Research Notes

Comparison of beak-trimming methods on early broiler breeder performance

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ABSTRACT Beak trimming is necessary in commercial broiler breeders to prevent or decrease trauma as they mature. Two common beak-trimming methods were evaluated by early performance comparison with nontrimmed chicks (NBT). The robotic electrocautery device (ECD) trims and cauterizes the beak tip. The robotic infrared beak-trimming device (IBT) applies an infrared light beam to destroy the live basal tissue while leaving the hard corneum intact for the first approximately 10 d. In 2 experiments, day-of-hatch Ross 708 by-product chicks were obtained from a local hatchery, where 1/3 of the chicks were trimmed using IBT. All chicks were then transported to another hatchery where 1/3 were trimmed using ECD and 1/3 were NBT. Personnel at each hatchery were highly experienced and skilled with their respective technique. All chicks were then transported to University of Arkansas facilities. Before placement in each experiment, chicks were individually neck-tagged and weighed, and in experiment 1, beaks were measured using a digital caliper. A small but significant transient reduction in BW gain was observed at 14 d due to ECD as compared with NBT controls, although ECD was not different than IBT in experiment 1. In experiment 2, IBT birds were significantly heavier at 11 d by 7.8 and 8.7 g than the NBT or ECD, respectively. However, at d 21 and 42, no significant differences in BW or BW gain were observed. When beak trimming was performed on day of hatch by skilled and experienced personnel, little measurable effect on early performance was observed during the first 6 wk of life. Decreased broiler performance is generally considered a sensitive indication of physical or psychogenic stress. Given the marked reduction in beak-inflicted trauma with beak trimming birds as they reach sexual maturity, these results suggest that when properly performed, neither of these beak-trimming methods causes sufficient physical or psychogenic stress to markedly affect early growth rate.

Key words: beak trimming, early performance, body weight

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INTRODUCTION

Beak trimming has become an accepted procedure for many integrators and breeders to aid in the prevention of feather pecking and cannibalism. Beak trimming of poultry has been criticized because of the potential acute or chronic pain that can be incurred by the chick (Hughes and Gentle, 1995; Glatz, 2005; Kuenzel, 2007). Beak-trimmed layers have been shown to have a lower rate of mortality, primarily due to less cannibalism (Lee and Craig, 1991). Beak trimming is also known to improve feed conversion due to less feed waste (Blokhuis et al., 1987).

Research regarding the effect of beak trimming on broiler breeders is limited. Andrews (1977) demonstrated that broilers beak-trimmed at either day of hatch or at 10 d showed no significant differences in BW from control nontrimmed broilers until 8 wk of age, at which time the beak-trimmed broilers weighed significantly less than controls. Gentle and McKeegan (2007) reported that broiler breeder chicks beak-trimmed on day of hatch with either the infrared beak-trimming method or hot blade method had lower BW under feed restriction feeding at 21 d, and chicks trimmed with the hot blade method had significantly lower BW at 42 d. Industry management policies have justified beak trimming based on the reduction of injuries due to pecking trauma, but these policies have not considered observations during the first few weeks of a chick's life. There are 2 commonly utilized beak-trimming methods in commercial operations: robotic electrocautery device, or hot blade (e.g., Lyon Electric Co., San Diego, CA), and the robotic infared beak treatment (Nova-Tech Engineering, Willmar, MN). Significant stressors, whether psychogenic or physical, including stress associated with beak trimming at older ages, are well known to decrease growth rate in broiler chickens (North and Bell, 1990). The objective of the present study was to investigate the effect of beak-trimming methods per-

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formed on day of hatch on early performance in broiler breeders. In this study, beak trimming was performed by highly experienced personell from primary breeder hatcheries for these experiments.

MATERIALS AND METHODS

General Procedures

These experiments were approved by the Institutional Animal Care and Use Committee of the University of Arkansas. In each experiment, day-of-hatch Ross 708 chicks were obtained from a local hatchery. Chicks were randomly assigned to one of 3 treatment groups: nontrimmed chicks (NBT), robotic infared beak treatment (IBT), or robotic electrocautery device treatment (ECD). In an attempt to ensure that each beak-trimming method was performed to the greatest standards, each beak-trimming method was performed by professionals specifically trained for each method. In both experiments, 1/3 of the chicks were beak-trimmed with the IBT before departure from the source hatchery. All chicks were transported to another hatchery where another 1/3 of the chicks were beak-trimmed with the ECD and the other 1/3 remained untrimmed (NBT).

Experiment 1

In experiment 1, nine hundred day-of-hatch chicks were divided into 3 treatment groups (n = 300 per group). Once the chicks were neck-tagged and initial weights were recorded, initial beak measurements were made. Using a digital caliper (resolution 0.01 mm; accuracy ±0.02 mm), the beak measurements were determined from the rostral point of the nares to either the beak tip for the NBT, the blanch line for the ECD chicks, or blanch line for the chicks that were trimmed using the IBT. Chicks were co-mingled in a common area measuring 83 m^2 with ample feeder and water space and age-appropriate environmental temperature with supplemental radiant heat brooders on fresh wood shavings. All chicks had feed and water ad libitum. Chicks were fed a corn-soybean meal base chick starter ration formulated to meet or exceed NRC (1994) recommendations. Body weights were individually determined at 1, 4, 7, 14, and 21 d of age, and beak measurements were made at 1, 14, and 21 d of age. All beak measurements were made by a single individual for all groups on each measurement day.

Experiment 2

In experiment 2, two thousand sixteen day-of-hatch chicks were divided into 3 treatment groups of 672 chicks. Upon arrival from the hatchery, chicks were neck-tagged, and initial weights were recorded. Using a completely randomized block design, chicks were randomly assigned to 16 replicate pens per treatment group, each pen measuring 5 m^2. Chicks were placed on fresh wood shavings and provided feed and water ad libitum with age-appropriate environmental temperature with supplemental radiant heat brooders. Chicks were fed a corn-soybean meal starter ration from 0 to 4 wk and a grower ration from 4 to 6 wk. Each diet was formulated to meet or exceed NRC (1994) recommendations. Feeding and lighting schedules were managed following the Tyson Broiler Breeder Pullet Management Guidelines (Tyson Foods Inc., 2007). Body weights were determined at 1, 11, 21, and 42 d of age.

Table 1. Effect of beak trimming on beak length, experiment 1[1,2]

	Beak length (mm)		
Item	d 1	d 14	d 21
NBT[3]	6.4 ± 0.23[a]	9.5 ± 0.02[a]	11.5 ± 0.06[a]
IBT[4]	2.1 ± 0.02[c]	5.7 ± 0.04[c]	7.4 ± 0.05[c]
ECD[5]	3.8 ± 0.03[b]	5.9 ± 0.03[b]	7.9 ± 0.05[b]

[a–c]Different letters within a column indicate significant differences between treatments within each experiment ($P < 0.05$).

[1]Values presented as mean ± SE.

[2]Means represent 300 chicks per treatment group.

[3]NBT = no beak treatment.

[4]IBT = infrared beak treatment, measured to blanch line at d 1 or beak tip at d 14 and 21.

[5]ECD = electrocautery device, measured to the remaining beak tip at each time point.

Statistical Analysis

Data from each experiment were subjected to ANOVA procedures within ages using the GLM procedure of SAS (Version 9.1, SAS Institute Inc., Cary, NC). Statistically different means were separated using Duncan's multiple range test ($P < 0.05$).

RESULTS AND DISCUSSION

In experiment 1, at day of hatch, beaks of chicks trimmed with the IBT, measuring to the blanched line caused by the treatment, were markedly and significantly shorter than beaks from chicks from either the NBT or ECD groups. The uniformity in beak length was improved with both beak-trimming methods compared with the NBT group. However, by d 14 and 21, after beak sloughing in the IBT group and scab sloughing in the ECD group, beak lengths were similar, between the groups that were trimmed, although the IBT group remained slightly but significantly shorter than the ECD group (Table 1). At either d 14 or d 21, without careful measurement, beak length differences between these groups would not have been subjectively apparent, even to the careful observer.

In experiment 1, a small but significant difference in placement BW was observed, with the IBT group (48.6 g) larger than the ECD group (47.5 g) and the NBT group (45.9 g; Table 2). In experiment 1, the initial group for beak trimming was selected by hatchery per-

Table 2. Effect of beak-trimming methods on BW, BW gain, and beak length[1,2,3]

Item	Day of age	BW (g)			BW gain (g)		
		NBT[4]	IBT[5]	ECD[6]	NBT	IBT	ECD
Experiment 1	1	45.9 ± 0.20[c]	48.6 ± 0.19[a]	47.5 ± 0.19[b]	NA[7]	NA	NA
	4	81.4 ± 2.55	81.0 ± 0.46	80.2 ± 0.48	35.5 ± 2.54	32.7 ± 0.41	32.3 ± 0.45
	7	127.1 ± 0.93[b]	131.4 ± 1.04[a]	128.7 ± 0.74[b]	81.2 ± 0.93	82.9 ± 1.04	82.2 ± 0.74
	14	309.4 ± 2.51[a]	306.2 ± 2.42[a]	298.7 ± 2.46[b]	263.4 ± 2.50[a]	257.6 ± 2.42[ab]	251.3 ± 2.47[b]
	21	586.9 ± 5.25	581.0 ± 4.38	589.5 ± 3.85	540.9 ± 5.21	532.4 ± 4.32	542.0 ± 3.83
Experiment 2	1	44.2 ± 0.17	44.6 ± 0.17	44.5 ± 0.23	NA	NA	NA
	11	231.8 ± 1.39[b]	239.6 ± 1.24[a]	230.9 ± 1.35[b]	186.7 ± 3.75[b]	195.2 ± 2.22[a]	186.3 ± 2.6[b]
	21	699.6 ± 6.13	703.7 ± 4.95	700.4 ± 4.82	658.0 ± 5.82	658.6 ± 4.51	652.4 ± 5.15
	42	1,292.3 ± 9.62	1,270.1 ± 7.73	1,289.3 ± 8.38	1,249.7 ± 8.91	1,225.4 ± 7.68	1,244.1 ± 8.18

[a–c]Different letters within a row indicate significant differences among treatments within each experiment ($P < 0.05$).

[1]Values presented as mean ± SE.

[2]Means represent 300 chicks per treatment group for experiment 1 and 16 pens of 42 chicks per pen for experiment 2.

[3]Body weight gain determined by BW − initial BW.

[4]NBT = no beak treatment.

[5]IBT = infrared beak treatment.

[6]ECD = electrocautery device.

[7]NA = not applicable.

sonnel without any consideration to random selection. Thus, it is entirely possible that slightly larger chicks were inadvertently selected for beak trimming by IBT. This possibility was corrected in the second experiment in which a completely randomized block treatment assignment was employed.

By 4 d of age, there were no significant differences in either BW or BW gain (**BWG**) in experiment 1. Although, the IBT group was slightly but significantly larger at d 7 of experiment 1, there were no significant differences in BWG at 7 d of age. By d 14 of experiment 1, both NBT- and IBT-treated groups were significantly heavier than ECD-treated chicks. Although BWG was not different between IBT and ECD chicks, ECD chicks exhibited less BWG than NBT controls. At termination of this experiment at 21 d, there were no significant differences in BW or BWG among these 3 groups. Because of the inadvertent placement weight differences in this experiment, it seems most appropriate to consider BWG in comparing the effects of beak trimming by these 2 methods. The only significant differences in BWG were noted at d 14 in this experiment in which chicks treated by the ECD were significantly (4.6%) smaller than controls but not different from the IBT group. These small differences in BWG were negated during the following week so that by d 21, there were no differences in either BW or BWG. Clearly, any negative effect of beak trimming in this experiment was mild and transient.

In experiment 2, using a completely randomized block design for treatment assignment, there were no differences in BW at placement (Table 2). At the first postplacement weighing in this experiment, d 11, there was again a small but significant increase in BW in the IBT group as compared with either the NBT or ECD groups, similar to the observations at d 7 in experiment 1. However, no significant difference in BWG was detected at d 11. Similarly, there were no significant differences in BW or BWG at either d 21 or 42 in experiment 2 (Table 2).

Taken together the effects of beak trimming by either methodology as employed by commercially experienced experts in these experiments were small and transient. The present data do not support the premise that beak trimming, when properly performed by either method, has a substantial negative effect on growth rate. In fact, when compared with the known and well-documented injury that can occur with sexually mature, non-beak-trimmed poultry exhibiting aggressive feather pecking and cannibalism (Lee and Craig, 1991), proper beak trimming may be one of the most beneficial procedures possible from an animal welfare perspective.

These results differ somewhat from the recent report by Gentle and McKeegan (2007) in which IBT was found to have a less detrimental effect than ECD. The beak-trimming methods utilized in our experiments were performed by hatchery personnel that were both trained and experienced in their respective beak-trimming techniques. Data from the present study suggests that when properly performed by experienced and trained personnel, beak trimming is a humane procedure that is beneficial to the well-being of poultry intended for breeding purposes regardless of the technique or equipment employed.

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