The Economic Potential of Compounding Rabbit Diets with Graded Levels of *Moringa oleifera* Leaf Meal

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ABSTRACT

The economics of raising rabbits using Moringa oleifera Leaf Meal (MoLM) supplemented diets was experimented in this study that lasted for 56 days. A total of twenty four, 2-3 months old weaned rabbits of mixed sexes with an average initial weight of 1.00kg – 1.18kg were randomly allocated to four diets which were formulated with Moringa oleifera leaf meal (MoLM) replacing soybean meal at 0% (control), 5%, 10% and 15% designated as T1, T2, T3 and T4 respectively. The animals were randomly distributed into 3 replicates comprising 2 rabbits per replicate using Completely Randmonised Block Design (CRBD). The results obtained show among many others that significant differences existed in weight gain, feed intake, feed conversion ratio, cost of feed (kg), cost of weight gain, production cost (TVC) and net benefit. It also reveals that MoLM can conveniently replace up to 15% of expensive sources of protein in rabbit diet without compromising performance and favouring production cost positively. Hence, rabbit farmers are encouraged to patronize the use of MoLM as feed source for their rabbits.
Keywords: *Cost benefit ratio, feed convers leaf meal, Moringa oleifera, rabbit*

INTRODUCTION

The recent global escalation of food crisis call for sober reflection, owing to the fact that the world is facing a worsening food crises period unseen in the last 30 years that has a potential of leading to a catastrophe. Nigeria's population growth rate of over 3% per annum far outstrips the less than 2% annual growth in food production. Whereas her population increased in an annual rate of between 3% and 3.32%, total food production rose by no more than an average of 1.5% per annum between 1983 and 1990 (World Bank, 1988, 1995) and 1.03% per annum between 1990 and 2000 (CBN, 2002). The strong correlation that has been established between Nigeria's total GDP and the agriculture GDP suggests that the prospects of the non-oil sub-sector and the overall economy are closely tied to the performance of the agricultural sector (Eboh, 2005). Therefore, one serious challenge facing the country today is the attainment of substantial increase in the domestic animal supply to mitigate the deficiency in animal protein availability in the menu of the citizens. The major problem of development and expansion of livestock industries in developing countries are the reduced supply, high demand and high prohibitive cost of feeds and feed stuffs especially protein source (Solomon, Sadiku and Tiamiyu, 2007; Owen, Amakiri and Ezeano, 2010). The ever increasing cost of livestock feeds with the attendant increase in the cost of animal products such as meat, eggs and milk shows that there is the need to explore the use of non-conventional feed ingredients in the feeding of domestic animal (Alawa and Umunna, 1993; Ani and Omeje 2007; Owen *et al.*, 2009a).

The non-conventional feed ingredient being explored in this study is *Moringa oleifera* leaf meal (MoLM). In recent times, there has been an immense attention on *Moringa oleifera* with great advocacy for its use, both in the area of nutrition and medicine. All *moringa* species are native of India, from where they have been introduced into many tropical countries including Nigeria and most of the common species are *Moringa olefera* (Tsaknis *et al.*, 1999). Before the adoption of a given feed/food resources in livestock feeding, evaluator test for its composition, nutritional, economic values and health implications are essential to permit credible enlightenment programmes with regards to its quality and use (Aletor, Oguntokun and Aletor, 2002; Owen et al., 2008a; Owen et al. 2008b; Owen, Amakiri, David, Nyeche and Ndor , 2009b; Owen, Amakiri and Ezeano, 2010). This study is therefore carried out to investigate the economic potential of *Moringa oleifera* leaf meal (MoLM) as feed ingredient using rabbit as a subject.

MATERIALS AND METHOD

This study is carried out at the Rabbitry section of the Rivers State University of Science and Technology, Teaching and Research Farm in Port Harcourt, South-South of Nigeria. A total of twenty four, 2-3 months old weaned rabbits of mixed sexes with an average initial weight of 1.00kg – 1.18kg were randomly allocated to four diets which were formulated with *Moringa oleifera* leaf meal (MoLM) replacing soybean meal at 0% (control), 5%, 10% and 15% designated as T1, T2, T3 and T4 respectively. The animals were randomly distributed into 3 replicates comprising of 2 rabbits per replicate using Completely Randmonised Block Design (CRBD) in an experiment that lasted for 56 days. The fresh young *Moringa* leaves were harvested from Songhai farm at Bunu Tai in Tai Local Government Area in Rivers State. The leaves were removed from the stems and air dried for 14 days in the Animal Science Laboratory, Rivers State University of Science and Technology until they were completely dried. They were then milled to form *Moringa oleifera* Leaf Meal (MoLM) before being used to formulate experimental diets that constituted the following:

Treatment 1 (0% MoLM) 17.04% CP; 2658.48 ME kcal/kg
Treatment 2 (5% MoLM) 16.90% CP; 2641.03 ME kcal/kg
Treatment 3 (10% MoLM) 16.76% CP; 2622.53 ME kcal/kg
Treatment 4 (15% MoLM) 16.62% CP; 2606.15 ME kcal/kg

Feed and water were given *ad libitum*. Weekly body weight of the rabbits were taken while feed intake was obtained by subtracting the amount of left over feed from that offered on daily basis. Routine management practices and vaccinations were maintained throughout the study duration. Records taken include daily feed intake, weekly body measurements and mortality. On the termination of the study, these records were used to evaluate economic indices such as cost/kg feed, cost of total feed consumed/rabbit, cost/kg weight gain, net benefit, relative cost, cost benefit ratio, cost of feeding and cost reduction in relation to the Total Variable Cost (TVC).

The cost/kg feed was obtained by adding the cost of procuring the various feed ingredients in a particular treatment and dividing with the total feed consumed in various treatment groups. Cost of total feed consumed was calculated by multiplying total feed consumed in each treatment with the cost/kg feed. The cost/kg weight gain was obtained by multiplying the cost/kg feed with feed conversion ratio (feed : gain). The net benefit or profit index was obtained as:

$$R - PC$$

Where:

R = Revenue

PC = Production cost.

Relative Cost (RC) was obtained by dividing the cost of each trial feed with that of the control and multiplied by 100. The cost benefit ratio was obtained by dividing the net benefit by the revenue while cost of feeding was obtained by dividing cost of total feed consumed by cost of production multiplied by 100. Percentage cost reduction was obtained by subtracting the cost of each test feed from the control. All calculations involving costs were based on variable cost since housing, equipment and labour were provided on farm. The data collected were subjected to Analysis of Variance (ANOVA) (Steel and Torrie, 1980) and treatment means were separated using Duncans Multiple Range Test (DMRT) as modified by Gomez K. and Gomez A. (1984).

RESULTS AND DISCUSSION

This study show that numerical differences exist in relative cost, cost benefit ratio, percentage cost of feed and cost of reduction. The results show that T2 (5% MoLM) performed best when compared to other treated groups and the control. The result also showed that the cost of feeding decreased as the level of inclusion increased as against the control. The cost for feeding the control group accounted for 28.08% while those placed on 5%, 10% and 15% MoLM inclusion levels accounted for 26.07%, 27.47% and 26.62% respectively. Inclusion of MoLM in the diets resulted in a significant decrease in the cost per kg of feed. The cost per kg feed for

Treatments 1, 2, 3 and 4 were 89.43kg, 85.33kg, 88.07kg and 86.68kg respectively. It was found that diet 2 had the lowest cost per kg feed while Treatment 1 (control) with 0% MoLM had the highest cost per kg feed. The results show the economics of production of rabbits using *Moringa oleifera* Leaf Meal (MoLM) as shown on table 1. The table shows that significant differences exist in weight gain, feed intake, feed conversion ratio, cost of feed (kg), cost of weight gain, production cost (TVC) and net benefit. It also shows that numerical differences exist in relative cost, cost benefit ratio, percentage cost of feed and cost of reduction.

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It was found that diet 2 had the lowest cost per kg feed while Treatment 1 (control) with 0% MoLM had the highest cost per kg feed. This is due to the cost of MoLM when compared to soybean meal in the diets as at the time of this study and this has a lot of cost implications in the use of these diets. This shows that MoLM could be a good leaf protein source and it is in line with the findings of Amaefule and Obioha (2005) who used pigeon pea seed meal an unconventional feed ingredient to replace soybean in pullet diets and it is in complete agreement with the results obtained by Owen, Amakiri and Ezeano (2010) who used *Vernonia amygdalina* (bitter leaf meal) to replace soybean meal in broiler diets and obtained positive economic results.

The rabbit on the control group had the highest cost per kg weight gain (N2343.07) and treated groups had N1429.28, N1893.51 and N1941.63 for Treatments 2, 3 and 4 respectively. Weight gain is an important production index. Using the figures of N2343.07 and N1429.28 per kg of gain for the control (0% MoLM) and 5% MoLM supplemented diet, one could see a tremendous opportunity to reduce input cost while maintaining higher weight gain. The results obtained from this study further show that the use of MoLM as feed substitute reduced costs. This is in agreement with the findings of Owen *et al.*, (2008c), who used poultry litter another unconventional feed ingredient in rabbit diets and reported better performance in rabbits fed poultry litter. Maynard, Loosli, Hints and Warner, (1979); Owen, Amakiri, Ngodigha and Chukwuigwe (2008c); Owen, Amakiri and Ezeano (2010) stress that an essential practical consideration in evaluating a ration for farm animals is its cost in terms of returns obtained for the products. The cost of feeding as observed for the control group in this study was 28.08% to give a net benefit of N414.23. The rabbit in 5% used 26.07% cost of production as feed to produce a net benefit of N470.96. The inclusion of MoLM at 5%, 10% and 15% levels would cost 26.07, 27.47% and 26.62% respectively of the concentrate in the feed mixture. In other words, MoLM – mixed concentrate feed cost less than the cost of conventional concentrate feed presently available in the market. Since profit is a single index determining the economic value of keeping bird (Coelho, 1996; Olomu, 1995; Owen *et al*., 2010), and rabbit (Owen *et al*., 2008c), the profitability index in this study varied among treatments but it is more profitable to feed any of the MoLM treated groups than the un-supplemented groups. These results show that the level of profit in any animal production enterprise depends largely on the cost of stock, level of test ingredients used, time of feeding trial, price of feed ingredients and the demand for the animal products among others. Considering all these factors, profitability index may therefore vary from location to location, season to season as dictated by demand of consumers for rabbit meat.

Table 1: Economics of Production of Rabbits using Moringa oleifera Leaf Meal (MoLM)

	Treatments				
Parameters	**1**	**2**	**3**	**4**	**SEM**
Mean initial weight (kg)	$1,10^{b}$	1.08^{bc}	1.18^{a}	1.00^{c}	0.07
Mean final body weight (kg)	1.35^{b}	1.45^{a}	1.48^{a}	1.28^{c}	0.06
Mean weight gain (kg)	0.25^{c}	0.37^{a}	0.30^{ab}	0.28^{b}	0.01
Total feed consumed (kg)	6.55^{a}	6.20^{b}	6.45^{a}	6.28^{a}	0.07
Feed conversion ratio (feed: gain)	26.20^{a}	16.75^{c}	21.50^{b}	22.40^{b}	0.08
Cost/kg feed (N)	89.43^{a}	85.33^{b}	88.07^{a}	86.68^{b}	0.50
Cost of total feed consumed (N)	585.77^{a}	529.05^{d}	568.05^{b}	544.35^{c}	0.04
Cost/Kg weight gain (N)	2343.07^{a}	1429.28^{c}	1893.51^{b}	1941.63^{b}	0.50
Cost/rabbit (N)	1500	1500	1500	1500	
Production cost (TVC) (N)	2085.77^{a}	2029.04^{c}	2068.05^{b}	2044.35^{b}	10.00
Revenue (N)	2500.00	2500.00	2500.00	2500.00	
Net benefit (N)	414.23^{d}	470.96^{a}	431.95^{c}	455.65^{b}	0.80
Relative cost(%)	100.00	90.32	96.97	92.93	
Cost of benefit ratio	0.17	0.19	0.17	0.18	
Cost of feeding (%)	28.08	26.07	27.47	26.62	
Cost reduction (%)	0 2.01	0.61	1.46		
Mortality	0 0	0	0		

^{abcd} *within rows means with different superscripts differ significantly ($p<0.05$)*

Source: Experimentation, 2012

CONCLUSION

This study was necessitated by the deficit of conventional feed resources for animals which has culminated to the hike in their prices leading to soaring cost of livestock products. This has catapulted the search for unconventional feed stuffs that has played little or no role in animal feed industry. The economics of raising rabbits using *Moringa oleifera* Leaf Meal (MoLM) supplemented diets were evaluated in a study that lasted for 56 days. The study revealed that MoLM can conveniently replace up to 15% of expensive sources of protein without compromising performance and favouring production cost positively. Hence, rabbit farmers are encouraged to patronize the use of MoLM as feed source for their rabbits.

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