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EFFECTS OF BEAK TRIMMING METHOD AND CAGE DENSITY ON LAYING HENS

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INTRODUCTION

Most poultrymen agree beak trimming is the best method of controlling feather picking, cannibalism and pick-outs. Proper trimming may also have some beneficial effect on feed efficiency by reducing feed wastage. However, beak trimming, if performed improperly or at the wrong age, could have negative effects on feed efficiency, body weight gain, egg size, rate of production and could conceivably contribute to cannibalism and pick-outs. For these reasons, beak trimming is a management tool which deserves the close attention and scrutiny of both rearing and production phases of management.

In California today, there are several beak trimming methods commonly practiced either singularly or in combination. A precision method is often performed between six and ten days of age. Under certain circumstances, this method can serve as a final trimming, lasting through the production life of the hen. Frequently, however, a follow-up trimming must be done between ten and 14 weeks of age.

The moderate method, intended to be a final trim, is accomplished between ten and 14 weeks of age. This technique of removing two-thirds of the upper beak and then one-third of the lower beak, is often used in conjunction with a prior precision trimming at about one week of age.

Finally, the severe method, also done between ten and 14 weeks of age, removes approximately two-thirds of both the upper and lower beaks. As in the case of the moderate method, two cuts are required. The end result of the severe method is that upper and lower beaks are equal in length. As in the case of the moderate method, the severe trimming is commonly preceded by a precision trimming at about one week of age, and is intended to last the duration of the hen's productive life.

Irrespective of the method used, the effectiveness of beak trimming depends on the technician's ability to consistently achieve the critical balance between removing enough beak to prevent regrowth, but not enough to damage the tongue or cause difficulty in eating.

In commercial conditions it is common to observe a wide variety of cage densities, genetic strains of chickens, and beak trimming methods. All these factors may be assumed to interact, affecting layer performance and profitability. An experiment was conducted to evaluate these variables and their impact on first year layer performance.

Experiment:

The experiment utilized 672 pullets consisting of two commercial strains, three

beak trimming methods and two cage densities. The treatments were replicated four times. The chicks were hatched in August and were reared under natural day length conditions in an open-type cage house. At seven days of age all chicks were lightly beak trimmed. Pullets were randomly selected and beak trimmed at 12 weeks of age by one of three trimming methods. Following the completion of the growing period (20 weeks of age), the six groups (three trimming methods for each of two strains) were moved to an open-type lay house and randomly divided and stocked at either three or four birds per 16-inch wide by 12-inch deep wire cage. They were provided artificial morning and evening lights to maintain a constant day length of 17 hours. A standard commercial lay ration of 17 percent protein was provided at this time. The cage densities used resulted in 64 square inches of floor space and 5.3 inches of feeder space for the three-bird cage, and 48 square inches of floor space and 4 inches of feeder space for the four-bird cage.

The trimming methods evaluated were the one-cut method in which both beaks were removed simultaneously, the moderate method and the severe method described earlier. At 20 weeks of age the upper beak length resulting from all three methods was approximately 1/8 inch beyond the nostril. Bottom beaks protruded 0, 1/8, and 1/4 inches beyond the upper beak for the severe, one-cut, and moderate methods, respectively. No beak regrowth was observed in any of the treatments by 56 weeks of age.

Daily egg production and mortality, weekly feed consumption, and monthly egg weight data were compiled and summarized into twelve 28-day periods. All data from the 48-week experiment (20 to 68 weeks of age) were subjected to statistical analyses using the analysis of variance and Duncan's multiple range techniques.

Results:

Egg production was significantly affected by beak trimming method at both densities when strains were averaged together (Table 1). Both hen-day and hen-housed production results favored the severe method.

Neither density nor trimming method significantly affected feed consumption per hen-day (Table 1). The significant differences observed in pounds of feed per dozen were a result of differences in egg production. Again, this trait was improved by the severe trimming method.

Although numerical differences in percent mortality occurred between trimming methods within the 3-bird cage density, these

Table 1. Effects of Cage Density and Beak Trimming Method on Layer Performance[1]

DENSITY/METHOD	EGG PRODUCTION		FEED CONSUMPTION		MORTALITY
	Hen-Day (%)	Hen-Housed (eggs)	Per Hen-Day (lbs)	Per Dozen (lbs)	Of Hens Housed (%)
3 Birds/Cage					
One-Cut	74.8 b[2]	232 ab	.227 (N.S)[3]	3.64 b	15.6 ab
Moderate	77.1 ab	246 a	.228	3.56 bc	7.3 b
Severe	78.0 a	243 a	.227	3.49 c	11.5 b
4 Birds/Cage					
One-Cut	74.9 b	216 b	.231	3.70 b	24.2 a
Moderate	71.5 c	217 b	.232	3.89 a	18.0 ab
Severe	76.0 ab	244 a	.226	3.57 bc	8.6 b

[1]Strains averaged together.
[2]Different letters indicate significant differences ($P \leq 0.05$) within a column.
[3]N.S. indicates non-significant differences ($P > 0.05$).

Table 2. Effects of Cage Density and Beak Trimming on Economic Factors[1]

DENSITY/METHOD	VALUE/DOZEN[2] (dollars)	FEED COST/DOZEN[3] (dollars)	EGG INCOME MINUS FEED COST (dollars)
3 Birds/Cage			
One-Cut	.47 (N.S.)[4]	.33 b[5]	2.84 ab
Moderate	.48	.32 bc	3.24 a
Severe	.47	.31 c	3.18 a
4 Birds/Cage			
One-Cut	.48	.33 b	2.63 bc
Moderate	.48	.35 a	2.35 c
Severe	.47	.32 bc	3.11 a

[1]Strains averaged together.
[2]Assumes egg prices of 50, 43, 26, and 15 cents per dozen—large, medium, small, and peewee eggs, respectively.
[3]Assumes feed price at $9.00/CWT.
[4]N.S. indicates non-significant differences ($P > 0.05$).
[5]Different letters indicate significant differences ($P \leq 0.05$ within a column).

differences were not found to be statistically significant. At the higher density, however, mortality was significantly increased by the one-cut method relative to the severe method (Table 1).

Table 2 presents data dealing with the economic evaluation of the experiment. No differences in egg size due to trimming method or cage density were observed which was reflected in the average value per dozen figure. Significant differences in feed cost per dozen, due to trimming methods interacting with cage density, were detected. These differences were largely due to trimming and density effects on egg production since feed consumption was not influenced by these factors. In the 3-bird cage, the one-cut method significantly increased this cost above the severe method, and in the 4-bird cage, the moderate technique increased feed cost per dozen. Net income (egg income minus feed cost) was also significantly influenced by density and trimming method. While there were no differences due to trimming method in the 3-bird cage, severely trimmed birds clearly earned more money than the other two treatments in the 4-bird cage. The three worst combinations in net income were the moderate and one-cut methods used with 4-bird cage, and the one-cut method used with the 3-bird cage.

Table 3 presents data from five categories where significant density by trimming method interactions were observed. Note that when the severe trimming method was

Table 3. Effects of Adding One Bird Per Cage[1]

Method	EGG PRODUCTION Hen-Day (%)	EGG PRODUCTION Hen-Housed (eggs)	MORTALITY Of Hens Housed (%)	FEED COST Per Dozen (dollars)	EGG INCOME MINUS FEED COST (dollars)
One-Cut	+0.1	-17	+ 8.6	no change	-.21
Moderate	-5.6	+29	+10.7	+.03	-.89
Severe	-3.9	+ 1	- 2.8	+.01	-.07

[1]Value for 4-bird cage minus the value for 3-bird cage.

used, relatively minor differences in eggs/hen housed, mortality and net income between the 3- and 4-bird cage resulted. Further, these data indicate that birds trimmed by the moderate method were least tolerant to increases in cage density.

Over all data analyzed, there were no differences in the pattern of response to either cage density or trimming method between the two strains used. There were, however, notable differences between the strains overall, densities and trimming methods averaged (see summary Tables 4 and 5).

TABLE 4. Summary of Egg Production, Egg Size and Feed Consumption Results

STRAIN/METHOD	EGG PRODUCTION				EGG SIZE		FEED CONSUMPTION	
	Hen-Day		Eggs/Hen-Housed		Egg Weight		Per Hen-Day	
	3 BIRDS (%)	4 BIRDS (%)	3 BIRDS (eggs)	4 BIRDS (eggs)	3 BIRDS (gm)	4 BIRDS (gm)	3 BIRDS (lbs)	4 BIRDS (lbs)
STRAIN A								
One-Cut	76.6	76.8	245	217	58.6	59.5	.226	.234
Moderate	79.8	73.4	248	214	58.7	60.1	.231	.236
Severe	80.1	79.1	245	249	58.9	58.7	.230	.229
Average	**78.8**	**76.4**	**246**	**227**	**58.7**	**59.4**	**.229**	**.233**
STRAIN B								
One-Cut	73.0	73.0	220	214	58.6	58.6	.228	.228
Moderate	74.4	69.7	243	220	58.8	59.3	.225	.228
Severe	75.0	72.8	242	238	57.8	57.8	.224	.220
Average	**74.1**	**71.8**	**235**	**224**	**58.4**	**58.6**	**.226**	**.225**

TABLE 5. Summary of Mortality, Feed Efficiency and Net Income Results

STRAIN/METHOD	MORTALITY Of Hens Housed		FEED CONVERSION Feed:Eggs		NET INCOME[1] Egg Income Minus Feed Cost	
	3 BIRDS (%)	4 BIRDS (%)	3 BIRDS	4 BIRDS	3 BIRDS (dollars)	4 BIRDS (dollars)
STRAIN A						
One-Cut	10.4	26.6	2.28	2.32	3.17	2.80
Moderate	10.4	21.9	2.24	2.42	3.40	2.36
Severe	14.6	14.1	2.21	2.24	3.32	3.39
Average	**11.8**	**20.9**	**2.24**	**2.33**	**$3.30**	**$2.85**
STRAIN B						
One-Cut	20.8	21.9	2.42	2.42	2.51	2.46
Moderate	4.2	14.1	2.33	2.50	3.09	2.35
Severe	8.3	3.1	2.31	2.40	3.04	2.83
Average	**11.1**	**13.0**	**2.35**	**2.44**	**$2.88**	**$2.55**

[1]Assumes egg prices of 50, 43, 26, and 15 cents per dozen—large, medium, small, and peewee eggs, respectively. Feed price assumed to be $9.00/cwt.

Discussion/Conclusions:

Egg production, mortality, feed efficiency, and egg income minus feed cost were the major factors affected by the interaction of cage density and beak trimming method in this experiment. Egg size and feed consumption were not significantly altered by these variables.

Method of beak trimming had greater effects on production, mortality and feed efficiency at the higher cage density. at 4 inches of feeder space and 48 square inches of floor space, the moderately trimmed birds performed poorly; however, by removing one bird per cage the moderately trimmed birds performed similar to the best treatment method.

Genetics are assumed to play an important role in behavior. There have been many reports indicating that one strain of bird is more susceptible to cannibalism than another. While genetics is assumed to be a factor, this experiment did not reveal any significant strain by density or strain by beak trimming method interactions. The two strains responded similarly to both variables. Perhaps if higher densities or other trimming methods were evaluated, differences would have appeared. Further, differences due to strain may have been observed if other strains were used.

Cage density has been shown to influence layer peformance. At the cage densities used in this experiment, it was interesting to note that by using the severe trimming method we could offset the effects of adding one bird per cage. This was evident after evaluating the performance and economic data in Tables 1 and 2. In every category presented, the 4-bird cage/severe method combination performed similar to the best combination at the 3-bird density. These data suggest at limited densities (those used in this experiment), beak trimming method is a critical factor to be considered before housing birds at higher cage densities.

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