THE HAEMATOLOGICAL AND BIOCHEMICAL PARAMETERS OF RABBITS FED WITH *MORINGA OLEIFERA Lam*. BASED DIETS

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ABSTRACT

In a 12-week trial, 70 weaner rabbits aged between 4 to 6 weeks of both sexes, (average weight of 388 ± 0.8g) were randomly allotted to five experimental groups. The animals were fed *Moringa oleifera* (M) and *Centrosema pubescens* (C) based diet in the following ratio, 100%C, 75%C+25%M, 50%C+50%M, 25%C+75%M and 100%M in a completely randomized design. The rabbits comprised of crosses of New Zealand White, Chinchilla, and California breeds. The animals were weighed weekly and at the expiration of the experiment, blood samples were collected for haematological and biochemical parameters analysis and carcass was analyzed. There were no significant differences in red blood cell (RBC) and white blood cell WBC ($p>0.05$) counts of the animals in all the groups. The packed cell volume (PCV) of animals fed 25C75M (43.7%) was significantly ($P< 0.05$) higher compared with animals in other groups. The serum cholesterol of animals fed 100M diet were significantly ($p> 0.05$) lower than values obtained from other animals. There was no significant difference in the carcass parameters evaluated except the stomach weight of animals fed 100% C. pubescens which was significantly ($p< 0.05$) higher than those obtained for other animals. It was concluded that *Moringa oleifera* can effectively replace *Centrosema pubescens* in rabbit's diets without any deleterious effect and can therefore be used to develop a novel strategy to produce rabbit's meat with lower cholesterol and saturated fatty acid contents.

Key words: *Moringa oleifera* , *Centrosema pubescens*, haematology, cholesterol, carcass

INTRODUCTION

Rabbit production is promising in Nigeria where grains are expensive and scarce (Odeyinka *et al.*, 2007) but forages are cheap and abundant and the need for maximum meat production is acute (Oteku and Igene, 2006). Rabbits can utilize the available proteins in cellulose rich plants, where as it is not economical to feed these to chicken and turkeys, the only animals with higher energy and protein efficiency (Ahemen *et al*.,2013). *Centrosema pubescens* is a herbaceous, climbing, perennial herb with nutrient content of dry matter at 23.3%, crude fibre 30.8%, crude extract 3.9%, crude protein 21% and total digestible nutrient 4.9%. This plant is commonly found in the tropics and it is a conventional forage used for feeding rabbit and it is found in abundance in arable farm environment (Udeh *et al*., 2007). *Moringa oleifera* is a multi-purpose shrub used by human beings for their food and medicine since centuries. *Moringa oleifera* leaves can be used as a feed supplement, to improve feed efficiency and livestock performance, or as a replacement for conventional crops to obtain more economically sustainable, environmentally friendly and safer production (Areghore, 2002; Richter *et al*., 2003). Hence, the objective of this study was to evaluate the hematological, biochemical and carcass characteristics of rabbits fed *Moringa oleifera*, *Centrosema pubescens* and different mixtures of both plants.

MATERIALS AND METHODS

The experiment was conducted at the Rabbit Unit of the Teaching and Research Farm, Obafemi Awolowo University, Ile-Ife, Nigeria for a period of 12 weeks. Seventy weaner rabbits of both sexes

(1:1) of heterogeneous population were used for this experiment. The animals were 4 to 6 weeks old and weighed between 205 and 534 g. They were randomly allotted to five treatments in a completely randomized design. Two rabbits each were housed in a cage with a dimension of 76cm x 62cm x 42cm. Adequate feed and water were provided daily with the use of local clay mortal bowl of 12x15cm in diameter.

Freshly harvested vegetative parts of *Centrosema pubescens* (C) and *Moringa oleifera* (M) leaves were offered to the animals at the ratio of 100:0 (C100), 75:25 (C75M25), 50:50 (C50M50), 25:75 (C25M75) and 0:100 (M100) respectively. The animals were fed 4% of their body weight at a ratio of 2% experimental concentrate (Calculated Crude Protein: 17.89,Crude fibre:13.52)and 2% *C.pubescenes* and or *M.oleifera* on dry matter basis daily. The C*entrosema pubescens* and *Moringa oleifera* leaves were collected from established plots at Teaching and Research Farm at Obafemi Awolowo University, Ile- Ife in Osun State, Nigeria.

Table 1: Composition of experimental diets

Ingredients (%)	**(%)**
Groundnut Cake (GMC)	8.00
Wheat offal	19.00
Palm Kernel Cake	50.00
Maize	15.00
Fish	5.00
Bone Meal	2.00
Salt	0.25
Methionine	0.25
Lysine	0.25
Vitamin premix	0.25
Total	100.00

The animals were subjected to a 7-day adaptation period, growth trials lasted for 12 weeks. Each animal was weighed using a Triple beam sensitive scale before the commencement of the experimental period and subsequently weekly throughout the experimental period. Feed intake was recorded daily blood was collected at the end of the experiment and analyzed for haematological parameters and cholesterol level. The animals were slaughtered and carcass analysis was carried out

Statistics analysis

Data obtained were statistically analyzed with the general linear model of SAS (2008). Significant means were separated using the Duncan Multiple Range test of the same package.

RESULTS AND DISCUSSION

The average dry matter intake ranged from 3.44 to 3.89% of the body weight which compared with the 4% reported by Odeyinka *et al*. (2007). Animals in all the treatments were in a positive weight balance and weight of the animals increased with the period of experiment (Figure 1). The mean weight gain (Table 2) in this experiment were similar with result in some other studies. Odeyinka *et al*. (2007) obtained 12.0g per day for weaner rabbits fed diet containing household wastes and Omoikhoje *et al.*(2006) obtained 11.06g per day on the response of weaner rabbits fed concentrate supplemented with varying levels of *Syndrella nodiflora* forage.

Table 2: Weight gain of weaner rabbits fed experimental diet over a period of 12 weeks

Parameter	**C100**	**C75M25**	**C50M50**	**C25M75**	**M100**	**Sem**	**Prob.**
AIW (g)	387.6	389.1	388.5	388.5	387.6	22.7	1.00
AFW (g)	1472.5	1460.1	1477.8	1493.6	1505.5	44.6	0.95
AWG **(g)**	1084.9	1071.0	1089.3	1105.1	1118.0	39.2	0.95
DMI(%)	3.44	3.89	3.79	3.97	3.77	0.01	0.56

AIW- Average initial weight, AFW- Average final weight, AWG- Average weight gain

Table 3: Carcass evaluation of experimental rabbits

Parameter	C100	C75M25	C50M50	C25M75	M100	Sem	Prob
Live weight (g)	1529.2	1540.7	1520.8	1528.0	1538.7	25.26	0.35
Hot dressing weight (g)	798.0	844.8	793.7	825.8	928.5	15.30	0.86
Dressing (%)	52.2	54.7	52.3	53.9	53.7	0.45	0.65
Shrinkage (%)	0.95	3.53	1.57	1.50	1.23	0.35	0.58
Kidney weight (g)	13.5	12.9	11.0	12.7	12.3	0.25	0.66
Kidney (%)	0.88	0.85	0.73	0.83	0.81	0.01	0.62
Kidney fat (g)	14.9	17.7	17.0	16.0	20.8	0.09	0.43
Kidney fat (%)	0.98	1.15	1.13	1.07	1.38	0.06	0.43
Liver weight (g)	47.5	51.0	50.4	54.3	53.0	1.45	0.17
Liver (%)	3.09	3.31	3.31	3.58	3.48	0.08	0.17
Skin weight (g)	160.1	162.8	160.3	141.5	150.1	6.10	0.59
Skin (%)	10.5	10.5	10.5	9.04	9.85	0.35	0.56
Heart weight (g)	9.75	13.8	8.33	8.00	7.75	0.83	0.59
Heart (%)	0.64	0.94	0.55	0.52	0.51	0.06	0.59
Lung weight (g)	9.71	13.5	13.2	11.8	11.7	0.54	0.72
Lung (%)	0.63	0.87	0.87	0.77	0.77	0.03	0.72
Head weight (g)	160	129	149	133	139	3.15	0.52
Head (%)	10.5	8.47	9.84	8.80	9.20	0.22	0.51
Stomach (g)	75.5^{a}	41.8^{b}	36.5^{b}	52.9^{ab}	39.9^{b}	3.65	0.04
Stomach (%)	4.94^{ab}	2.74^{b}	2.41^{b}	3.37^{ab}	2.63^{b}	0.22	0.04
Weight of 1cm:							
Ceacum (g)	4.3	5.1	3.8	4.0	3.0	0.18	0.85
Small intestine (g)	5.7	5.0	5.0	5.1	4.5	0.18	0.05

Figure 1: Average weekly weight (grams) of experimental rabbits fed for twelve weeks

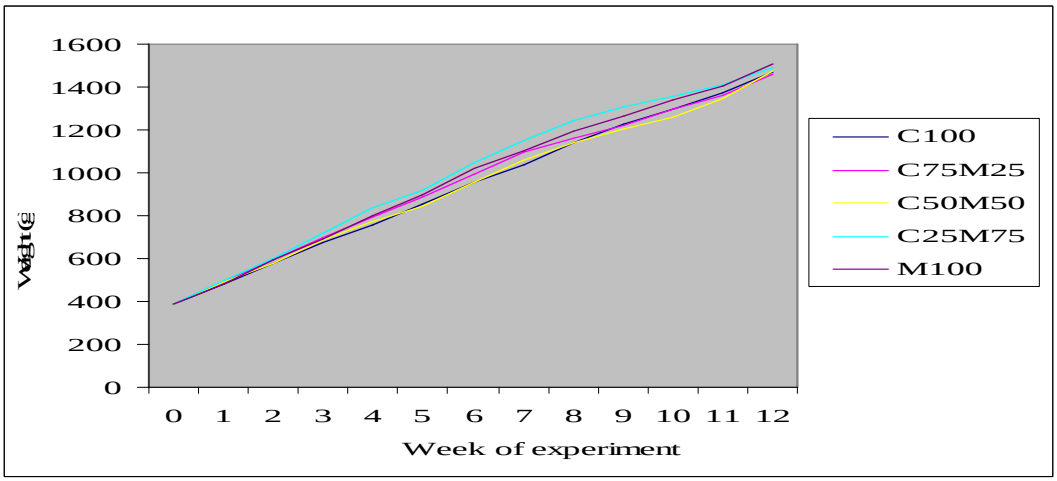

Table 4: Effect of experimental diets on haematological parameters of weaner rabbits

Parameter	C100	C75M25	C50M50	C25M75	M100	Sem	Prob
RBC (10^{6})mm	5.83	5.89	5.71	5.76	5.82	0.06	0.88
WBC (10^{3})mm	5.41	5.41	5.37	5.48	5.64	0.03	0.11
PCV (%)	34.5^{b}	37.0^{ab}	39.8^{ab}	43.7^{a}	39.8^{ab}	1.08	0.04
Cholesterol mg/dl	39.31^{a}	29.77^{ab}	38.88^{a}	35.78^{a}	23.69^{b}	1.95	0.03

RBC- Red blood cell, WBC- White blood cell, PCV- Packed cell volume

However, weight gain obtained was higher than the value reported by Bamikole *et al.*(2000) and Jokthan *et al.*(2003) who obtained 5.72 and 7.62g/day, respectively. The mean dressing percentage for all the animals fed experimental diets as recorded in Table 3 were in accordance with the range

reported by Odeyinka *et al*., (2007), higher than 48.2% obtained by Oluremi *et al.*, (2006) and 47.9% by Oteku and Igene (2006), but lower than 69.9% reported by Amaefule *et al*. (2005). The high stomach weight in animals fed C100 might be attributed to the high percentage of crude fibre in Centrosema, this is in agreement with Zhenyu *et al.*, 2018 that feed high in dietary fibre led to significant increase in stomach weight of rabbits.

Haematological tests have been widely used for the diagnosis of various animal diseases (Tibbo *et al.*, 2004). The blood in an animal serves as a transport medium. The red blood cell, white blood cell and packed cell volume values obtained in this experiment (Table 4) were in agreement with the ranges of values reported by Melvin (1977) and Omoikhoje *et al*. (2006) as normal for rabbits. This means that total replacement of *Centrosema pubescens* with *Moringa oleifera* did not affect iron utilization in the rabbits. Serum cholesterol which was lower in animals fed *Moringa Oleifera* diets may be attributed to definite hypocholesterolemic activity of *Moringa oleifera* (Ghasi *et al*., 2000).

CONCLUSION

In conclusion, the results indicated that *Moringa oleifera* had no adverse effect on the growth and health of rabbits and can effectively replace *Centrosema pubescens* in rabbit's diets and therefore be used to develop a novel strategy to produce rabbit's meat with lower cholesterol and saturated fatty acid contents.

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