Management factors affecting the use of pasture by table chickens in extensive production systems

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ABSTRACT

Whether chickens will make proper use of pasture is a problem experienced by producers of free-range and organic chickens. The aims of this project are to identify husbandry techniques and aspects of system design that encourage good pasture use. Two studies have been conducted comprising a winter and a summer flock. The aim of the winter flock was to examine the effect of outdoor artificial shelter on pasture usage. This was done for female Ross 308 birds grown to day 56, and ISA 657 birds grown to day 81. In summer, ISA 657 birds were grown to day 81. Treatments were either standard or enriched brooding, with pasture only or enriched pasture. Standard brooding was in a controlled environment house until day 42. Enriched brooding was in naturally ventilated houses in which birds had sight of pasture from an early age and access from day 21. Enriched pasture included artificial shelter, with straw bales and a conifer "wigwam" used to provide natural shelter. Chickens may be encouraged to go outdoors by brooding in a less "controlled" environment than that used for intensive broilers, and by allowing access to pasture when young. However, mortality was higher. Conifer wigwams may offer a means for more even use of pasture and better distribution of droppings.

Keywords: table chickens, pasture, extensive production, shelter

INTRODUCTION

This project addressed some of the technical problems experienced both by organic chicken producers and by producers of conventional free-range and "traditional" free-range chickens (the latter being a marketing term requiring a specific and prolonged growing period). The aims of this project were to identify husbandry techniques and aspects of system design that encourage good pasture use. The project will provide information to organic chicken producers on simple and inexpensive means of encouraging pasture usage applicable to fixed or mobile housing systems. This will help producers to optimise pasture use and reduce sward damage and the localised build-up of droppings.

MATERIALS AND METHODS

To date, two studies have been conducted, one a winter flock, the other with a summer flock. The aim of the winter flock study was to examine the effect on pasture usage of providing outdoor shelter. This was done separately but at a concurrent start date for two breeds - female Ross 308 birds grown to day 56, and ISA 657 birds grown to day 81. The study used 165 birds in each of four houses. Outdoor shelter was a strip of synthetic porous windbreak 1m high running down the length of a 25.5m paddock. In addition there was a 'table top' shelter measuring 1 m x 2m sited at the end of the paddock. The latter provided aerial shelter away from the house. A control treatment was pasture only. There were two replicates of each pasture treatment (330 birds) for each breed. Brooding was in a controlled environment house and birds were transferred to the range facilities at day 28 and day 42 for Ross 308 birds and ISA 657 birds, respectively. After brooding, daily access to range was provided. Measurements were made of live weight, feed usage, FCE, mortality and pasture usage (using a system of transponders and receivers located at key points below ground in the paddocks). Stocking density on the range was 2m² per bird.

In the summer flock, ISA 657 birds were grown to day 81. There were eight houses each holding 165 birds. The treatments were either standard brooding or enriched brooding, with either pasture only or enriched pasture. Standard brooding was in a controlled environment house until day 42, whereas enriched brooding was in naturally ventilated houses where the thermal and visual environment was less controlled, and in which birds had sight of the pasture from an early age and access to pasture from day 21. Enriched pasture included the provision of artificial shelter as described for the summer flock, but in addition straw bales and a 2m high conifer "wig-wam" were used so as to provide natural shelter. There were two replicates of each treatment (330 birds). Measurements were as described for the winter flock.

RESULTS

Winter flock (results given for ISA 657 birds only)

Pasture usage was affected by weather conditions with fewer birds being detected outdoors in windy and wet weather. Multiple regression analysis produced the following equation, relating the number of transponder detections on range to weather conditions. Weather conditions for the winter flock (for the 39 period during which the birds had access to the range) are given in Table 1.

$$N = 67.9 - 10.8T_{min}{}^{\circ} + 4.63T_{max}{}^{\circ} - 0.061W + 2.37R$$

where: N = number of detections per day; T_{min} = minimum ambient temperature, ^{o}C; T_{max} = maximum ambient temperature, ^{o}C; W = wind run, km; R = rainfall, mm; $r^2 = 0.39$, $p<0.05$ (applicable to all birds on both treatments).

The provision of shelter outdoors tended to encourage birds to range further down the paddock (evidenced by the number of transponder detections at the furthest point from the houses) than the provision of pasture only. Even when

provided with shelter the highest number of detections outdoors was at the receiver near to the pophole.

Birds provided with shelter tended to have a lower feed intake between day old and day 81 (92 g Vs 96 g /bird.day), but differences were not statistically significant. This resulted in ISA 657 birds on the pasture only treatment being heavier at day 81 than birds provided with pasture plus shelter (2.332 kg and 2.279 kg/bird, respectively; $p<0.05$). There were no effects of pasture treatment on FCE or mortality between day old and day 81.

Table 1. Daily weather conditions experienced by as-hatched ISA 657 birds in winter[a] at ADAS Gleadthorpe

	Min. ambient temperature (°C)	**Max. ambient temperature (°C)**	**Rainfall ($mm.day^{-1}$)**	**Windrun ($km.day^{-1}$)**
Minimum	- 6.4	4.3	0.0	6
Maximum	7.9	15.7	31.4	404

[a] *Between 14/3/00 and 17/4/00*

1. Summer flock

Birds brooded in the controlled environment house ranged significantly less than birds brooded in the free range facilities (e.g. between days 65 to 74, $p<0.05$). Conifer wigwams provided in the enriched pastures were very attractive to the birds, especially when chicks were brooded in the free range facilities with early access to pasture. In the latter treatment the highest number of detections was at the conifer wigwam rather than at the pophole.

There were no effects of brooding treatment and pasture design on feed usage or FCE between day old and day 82, nor on live weight at day 82. FCE between day old and day 82 was 0.327 (FCR 3.062), and as expected this was better than that for the winter flock.

Chicks brooded in a controlled environment house had lower mortality ($p<0.01$) between day old and 28 days (mean 0.8%) than chicks brooded in the free range facilities (mean 6.5%). Deaths in chicks brooded in the free range facilities were due to yolk sac infection, nephritis and the failure to find feed and water. Yolk sac infection was the only cause of mortality in chicks brooded in a controlled environment.

Table 2. Daily weather conditions experienced by as-hatched ISA 657 birds in summer[a] at ADAS Gleadthorpe

	Min ambient temperature (°C)	**Max ambient temperature (°C)**	**Rainfall (mm)**	**Windrun (km)**
Minimum	2.1	14.0	0.0	4
Maximum	15.4	27.0	22.8	399

[a] *Between 26/07/00 and 20/09/00*

Table 3. Total number of detections (mean of 4 or 2 pens) in 10-day periods according to treatment.

Treatment		Days: 35 to 44	45 to 54	55 to 64	65 to 74
Brooding					
Enriched		586	251[#]	290	171*
Standard		1.5	61	110.5	72.5
Pasture					
Enriched		304[¶]	90	148	90
Standard		283[¶]	222	255	153
SD[=]		182.0	59.4	37.2	76.1
Brooding * Pasture interaction					
Enriched	enriched	608	116	218	135
Enriched	standard	564	387	363	207
Standard	enriched	0[¶]	65	79	45
Standard	standard	3[¶]	58	142	100
SD		257.3	84.0	52.7	107.6

[#], P<0.1; *, P<0.05; [¶], not relevant as treatment not yet started; [=], SD applicable both to brooding and pasture comparisons

Transponder detections were qualified by visual observations. For example, Antenna 1 was close to the exit from the shed and showed a predominance of detections in the groups that had access to pasture only (i.e. unenriched pasture), regardless of brooding treatment. By contrast, Antenna 6 was close to the wigwam in treatments with enriched pasture, and to a perimeter fence in treatments with pasture only (at the same location in each paddock). There was a predominance of detections at this antenna in enriched pasture treatments, regardless of brooding treatment. The overall impression was one of birds with access to enriched pasture roaming more widely, while those with pasture only stayed closer to the shed.

DISCUSSION

Young birds made good use of pasture on warm, still, dry summer days between the ages of 21 and 42 days. They subsequently continued to use pasture more than birds kept indoors up to day 42. However, although there was no significant effect of pasture enrichment on the total number of detections, there was a clear difference in behaviour. Those with enriched pasture spent a great deal of time around the conifer wig-wam while those with pasture only were detected more frequently close to the shed entrance, suggesting that they did not venture so far into the paddock. The wigwam in particular attracted the birds in the enriched pasture. There was relatively little use of the windbreak, the straw bale or the covered shelter at the far end of the paddock.

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