

The Effect of Artificial Light on Egg Production of Late Hatched White Leghorn Pullets

By
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Experiments conducted at a number of experiment stations have shown that the use of artificial lights on chickens during late fall and winter increases their egg production. Most of these studies, however, covered only the period of time that the birds were exposed to artificial lights and not the laying year. In general the results from those experiments, which extended through the year, show that artificial lighting increases fall and winter production materially but has little influence on the number of eggs laid during the year.

The experiment reported herein was conducted to get information on the effect of artificial light on egg production of late hatched White Leghorn pullets. As a large percentage of the chicks raised in North Dakota are hatched relatively late in the season and an expansion of rural electrification is anticipated in the near future, the results of the experiment should be of interest.

Description of the Experiment

Two pens of 67 White Leghorn pullets each were housed in two sections of a laying house on October 19, 1944. The pullets were hatched on April 25 and May 5 and 16 and were fairly evenly distributed among the three hatches. In distributing the pullets between the two pens both age and breeding were considered. Less than ten percent of the birds had started to lay when the experiment was commenced.

The same mash and grain ration was fed and management was similar in the two pens except that one pen received no artificial light and the other pen received artificial light from the

time they were housed until April 10. Both morning and evening lights were used in the lighted pen to provide 14 hours of total light per day. Two 40 watt electric lights were used in the 18' x 18' pen. All birds were trapnested. All eggs laid on three successive days each month from November to August, inclusive, were weighed. Body weights to the nearest tenth of a pound were recorded at 8 week intervals. The experiment was ended September 19, 1945, after it had been in progress for 48 weeks.

Results

Pullets which were exposed to artificial light laid an average of 17 more eggs to February 7

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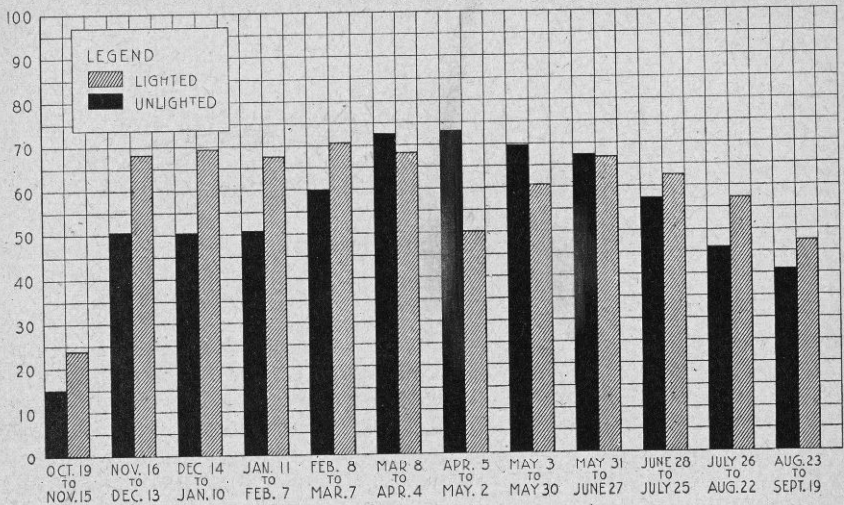


Figure 1.—The effect of Artificial Lights on Egg Production of White Leghorns by 4-week Periods.

than unlighted pullets (Table 1). This is a significant increase in egg production during the period when egg prices ordinarily are highest. The percentages of egg production for the twelve four-week periods are shown in Figure 1. Egg production was appreciably higher in the lighted group for the first five periods (to March 7), but for the next three periods (March 8 to May 30) production was higher in the unlighted pen. During the ninth period the two pens laid at about the same rate, but for the last three periods the lighted pullets laid at a somewhat higher rate.

During the 48 weeks of the experiment the lighted group laid 199 eggs per bird as compared with 181 eggs per bird for the unlighted group, the percentages of production being 59 and 54, respectively. An egg a day per hen is 100 percent production.

Very little difference between the average egg weights of the

two groups was observed. The rate of mortality was higher in the unlighted pen, but post-mortem examinations by the Veterinary Department revealed that many of the losses were from conditions that probably were not influenced by difference in management of the two pens. No appreciable difference between average body weights of the two groups was observed at the beginning and end of the experiment; however, the unlighted birds were a little heavier on the 8-, 16- and 24-weeks weighings. At subsequent weighings the average weights of the two groups were about the same.

Feed consumption data are also given in Table 1. The lighted group consumed more feed per bird, but required less feed to produce a dozen eggs. A higher percentage of the total diet of birds exposed to artificial lights was mash.

Table 1.—Influence of Artificial Lights on the Performance of White Leghorns.48 weeks trial—Oct. 19, 1944 to Sept. 19, 1945
67 pullets per pen

	No Lights	Lights
16 weeks—to Feb. 7		
Egg production		
Total no. eggs	3,033	4,037
Avg. no. eggs per bird housed	45.3	60.3
Avg. no. eggs per bird (bird-day basis)	46.6	63.7
Percent production	41.6	56.9
48 weeks—to Sept. 19		
Egg production		
Total no. eggs	9,886	10,851
Avg. no. eggs per bird housed	147.6	162.0
Avg. no. eggs per bird (bird-day basis)	181.1	199.5
Percent production	53.9	59.4
Avg. egg weight in grams	55.8	55.5
Percent mortality	40.3	31.3
Body weight		
Avg. weight at beginning, lbs.	3.4	3.4
Avg. weight at end, lbs.	4.3	4.4
Feed consumption per bird		
Mash, lbs.	19.4	23.1
Grain, lbs.	59.7	58.6
Total, lbs.	79.1	81.7
Feed consumption per dozen eggs		
Mash, lbs.	1.28	1.39
Grain, lbs.	3.96	3.53
Total, lbs.	5.24	4.92

Influence of Artificial Light on Factors Related to Egg Production

Factors affecting egg production in chickens include early sexual maturity, intensity or rate of production, broodiness, pauses (cessation of egg laying for 7 days or more), and persistency. Since artificial light influenced both the winter production and also the production for the entire experiment, it undoubtedly had an effect on one or more of the above factors. Table 2 shows the influence of artificial lighting on the five factors.

Artificial light increased winter production (to March 7) by hastening sexual maturity, by reducing pausing, and to a limited extent by increasing the intensity of production. As there

were no broody hens prior to March 7, broodiness was not a factor. The measure of sexual maturity in this experiment was the date the first egg was laid in the trapnest. The average date of sexual maturity in the lighted group was 17 days earlier than that for the unlighted group. Pauses were three times more prevalent to March 7 in the unlighted pen than in the lighted pen, and the average number of days of non-production due to pausing was 11.5 and 3.1, respectively. The influence of artificial lights on the two factors, sexual maturity and pausing, decreased the number of days of non-production by 25. This accounts for the greater part of the difference of 20 eggs per bird to March 7.

Intensity of egg production was determined by dividing the

Table 2.—Influence of Artificial Lights on Factors Related to Egg Production

Factor	No Lights	Lights
Rate of sexual maturity		
Avg. date of laying first egg ¹	Nov. 26	Nov. 9
Intensity of production		
Avg. net rate to Mar. 7	72.4	75.3
Avg. net rate to Sept. 19	73.3	73.7
Broodiness		
Avg. no broody periods to Mar. 7	0	0
Avg. no. brood periods to Sept. 1913	0
Avg. no. days of non-production per bird	1.7	0
Pauses		
Avg. no. pauses to Mar. 745	.15
Avg. no. days of non-production to Mar. 7	11.5	3.1
Avg. no. pauses to Sept. 19	1.5	1.2
Avg. no. days of non-production to Sept. 19	30.0	25.4
Persistence		
Avg. date last egg was laid	Sept. 9	Sept. 12

¹For all pullets. The data for the other factors are based upon the number of birds that were living on the dates indicated.

number of eggs laid by the number of days in production minus all pauses of seven days duration or longer. There was a slight difference between the intensities of production to March 7 in favor of the lighted group.

The data in Table 2 concerning the influence of artificial lights on egg production factors to September 19 reveal that most of the difference in egg production (18 eggs per bird for the 48 weeks) was due to the hastening effect of lights on sexual maturity. Also the unlighted birds lost about 6 more days per bird than the others due to broody and non-broody pauses. The use of lights had no effect on intensity of production for the 48 weeks of the trial and very little influence on persistency.

Summary

Late hatched White Leghorn pullets, which were exposed to artificial lights so as to provide 14 hours of total light per day commencing October 19, laid 64 eggs per bird to February 7 whereas unlighted pullets laid 47 eggs. The percentages of egg production were 57 for the lighted group and 42 for the unlighted group.

For the 48 weeks of the experiment the average egg production was 199 for the lighted pen and 181 for the unlighted pen. The percentages of production for the two pens were 59 and 54, respectively. The use of artificial lights had little influence on mortality rate, body weight, or egg weight.

Feed consumption per bird was higher in the lighted pen, but the amount of feed to produce a dozen eggs was less than in the unlighted pen.

Artificial lights increased winter egg production in late hatched pullets by hastening sexual maturity, by decreasing pausing, and to a lesser extent by increasing the intensity of production.

The increased 48-weeks egg production of the lighted group was due largely to the influence of lights on sexual maturity. The lighted birds also had somewhat fewer non-productive days due to broodiness and pauses. Artificial lights had no effect on the intensity of egg production for the 48 weeks, and little influence on persistency.