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VARYING THE AGE OF SEXUAL MATURITY IN SINGLE COMB WHITE LEGHORN LAYING HENS

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For many years, the standard recommendation for lighting pullets has been to increase the number of hours of light at twenty weeks of age. This was assumed to be the optimum age for stimulating pullets into production.

In recent years, several major breeders have recommended lighting at earlier ages, usually eighteen weeks. Such flocks are observed to commence production earlier and to peak at around twenty-eight weeks of age compared to thirty or thirty-two weeks for pullets lighted at twenty weeks of age.

The following experiment was designed to determine the economic outcome of varying the stimulation age with two strains of commercial White Leghorn pullets.

EXPERIMENTAL PROCEDURE

Location: University of California, Moreno Ranch, Riverside County.

Housing: California open-type with curtains and hot weather foggers. Two hens per 10" or 12" wide by 12" deep cage. Cages placed stair-step and back to back.

Feeding: Ad libitum hand feeding, front feeder.

Watering: One Hart cup for two cages, in partition.

Duration of experiment: January 6 to December 8, 1981 (48 weeks).

Stock: Two commercial White Leghorn strains (A & B). Hatched August 15, 1980.

Experimental design: Completely randomized, 8 replicates of 10 or 12 hens each, 3 treatments.

Measurements: Daily - egg production, feed consumption and mortality. Every 4 weeks - egg weights. Body weights were taken periodically.

Treatments: 18, 20 and 22 week ages at initiation of sexual stimulation.

All pullets were reared in an open-type cage rearing house during a period of decreasing day lengths. No artificial lights were supplied after eight weeks of age.

At 18 weeks of age, one-third of the pullets were moved approximately ten miles and placed in their laying cages. A 17-hour lighting program was initiated immediately and the flock was put on a 17% protein layer diet.

At 20 weeeks of age, the second one-third of the flock was moved into the house

and randomly caged among the previous group. They were placed on the laying ration upon arrival.

The final one-third was also moved at 20 weeks, but were placed in another part of the laying house without exposure to artificial lights and retained on a grower diet until they were moved in with the remainder of the flock at 22 weeks of age.

TABLES OF RESULTS

Table 1. Early Egg Production (Hen-Day %)

Week	Strain A			Strain B		
	18[1]/	20	22	18	20	22
21	5.3	0	0	1.3	0	0
22	24.4	1.5	0.2	8.0	0.2	0.2
23 (161)	50.7	28.4	2.5	26.3	5.5	3.5
24 (168)	79.0	62.0	26.0	52.0	17.0	23.0
25	81.4	78.7	68.6	69.2	42.0	52.3
26	89.5	86.9	84.0	83.8	69.3	72.8
27	91.5	88.9	94.3	91.7	84.3	88.7
28	90.0	85.5	92.4	90.3	86.2	86.4

1/ Age at lighting.

Table 2. Egg Production and Egg Size (20-68 weeks of age)[1]/

	Strain A			Strain B		
	18[2]/	20	22	18	20	22
Hen-Day Egg Production %	82.5a	78.8b	78.7b	76.9b	72.7c	76.2bc
Eggs/Hen-Housed	253ab	242ab	257a	256a	236b	236b
Average Egg Weight, g.	57.7b	59.2a	59.4a	57.7b	58.4ab	59.4a
Large Eggs & Above, %	65.9c	75.7ab	80.7a	65.7c	72.7bc	78.3ab
Total Egg Mass, Kg.	14.6ab	14.3ab	15.2a	14.7ab	13.8b	14.0b

1/ - Means in any row with different letters are significantly different ($P < 0.05$).

2/ - Age at lighting.

Table 3. Mortality Results (% of Hens Housed) 1/

	Strain A			Strain B		
Weeks	18[2]/	20	22	18	20	22
21-24	0	1.0	1.3	0	0	0
25-28	1.3	3.8	0	0	0	0
29-32	5.0	1.3	1.3	0	1.3	1.3
33-36	2.5	1.0	0	0	0	3.3
37-40	0	1.0	0	0	0	1.3
41-44	1.0	0	0	0	0	3.3
45-48	2.5	2.5	0	1.0	3.3	0
49-52	0	1.3	1.3	0	1.0	2.5
53-56	0	1.0	0	0	1.3	2.5
57-60	1.0	0	0	2.5	0	0
61-64	0	1.0	1.3	0	3.1	0
65-68	0	0	2.1	1.3	1.3	0
Total	13.3	14.0	7.1	4.8	11.3	14.2

1/ - The sum of period data may not equal the totals because of rounding errors.

2/ - Age at lighting.

Table 4. Feed Consumption and Feed conversion 1/

	Strain A			Strain B		
	18[2]/	20	22	18	20	22
Feed/Hen-Day, lb.	.227ab	.229a	.227ab	.224ab	.221b	.224ab
Feed/Dozen Eggs, lb.	3.30a	3.50b	3.47b	3.50b	3.65c	3.53bc
Feed/24 oz. Dozen, lbs.	3.25a	3.35ab	3.31ab	3.44bc	3.54c	3.37ab
Feed: Egg Ratio	2.16a	2.23ab	2.21ab	2.30bc	2.36c	2.25ab
Feed/Hen-Housed, lb.	69.5a	70.3ab	74.2bc	74.5c	71.5abc	69.5a

1/ - Means in any row with different letters are significantly different ($P < 0.05$).

2/ - Age at lighting.

Table 5. Body Weights [1/] (pounds)

	Strain A			Strain B		
Age (days)	18[2/]	20	22	18	20	22
158	3.10	3.11	2.95	3.34	3.28	3.11
168	3.25	3.40	3.31	3.50	3.54	3.44
210	3.46	3.59	3.54	3.63	3.66	3.64
420	3.70a	3.85ab	3.76ab	3.77ab	3.91ab	3.97b

1/ - Statistical analyses were run on the420 day sample; means with different letters are significantly different ($P < 0.05$).

2/ - Age at lighting.

Table 6. Economic Results [1/]

	Strain A			Strain B		
	18[2/]	20	22	18	20	22
Feed Cost/Hen-Housed, $	6.25a	6.33ab	6.68bc	6.70c	6.44ab	6.26a
Feed Cost/Dozen, ¢	29.7a	31.5b	31.2b	31.5b	32.8c	31.8bc
Av. Egg Value/Dozen, ¢	46.7bc	47.8a	48.3a	46.7c	47.5ab	48.1a
Egg Income Minus Feed Cost/Hen-Housed, $	3.58a	3.31ab	3.65a	3.24ab	2.90b	3.21ab

1/ - Prices used $9.00/100 lb. feed price; 50¢/dozen for large eggs, 43¢/dozen for medium, 26¢/dozen for small eggs.

2/- Age at lighting.

RESULTS AND DISCUSSION

Egg production rates with Strain A progressed as expected in the early stages of lay with the 18 week stimulated pullets starting into production first and the 22 week pullets last (Table 1). The 18 week Strain B pullets started production first, but the 20 week group did not begin to lay until the 22 week pullets and fell behind for the remainder of the experiment.

Overall hen-day production favored the 18 week groups (Table 2). Both 20 week groups performed poorly for unexplained reasons. It is assumed that the stresses of moving and problems of adjusting to new facilities may have combined to affect the 20 week group to a greater extent than the other two groups. The 18 and 22 week groups did not come into production until the third week following their move. The 20 week group started into lay during the second week.

Egg weights were positively correlated with age at sexual stimulation in every period except the first. The 13 to 15

percent difference in the number of large eggs between the 18 and 22 week treatments was a major factor in offsetting egg production differences. This resulted in a 1.5 cent per dozen higher egg value in the 22 week groups.

Within strains, total egg mass was not significantly different between treatments, but in both strains the 20 week treatment produced the least egg mass.

Overall mortality was somewhat high considering the fact that two-bird cages were used (Table 3). During the fourth period a significant treatment by strain interaction began to appear which remained until the end of the test. Strain A showed significantly lower mortality in the 22 week treatment while Strain B showed exactly the opposite in favor of the 18 week group.

Feed consumption differences were slight and related to egg production (Table 4). Within Strain A the feed to egg ratio was statistically the same between treatments. The low production in the 20 week treatment in Strain B caused this group to have a significantly poorer feed to egg ratio.

Initial body weights were slightly higher in the 18 week treatment reflecting differences in sexual development, but these weights were reversed by the end of the experiment (Table 5). Body weights at 420 days were closely associated with egg weights.

Within strains, net returns were essentially equal between the 18 and 22 week treatments. The 20 week groups experienced a significant $.31 per hen reduction in income (Table 6).

A seven cent difference in large and medium prices was used for this analysis. In real situations, this difference would vary from as little as four cents to as much as fifteen cents during different seasons.

During the early stages of production, the percentage of large eggs varied by as much as 23% between the 18 and 22 week treatments. If these periods coincided with seasons of wide spreads in egg prices, the 22 week treatments would have gained additional advantages.

SUMMARY

This experiment has demonstrated significant differences in performance between the various treatments. It has also demonstrated that recommendations for initiating production are not necessarily interchangeable between strains.

The problems associated with 20 week stimulation are not fully understood and must be studied in more detail before conclusions can be made relative to the causes of their poor performance.

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