).

Both litter weight at birth (which was not significantly different among groups) and at weaning were also highest in M0 and M100. M0 had 228 and 1173 respectively for litter weight at birth and at weaning while M100 had 232 and 1116 for litter weight at birth and at weaning respectively. The litter size at weaning was 5.00 in M0 and 5.81 for M100 while M25, M50 and M75 had 2.87, 3.40 and 4.46 respectively. Litter size at birth of 5 for M0 and M100 are similar to the 5.09 reported by Ozimba and Lukefahr (1991) and Mai (2005). The litter weight at birth and litter size at birth followed the same trend and this is in agreement with the report of Kavamto *et al.* (1973). The litter size at weaning is in agreement with the report of Ren *et al*. (2003). The survival rate in this study (62.93 to 97.65) is higher than 63.3 to 76.1% reported by Ren *et al*. (2003) but similar to that of Nguyen *et al*. (2006). The average daily weight gains of the kids were 6.99, 8.06, 8.64, 8.13 and 6.78 g/day for M0 to M100, respectively (Table 3). These values are higher than the weight gains (3.09, 6.5 g/day) reported by Roy *et al*. (2002) and Rahim *et al*. (1997), respectively. Kids of does on M25, M50 and M75 had significantly higher growth rate than those on M0 and M100. This shows a negative relationship between litter size and growth rate. The animals on 100% *Moringa* (M100) had higher values in litter size at birth, litter weight at birth and litter weight at weaning than those on 100% *Centrosema* (M0) though not significantly different. This shows that *Moringa* can effectively replace *Centrosema* in the diet of rabbits.

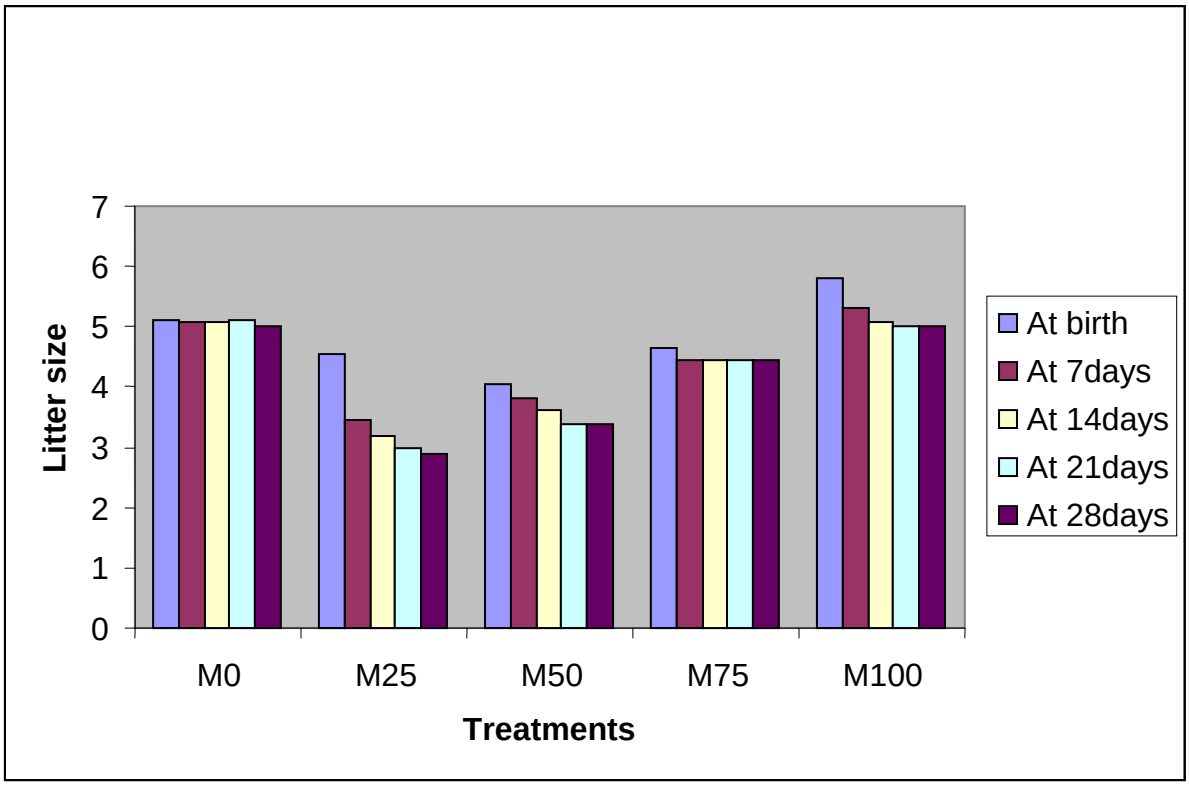

Figure 1: Average litter size of doe rabbits fed experimental diets

CONCLUSIONS

Moringa oleifera leaves are suitable for feeding rabbit does. It can be concluded that *M. oleifera* can be used to replace *Centrosema pubescens* without adverse effect on the reproductive performance of rabbits especially in the dry season when the yield/supply of *C. pubescens* is inadequate.

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