Morphological Characteristics and Production Performance of F1 Progenies of Red Jungle Fowl

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Abstract

A study conducted to assess the morphological and production performance of F1 Red Jungle Fowl mated with native hens under confinement system. The F1 of Native x Native got highest bodyweight and lowest in F1 Hinundayan x Native during week 2. On the other hand, weeks 4, 3 and 8 revealed consistently heaviest body weights (p<0.01) in F1 Native x Native. Bi-weekly body lengths showed highly significant differences (p<0.01) from week 2 up to week 6. It also showed consistent longest body lengths in F1 Native x Native and F1 Baybay RJF x Native. On the shank length, there was no significant difference in weeks 2, 4 and 6 but significantly differed (p<0.05) at week 8. The wingspan also showed highly significant differences (p<0.01) in week 2 to week 6, with widest (p<0.01) on F1 Native x Native. The plumage, skin, shank, earlobe and comb colors of the F1 progenies varied from red, brown and black showing red plumage color as the dominant color. The F1 Native x Native showed highest average feed consumed (p<0.01) and average weight gain (p<0.05) while feed efficiency was not significant.

Keywords: qualitative traits, quantitative traits, feed efficiency, cross breeding

1.0 Introduction

The Red Jungle fowls, which were believed to the progenitor of the usual backyard “native” chickens, are still plenty in many forests of Leyte. Although female Red jungle fowls are harder to captivate than the males, people living near these Leyte jungle-like mountains sometimes capture these wild chickens using either primitive or innovative methods. The forest of Mount Pangasugan, Baybay Leyte is still a sanctuary for wild animals including Red Jungle Fowls. Currently, there is no readily available information on the morphological characteristics and production performance of Red Jungle fowls in Leyte and their crosses with native chickens in

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Crossbreeding is done in order to take advantage of heterosis as a result of non-additive gene action. The specific combining abilities of different breeds or strains of poultry and livestock were also determined. In the study of Parker and McDaniel (2002), roosters and hens are selected based on their physical characteristics associated with the mature males and females. These include the size and color of comb and wattle, body size and shank length, and other economically important traits to improve production performance of a poultry population.

Native chickens contribute a year-round supply of meat and eggs and provide extra income for small holder farmers. Most farmers prefer to raise native chickens than commercial breeds. Because of the low input and their inherent ability to survive under harsh environmental conditions and reproduce even under minimal care and marginal management (Lambio, 2000). Most populations of native chickens, however, have been subjected to little or no deliberate selection for higher productivity.

But the lack of performance and breeding records has always been the major problem in improving the animal genetic resources in most developing countries like the native chickens in the Philippines. As a matter of fact, the native chicken still contribute a high degree on the supply of meat and eggs in the markets especially in rural areas (Arboleda, 1987).

Hence, this study was conducted to assess the morphological and production performance of F1 progenies of Red Jungle Fowls in selected areas of Leyte, and native chicken under confinement system; and moreover, to determine and differentiate the qualitative and quantitative traits of F1 progenies reared under confined management system.

2.0 Research Design and Methods

The naturally incubated and brooded F1 progenies of the different mating combinations of Red Jungle Fowl roosters and Native chicken hens were used as experimental units. A total of forty-eight (48) F1 progenies were randomly selected from the different mating combinations of Red Jungle fowl roosters and Native chicken hens. Each treatment was composed of 12 chicks. And each treatment was composed of three

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replicates from the mating type. The experiment was laid out in Randomized Complete Block Design set-up below:

<table>
<thead>
<tr>
<th>T1R1H1</th>
<th>T1R3H5</th>
<th>T2R3H9</th>
<th>T3R3H15</th>
</tr>
</thead>
<tbody>
<tr>
<td>T0R2H3</td>
<td>T1R4H7</td>
<td>T2R6H11</td>
<td>T3R7H14</td>
</tr>
</tbody>
</table>

RJ- Red Jungle Fowl; Rn- Native rooster; H-Hen

<table>
<thead>
<tr>
<th>T3R2H13</th>
<th>T1R4H9</th>
<th>T3R1H2</th>
<th>T3R3H12</th>
</tr>
</thead>
<tbody>
<tr>
<td>T3R5H16</td>
<td>T1R3H2</td>
<td>T5R2aH4</td>
<td>T1R2aH10</td>
</tr>
</tbody>
</table>

RJ- Red Jungle Fowl; Rn- Native rooster; H-Hen

Where:

- T0 = Native x Native
- T1 = F1RedJungleFowl x Native
- T2 = F1MalaysianRedJungleFowl x Native
- T3 = F1HimundsamalRedJungleFowl x Native

Quantitative and qualitative parameters were measured and evaluated:

1. **Body weight (g)** - measured using the weighing scale.
2. **Body length (cm)** - measured from the tip of the rostrum maxillary (beak) and caudal (tail, without feathers). The bird’s body was drawn throughout its length.
3. **Shank length, (cm)** - measured the shank and hock joint to the spur of either leg.
4. **Wing span, (cm)** - were stretched out in full and measured the length between tips of right and left.
5. **Colors of the plumage, skin, shank, earlobe, and comb.**

Production performance data was gathered:

1. Bi-weekly body weight (g) of F1 chicken.
2. Initial body weight (g) of F1 chicks at 14 days old
3. Average weight gain (AWG), g using the formula:

   \[
   AWG = \text{Final live weight} - \text{Initial weight}
   \]

4. Average feed consumption (AFC), g using the formula:

   \[
   AFC = \frac{\text{total feed given} - \text{feed refused}}{\text{number of birds fed}}
   \]

5. Average feed conversion efficiency (AFCE)

   \[
   \text{AFCE} = \frac{\text{average feed consumed}}{\text{average weight gain}}
   \]
Data collected was subjected to analysis of variance using the Statistical Package for Social Sciences (SPSS) version 17 while the comparison of treatment means was done using Tukey’s Honestly Significant Difference (HSD) Test.

3.0 Results and Discussion

Quantitative Traits

**Body weight.** Bi-weekly body weights showed significant differences from week 2 up to week 8 (Table 1). The first two weeks of the F1 Native x Native (212.50 g) got the highest (p< 0.05) in terms of the body weight. This was followed by F1 Baybay RJF x Native (200.0 g), F1 Matalomx Native (172.92 g), and F1 Hinundayan RJF x Native (158.33 g). On the other hand week 4, week 3 and week 8 bi-weekly body weights revealed consistently the heaviest weight (p<0.01) in F1 Native x Native hen with 393.75 g, 537.5 g, and 720.83 g, respectively. The bi-weekly body at weeks 4 and 6 were lowest (p<0.01) on F1 Hinundayan RJF x Native (233.33 g and 375.0 g, respectively). The result on bi-weekly body weights at week 6 showed comparable body weights among the different F1 progenies of Red Jungle fowls from any place of origin in Leyte. Although not significant, F1 biweekly body weight at week 8 was lowest (p<0.01) in F1 Matalom RJF x Native (537.5 g). The F1 progenies of native chicken were expected to be heavier than any of the F1 progenies from crosses between Red Jungle Fowls and Native chicken hen due to continuous intensive selection for growth under domestication. The F1 Red Jungle Fowl/Native was infused with the small body characteristic of the Red Jungle Fowl resulting to slower growth performance.

According to the Poultry Nutrition Handbook, the body weight of F1 progenies performed well and quite comparable to the standard bodyweight at eight weeks old of 537-720 grams vs. 500-640 grams, respectively. Moreover, the growth performances of these lines were comparable with those of the native chicken breed. This was explained by the effects of the provision of commercial feeds, better management, health care and the environment. The result of this study is similar to the work reported by Shanawany (1987) who stated that differences in hatching weight have been reported to affect subsequent growth performance (North, 1984).
Table 1. Biweekly body weight (g) of the F1 progenies from crosses between Native and Red Jungle Fowls in selected areas of Leyte under confinement system.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>2 weeks</th>
<th>4 weeks</th>
<th>6 weeks</th>
<th>8 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>T0 (F1 Native x Native)</td>
<td>212.50a</td>
<td>393.75a</td>
<td>537.50a</td>
<td>720.83a</td>
</tr>
<tr>
<td>T1 (F1 Baybay RJF x Native)</td>
<td>200.00ab</td>
<td>316.67b</td>
<td>433.33b</td>
<td>591.67ab</td>
</tr>
<tr>
<td>T2 (F1 Matalom RJF x Native)</td>
<td>172.92ab</td>
<td>254.17bc</td>
<td>406.25b</td>
<td>537.50b</td>
</tr>
<tr>
<td>T3 (F1 RJF Hinundayan x Native)</td>
<td>158.33b</td>
<td>233.33c</td>
<td>375.00b</td>
<td>625.00ab</td>
</tr>
</tbody>
</table>

\( p\)-value 0.025* 0.000** 0.001** 0.005**

RJF- Red Jungle Fowl

*Column means with no common superscript are significantly different.

**significant (p < 0.05)

***highly significant (p < 0.01)

**not significant (p > 0.05)

**Body Length.** Bi-weekly body lengths showed highly significant \( (p<0.01) \) differences from week 2 up to week 6, but not significant \( (p>0.05) \) at week 8 (Table 2). On weeks 2, 4, and 6, consistently longest body lengths were manifested on F1 Native x Native (19.41 cm, 25.33 cm, and 28.75 cm, respectively). The body lengths at week 2, 4, and 6, from F1 Matalom RJF x Native were comparable to F1 Hinundayan RJF x Native. Although not significant, the week 8 bi-weekly body lengths revealed slightly heavier on F1 Native x Native over that of the other mating combinations. Just like bi-weekly body weight, biweekly body length was presumed to improve in the native chickens due to domestication selection pressure on important economic traits.
**Shank Length.** In terms of shank length, results showed no significant difference weeks 2, 4 and six among treatments, but significantly (p<0.05) differed at week 8 (Table 3). Just like bi-weekly body weight, biweekly body length, and shank length, wingspan tends to improve in the native chickens due to domestication selection pressure on important economic traits.

Table 3. Biweekly Shank length (cm) of F1 progenies from crosses of Native and Red Jungle Fowls in selected areas of Leyte under confinement system.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>2 weeks</th>
<th>4 weeks</th>
<th>6 weeks</th>
<th>8 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>$T_0$ (F$_1$ Native x Native)</td>
<td>2.85</td>
<td>3.78</td>
<td>4.63</td>
<td>5.15ab</td>
</tr>
<tr>
<td>$T_1$ (F$_1$ BaybayRJF x Native)</td>
<td>2.79</td>
<td>3.54</td>
<td>4.39</td>
<td>4.83ab</td>
</tr>
<tr>
<td>$T_2$ (F$_1$ MatalomRJF x Native)</td>
<td>2.72</td>
<td>3.50</td>
<td>4.24</td>
<td>4.79b</td>
</tr>
<tr>
<td>$T_3$ (F$_1$ HinundayanRJF x Native)</td>
<td>2.92</td>
<td>3.70</td>
<td>4.42</td>
<td>5.30a</td>
</tr>
</tbody>
</table>

| p-value          | 0.617ns | 0.091ns | 0.094ns | 0.016*  |

*RJF: Red Jungle Fowl

Column means with no common superscript are significantly different

*significant (p < 0.05)

** highly significant (p< 0.01)

ns not significant (p > 0.05)

**Wingspan.** In terms of wingspan, results showed highly significant (p<0.01) differences in week 2 to week 6, but not significant at week 8 (Table 4). Wingspan at week 2, 4 and 6 showed highly (p<0.01) significant difference showing consistently widest span on F1 Native x Native. Although not significant at week 8, F1 Native x Native displayed the widest wingspan over that of the F1 from crosses of Native chicken hen with Red Jungle Fowl roosters of any

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Figure 4. Measuring shank length of F1 progenies of red jungle fowl and native hen in selected areas of Leyte under confinement system.

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origins. The shank length is an important economic trait of chicken, which can be improved through continuous intense selection pressure on this trait under domestication.

Colors of the Plumage, Skin, Shank, Earlobe, and Comb. The result on plumage, skin, shank, earlobe and comb colors of the F1 progenies varied from red, brown and black, but the red plumage color dominated among the four treatments. However, according to Missohou et al., 1998 state that there were considerable number of chickens which showed heterogeneity and had diverse plumage color like black, multicolor, black with white tips, reddish brown and white with red stripes. The presence of such large variations in plumage colors could be the result of their geographical isolation as well as periods of natural and artificial selections.

Variations was also observed on shank colors that varied from yellow, gray, white, black and

Table 4. Biweekly wingspan (cm) of F1 progenies from crosses of Native and Red Jungle Fowls in selected areas of Leyte under confinement system.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>2 weeks</th>
<th>4 weeks</th>
<th>6 weeks</th>
<th>8 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>T₀(F₁ Native x Native)</td>
<td>19.35&lt;sup ab&lt;/sup&gt;</td>
<td>23.00&lt;sup a&lt;/sup&gt;</td>
<td>27.83&lt;sup a&lt;/sup&gt;</td>
<td>29.67&lt;sup a&lt;/sup&gt;</td>
</tr>
<tr>
<td>T₁(F₁BaybayRJF x Native)</td>
<td>19.91&lt;sup a&lt;/sup&gt;</td>
<td>22.33&lt;sup a&lt;/sup&gt;</td>
<td>26.08&lt;sup a&lt;/sup&gt;</td>
<td>28.75&lt;sup a&lt;/sup&gt;</td>
</tr>
<tr>
<td>T₂(F₁MatalomRJF x Native)</td>
<td>17.55&lt;sup bc&lt;/sup&gt;</td>
<td>20.64&lt;sup b&lt;/sup&gt;</td>
<td>26.17&lt;sup a&lt;/sup&gt;</td>
<td>28.5&lt;sup a&lt;/sup&gt;</td>
</tr>
<tr>
<td>T₃(F₁HinundayanRJF x Native)</td>
<td>16.87&lt;sup c&lt;/sup&gt;</td>
<td>20.65&lt;sup b&lt;/sup&gt;</td>
<td>24.32&lt;sup b&lt;/sup&gt;</td>
<td>29.52&lt;sup c&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

| p-value | 0.001** | 0.000** | 0.000** | 0.170ns |

<sup>RJF</sup>: Red Jungle Fowl

Column means with no common superscript are significantly different
*significant (p < 0.01)
** highly significant (p < 0.01)
*not significant (p > 0.05)

<sup>1</sup>Southern Leyte State University, San Juan, Southern Leyte

<sup>2</sup>Visayas State University, Visca Baybay, City
a mix of either of the two colors. It was found out that the shank colors that dominated in $F_1$ Native x Native was yellow. And it was gray for $F_1$ BaybayRJF x Native, $F_1$ MatalomRJF x Native and $F_1$ HinundayanRJF x Native.

The distinguishing characteristics that helped identify various breeds and varieties of chickens, several forms or shapes of combs included Buttercup, Cushion, Pea, Rose, Single, Strawberry and V-shaped. As revealed in Table 5, results showed that the type of comb that dominated among the four treatments was the single type comb. This was characterized with moderately thin, fleshy formation of smooth soft surface texture, firmly attached from the beak to the top of the skull with a strong base. While the top portion showed five or six deep serrations or distinct points, the middle points were higher than the back or front, forming a semi-oval shape when viewed from the side. The comb was much larger and thicker in males than in females. It was lopped in the female depending on the breed. The comb were divided into three sections such as the front, the middle and the posterior or blade that extended past the rear base of the skull, and supported by Garrigus (2007).

Table 5. Colors of the Plumage, Skin, Shank, Earlobe, and Comb of $F_1$ progenies from crosses of Native chicken hen and Red Jungle Fowls in selected areas of Leyte under confinement system.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Comb</th>
<th>Earlobe</th>
<th>Plume</th>
<th>Shank Color</th>
<th>Skin Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>$T_0$($F_1$ Native rooster x native)</td>
<td>Single</td>
<td>With Brown Feathers</td>
<td>Red</td>
<td>Yellow</td>
<td>White</td>
</tr>
<tr>
<td>$T_1$($F_1$ Baybay RJF x native)</td>
<td>Single</td>
<td>With Red Feathers</td>
<td>Red</td>
<td>Gray</td>
<td>White</td>
</tr>
<tr>
<td>$T_2$($F_1$ Matalom RJF x native)</td>
<td>Single</td>
<td>With Brown Feathers</td>
<td>Red</td>
<td>Gray</td>
<td>White</td>
</tr>
<tr>
<td>$T_3$($F_1$ Hinundayan RJF x native)</td>
<td>Single</td>
<td>With Brown Feathers</td>
<td>Red</td>
<td>Gray</td>
<td>White</td>
</tr>
</tbody>
</table>

The earlobe of the chicken was a structure on the skin of the face just below the ear, the outline of which was marked by a slight thickening of the tissues. Based on the result of the study the type of earlobe color that dominated the four treatments were with brown feathers for $T_0$ (F1 Native rooster x native hen), $T_2$ (F1 RJF from Matalom x native hen) and $T_3$ (F1 RJF from Matalom x native hen).
RJF from Hinundayan x native hen). While on the hand, red feathers were observed for T1 (F1RJF from Baybay x native hen). Banks (1999) said that the earlobe was bare of feathers and may be the same color as the rest of the face for which the degree of redness was somewhat dependent upon the health of the bird. As is true of most of the head furnishings, this structure is larger in males than females.

Skin color (yellow or white) is being restricted to the epidermis or top layer of skin. Based on the result, skin colors among the four treatments were dominated by a white color skin that was dominant and was the wild type (W+). White skin was characterized by a lack of yellow pigmentation.

**Production Performance**

**Average Feed Consumed.** The average feed consumption of F1 progenies of Red Jungle Fowl mated with Native chicken hens showed highly significant difference (p<0.01) among treatments. Results revealed highest average feed consumption on F1 Native compared with F1 progenies from crosses of Native chicken hens and Red Jungle Fowl roosters from any areas of origins. Further observation revealed that the feed intake indicated that birds were able to consume nearly the standard feed consumption at 1400 grams.

Table 6. Production performance of F1 progenies from crosses of Native and Red Jungle Fowls in selected areas of Leyte under confinement system.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Average Feed Consumed</th>
<th>Average Weight Gain</th>
<th>Feed Conversion Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>T0(F1 Native x Native)</td>
<td>1180.00</td>
<td>635.42</td>
<td>1.86</td>
</tr>
<tr>
<td>T1(F1 Baybay RJF x Native)</td>
<td>954.99</td>
<td>495.83</td>
<td>2.04</td>
</tr>
<tr>
<td>T2(F1 Matalom RJF x Native)</td>
<td>1050.00</td>
<td>466.67</td>
<td>2.25</td>
</tr>
<tr>
<td>T3(F1 Himundayan RJF x Native)</td>
<td>1145.83</td>
<td>562.50</td>
<td>2.03</td>
</tr>
</tbody>
</table>

*p-value*  
**0.000**  
*0.015*  
**0.093**

RJF: Red Jungle Fowl  
Column means with no common superscript are significantly different  
*significant (p < 0.05)  
**highly significant (p < 0.01)  
*significant (p > 0.05)
Average Weight Gain. The average weight gain of F1 progenies of Red Jungle Fowl mated with Native chicken hens showed significant (p<0.05) difference among treatments. Results revealed highest but comparable average weight gain on F1 Native and F1 Hinundayan RJF x Native. Meanwhile, F1 progenies from Baybay RJF x Native and Matalom RJF x Native exhibited lower weight gain.

Feed Efficiency. After an eight-week period of feeding, data revealed no significant difference observed in feed conversion efficiency (Table 6). Although not significant, F1 Baybay RJF x Native had better FCE over that of F1 Matalom RJF x Native, Baybay RJF x Native and Hinundayan RJF x Native. As recorded, the FCE results ranged from 1.86 – 2.25 were comparable to the standard FCE that ranged from 2.00 – 2.50.

4.0 Conclusion

The results of the study proved that the native chicken population was generally better in terms of the overall economically important traits compared with F1 progenies infused with Red Jungle Fowl as a result of selection in domestication.

5.0 References Cited


