INFLUENCE OF PULLET WEIGHT ON PRODUCTION AND CLOACAL HAEMORRHAGE IN LAYERS

M. NG, G.B. PARKINSON and P.H. CRANSBERG

Summary

Laboratory model studies undertaken in cages have indicated that oviduct haemorrhage and/or picking behaviours in commercial layers are not uniformly distributed across the life of the laying flock. These problems are accentuated at stages that correspond to periods of high metabolic pressure (peak production and peak egg mass). Comparative studies with individually housed birds indicate that approximately 50% of the cloacal haemorrhage can occur independently of picking behaviours. Furthermore, the incidence of cloacal haemorrhage appears to be correlated with low body weights in early lay and the production of disproportionately large eggs. Birds that experience cloacal haemorrhage in early lay can continue to manifest the problem, whilst some birds repair the damaged oviduct very rapidly. Superior management of the transition from the rearing to the laying phase and more attention to body weight management is likely to reduce the extent of cloacal haemorrhage.

I. INTRODUCTION

Anecdotal evidence from studies of commercial laying flocks suggests an important link between body weight, production, cloacal haemorrhage and mortality. High levels of blood stained shells, recorded in many under weight flocks, seem likely to reflect significant levels of cloacal haemorrhage/trauma and may be important in the health and mortality of a flock. Cloacal or oviduct haemorrhage could be linked to oviduct prolapse, salpingitis/egg peritonitis and cannibalism.

In most of the research to date the relationship between bodyweights, production, and mortality have been performed on flocks with bodyweights close to optimum. The main conclusions drawn from these studies relate to feed efficiency, egg size, and egg mass (Balnave, 1984; Harms et al., 1982; Leeson and Summers, 1987). Very little research has examined the thresholds of body weight, below which mortality may be manifested. Furthermore, there is relatively little empirical knowledge about the causes of mortality in under-weight flocks or birds that have been clearly pushed below the genetically defined standards for body weight.

The experiment described in this paper attempts to model the farming of brown egg layer pullets that are substantially below the appropriate body weight standards. Eighteen-week-old birds from a commercial flock were selected based on body weight. The light (L) group contained birds weighing less than 1.27kg and the heavy (H) group consisted of birds weighing more than 1.50kg (breed standard is 1.33kg) The flocks were housed in single bird cages, in a temperature-controlled shed, under 16 hours of light. The pullets were fed ad libitum a commercial diet containing 170 g protein, 11.7 MJ metabolisable energy, and 37 g calcium/ kg. Body weight, egg weight, egg production, feed intake, and cloacal haemorrhage and blood stained eggs were monitored from 18 to 36 weeks of age. The experimental birds had no opportunity to undertake picking or cannibalism behaviours, so that oviduct haemorrhage could be studied independently of social behaviours.

Department of Natural Resources and Environment, Agriculture Victoria, Victorian Institute of Animal Science, Attwood, Victoria 3049.
II. RESULTS AND DISCUSSION

Statistical analysis of the data revealed that average body weight at 36 weeks of age of L was significantly lighter than H (P<0.01). The bodyweight patterns of the two groups are shown in Figure 1. The light group had body weights 5-30% below accepted body weight standards at 18 weeks. At 36 weeks of age the majority of L birds were between 10 and 30% below breed standards, however, two of the birds exceeded the breed standard weight. There was a clear increase in predisposition to cloacal haemorrhage in the light group. Despite obvious damage to the oviduct, as indicated by the higher number of blood stained eggs, the incidence of cloacal haemorrhage in the L group was not associated with prolapse or mortality.

Regression analysis confirmed that body weight at 18 weeks of age was strongly correlated with body weight at 36 weeks of age (r = 0.811, P< 0.001). This finding indicates that 66% of the variation in bodyweight at 36 weeks of age is accounted for by initial weight at 18 weeks of age, and is similar to the findings of Balnave (1984). This study indicates that the relationship between weight at 18 weeks and weight at 36 weeks applies over a broad range of initial body weights, and in birds housed in single-bird cages without social competition. Again, this study supports the findings of Harms et al. (1982), Balnave (1984) and Leeson and Summers (1987) that body weight differentials are maintained throughout the laying period.

![Figure 1](image)

Figure 1. Body weight patterns of light (●) and heavy birds (■) from 18 to 36 weeks of age. Error bars are SEM's.

Comparison of total production between each of the body weight groups indicated that the H group produced significantly more eggs between 18 and 36 weeks of age compared with the L group (Figure 2). In contrast, Harms et al. (1982) and Balnave (1984) found that pullet bodyweight did not significantly influence production. This difference may be a reflection of the low body weight range (1.18 kg at 18 weeks of age) used in the current experiment. Leeson and Summers (1987) also found that low body weights in 18-week-old White Leghorns (1.1kg) also reduced egg production between 19-25 weeks by approximately 5%.
Figure 2. Comparison of egg production (% rate of lay) between the heavy (●) and light (■) groups to 35 weeks of age.

Egg size was not significantly different between the two groups (Table 1). In fact, egg weight was well below breed standards in both groups. This lower egg weight may have reduced the incidence and severity of cloacal haemorrhage in both groups.

Table 1. Production comparisons between the two bodyweight groups from 18 to 36 weeks of age.

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Egg size at 36 weeks of age (g)</th>
<th>Average daily food intake (g)</th>
<th>Number of birds laying blood-stained eggs</th>
<th>Proportion of blood-stained eggs (%)</th>
<th>Egg:body weight ratio at 36 weeks of age (g egg/kg body weight)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>21</td>
<td>54.5(1.18)</td>
<td>95.06(2.06)</td>
<td>9&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.23</td>
<td>3.37(0.085)&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>H</td>
<td>24</td>
<td>56.3(0.75)</td>
<td>113.00(2.43)</td>
<td>3&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.22</td>
<td>2.75(0.057)&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Means in the same column without a common superscript are significantly different, P<0.05.

The L group laid substantially more blood stained eggs than the H group. Approximately 40% of the L group produced at least one blood stained egg whereas only 10% of the H group produced a blood stained egg (Table 1). In the L group, 15% of birds produced multiple blood stained eggs, and 10% produced eggs with severe blood staining on the shell surface.

The egg:body weight ratio at 36 weeks of age was significantly larger (P<0.05) in the L group than in the H group. This finding suggests that low body weight increases egg:body weight ratio, despite a slight though non-significant decrease in egg size.

III. CONCLUSION

Overall, these findings suggest that extremely low body weights at 18 weeks of age are associated with a reduction in total production to 36 weeks, with a significant increase in the number of birds laying blood stained eggs, and with an increased proportion of eggs that are blood stained. The significance of cloacal haemorrhage to problems such as cannibalism and salpingitis remains to be determined, but it could be hypothesised that severe cloacal haemorrhage frequently observed in under-weight flocks or flocks with a large proportion of under-weight birds, could be a critical factor(s) in determining flock mortality. More work is
also needed on the tolerance of both under-weight and normal body weight flocks to changes in average egg weight induced by nutritional strategies.

REFERENCES