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EFFECT OF AIR-DRIED MUCUNA (*Mucuna pruriens*) LEAF MEAL IN THE DIETS OF GROWER RABBIT BUCKS ON THE PERFORMANCE, NUTRIENT DIGESTIBILITY AND ECONOMIC COST OF PRODUCTION

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ABSTRACT

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*A twelve week feeding trial was conducted to investigate the effect of air-dried mucuna (*Mucuna pruriens*) leaf meal (MLM) in the diets of grower rabbit bucks. Mucuna leaf meal was included at 0%, 5%, 10%, 15% and 20% for T₁, T₂, T₃, T₄ and T₅ respectively. Thirty grower rabbits bucks were assigned to five experimental dietary treatments denoted T₁, T₂, T₃, T₄ and T₅ respectively in a completely Randomized Design (CRD). Each treatment had six rabbits with each serving as a replicate. Results of performance showed that there were no significant differences in final body weight, daily weight gain, daily feed and protein intake. Protein efficiency ratio and feed conversion ratio were significantly higher at T₁. Nutrient digestibility by rabbit indicates significant different ($p < 0.05$) in ether extract (EE), crude fibre (CF), and crude protein (CP). EE and CF were significantly higher at T₄, and CP was highest at T₁. There was no significant difference ($P > 0.05$) in NFE across the treatments. There was also no significant difference ($P > 0.05$) for cost per kg gain. Cost of feed consumed, total cost and percentage feed cost were significantly higher ($P < 0.05$) at T₁, T₂, and T₃. Percentage drug cost was significantly better ($P < 0.05$) at T₄ and T₅, percentage cage cost and animal were statistically depressed ($P < 0.05$) at T₁, T₂ and T₃ and highest at T₅. It was concluded that mucuna (*Mucuna pruriens*) leaf meal has potentials as a valuable unconventional leguminous feedstuff. The use of mucuna pruriens leaf meal in the diets of rabbit bucks promoted growth best at 5% and thus carcass yield. Rabbit farmer can incorporate mucuna pruriens leaf meal at 5% for growth performance.*

Key words: *mucuna, rabbit bucks, performance, nutrient digestibility and economic of production*

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INTRODUCTION

Small-livestock such as rabbits have advantages of fast growth, large litter size, and short generation interval and good quality consumable and non-consumable animal products, but are faced with the challenge of feedstuff availability and affordability. In Nigeria today, the cost of feeding livestock intensively is over 70%²⁴. Based on their findings, unconventional feedstuffs could play a vital role in alleviating this enormous challenge posed by intensive feeding in livestock production, because they are mostly cost-free and are readily available.

38 The cost of feeding rabbits is high, a condition that also prevails for other Nigerian livestock
39 species ¹. Less developed countries, like Nigeria, are facing serious competition between human
40 and livestock (especially, the monogastric animals) for available conventional feedstuffs ³⁰. This
41 increased competition for available conventional feeds and scarcity of food have both
42 encouraged nutritionists, scientists and agriculturists to research into the use of unconventional
43 feedstuffs that are cheap, readily available and are possible substitute for more expensive protein
44 sources (groundnut cake and soybean meal) and energy sources such as maize ²².

45 Forages offer a considerable potential as major source of energy, protein, minerals and vitamins
46 for herbivorous animals and are readily available ¹⁹. Forages not only serve as a source of fibre
47 for rabbit, they are essential for normal functioning of the gut health and mobility; caecotrophy
48 and appetite stimulation ⁹.

49

50 *Mucuna pruriens*, widely known as “velvet bean,” is a vigorous annual climbing legume
51 originally from Southern China and eastern India, where it is at one time widely cultivated as a
52 green crop ¹⁰. It is one of the most popular green crops currently known in the tropics. Velvet
53 beans have great potential as both food and feed as suggested by experiences worldwide. The
54 velvet beans has been traditionally used as a food source by certain ethnic groups in a number of
55 countries. It is cultivated in Asia, America, Africa, and Pacific Islands, where its pods are used as
56 a vegetable for human consumption, and its young leaves are used for animal folder.

57

58 *Mucuna utilis* (velvet bean), a tropics legume, is little known and has a low human preference as
59 an energy/protein source but high preferences in livestock feed ¹¹. It is comparable to soya bean
60 in terms of amino acid and mineral profile ¹⁷. However, the use of velvet beans as a source of
61 protein for monogastrics is limited by the presence of antinutritional factors like trypsin
62 inhibitors, haemagglutinins, phytic acids, hydrocyanic acid and tannins ¹².

63

64 Little has been reported on the use of mucuna leaves in the diets of rabbits. Therefore, mucuna
65 leaf meal, a potential feedstuff, could play a vital role in livestock production, hence, its effect on
66 the performance of growing rabbit bucks was investigated in this study.

67

68 **MATERIALS AND METHODS**

69 **Site**

70 The study was conducted at the Rabbitry Unit of the Livestock Teaching and Research Farm,
71 University of Agriculture, Makurdi, Benue State. Makurdi lies between Latitude 7⁰44'N and
72 longitude 8⁰21'E in the Southern Guinea savanna Zone, Benue State. The area has an annual
73 rainfall of 6-7 months in duration (i.e. March – October) and ranging from 508 to 1016 mm with
74 a minimum temperature range of 24.20 +1.4⁰C and maximum temperature range of 36.33
75 +3.70⁰C, respectively. The relative humidity ranges between 39.50 + 2.20% and 64.00 +
76 4.80% ²⁹

77 **Processing of Mucuna Leaf Meal and Diet Preparation**

78 Mucuna leaves were sourced from within Makurdi metropolis at the back of Rabbitry Unit of the
79 Livestock Teaching and Research Farm, University of Agriculture, Makurdi, Benue State. The
80 leaves were harvested from the wild, such that yellow leaves were discarded, leaving the
81 greenish leaves for use. Harvested leaves were air-dried, turned frequently to enhance uniform
82 drying until the material became crispy. Air-dried mucuna leaves were milled using a roller
83 miller to obtain mucuna leaf meal (MLM) which was subjected to proximate analysis ⁵ and the
84 proximate composition determined. Five iso-caloric and iso-nitrogenous experimental diets were
85 formulated which contained 0%, 5%, 10%, 15%, and 20% mucuna leaf meal and 0%MLM
86 served as the control diet (Table 1).

87 88 **Experimental Design**

89 The experimental design was completely randomized design (CRD). Thirty rabbits were grouped
90 into five with each group containing six animals and replicated six times; each animal serving as
91 a replicate. The treatment groups were balanced of their weights and randomly exposed to the
92 five dietary treatments.

93 **Experimental Animals and Management**

94 Thirty healthy grower rabbit bucks of about four to five (4-5) weeks of age were purchased from
95 farms within Makurdi metropolis for the study. Before the arrival of the rabbits, the cages,
96 feeders and drinkers were properly cleaned and disinfected using izal. On arrival, the rabbits
97 were housed individually in 40 x 60 x 40 cm³ cages having wire mesh floor, 1m above the
98 ground and acclimatized for 10 days. Standard rabbit husbandry practices including medications,
99 recommended sanitary space measures and other health practices were strictly observed

100 throughout the experimental period ¹⁵. The animals were served feed and water ad-libitum daily
101 for 84 days

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104 **Table 1. Feed Composition of Grower Rabbits Diets Containing mucuna leaf meal (MLM)**

| Ingredients | Experimental Diets | | | | |
|-------------------|------------------------|------------------------|-------------------------|-------------------------|-------------------------|
| | T ₁ (0%MLM) | T ₂ (5%MLM) | T ₃ (10%MLM) | T ₄ (15%MLM) | T ₅ (20%MLM) |
| Maize | 38 | 38 | 37 | 34 | 33 |
| Maize offal | 12.15 | 10.15 | 7.15 | 8.15 | 8.15 |
| Brewer dry grain | 10 | 10 | 10 | 10 | 10 |
| Soya bean meal | 16 | 12 | 12 | 9 | 7 |
| Rice offal | 19 | 19 | 19 | 19 | 17 |
| Mucuna leaf meal | 0 | 5 | 10 | 15 | 20 |
| Blood | 2 | 3 | 3 | 2 | 2 |
| Bone ash | 2 | 2 | 2 | 2 | 2 |
| Salt | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 |
| Lysine | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Methionine | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| Premix | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| Total | 100 | 100 | 100 | 100 | 100 |
| Calculated | Analysis (%) | | | | |
| Crude protein | 17.23 | 17.25 | 17.33 | 17.10 | 17.29 |
| Crude fibre | 13.02 | 13.17 | 13.38 | 13.81 | 13.45 |
| ME (Kcal/kg) | 2560.41 | 2570.24 | 2580.00 | 2567.76 | 2587.01 |
| Ether extract | 2.2 | 2.30 | 2.46 | 2.53 | 2.66 |
| Calcium | 1.2 | 1.22 | 1.21 | 1.20 | 1.16 |
| Phosphorus | 0.8 | 0.84 | 0.82 | 0.80 | 0.76 |
| Methionine | 0.25 | 0.23 | 0.22 | 0.21 | 0.19 |
| Lysine | 1.56 | 1.21 | 1.21 | 1.37 | 1.32 |

105 MLM= mucuna leaf meal, ME= metabolizable energy, T1-5= treatment 1,2,3,4 and 5.

106 **Table 2: Proximate composition of Experimental Diets (Analysed)**

| Constituents | T₁ | T₂ | T₃ | T₄ | T₅ |
|---------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Moisture | 11.88 | 11.97 | 11.77 | 10.89 | 12.00 |
| Ash | 9.50 | 5.42 | 10.14 | 17.47 | 7.79 |
| Ether extract | 5.18 | 5.52 | 6.39 | 6.87 | 6.24 |
| Fibre | 12.81 | 15.01 | 11.19 | 20.80 | 15.41 |
| Protein | 16.94 | 16.39 | 15.42 | 18.56 | 18.23 |
| NFE | 43.60 | 45.69 | 45.12 | 25.43 | 40.34 |

107 NFE=Nitrogen Free Extract, T₁= 0%MLM, T₂= 5%MLM, T₃= 10%MLM, T₄= 15%MLM, and
 108 T₅= 20%MLM, %= percentage, MLM= Mucuna leaf meal

109 **Proximate Composition**

110 Proximate composition of mucuna leaf meal, treatment diets as well as fecal samples collected
 111 during digestibility trial were determined using the standard methods⁵ of Purity Laboratory Jos,
 112 Plateau State.

113
 114 **Fibre Fraction**

115 Fibre fraction of mucuna leaf meal was determined at Animal Nutrition laboratory Department
 116 of Animal Nutrition, Federal University of Agriculture, Abeokuta, Ogun State.

117
 118 **Growth Performance Indices**

119 Feed intake (FI): a known quantity of feed offered (FO) to each rabbit and the leftover feed
 120 (LOF) at the end of every week were weighed and the feed consumed was calculated by
 121 difference. That is, $FI = FO - LOF$

122 Body weight gain (BWG): Individual rabbits were weighed at the commencement of the trial,
 123 weekly thereafter, and at the end of the feeding trial. Total weight gain was obtained by
 124 difference between final live body weight (FW) and initial body weight (IW). That is, $FW - IW$.

125 Daily weight gain was determined as the total weight gain divided the number of the days the
 126 experiment lasted.

127 Feed Conversion Ratio (FCR): This is a measure of an animal's efficiency in converting feed
128 into desired output. It was calculated as the ratio of feed intake to body weight gain

129
130
$$FCR = \frac{FI}{BWG} \dots\dots\dots (1)$$

131
132 Protein Intake (PI) was calculated as follows; FI × % crude protein in feed.

133 Protein Efficiency Ratio (PER); this expresses numerically the growth promoting value of
134 protein, it involves using the weight of protein intake in a test diet to divide the weight gain by
135 the animal on the test diet. It was calculated as follows;

136
$$PER = \frac{BWG}{PI} \dots\dots\dots (2)$$

137 **Digestibility Trial**

138 At the end of the 11th week of the feeding trial, three (3) rabbits, with live weights closed to their
139 treatment average were selected from each treatment and used for the digestibility trial. Faecal
140 collection lasted for five (5) days. During this period, nylon net were tied under individual rabbit
141 cages for daily faecal collection. Before the commencement of faecal collection, the rabbits were
142 deprived of feed for 18 hours to ensure that faecal collection corresponded to the feed offered.
143 The fresh collected faeces were weighed and oven dried at 80⁰C for 24 hours, the oven-dried
144 faeces per replicate was also weighed. At the end of the digestibility study, collected faeces from
145 each replicate were bulked, thoroughly mixed together and milled. Samples of the milled faeces
146 were stored in air tight containers for proximate analysis. Also sample of feed from each
147 treatment were taken for proximate analysis. Proximate composition was determined as outlined
148 by ⁵

149
150 Digestibility coefficients were calculated using the following equation by ²⁰.

151
$$\text{Apparent digestibility} = \frac{\text{Nutrient in feed} - \text{Nutrient in faeces}}{\text{Nutrient in feed}} \times 100 \dots\dots\dots (3)$$

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156 **Economics of production**

157 The cost of feed ingredients and other services such as transportation and processing (milling of
158 mucuna leaf) were used to get the actual cost of each ingredient during the study. The
159 formulation for each diet was used to determine the cost of feed by multiplying unit cost (₦) of
160 each ingredient by its proportion in the diet to determine its cost contribution to the diet. The sum
161 of all the cost contribution from all the ingredients that made up each diet gave the units cost of
162 (₦) diet. Value of rabbit per kg multiply by the final weight (kg) were used to get revenue.
163 Benefit per rabbit was gotten by subtracting total cost of production from revenue. Cost benefit
164 ratio was calculated by dividing total cost of production by benefits per rabbit. Feed cost divided
165 by total cost multiplied by one hundred gives percentage feed cost. Percentage drug cost equals
166 to drug cost divided by total cost multiplied by one hundred. Cage cost divided by total cost
167 multiplied by one hundred equals to percentage cage cost and percentage animal cost was
168 determine as cost of animal divided by total cost multiplied by one hundred.

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170 **Statistical Analysis**

171 All the data generated were subjected to the analysis of variance (ANOVA) using Statistical
172 Software (SPSS version 16) and significant differences were separated using its Duncan New
173 Multiple Range Test ⁽²⁸⁾.

174

175

176 **RESULTS**177 **Table 3:** Proximate composition and fibre fraction of mucuna leaf meal (MLM)

| Composition | Percentages (%) |
|-----------------------------|------------------------|
| Dry matter | 88.97 |
| Ash | 10.25 |
| Ether extract | 4.91 |
| Crude fibre | 26.54 |
| Crude protein | 26.09 |
| Nitrogen free extract (NFE) | 21.18 |
| Fraction | % |
| Cellulose | 22 |
| Hemicellulose | 38 |
| Neutral detergent fibre | 49 |
| Acid detergent fibre | 33 |
| Acid detergent lignin | 11 |

178

179 Table 3 shows proximate composition and fibre fraction of mucuna leaf meal (MLM). The value
180 11.03 for moisture in this study is lower than 12.50%¹³ but similar to 11.37%³¹. The crude
181 protein of 26.09% recorded for MLM was higher than the values of 22.94%¹³ but lower than
182 31.91% by³¹. The value of 4.91% ether extract in MLM was lower than 8.50%¹⁴ and¹³. Crude
183 fibre (26.54%) obtained is higher than 12.50% and 14.80%³¹. Ash 10.25% obtained in this study
184 was higher than 5.80% recorded by¹⁶. NFE (21.18%) recorded in this study was lower than
185 47.51%¹⁴. From the results and reports, it is noted that differences exist among report with
186 composition and these differences could be attributed to variations in processing method and
187 varieties. However, on average, the best material (MLM) is a fibrous protein source.

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191 **Fibre Fraction of Mucuna Leaf Meal**

192 The fibre fractions are presented in table 3. Higher cellulose and acid detergent lignin (ADL)
193 lead to low degradation by the microbes. Higher percentages of hemicellulose, neutral detergent
194 fibre (NDF) and acid detergent fibre (ADF) indicates high nutrient degradation by microbes
195 which shows that mucuna leaf meal is saved for rabbit. The value of NDF 49% in this present
196 study is higher than 43% reported by ⁴, 33% ADF in this research is lower compare to 38% as
197 quoted by ⁴. The value for ADL in this work is higher than 7.1% as reported by the earlier
198 author.

199

200 **Table 4: Growth Performance of Rabbit Bucks Fed Diets containing Different levels of Mucuna Leaf Meal (MLM)**

| Parameters | Experimental Diets | | | | | SEM | P-value |
|--------------------------|------------------------|------------------------|-------------------------|-------------------------|-------------------------|-------------------|---------|
| | T ₁ (0%MLM) | T ₂ (5%MLM) | T ₃ (10%MLM) | T ₄ (15%MLM) | T ₅ (20%MLM) | | |
| Final Weight (g) | 1719.0 | 1645.8 | 1583.7 | 1459.2 | 1467.0 | 155.51 | .062 |
| Total Weight Gain (g) | 1263.0 | 1143.6 | 1095.8 | 978.83 | 983.00 | 171.95 | .083 |
| Daily Weight Gain (g) | 15.04 | 13.05 | 13.05 | 11.59 | 11.73 | 2.03 | .073 |
| Total Feed Intake (g) | 5201.50 | 5737.40 | 5464.33 | 5336.67 | 5364.33 | 516.94 | .590 |
| Daily Feed Intake (g) | 62.67 | 69.13 | 65.83 | 64.28 | 64.63 | 6.23 | .589 |
| Protein Intake (g) | 10.79 | 11.92 | 11.41 | 10.99 | 11.18 | 1.07 | .542 |
| Protein Efficiency Ratio | 1.39 ^a | 1.09 ^b | 1.14 ^b | 1.05 ^b | 1.05 ^b | 0.12 [*] | .023 |
| Feed Conversion Ratio | 4.17 ^b | 5.04 ^{ab} | 5.09 ^{ab} | 5.76 ^a | 5.60 ^a | 0.72 [*] | .023 |
| Mortality Rate (%) | 33.3 | 16.67 | 0.00 | 0.00 | 0.00 | — | — |

201

Means on the same row with different superscript are significantly different (P<0.05), SEM= Standard error of mean, *=significant, T₁ =

0%MLM, T₂ = 5%MLM, T₃ = 10%MLM, T₄ = 15%MLM, T₅ = 20%ML

204 Table 4 contained growth performance of rabbit bucks fed diets containing mucuna leaf meal
205 (MLM). There were no significant differences in the final body weight (FBW), daily weight gain
206 (DWG), daily feed intake (DFI), and protein intake. Animals on T₁ (controlled diet) had the highest
207 FBW (1719.0g) and lowest in T₄ (1459.2g). The daily weight gain of 11.59-15.04g per rabbit per
208 day were lower than 17.65-18.57g/day³ and 18.00-20.00g², but was higher than 4.94-14.80g/day⁸
209 and 8.70-9.91 g/day¹⁸ who fed rabbits on different levels of groundnut haulms. The average daily
210 weight gain was better at T₁ (0% MLM), T₂ and T₃ but decreased numerically at T₄ and T₅ which
211 had the lowest figures. This implied that mucuna leaf meal had some growth suppressing effect in
212 the diets of rabbits on the weight gain. The quantity of feed consumed per rabbit per day observed
213 in this study was however quite higher than 48.83 – 52.13 g²⁵, 44.73 to 57.90 g²¹ but lower than
214 77.64 – 87.59 g and 63.89 -82.46 g⁶. Similarities (p>0.05) observed in feed intake suggest that all
215 the diets were palatable and thus accepted by the rabbits as the inclusion of MLM at varying levels
216 did not depressed feed consumption. There were no significant differences (P<0.05) in protein
217 intake and the values ranged from 10.79 to 11.92g.

218
219 Significant differences (P<0.05) occurred in the feed conversion ratio and protein efficiency ratio.
220 The values of feed conversion ratio and protein efficiency ratio obtained in this study showed that
221 the control diet (T₁) was better. The significant difference between the control (T₁), T₄ and T₅
222 indicate a decline in absorption with the level of mucuna in the body beyond 10%. This has also
223 manifested in the final weight. Though the final weight is statistically seminar on analysis of
224 variance, the trendy decrease in final weight clearly shows that it is not a chance occurrence but diet
225 effect. The mortality rate in T₁ occurred due to injury sustained by the animal and diet effect, we
226 loss two out of six rabbits

227

228 **Table 5: Digestibility of Rabbit Bucks fed Diets containing different levels of Mucuna Leaf**
 229 **Meal (MLM)**

| Parameters | Experimental Diets | | | | | SEM | P-value |
|---------------|--------------------|--------------------|--------------------|--------------------|--------------------|-------|---------|
| | T ₁ | T ₂ | T ₃ | T ₄ | T ₅ | | |
| Ether extract | 67.83 ^c | 63.50 ^c | 73.13 ^b | 75.37 ^a | 61.71 ^c | 5.25* | .039 |
| Crude Fibre | 27.03 ^b | 21.68 ^b | 10.33 ^b | 56.16 ^a | 21.44 ^b | 8.97* | .001 |
| Crude Protein | 80.44 ^a | 72.77 ^b | 71.07 ^c | 78.82 ^b | 71.26 ^c | 4.11* | .049 |
| NFE | 80.23 | 79.31 | 80.49 | 75.66 | 76.12 | 5.46 | .715 |

230
 231 abc Means on the same row with different superscript are significantly different (P<0.05), SEM=
 232 Standard error of mean, T₁ = 0%MLM, T₂ = 5%MLM, T₃ = 10%MLM, T₄ = 15%MLM, T₅ =
 233 20%MLM, NFE= nitrogen free extract.

234
 235 Table 5 showed coefficient digestibility of nutrients by rabbit bucks fed diets containing different
 236 levels of mucuna leaf meal (MLM)
 237 There were significant (P<0.05) differences in nutrient digestibility by rabbit. Ether extract and
 238 crude fibre varied without pattern while crude protein varied first from 0 to 10%, became elevated
 239 at 15% and fell again at 20%. This was almost a trend of declined except 15% which cannot be
 240 explained. NFE was not significantly affected meaning that energy utilization was similar across the
 241 treatment. The coefficient of digestibility of crude protein which ranged from 71.07%-80.44%, was
 242 higher than 63.30 to 76.28%²³ but comparable with 70.56 to 81.31% and 72.25 to 82.88%²⁷ and ²⁶
 243 respectively. This suggested good availability of crude protein in the diet with MLM up to 20%
 244 inclusion levels. High values indicated efficient utilization of protein for tissue accretion while
 245 lower values are indications of poor crude protein utilization for tissue synthesis²⁶. The crude fibre
 246 digestibility was low in T₃ (10.33%) and high in T₄ (56.16%). Coefficient digestibility of crude
 247 fibre (10.33%-56.16%) was low compared to values 27.54 to 56.36²¹ and 71.00 to 82.29%²⁷

248 Ether extract ranged from 61.71% - 75.37 % and were lower than 71.12% - 78.43% as reported by
249 ²⁶. High digestibility value of ether extract in this study attests to the rabbit ability to utilize dietary
250 fat ²⁶.

251 The high digestibility of NFE represents the readily available carbohydrates. This could be an
252 indication that readily available carbohydrates were well utilized by the rabbits across the
253 treatments.

254 **Table 6: Economic cost of production of Rabbit Bucks fed Diets containing Mucuna Leaf Meal (MLM)**
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| Parameters | Experimental Diets | | | | | SEM | P-value |
|---------------------------|--------------------|----------------|----------------|----------------|----------------|--------|---------|
| | T ₁ | T ₂ | T ₃ | T ₄ | T ₅ | | |
| Cost of weaner rabbit (₦) | 1300 | 1300 | 1300 | 1300 | 1300 | - | - |
| Cost per Kg | 90.95 | 86.74 | 85.05 | 74.98 | 70.83 | - | - |
| Cost of feed consumed (₦) | 473.08 | 497.66 | 464.74 | 400.14 | 379.96 | 43.76* | .001 |
| Cost per kg gain | 379.23 | 437.17 | 432.90 | 431.51 | 396.77 | 55.29 | .399 |
| Total cost (₦) | 1853 | 1878 | 1845 | 1780 | 17600 | 43.76* | .001 |
| Revenue (₦) | 3438 | 3292 | 3167 | 2918 | 2934 | 311.02 | .062 |
| Benefit per Rabbit (₦) | 1585 | 1414 | 1323 | 1138 | 1173 | 282.09 | .125 |
| Cost Benefit ratio | 1.190 | 1.344 | 1.415 | 1.667 | 1.580 | 1.354 | .158 |
| % feed cost | 25.397 | 26.478 | 25.180 | 22.363 | 21.562 | 1.766* | .000 |
| % Drug cost | 8.108 | 7.992 | 8.132 | 8.427 | 8.527 | 0.189* | .000 |
| % Cage Cost | 1.193 | 1.720 | 1.192 | 1.225 | 1.258 | 0.031* | .000 |
| % Animal Cost | 66.307 | 63.921 | 65.100 | 67.421 | 68.200 | 1.059* | .000 |

256
 257 T₁ = 0%MLM, T₂ = 5%MLM, T₃ = 10%MLM, T₄ = 15%MLM, T₅ = 20%MLM, %= percentage, ₦361= \$1.
 258
 259

260 **Statistical analysis was run because apart from cost per kg that didn't have replicate and the cost of feed**
261 **were not analyzed, but the cost of feed consumed varied with each animal and the cost incurred on animal is**
262 **not the same and it has replicates therefore could be analyzed statistically based on the design which is CRD.**
263 **Revenue was calculated based on animal's weight (body weight gain) and the weight of the animals varied**
264 **accordingly and they are replicated too, this is applicable to cost per kg gain, total cost, benefit per rabbit,**
265 **cost benefit ratio, percentage feed cost, percentage drug cost, percentage cage cost and percentage animal**
266 **cost, therefore, economics of production can be analyzed statistically**

267 Table 6 economic of production of rabbit bucks fed different levels of mucuna leaf meal (MLM)

268 The result of economics of production in this feeding trial showed that cost/kg of the diet was higher in T₁ (₦90.95) and progressively
269 reduced to T₅ (₦70.83) as the level of MLM was increasing in the diets due to the minimal cost of MLM. The cost/kg of the diets,
270 agrees with the findings of ⁷ who observed that the cost/kg feed was reduced generally with increasing dietary yam peel meal. Cost per
271 kg gain, revenue, benefit per rabbit, and cost benefits ratio. However, the cost of feed consumed, total cost of production, percentage
272 feed cost, percentage drug cost, percentage cage cost and percentage animal cost were significantly different (P<0.05). Cost of feed
273 consumed, total cost of production and percentage feed cost were trendy, they were higher at T₁, T₂ and T₃ and declined at T₄ and T₅,
274 meaning the cost reduced as the test ingredient increased to 15 and 20% respectively and these were in agreement with the report of ⁷
275 who worked on Effects of Replacing Maize with Sun-Dried Yam Peel Meal on Growth Performance Carcass Characteristics and
276 Economics of Production of Meat Type Rabbit. The percentage drug cost, percentage cage cost and percentage animal does not follow
277 any particular trend and as such the variations cannot be attributed to the effect of MLM.

278 The significant differences observed in this study could be attributed to variations in the body weight gain of the animal, disease
279 infestations and different quantities of feed consumed among other things.

280 Base on the findings from this study, the following conclusions have been drawn:

281 This study has revealed that *Mucna pruriens* leaf meal has potentials as a valuable unconventional leguminous feedstuff.

282 The use of *Mucuna pruriens* leaf meal in the diets of rabbit bucks promoted growth best at 5% and thus carcass yield.

283 The economic analysis revealed that with MLM, benefit can be maximized at 20% level of inclusion and also it costs less to produce

284 1kg live weight of rabbit as level of MLM increased. Based on the results obtained from this study it could be recommended that:

285 Rabbit farmers can incorporate *Mucuna pruriens* leaf meal at 5% in the diets of rabbit bucks for growth performance.

286

287

288 **Ethical :**

289 As per international standard written ethical approval has been collected and preserved by the author(s).

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