

CARCASS CHARACTERISTICS OF GROWING RABBITS (*ORYCTOLAGUS CUNICULUS*) FED DIETS CONTAINING GRADED LEVELS OF *MORINGA OLEIFERA* LEAF MEAL

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ABSTRACT

The study was carried out at the Livestock Teaching and Research Farm, Department of Agricultural Education, College of Education Waka-Biu, Biu Local Government Area, Borno State. Forty-five cross-bred bucks (Dutch x New Zealand White) were used to evaluate the effect of inclusion of *Moringa oleifera* Leaf Meal (MOLM) on carcass characteristics of grower rabbits. The experiment has five treatments and each of the treatment has three replicates consisting of three rabbits per replicate making a total of nine rabbits per each treatment group in a Complete Randomized Design (CRD). The data were subjected to one way Analysis of Variance using SPSS (17.0) and means were separated using least Significant Difference. Five diets were formulated at 0, 5, 10, 15 and 20 % levels designated as T1, T2, T3, T4 and T5 respectively. Results showed that most of the values did not differ significantly ($p>0.05$) among treatments, except for the shoulder, loin, lungs and tail which differ ($p<0.05$) significantly. Highest values of slaughter weight, dressed weight and dressing percentages were reported at 10% level of inclusion while shoulder, abdominal fat and feet were highest at 20% level of inclusion. Loin and abdominal fat reduces with increasing level of Moringa.

Keywords: Carcass Characteristics, Diet, Graded levels, Rabbits, *Moringa oleifera* Leaf Meal

INTRODUCTION

Rabbit production can be regarded as one of the least developed livestock production practices in Nigeria. Problems responsible for this include climatic factors occasioned by high temperature which characterized most parts of the country, diseases and poor markets as well as feeds and feeding. Full advantages of rabbit nutrition have not been taken into consideration and this limit interest in rabbit production. Rabbits have a short generation interval with high litter size and can be raised at the backyard which is well suited to small holder rabbit producers. It is important to note that, feed supply and quality are the major limiting factors to vibrant rabbit production in Nigeria (Muhammad *et al.*, 2018). To make rabbit rearing more viable as a small-scale business, there is the need to advocate for the development of alternative feeding materials that are relatively cheap when compared with commercial feeds or conventional feedstuffs. Rabbits can be raised on high fibre feeds and materials that are not utilized by man and since they do not compete with man for grains, they have the advantage over swine and poultry (Adeyemo *et al.*, 2013). Rabbit meat as reported by Cheek *et al.* (1987) is fined grained, nutritious and appetizing. It is ranked best in quality as it is low in fat (10-12%), compared to other meats like poultry (11-13%), pork (42-48%), and beef (27-29%) but high in protein (20-22%) compared to chicken (19-21%), pork (10-12%) and beef(15-17%).

Moringa oleifera was reported to be a good source of vitamins and amino acids (Akangbe and Abu, 2018). Its seed was claimed to boost the immune system of broiler chickens (Lilibeth *et al.*, 2010). The leaves and green fresh pods of *Moringa oleifera* are rich in carotene and ascorbic acid (Makkar and Becker, 1999) and also, its inclusion into layers diets induced double yolks, (Akangbe and Abu 2012). *Moringa oleifera* seeds extract was reported to have antibacterial properties and the conclusion was made to investigate it as a phytotherapeutic agent to combat infectious agents (Ewuola, 2009). Most parts of the plant have been used in folk medicine in Africa and South Asia (Fahey, 2005). The medicinal effects of the plant were ascribed to their possession of anti-oxidants, which are known to suppress formation of reactive oxygen species (ROS) and free radicals (Aja *et al.*, 2014).

The high cost of animal production in terms of feeding, housing, drugs and vaccine has greatly reduced the number of farmers going into large-scale livestock production. There has been an increased interest in the utilization of the leaf of *Moringa oleifera*, (Family *Moringaceae*) commonly known as horseradish tree or drumstick tree as a protein source for livestock (Makkar and Becker 1999). The leaves contain high concentration of crude protein, essential vitamins, calcium, iron and proteins. Consequently, man has to look for a cheaper source of animal protein, this obviously calls for more research into other non-competitive feed resources of which *Moringa oleifera* leaf could be an alternative choice of raw material as a protein source for animal nutrition.

MATERIALS AND METHODS

The study was conducted at the Livestock Teaching and Research Farm, Department of Agricultural Education, College of Education Waka-Biu, Biu Local Government Area of Borno State, Nigeria. Waka-Biu is located between latitude 10° and 40° North and longitude 12° 42' East. The minimum relative humidity is 15% in March and the maximum is 74% in August (DNMA, 2013). A total of 45 cross-bred (Dutch and New Zealand White) grower bucks (6 weeks) were purchased from a reputable vendor and used for the experiment. They were randomly allotted to five experimental diets in groups of nine per treatment and three rabbits per replicate in a complete randomize design (CRD).

Fresh leaves of *Moringa oleifera* were harvested before flowering from the College farm. The branches were threshed carefully to separate leaves from twigs. The separated leaves were air-dried (by spreading the leaves under a shade) for five (5) days before milling (0.2 mm sieve) to obtain *Moringa oleifera* Leaf Meal (MOLM) using a Thomas–Willey milling machine. Ground leaves of MOLM were mixed with the other experimental diets at varying inclusion levels. Five diets were formulated at 0, 5, 10, 15 and 20 % levels designated as T1, T2, T3, T4 and T5 respectively. The ingredient composition and calculated analysis of the experimental diets is presented in Table 1.

Table 1: Experimental Diets Composition and Calculated Analysis

Ingredient	TREATMENT				
	T1 (0%)	T2 (5%)	T3 (10%)	T4 (15%)	T5 (20%)
Maize	40.00	37.00	31.72	27.35	23.72
Soya Bean Meal	23.00	21.25	21.28	20.65	19.28
MOLM	0.00	5.00	10.00	15.00	20.00
Groundnut Haulms	15.95	15.95	15.95	15.95	15.95
Fish Meal	3.00	3.00	3.00	3.00	3.00
Wheat Bran	15.00	15.00	15.00	15.00	15.00
Salt (NaCl)	0.30	0.30	0.30	0.30	0.30
Bone Meal	2.50	2.50	2.50	2.50	2.50
Premix	0.25	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00	100.00
Calculated Analyses					
Crude Protein (%)	18.81	18.82	18.88	18.89	18.81
Crude Fibre (%)	9.15	9.37	9.60	9.78	9.98
Ash (%)	3.98	4.20	4.51	4.81	5.10
ME (Kcal/kg)	2763.00	2700.00	2576.00	2481.00	2392.00

MOLM = *Moringaoleifera* Leaf Meal; ME = Metabolizable Energy.

Premix supplied the following = Vit. A = 5000iu, Vit D3 = 800,000iu Vit. E = -12,000mg, Vit. K = 1,500mg, Vit. B1 = 1000mg, Vit. B2 = 2000mg, Vit. B6 = 1,500mg, niacin = 12000mg, panthotenbic acid = 20.00mg, biotin = 10.00mg, Vit B12 = 300.00mg, folic acid = 150,000mg choline = 60,000mg, manganese 10,000mg, iron = 15,000, zinc = 800.00, copper = 400.000mg, Iodine = 80.00mg, selenium = 8,000mg.

Experimental diets and clean drinking water were provided *ad libitum* throughout the experimental period. The experiment lasted for ten weeks. The data collected were subjected to one way Analysis of Variance using SPSS (17.0) and means were separated using LSD. At the end of the 10th week of the feeding trial, one (1) buck was randomly selected from each of the replicate for carcass and organ analyses. The bucks for carcass analyses were starved overnight and slaughtered at 06:00 hours. The bucks were then dressed and dressing percentages were calculated as follows

$$\text{Dressing Percentage} = \frac{\text{Carcass Weight}}{\text{Live-weight}} \times 100$$

The primal cuts (head, shank, thigh, wings, neck, breast and drumstick) were weighed and expressed as percentage of live weight. The visceral organs (crop, gizzard, liver, spleen, abdominal part, caeca, heart, intestine and kidney) of the buck were similarly determined.

RESULTS AND DISCUSSION

The carcass characteristics and organ weights of rabbits fed graded levels of MOLM is presented in Table 2. Most of the values did not differ significantly ($p > 0.05$) among treatments, except for the shoulder, loin, lungs and tail which differ ($p < 0.05$) significantly. Highest values of slaughter weight, dressed weight and dressing percentages were reported at 10% level of inclusion while shoulder, abdominal fat and feet were highest at 20% level of inclusion. Loin and abdominal fat reduces with increasing level of Moringa. Values in this study can be favourably compared to that reported by Nuhu (2010) when MOLM was fed to growing rabbits and Igwebuike *et al.* (1995) who fed sorghum waste to growing rabbits.

Table 2: Carcass Characteristics of Rabbits fed graded levels of *Moringa oleifera* Leaf Meal

Carcass Component	Levels of MOLM (%) in the diets					SEM
	T1 (0)	T2 (5)	T3 (10)	T4 (15)	T5 (20)	
Slaughter weight (g)	1154.30	1239.70	1378.30	1332.10	1330.00	51.29 ^{NS}
Dressed weight (g)	700.00	700.00	733.33	700.00	700.73	37.03 ^{NS}
Dressing percentage (%)	42.74	42.29	43.40	41.03	39.40	4.71 ^{NS}
Weight of organs expressed as percentage of slaughter weight						
Head (%)	8.91	7.28	8.49	9.25	8.68	0.99 ^{NS}
Shoulder (%)	18.13 ^a	15.09 ^b	17.35 ^a	17.35 ^a	18.30 ^a	1.13*
Back (%)	5.19	5.39	5.98	6.62	5.93	0.89 ^{NS}
Loin (%)	14.96 ^a	12.81 ^{ab}	12.82 ^{ab}	12.15 ^b	11.95 ^b	1.81*
Thigh (%)	13.49	11.42	12.39	13.44	12.70	1.46 ^{NS}
Heart (%)	0.24	0.20	0.29	0.25	0.18	0.02 ^{NS}
Liver (%)	3.62	3.17	3.52	3.21	2.76	0.31 ^{NS}
Kidney (%)	0.75	0.79	0.78	0.80	0.69	0.10 ^{NS}
Lungs (%)	0.56 ^b	0.73 ^a	0.57 ^{ab}	0.72 ^{ab}	0.45 ^b	0.12*
Abdominal Fat (%)	2.64	1.76	1.45	2.12	1.49	0.62 ^{NS}
Tail (%)	0.24 ^c	0.20 ^d	0.23 ^{cd}	0.29 ^b	0.34 ^a	0.03*
Skin (%)	6.49	7.19	6.46	6.85	7.04	0.80 ^{NS}
Feet (%)	1.92	2.11	1.98	1.97	2.13	0.36 ^{NS}

a,b,c = Means on the same row with different superscripts differ significantly (0.05). SEM = Standard Error of Means., NS = Not significant ($p > 0.05$), * = significant ($p < 0.05$).

CONCLUSION AND RECOMMENDATIONS

Results obtained in the study revealed that loin and abdominal fat reduces with increasing level of Moringa. More research should be carried out with different breeds of rabbits to perfect the feeding of MOLM to rabbits in the tropics.

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