International Journal of Poultry Science 1 (5) : 158-160, 2002

Growth of Beaks in Layers Following Re-trimming

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Abstract: Two experiments were conducted with 14 week-old pullets to examine whether severity of hot blade re-trimming and cauterisation time affected re-growth of beaks up to 30 weeks. In both experiments block cuts of the beak were made such that 5, 6 and 7 mm of the upper beak remained from the outer edge of the nostril to the end of the beak with a 2 mm step to the lower beak. A cauterisation time of 2 and 3 seconds was used in the first and second experiment respectively. Upper beak length at 30 weeks for layers in experiment 1 was not significantly different ($p>0.05$) between the treatments with upper beaks re-growing to 8.3, 8.7 and 9.1 mm respectively for the 5, 6 and 7 mm treatments. Similarly there was no difference in the length of the step at 14, 18 or 30 weeks of age. However, in the second experiment, the length of upper beaks (cut to 5, 6 and 7 mm at 14 weeks) were significantly different ($p<0.05$) at 30 weeks and only re-grew to 6.8, 7.9 and 8.9 mm respectively. Likewise a significant difference ($p<0.05$) in the length of the beak step was maintained up to 30 weeks. It is considered that the increase in the cauterisation time used for pullets in second experiment prevented substantial beak re-growth, especially for the severe levels of trimming.

Key Words: Laying hens, beak trimming, beak length and cauterisation

Introduction

In sheds where light intensity cannot be controlled, beak trimming of chickens is performed early in the life to decrease injuries caused by the behavioural vices of cannibalism, bullying and feather and vent pecking (Glatz, 2000). Beak trimming involves the partial removal of the upper and lower beak using an electrically heated blade. Without a correct beak-trimming program, the egg producer risks heavy losses of chickens and pullets from cannibalism and in the laying stage from protrusion and vent pick outs (Glatz, 2000). Birds are normally trimmed at 7 to 10 days-of-age and because beaks re-grow a follow up trim occurs at 12-14 weeks. Contract pullet rearers have reported difficulty in rearing pullets to target body weight. It was suspected that the failure of some birds to reach target weight might be due to a variation in the severity of beak trimming and cauterisation time which could result in different rates of beak growth, lower feed intake and body weight (Glatz, 2000). A field survey by Woolford *et al.* (1990) found that there was variation in the length of beaks of hens, supporting the idea that either there were differences in the level of re-trimming or there was variation between birds in beak growth following re-trimming. It is known that when more than half the beak is trimmed re-growth is reduced (Beane *et al.,* 1967; Strong, 1990) compared to removal of a quarter or half of the beak (Kuo, *et al.,* 1991). Beak-trimming crews use various blade temperatures and cauterising times. Some operators use lower blade temperature and longer cauterising times and others use a hotter blade with shorter cauterising times (Glatz, 2000) which may also contribute to variability in beak re-growth.

The objective of this study was to determine if different levels of re-trimming and cauterisation time influenced the re-growth of beaks.

Materials and Methods

Birds and management: The study was done on 2 commercial poultry farms. The birds were firstly housed on a contract pullet growers farm and then on a layer farm. A contract beak trimmer with extensive commercial experience used a Lyon hot blade trimming machine to block cut both beaks. The beak trimmer judged by eye the half way point on the upper beak where the block cut was made for 10 day-old chickens. From 0-8 weeks chickens (Hyline strain) were raised on the floor and at 9 weeks transferred to rearing cages (53 cm x 45 cm x 53 cm). At 18 weeks birds were taken to a layer farm and housed in cages (45 cm x 45 cm x 40 cm). Lighting was held constant at 16 h per day. A commercial chick starter diet was fed from 0-6 weeks, a grower diet from 7-18 weeks and a layer diet from 19 weeks-of-age. A second experiment was conducted with the same strain of pullets on the same farms the following year.

Measurements and beak trimming: Sixty pullets (14 weeks-of-age) were selected at random from a flock of 2,000 birds, wing banded and housed 4 per cage. Prior to re-trimming the upper beak of each bird was measured with a vernier calliper. A pen mark was placed on the upper beak 5, 6 and 7 mm from the edge of the

Table 1: Length of upper beak and beak step in birds at 14, 18 and 30 weeks-of-age

	Age (weeks)					
	14	18	30	14	18	30
Treatment (mm)	Upper beak length (mm)			Step between upper and lower beak (mm)		
Experiment 1						
5	5.0	7.084b	8.323	1.975	1.103b	1.329
6	6.0	7.418b	8.786	2.235	1.848a	1.787
7	7.0	8.089a	9.090	1.945	1.250b	1.502
LSD (P=0.05)		0.483	NS	NS	NS	NS
Experiment 2						
5	5.0	5.857a	6.757a	2.132a	1.177	1.932a
6	6.0	6.692b	7.898b	1.648b	1.363	1.363ab
7	7.0	7.499c	8.940c	0.996c	1.042	0.650b
LSD (P=0.05)		0.39	0.72	0.35	NS	0.75

LSD = least significant difference, NS = not significant. Means within columns and experiments followed by the same letter are not significantly different at P<0.05.

external nare for the three respective groups to enable the beak trimmer to see where the block cut had to be made. The operator used a Lyon trimming machine to re-trim pullets leaving 5, 6 and 7 mm with a step of 2 mm from the top to the bottom beak. The beak was placed squarely onto the cutting blade. A blade stop was used to help the operator align the blade to the position where the cut was made. The blade (dull red in colour) was gently lowered onto the top of the beak, with the beak kept in position for 2 seconds to allow cauterisation to occur as the blade made contact with the bottom bar. Care was made to ensure the bird did not move during cutting. Cauterisation time was increased from 2 to 3 seconds for the second experiment. The beak trim operator judged the time of cauterisation. Body weight, upper beak length and length of step from the upper beak to the lower beak was measured at 14, 18 and 30 weeks for both experiments.

Experimental analysis: Prior to re-trimming, birds (14 weeks-of-age) were randomly allocated to each of the treatment cages. Each treatment consisted of 5 replicate cages each holding 4 birds. At 18 weeks-of-age, the 3 re-trimming treatments were transferred to a block of 15 cages in the layer shed and housed in the same groupings determined in the initial randomisation. Base SAS software (SAS Institute, 1988) was used to perform an analysis of variance (by GLM procedure) to examine the effects of different levels of re-trimming on upper beak length, the length of the step from the upper to the lower beak and body weight. Duncan's Multiple Range Test was used to separate treatment means.

Results

Experiment 1: At 18 weeks-of-age, the upper beak length of birds trimmed to 5 and 6 mm were significantly (P<0.05) shorter than the 7 mm treatment group (Table 1), but by 30 weeks of age there was no difference in beak length between the treatments (P>0.05). The length of the step between the upper and lower beak was significantly less (p<0.05) for the heaviest and lightest trims compared to the moderate trim (6 mm) at 18 weeks but no differences in the length of the step were apparent by 30 weeks-of-age. At 18 weeks the body weight of pullets (Table 2) trimmed to 5 mm were significantly lower (P<0.05) than the 7 mm treatment with the 6 mm birds intermediate. The body weights (Table 2) of the treatment birds at 30 weeks, however, were not significantly different (P>0.05).

Experiment 2: In contrast to experiment 1 a significant difference was maintained in upper beak length between the treatments at both 18 weeks and 30 weeks (Table 1). The difference between treatments in length of the beak step was inconsistent at the different ages, although by 30 weeks of age, birds that had been more severely trimmed showed a greater difference (P<0.05) in the length of the beak step. At 18 and 30 weeks there was no significant difference in body weight for the treatments (Table 2).

Discussion

The most interesting and surprising aspect of this trial was that re-growth of the beak was greatest for the most severe level of trim in the first experiment yet the trend was reversed in the second experiment. It is considered the increase in the cauterisation time prevented substantial re-growth of the beak of the pullets, which had been severely trimmed. Lunam *et al*. (1996) report that severe trimming with 4 second cauterisation results in removal of sensory receptors in the beak which inhibits nerve recovery and perhaps beak re-growth.

In experiment 1, we have observed that beaks eventually regrow to the same length. This result is in conflict with a qualitative survey of beak lengths by Woolford *et al.* (1990) where a considerable variation in beak lengths was observed. Consultation with experienced beak-trim operators in Australia revealed that the major factors

Table 2: Body weight of birds (g) at 14, 18 and 30 weeks-of-age

Treatment (mm)	Age(weeks)		
	14	18	30
Experiment 1			
5	1021	1162b	1865
6	1064	1241ab	1928
7	1049	1319a	1841
LSD (P=0.05)	NS	133	NS
Experiment 2			
5	1166	1178	1690
6	1181	1177	1684
7	1226	1192	1660
LSD (P=0.05)	NS	NS	NS

LSD = least significant difference, NS = not significant. Means within columns and experiments followed by the same letter are not significantly different at P<0.05.

affecting the quality of beak trimming are consistently achieving appropriate beak length and shape of beak to minimise further pecking (Glatz, 2000). The Australian State and Territory Agriculture Ministers recommended the development of a national beak trimming accreditation program (Glatz *et al.,* 2002) to enable industry to achieve a consistent, high quality standard of beak trimming. The standards for beak trimming (Bourke *et al.,* 2002) are based on national competency standards, which are statements of the skills required for effective performance in an industry.

In the two experiments reported in this paper, cauterisation time was the main difference in the beak trimming process. Beak-trimming crews use various temperatures and cauterising times. Some operators use lower blade temperature and longer cauterising times and others use a hotter blade with shorter cauterising times. The use of a rolling motion to cauterise the beak is recommended as a means of inhibiting re-growth and to prevent the formation of sharp edges on the outer edges of the beak (Glatz, 2000).

Cauterisation had a substantial influence on the re-growth of beaks. In experiment 2 differences in beak length was maintained between the treatments and the propensity for re-growth is limited when cauterisation time is increased probably due to depletion of receptors in the beak tissue (Lunam *et al.,* 1996). Re-growth was reduced by half in experiment 2 for the 5 and 6 mm treatments as a result of the increase in cauterisation time, but re-growth of the 7 mm treatment was unaffected by cauterisation time. Lunam *et al.* (1996) report that nerves will regenerate after moderate re-trimming and allow beak receptors to become functional possibly allowing re-growth of beak. It was difficult for the beak trim operator to achieve the exact beak step of 2 mm from the top to the bottom beak especially when cauterisation time was increased. The differential growth of the upper and lower beak as the bird aged may be due to sloughing of dead tissue from the beak stump.

In this trial and in a previous study (Glatz, 1987) it was shown that severity of trimming has a significant effect on body weight in the first four weeks following trimming, but thereafter body weights recover to normal levels. In experiment 2, body weight of all treatment groups were lower than experiment 1 indicating that extra cauterisation time might have had a significant effect on feed intake and body weight. In Australia it is generally accepted that a block cut made of both beaks at the half way point of the upper beak at 5-10 days results in consistent beak trimming and the need for undertaking a re-trim at 10-12 weeks is reduced (Glatz, 2000). The results of this experiment confirm the work of Beane, *et al.* (1967) who reported beak re-growth was dependent on cauterisation time and amount of beak removed.

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