EVALUATION OF A BANTAM CROSS EGG LAYER

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Summary

This paper reports on two experiments in which a bantam White Leghorn male (Line A) with commercial egg production traits was crossed with a conventional female parent White Leghorn line (Line D). The offspring of this experimental cross were then compared to offspring of the female parent line (Line D) crossed with a conventional White Leghorn male line (Line B).

The average weight of the bantam cross (Line A x D) was 1518g at 50 weeks of age, whilst the body weight of the commercial White Leghorn (Line B x D) was 1712g. Production in the bantam cross White Leghorn peaked at similar levels to the conventional White Leghorn, 91-94% at 22-26 weeks of age, and remained above 80% from weeks 20 to 31 in experiment one and from weeks 21 to 40 in experiment two. Average egg production from the bantam cross was 4.7% lower between 18-50 weeks than the conventional White Leghorn. Average feed consumption in the bantam cross was approximately 11.3% lower than the commercial White Leghorn to 50 weeks. Average egg weight of the commercial White Leghorn at 50 weeks of age was 60.8g, whilst the bantam cross was 62.4g.

Overall the results are very promising, and provide the industry with an opportunity for a quantum efficiency leap by reducing body weight and maintenance requirements whilst holding egg mass output relatively constant. In the future, feed efficiency in egg production can be significantly improved by using a bantam male line crossed with a regular sized commercial female line. It will not be difficult to recover the small to moderate discounts in egg mass that have been observed in this preliminary cross. A number of alternative genetic approaches could be adopted, such as crossing the bantam line with a superior female parent line, further selection of the pure bantam line, or a program of introgression of the bantam genes into elite parent stocks.

I. INTRODUCTION

Genetic selection over the last 40 years has seen massive improvements in the performance of laying hens. It is likely, however, that the rates of feed efficiency gain are going to slow as egg production approaches the threshold of 365 eggs per annum. Two alternative genetic approaches have been suggested to accelerate body weight reduction in commercial laying strains and improve feed conversion. These two approaches have been the introduction of dwarf or bantam genes into commercial lines. Research with dwarfing genes has been generally unsuccessful mainly due to lower peaks of production, reduced persistency of production and low egg weights (Polkinghorne and Lowe, 1973).

Unlike the introduction of dwarf genes, bantam genes have shown more promise as a mechanism to alter the relationship between body weight and egg weight without affecting egg production. Yoshida and Saito (1983) found that the introduction of Sebright bantam genes into various strains of fowl reduced adult body weight by 8-17%, reduced egg weight by only 3-4% and had no effect on egg production. Additionally, Parkinson and Cransberg (2000) introduced bantam genes into a commercial White Leghorn x New Hampshire cross with equally promising results. These bantamised hybrids had unusually high egg weight to body weight ratios and maintained competitive rates of egg production when compared in controlled experiments to commercial brown egg laying stocks.

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The experiment reported here assesses the performance of a cross between a bantamised WL male and a commercial WL female for production characteristics and general viability. The experiment directly compares these results to a commercial WL cross that uses the identical commercial female line.

II. MATERIALS AND METHODS

The strains used in these experiments were a commercial WL (Line B x D), and a cross between a bantam WL male (mature body weight of bantam male approximately 1500 grams) and the commercial WL female (Line A x D). Birds in experiment one were monitored to 50 weeks of age, while birds in experiment two were monitored through to 70 weeks of age. Both experiments were conducted with identical inputs under identical conditions. All birds were reared in cages in a controlled environment shed, fed a commercial diet and were exposed to natural day-length at a light intensity of approximately five lux to 14 weeks of age. At 14 weeks of age, birds were placed into five bird cages in an environmentally controlled shed with temperatures ranging from 16-27°C with an average of 21-23°C. Light was constant at 16 hours per day, with a light intensity of 5-10 lux.

All birds were fed a commercial grower ration (ME 12.1 MJ/kg and crude protein 160 g/kg) between 9-18 weeks of age, followed by a commercial layer diet (ME value 11.61 MJ/kg, 18.5% crude protein, 3.75% calcium) for the remainder of the experimental period. Feed and water were available ad libitum.

Birds were weighed intermittently, starting at 16 weeks of age and continuing through to the end of each experiment. Egg production was recorded daily and accumulated to provide weekly figures. Egg weight was measured weekly (all eggs from a particular day were weighed) while feed consumption was calculated at 50 weeks of age.

III. RESULTS

a) Comparison summary of bantam cross with commercial WL.

Table 1. Summary of production parameters of the bantam cross and the commercial WL to 50 weeks of age (results are an average of experiments one and two).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Commercial WL</th>
<th>Bantam cross</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average body weight @ 50 weeks (grams)</td>
<td>1712</td>
<td>1518</td>
</tr>
<tr>
<td>Ave. feed consumption (gm/bird/day) @ 50 weeks</td>
<td>115.5</td>
<td>102.4</td>
</tr>
<tr>
<td>Ave. egg production (%) from 18-50 weeks</td>
<td>81.3</td>
<td>76.6</td>
</tr>
<tr>
<td>Average egg weight (grams) 20-50 weeks</td>
<td>55.7</td>
<td>55.9</td>
</tr>
<tr>
<td>Average egg weight (grams) @ 50 weeks</td>
<td>60.8</td>
<td>62.4</td>
</tr>
<tr>
<td>Average egg mass (grams) 20-50 weeks</td>
<td>47.7</td>
<td>45.0</td>
</tr>
<tr>
<td>Egg weight: body weight ratio (%) @ 50 weeks</td>
<td>3.55</td>
<td>4.11</td>
</tr>
</tbody>
</table>

b) Body weight – Experiment 2

At 16 and 70 weeks of age the bantam cross had an average body weight of 1202 and 1605g respectively, whilst the commercial white leghorn was 1256 and 1809g at the same ages (Figure 1). The bantam cross was significantly smaller (P<0.01) than the commercial WL from 16-70 weeks (Figure 1).
c) Egg production – Experiment 2

The bantam cross had high levels of egg production, peaking at 91.1% at 22 weeks of age (Figure 2). In comparison, the commercial line peaked at 94.2% in week 26 (data point at 34 weeks is likely to be erroneous). Average egg production from 17 to 70 weeks of age was 70.9% in the bantam cross and 76.1% in the commercial WL.

d) Egg weight – Experiment 2

The average egg weight of the commercial WL is superior to the bantam cross up to 31 weeks of age. At all data points after 31 weeks of age, egg weight of the bantam cross was superior to the commercial WL. Average egg weight from week 21 to 70 was 58.6g in the bantam cross and 57.2 in the commercial WL. The egg weight to body weight ratio at 70 weeks was 4.05 and 3.48 in the bantam cross and the commercial WL respectively.
IV. DISCUSSION

The production results achieved by these birds are extremely encouraging in comparison to the commercial WL. Overall there is a superior average egg weight in the bantam cross and production is only 6% lower despite the large reduction in body weight (11.3% at 50 weeks). It is anticipated that the production performance and egg mass output can be further improved by crossing the bantam line with a superior female parent line, further selection of the pure bantam line, or a program of introgression of the bantam genes into elite parent stocks.

The ratio of egg weight to body weight in the bantam cross was markedly superior to the commercial WL and illustrates the large egg size relative to body size.

Mathematical simulations indicate that feed consumption will be reduced by approximately 5-6% if the egg mass of the bantam cross and commercial WL were equivalent. In others words, the lower egg mass recorded in the bantam cross accounts for a reduction in feed intake of about 5%, whilst the reduction in metabolic body size accounts for a further 5-6% reduction in feed intake.

The global trend towards out of shell egg products will increase the emphasis on feed conversion efficiency at the expense of shell colour and probably very large eggs, and lends strong support to the development of commercial lines as described in this experiment. Additional research will be directed at evaluating bantam crosses with lower body weights. Experimental bantamised White Leghorn crosses have been produced with mature weights as low as 1.37 kg with acceptable average egg weight and production performance.

REFERENCES