Evaluation of F1 Progeny from Multi-Hybrid Crossing of Local Chicken Genotypes

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Abstract
A study was carried out to develop cross breeding programmes for local chicken to evaluate the growth traits of F1 progenies. The crosses made were Naked-neck X Giriraja, Naked-neck X Hy-line white, Village chicken X Giriraja and Village chicken X Hy-line white. Pure Cobb and Hy-line white lines were used for comparative analysis. The parameters measured were body weight of day old chick, body length at birth, weekly weight gain, feed conversion efficiency and body weight at 20 weeks age. Non-metric parameters measured were feather colour, ear lobe colour, body shape and comb type. The data were analyzed with one way ANOVA and DMRT was used to compare the mean values. The results of the study revealed that the weight of day-old chick (58.3±1.3 g), body length at birth (5.8±0.9 cm), weekly weight gain (55.1±1.9 g/week) and body weight at 20 weeks age (1.7±0.05) were significantly higher (P<0.05) in F1 progeny of Naked-neck X Giriraja and Cobb. No significant difference (P>0.05) was observed for feed conversion efficiency between F1 progenies of all the crossings (0.59-0.61) except Cobb (0.65±0.1). The mature body weight was significantly higher (P<0.05) in Cobb (2.5±0.01 kg). The colour and comb type of day-old chicks of F1 progenies were yellow and single, respective of the crossings. The ear lobes of F1 progenies of village chicken and naked-neck chicken were white and red, respectively. Body shape observed was triangular in village chicken crosses while it was rectangular in naked-neck chicken. Adversity in feather colouring pattern was observed among different individuals of the progenies. It was concluded that the F1 progeny of Naked-neck X Giriraja showed higher values for many of the metric traits measured in this study. For further confirmation the trial should be done for several generations.

Key words: Giriraja, Hy-line White, Naked-neck chicken, Village chicken

Introduction
Being the cheapest sources of animal proteins, chicken meat and eggs have contributed largely to animal protein requirement of the people in Sri Lanka. About 70% of the contribution to livestock sub-sector in Sri Lanka comes from chicken meat and eggs (Department of Census and Statistics, 2012). The local chicken contributes about 15% to the national egg production (Department of Census and Statistics, 2012). They are mainly reared for the egg production as they are having low growth rates. The local chicken are reared both in the rural and semi urban areas. However, they are highly distributed in many rural villages of Sri Lanka. More importantly, there are no commercial-level village chicken productions as the growth and performance are poorer than with exotic breeds. Though the government has introduced various projects to improve the local chicken production, more attention is required to improve performance of the existing flock of local chicken since their tasty meat and eggs are popular particularly in the dry zone.

For upgrading the existing village chicken flock, proper and planned breeding programmes are utmost important. In this context, the present study was formulated to develop different cross breeding programmes for local chicken using exotic chicken breeds with the objective to evaluate the growth characteristics of F1 progeny. Multi-hybird crossing technique (using more than two genotypes) was used to produce F1 progeny in this study.

Materials and Methods
This study was conducted at the Livestock Farm, Eastern University, Sri Lanka. Village and naked-neck
chickens are the local chicken used in the study. Hy-line white and Giriraja were used as sire parents in the cross breeding programmes. Five local hens were allocated for one cockerel for each cross and each cross was replicated thrice. Each flock was maintained separately under intensive system with regular feeding. Average age of dam and sire used were one year. The meat strain Cobb and the egg strain Hy-line white were used for comparative analysis. Muti-hybrid crossing technique was used with four crosses namely Naked-neck X Giriraja, Naked-neck X Hy-line white, Village chicken X Giriraja, and Village chicken X Hy-line white. The crossing technique used was multi-hybrid technique. Fresh and clean eggs were collected and incubated naturally using separate broody hens. Body weight and length of day-old chicks hatched were measured. The other parameters measured were the weekly weight, amount of feed consumed, mature body weight at 20 weeks. The body weight was recorded separately for each bird. The weight gain and feed conversion efficiency were computed based on basic parameters recorded. The Statistical Analysis Software (SAS Version 9) with one way ANOVA was used for all statistical analyses and Duncan Multiple Range Test was used to find out the significant difference if there any.

Results and Discussion

Table 1 shows the performance traits of F1 progeny from different crossing of local chicken through multi-hybrid crossing technique. Effect of dam and sire was significant (P<0.05) in all the traits.

Weight of day-old chick

Weight of day-old chick was significantly higher (P<0.05) in F1 progeny of naked-neck X Giriraja and Cobb than the progenies of other crosses. The result indicated that the F1 progeny from Naked-neck X Giriraja has the potential to be improved as meat type chicken under local farming system. The recorded value for day-old weight in the present study was higher than day-old chicks of some developed local chicken in other countries like Ghana (29.9g). Significantly lower value for weight of day-old chicken was observed in F1 progeny of village chicken X Hy-line white.

Body length at birth

Body length at birth was significantly higher (P<0.05) in F1 progeny of Naked-neck X Giriraja and Cobb and no significant difference was observed between the progeny of other crosses.

<table>
<thead>
<tr>
<th>Performance traits</th>
<th>Village X Giriraja</th>
<th>Village X Hy-line white</th>
<th>Naked neck X Giriraja</th>
<th>Naked neck X Hy-line white</th>
<th>Cobb</th>
<th>Hy-line white</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight of day-old chick (g)</td>
<td>48.6±2.1 a</td>
<td>45.0±1.6 b</td>
<td>58.3±1.3 d</td>
<td>51.4±0.9 c</td>
<td>59.7±1.8 d</td>
<td>49.0±2.3 a</td>
</tr>
<tr>
<td>Body length at birth (cm)</td>
<td>4.9±0.6 a</td>
<td>5.0±0.2 a</td>
<td>5.8±0.9 b</td>
<td>5.1±1.2 a</td>
<td>5.7±0.7 b</td>
<td>4.9±0.8 a</td>
</tr>
<tr>
<td>Weight gain (g/week)</td>
<td>40.3±2.7 a</td>
<td>42.7±1.5 a</td>
<td>55.1±1.9 c</td>
<td>48.2±2.8 b</td>
<td>55.7±2.1 c</td>
<td>50.2±1.7 b</td>
</tr>
<tr>
<td>Feed conversion efficiency</td>
<td>0.59±0.2 a</td>
<td>0.61±0.2 a</td>
<td>0.61±0.3 a</td>
<td>0.59±0.1 a</td>
<td>0.65±0.1 b</td>
<td>0.61±0.2 a</td>
</tr>
<tr>
<td>Mature live weight (kg)</td>
<td>1.0±0.07 a</td>
<td>1.2±0.05 b</td>
<td>1.7±0.05 d</td>
<td>1.5±0.08 c</td>
<td>2.5±0.01 e</td>
<td>1.8±0.05 d</td>
</tr>
</tbody>
</table>

* Numbers followed by different letters are significantly different (P<0.05)
Weight gain

Weight gains were significantly higher (P<0.05) in F1 progeny of naked-neck X Giriraja and Cobb meat strains compared to the others.

Feed conversion efficiency

No significant difference (P>0.05) was observed for feed conversion efficiency among F1 progenies of all the crossings and Hy-line white except Cobb which showed significantly higher (P<0.05) value for feed conversion efficiency. Basically the Cobb is a meat strain which was developed for higher body weight and feed conversion efficiency.

Mature body weight

The dam and sire effect was significantly higher (P<0.05) in body weight of all the progenies at 20 weeks age. Mature body weight was significantly higher (P<0.05) in F1 progeny of naked-neck X Giriraja compared with the other crosses. The findings were agreed with the reports made by Tadelle and Ogle (2000).

Mortality

In terms of mortality, there was no significant genotype effect. However, the feather pecking was observed in F1 progenies of Giriraja. Feather pecking is associated with poor management, adverse environment and breed or strain of bird. He also reported that hybrid strains are susceptible to feather pecking.

Non-metric traits

The colour of day-old chicks of F1 progenies was yellow in all crossings. The comb type observed was single. The ear lobe was white in the F1 progenies of village chicken while it was red in naked-neck crosses. Skin colour was yellow in all crosses. Body shape observed was triangular in village chicken crosses while it was rectangular in naked-neck chicken. Feather colour of F1 progeny of naked-neck X Giriraja was brown while it was white in naked-neck X Hy-line white. Fifty percent of the progeny of naked-neck in both crosses had naked-neck. Feather pecking was observed in naked-neck progenies. The birds showing the naked-neck character were found to be pecking themselves due probably to their exposed skin. Red colour seems to attract maximum attention by birds, and this might have caused the neck pecking of the naked-neck birds due to their exposed neck.

The results of the study revealed that the F1 progeny of Naked-neck X Giriraja showed higher values for many the metric traits measured in this study compared to other progenies. Therefore, the Giriraja white is a suitable sire breed to improve the naked-neck flock in terms of growth performance of F1 progeny. Further, there should be a planned breeding approach for village chicken with other existing chicken breeds in Sri Lanka to find out suitable sire breed to cross with village chicken. For further confirmation progeny performance should be evaluated in subsequent generations with continuous breeding programmes.

References
