Intensive selection for growth in broilers has not altered normal feeding behaviour

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Introduction Selection for increased growth rate in livestock may be accompanied by increases in requirements for energy and nutrients. It has been suggested that intensively selected broilers have altered food intake control mechanisms and could be constantly hungry, due to their high resource demands (Bokkers *et al*. 2004), which would be a major welfare issue. Such alterations in food intake control mechanisms as a side-effect of genetic selection would lead to changes in the feeding behaviour of birds, such as the clustering of visits into meals and the probability of birds starting a new meal in relation to the time since the last meal. The aim of this study was to test whether broilers intensively selected for growth showed any alteration in the structure of their feeding behaviour that would indicate a change in the underlying hunger and satiety control mechanisms.

Materials and methods Data of visits to feeders from 16,823 broilers aged between 2 and 5 weeks from four genetic lines in 12 hatches per line were used for analysis. Lines differed in their degree of selection for growth, with average live weights of 2.4, 2.1, 1.8 and 1.6 kg at 35 days of age for lines A, B, C and D, respectively, with all birds being fed on the same high quality food. Visit data was grouped into meals using meal criteria, were estimated per hatch within lines as described by Howie *et al*. (2008). The probability of birds starting a meal within the next min (Pstart) was calculated as the number of intervals > t and ≤ t + 1 divided by the number of intervals > t, where t = interval length in minutes between two subsequent visits to feeders by the same bird. Differences in bouting between the lines were analysed by calculating the frequency ratios between the relative frequencies of the bin containing the meal criterion and the bin containing the peak in frequency of the long intervals, using histograms of intervals between visits. Meal characteristics were compared between lines using ANOVA in GENSTAT 11, and the effect of stocking density was estimated using REML analysis, with stocking density within line as a fixed effect.

Results No significant difference in meal criteria was found between the lines. Similar patterns of bouting were observed across all the lines, and even the line with the highest growth rate showed a normal bouted structure (Figure 1). The faster growing lines (A and B) took longer and larger meals, but fewer per day (all $p < 0.001$), than the slower growing lines (C and D), even when the effects of differences in stocking density were accounted for. Birds of all lines showed a low probability of starting to feed immediately after a meal and similar proportional increases in this probability with time for lines A, C and D but slightly lower values for line B. As a result of the large number of data included in the analyses, small differences between the lines in the degree of bouting and change in starting probability were statistically significant but did not vary consistently with selection intensity.

Table 1 Mean and residual sd of

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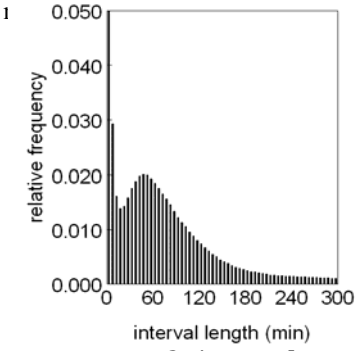

ɔouting across

Line:	A	B	C	D	RSD
Meal criterion (s)	1200	1050	1050	1210	258
Meal size (g)	12.2	13.3	7.83	7.27	2.67 ***
Meals per day	12.2	9.83	15.3	14.7	3.08 ***
Meal duration (min)	7.38	7.20	5.68	6.18	2.97 ***
Feeding rate (g/min)	2.55	2.50	2.35	2.28	0.79 ***
Average daily intake (g)	140	124	115	101	13.6 ***
Degree of bouting	1.53	1.76	1.64	1.56	0.21 *
Change in Pstart	1.25	1.52	1.73	1.61	0.36 *

)1; * = significant at $p < 0.05$

Figure 1 Histogram of intervals between visits for line A. The proportion of intervals in the first bin (0.52) is not shown for clarity of the distribution at longer intervals; the same pattern was observed in all lines.

Conclusions No alteration of the overall organisation of short-term feeding behaviour into bouts in relation to selection intensity was found. This study suggests that although there are differences in meal patterning between genetic lines in these broilers, the structure of short-term feeding behaviour that results from intensive genetic selection for growth is similar to that observed in many other species, ranging from insects to horses. The similar proportional increase in the probability of birds starting a new meal with time since the last meal and the lower meal frequency of lines A and B compared to C and D is not consistent with the hypothesis that intensive selection for growth leads to birds that are constantly hungry.

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References

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