Comparative Evaluation of Locally Formulated Feed and Three Commercial Feeds on the Growth Performance and Profitability of Broilers Production

Abstract: A study was conducted for the comparative evaluation of three commercially based feed and a locally formulated feed in order to determine the growth performance and profitability of broiler birds. Initially, a total of Two Hundred and Forty (240) birds -Day Old Chicks- were fed on the same commercially based starter ration under the same environmental condition for three consecutive weeks to serve as a brooding period. During this phase, the birds were randomly divided into four (4) treatments with each treatment further divided into 4 replications by Complete Randomised Design (CRD) of Fifteen (15) birds per replica. The treatments were labelled as T₁ (VF), T₂ (HF), T₃ (TF) and T₄ (Locally Formulated Feed). Proximate analyses of all the four feeds were run to determine the relative composition of parameters such as carbohydrate, crude fibre, Lipid, protein, etc. The average mean weight of the birds at the commencement of the study was ±430g as at the 3 weeks of brooding period. Consequently, the weight gain (g) were taken weekly and recorded for five consecutive. The result of the study indicates that the average weight gain in kilogramme (Kg) for T₁, T₂, T₃ and T₄ were 1.92, 1.69, 1.61 and 1.44 respectively. However the Feed cost in Naira (₦) per kg gain was 594.00, 505.92, 526.40 and 367.5 correspondingly for T₁, T₂, T₃ and T₄. This clearly indicates that although the three commercially based feeds are indisputably higher in terms of weight gain but their cost per kilogramme (Kg) is also on the escalation as compared with the Locally Formulated Feed whose cost per Kilogramme (Kg) is substantially lower even though it is also comparably lesser in terms of weight gain.

Keywords: Locally Formulated Feed and Three Commercial Feeds, Performance, Production.

INTRODUCTION

In Nigeria, poultry contributes significantly to the animal protein supply to the increasing populace. As a result of growing human population, there is high demand for poultry products (FAO, 2002). The advantage of poultry over other livestock is primarily due to the short and relatively quick turn over on investment and high quality protein products (Adeyemo et al., 2010). The contribution of broiler production is vital to the development of national economy through generating employment opportunity, additional income for household and improving the nutritional status of the people. It is one of the fastest growing sectors with bright future and plays a critical role in supplying nutritious food and creates the employment opportunity for educated unemployed youth. Broilers has shorter life cycle and its production requires less capital compared to other meat producing domestic animals.

Broiler chicken are raised for their palatable meat which has a high biological value than plant protein. Broiler production, apart from providing high quality animal protein, also generates quick return on investment and employment opportunities due to its short generation interval and general acceptability as there is no taboo against its production and consumption. According to Givens (2005), foods derives from animal products are important source of nutrients in human diets and play an increase role in the human nutrition in future. To increase protein intake in Nigeria, it therefore calls for urgent need to increase broiler production at both household and commercial holdings. Oluyemi and Robert (2000) and Isika et al., (2006) postulated that poultry was strategic in addressing animals’ protein intake shortage in human nutrition because of its high fecundity, fast growing rate, short generation interval and unparalleled competence in nutrient transformation to high quality animal protein. Broiler production involve the keeping of chicks of heavy meat breeds for the purpose of getting good quality meat products usually sold live or processed at ten to twelve weeks of age (Amos, 2006 ).
According to Akpodiete et al., (2001), feed alone account for 70-80% of total variable cost of intensive broiler production. This invariably has led to an increase in the cost of poultry production due to high price of poultry products which is getting out of reach of common man in most developing countries including Nigeria. The increasing cost of feed resource in livestock production have been identified as a serious impediment to meeting the demand for animal protein particularly in developing countries ( Adejinmi et al., 2000 ). This continually recurring challenging has compelled the search for alternatives to the expensive gain and protein concentrates (Adeyemi, 2005). This interest has result in animal nutritionist researching for alternatives that could help to reduce the cost of feeding without negatively impacting on the performance of the birds. Replacement of the expensive conventional feed ingredient with cheaper and available substitutes represent a suitable strategy at reducing feed cost and encouraging production.

**METHODOLOGY**

The experimental feeds were comprised of farm formulated feed from locally available ingredients (sorghum, wheat offal, groundnut cake, soya bean etc.) as Treatment 4 (T₄) and other three most commonly used commercial broiler feeds produce by different feed manufacturing companies in Nigeria. The commercial base feeds are labeled T₁ for (VFF), T₂ for (HFF) and T₃ for (TFF). Each experimental feed coded T₁, T₂, T₃, and T₄ respectively, was replicated three times in a complete randomized design (CRD).

In all, a total number of 240 birds were bought at day old chicks and fed on a commercial broiler starter feed of the same ration under the same management condition for a period of three consecutive weeks before the commencement of the experiment. The birds were randomly divided into four treatment groups and each group was further divided into four replications of fifteen (15) birds per replica as earlier stated.

The birds were then subjected to the same experimental management condition with the different finisher feeds treatments and water provided *ad-libitum*. This was sustained and it lasted for five weeks.

**Data Collection**

Data were collected on the initial body weight and final body weight. Weight gained at weekly interval and feed intake data were used to calculate feed conversion ratio (FCR). Feed cost per kilogram (Kg) was also calculated based on the prevailing market price of feed ingredients and commercial feeds, while the price of broilers based on weight were gotten after the experiment at prevailing market price for the determination of the cost and return of broiler production in Mai Idris Alooma Polytechnic, Geidam.

The following formulae were used for the calculation and analysis of the data obtained from the experiment;

**Experimental Parameters:**

1. **Specific Growth Rate (SGR)**
   \[
   SGR = \frac{\ln W_f - \ln W_i}{t}
   \]
   where;
   \[
   W_f = \text{final mean weight (g)}
   \]
   \[
   W_i = \text{initial mean weight (g)}
   \]
   \[
   t = \text{time interval}
   \]

2. **Food Conversion Ratio (FCR)**
   \[
   FCR = \frac{TFC}{TWG}
   \]
   Where;
   \[
   TFC = \text{Total Feed Consumed (g)}
   \]
   \[
   TWG = \text{Total Weight Gain by bird (g)}
   \]

3. **Survival Percentage Rate (SPR)**
   \[
   SPR = \frac{Nh}{Ns} \times 100
   \]
   Where;
   \[
   Nh = \text{Total number harvested.}
   \]
   \[
   Ns = \text{Total number stocked.}
   \]

4. **Gross margin (GM)**
   \[
   GM = TR - TVC
   \]
   Where;
   \[
   TR = \text{Total Revenue.}
   \]
   \[
   TVC = \text{Total Variable Cost}
   \]
Statistical analysis employing analysis of variance (ANOVA) was used to evaluate the significant difference in growth performance among the different feeds tested and the significant differences between the means.

### Table 1: Proximate Composition of Different Feed Used:

<table>
<thead>
<tr>
<th>Parameters</th>
<th>T&lt;sub&gt;1&lt;/sub&gt;</th>
<th>T&lt;sub&gt;2&lt;/sub&gt;</th>
<th>T&lt;sub&gt;3&lt;/sub&gt;</th>
<th>T&lt;sub&gt;4&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude protein</td>
<td>22.41%</td>
<td>18.90%</td>
<td>17.50%</td>
<td>19.76%</td>
</tr>
<tr>
<td>Moisture</td>
<td>6.90%</td>
<td>8.20%</td>
<td>8.50%</td>
<td>12.10%</td>
</tr>
<tr>
<td>Crude fiber</td>
<td>6.50%</td>
<td>14.50%</td>
<td>20.00%</td>
<td>16.50%</td>
</tr>
<tr>
<td>Fat</td>
<td>5.00%</td>
<td>5.00%</td>
<td>10.00%</td>
<td>3.50%</td>
</tr>
<tr>
<td>Ash</td>
<td>1.50%</td>
<td>2.00%</td>
<td>2.00%</td>
<td>1.00%</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>62.69%</td>
<td>56.40%</td>
<td>52.00%</td>
<td>47.64%</td>
</tr>
</tbody>
</table>

### RESULTS

The proximate analysis of the various treatments differed slightly in crude protein content, fiber and carbohydrate which showed T<sub>1</sub> contain higher protein content of 22.41% followed by T<sub>4</sub> 19.76%, T<sub>2</sub> 18.90% and T<sub>3</sub> 17.50% respectively. The crude fiber was also higher in T<sub>3</sub> (20.00%) followed by T<sub>4</sub> (16.50%) than those of T<sub>1</sub> (6.50%) and T<sub>2</sub> (14.50%) while highest carbohydrate percentage were observed in T1 (62.60%) and the lowest in T4 (47.64%).

The mean feed conversion ratio (FCR) in different treatments was 2.055 for T<sub>1</sub>, 2.030 for T<sub>2</sub>, 2.098 for T<sub>3</sub> and 2.033 for T<sub>4</sub>. The highest growth rate was recorded in T<sub>1</sub> and the lowest in T<sub>4</sub>. During the experiment the survival rate recorded was higher on T<sub>1</sub> followed by T<sub>2</sub> and T<sub>3</sub> respectively, while the lowest survival rate was observed in T<sub>4</sub>.

### Table 2: The Growth Performance of Broilers Fed on Three Different Commercial Based Feeds and Locally Formulated Feed at Finisher Phase.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>T&lt;sub&gt;1&lt;/sub&gt;</th>
<th>T&lt;sub&gt;2&lt;/sub&gt;</th>
<th>T&lt;sub&gt;3&lt;/sub&gt;</th>
<th>T&lt;sub&gt;4&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial weight (g)</td>
<td>430.12</td>
<td>430.05</td>
<td>430.11</td>
<td>430.30</td>
</tr>
<tr>
<td>Final weight (g)</td>
<td>2354.00&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2115.75&lt;sup&gt;b&lt;/sup&gt;</td>
<td>2043.25&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>1873.75</td>
</tr>
<tr>
<td>Feed intake (g)</td>
<td>3955.00&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3422.22&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3385.55&lt;sup&gt;b&lt;/sup&gt;</td>
<td>2935.50</td>
</tr>
<tr>
<td>Weight gain (g)</td>
<td>1924.00&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1685.75&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1613.25&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1443.75</td>
</tr>
<tr>
<td>Growth rate (g)</td>
<td>54.97&lt;sup&gt;a&lt;/sup&gt;</td>
<td>48.16&lt;sup&gt;b&lt;/sup&gt;</td>
<td>46.09&lt;sup&gt;b&lt;/sup&gt;</td>
<td>41.25&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Feed Conversion Ratio (FCR)</td>
<td>2.055</td>
<td>2.030</td>
<td>2.098</td>
<td>2.033</td>
</tr>
<tr>
<td>Survival rate (%)</td>
<td>95.50</td>
<td>94.00</td>
<td>94.00</td>
<td>92.50</td>
</tr>
</tbody>
</table>

The economic analysis of the cost evaluation (Table 3) revealed that the locally formulated finisher feed (T<sub>4</sub>) was cheaper to use and had lowest cost of ₦180.00 / kg feed.

### Table 3: Economic analysis of broilers fed with different commercial feed and locally formulated feed

<table>
<thead>
<tr>
<th>Parameters</th>
<th>T&lt;sub&gt;1&lt;/sub&gt;</th>
<th>T&lt;sub&gt;2&lt;/sub&gt;</th>
<th>T&lt;sub&gt;3&lt;/sub&gt;</th>
<th>T&lt;sub&gt;4&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total feed intake (kg)</td>
<td>3.96</td>
<td>3.42</td>
<td>3.39</td>
<td>2.94</td>
</tr>
<tr>
<td>Feed cost (₦/kg)</td>
<td>288</td>
<td>250</td>
<td>250</td>
<td>180</td>
</tr>
<tr>
<td>Total feed cost (₦)</td>
<td>1140.48</td>
<td>855</td>
<td>847.5</td>
<td>529.2</td>
</tr>
<tr>
<td>Total weight gain (kg)</td>
<td>1.92</td>
<td>1.69</td>
<td>1.61</td>
<td>1.44</td>
</tr>
<tr>
<td>Feed cost (₦) per kg gain</td>
<td>594.00</td>
<td>505.92</td>
<td>526.40</td>
<td>367.5</td>
</tr>
<tr>
<td>Cost difference relative to local (₦/kg)</td>
<td>226.5</td>
<td>138.42</td>
<td>158.9</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Fig1. Graphical Presentation of the Weekly Weight Gain for the Four Different Treatments in Five Weeks
DISCUSSION

The effects of finisher feed treatments on growth performance of broiler showed that average feed intake ranged from 2935.50g to 3955g, average weight gain (WG) from 1443.75g to 1924g and Feed Conversion Ratio (FCR) 2.03 to 2.98 were significantly (P < 0.005) influenced by the treatments. These values were compatible with the report of Doma et al., (2001) in broilers fed different commercial diets.

Birds fed under T4 had the lowest feed intake FI (2935.50g) which resulted in significantly lower (1443.75g) weight gain (P < 0.005) as compared to other treatments.

This could be attributed to the low protein and higher fiber content of the feed. Similar observations were also made by Hussein et al., (2001), who reported that low protein diet leads to poor performance. The low weight might also be attributed to high fiber contents in the diet and is similar to the report of Mateos et al., (2012) who reported that feeding high fiber diets enhanced relative weight of intestine, caeca and sizes of various digestive components resulting in decreasing weight gain.

The economic analysis of the cost evaluation revealed that the locally formulated finisher feed (T4) was cheaper to use and had lowest cost of N180.00 / kg feed. The highest feed cost of N 288/kg was observed on T1. The low feed cost (N /kg feed) in locally formulated feeds during this study agreed with the finding of Afolayan et al., (2009) who reported that on the farm feeds are cheaper and may attract more profit to the farmer as compared to the commercial feeds.

Cost estimation showed that the locally formulated feed was cheaper to formulate and had least cost of N 180.00 / kg feed. This agrees with the report of Apantaku et al., (2006) in Oyo area where poultry farmers prefer and use locally formulated feeds instead of commercially compounded feeds, which is perceived to be of relatively high quality and lowest cost.

CONCLUSION

The study shows that most of the commercial feeds used in the study area could be successfully substituted by locally formulated feed at the finisher stage. Feeding locally formulated feed at finisher stage will be cheaper and may attract more profit to the farmer as compared to the commercial based feeds.

REFERENCES