Progress Report Series No. 72 *January 1959*

AGRICULTURAL EXPERIMENT STATION
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ARTIFICIAL LIGHT *for* GROWING *and* LAYING BIRDS

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THE POSSIBILITY of increasing egg production by rationing light was announced in early 1958 by the Agricultural Experiment Station of the Alabama Polytechnic Institute.

The light plan involved (1) growing chicks to 5 months of age on 6 hours of light and 18 of darkness; and (2) starting layers on 6 hours light per day and increasing each week the daily light period by 18 minutes until end of production.

Many questions have been asked about this new lighting plan. To answer these, numerous tests have been completed. In most cases small numbers of birds were used and the results are for only 1 year. Therefore, differences may not be completely reliable. However, results do indicate how light affects birds.

How Much Light Increase Do Birds Need?

To answer this question, a flock of 120 White Leghorn pullets was raised on 6 hours light. When 5 months old, they were divided at random into 4 pens of 30 birds each. Pen 1 was given a daily light increase of 8 minutes per week; Pen 2, 18 minutes; Pen 3, 28 minutes per week; and Pen 4, a variable rate. In the latter, light increases were small and infrequent at the beginning of laying period. However, amount and frequency were increased as laying period progressed. The daily light increase averaged about 18 minutes per week and varied from 0 at the start to as much as 45 minutes per week toward end of the 15-month test period. Results are given in Table 1.

TABLE 1. EFFECT OF VARIED AMOUNTS OF LIGHT INCREASE ON PULLETS RAISED ON 6 HOURS OF LIGHT PER DAY

Item	Pen number			
	1	2	3	4
Weekly light increase, min./day	8	18	28	Varied
Production average, pct.	68.7	72.2	67.9	73.5
Eggs laid per hen (15 mo.), no.	314	330	311	336
Mortality (15 mo.), pct.	23	27	33	13
Feed consumed/doz. eggs, lb.	3.6	3.6	3.9	3.4

An average daily increase of 18 minutes per week seems to be superior to 8 or 28 minutes per week in egg production. The variable rate of light increase was slightly better than 18 minutes per week in number of eggs laid and feed conversion. It would probably be more difficult for an inexperienced poultryman to use the variable rate than the 18-minute rate. However, the variable increase appears to be more desirable for two reasons: (1) an 18-minute increase in light when birds are getting only 6 to 8 hours per day is a greater percentage increase than when they are getting 18 to 20 hours of light per day; and (2) as hens become older, they require greater stimulation in order to keep them laying at a high rate. To correct these two faults, it is suggested that birds be given a 3 per cent increase in light each week.

Most automatic time clocks can only be set ac-

curately in 15-minute intervals. To provide a practical guide for determining the desired 3 per cent light increase, a light schedule calendar is given on the inside pages of this report. All increases are in 15 minute increments and the number of days between increases is changed to obtain the correct stimulating effect for a normal flock.

Can Pullets Grown on 12 Hours Light Be Cut To 6 Hours When About Ready to Lay?

In a test to determine effect of cut-back of light on pullets, 90 Leghorns raised on 12 hours light were divided at random into 3 pens of 30 birds each when 4 months of age. Pen 1 was reduced to 6 hours light per day when 4 months of age; Pen 2 was reduced to 6 hours light per day when 5 months old; and Pen 3 was reduced to 6 hours when 6 months old. This amounted to reducing the light about 1 month before they started to lay (Pen 1), at about the time laying started (Pen 2), and after the pullets had been laying 1 month (Pen 3).

A similar flock of 30 pullets from the same source and hatch and raised at the same time on 6 hours of light was used as a control (Pen 4). All birds received daily increase of 18 minutes per week throughout the laying period, starting at 5 months of age for Pens 1, 2, and 4 and at 6 months of age for Pen 3 when they were reduced to 6 hours of light. The results of the 15-month test are given in Table 2.

TABLE 2. EFFECT OF REDUCING LIGHT FROM 12 HOURS PER DAY TO 6 HOURS ON PULLETS 4, 5, OR 6 MONTHS OLD

Item	Light reduced at			
	4 mo. Pen 1	5 mo. Pen 2	6 mo. Pen 3	Control* Pen 4
Average production (15 months), per cent	69.9	67.1	68.6	72.2
Eggs laid per hen (15 months), number	320	307	314	330
Mortality (15 months), per cent	20	27	27	27
Feed consumed per dozen eggs, pounds	3.8	3.8	3.9	3.6

* This pen was raised on 6 hours light per day.

Birds raised on 12 hours light cannot be cut back to 6 hours at time they start laying without considerable loss in egg production for a few months. The difference in annual production, however, is not great. If full benefit of the lighting system is to be obtained, the chicks must be grown on 6 hours of light rather than restricting them to this amount when they are nearly grown.

If pullets raised under normal daylight must be used as layers, the suggested light schedule is shown on the light schedule calendar (see inside).

Pullets that reach 5 months of age between June 21 and December 21 must receive just enough artificial light both night and morning to keep the days from getting shorter between time they are 5 months old and their peak of production. Usually pullets reach their production peak after they have been laying about 2 months. A regular light increase is begun at that time. If a constant light schedule fits your management better than a variable one, the light is increased 15 minutes daily per week for the remainder of production period. If your management can use a variable light schedule, you will probably get a little higher production by following the variable schedule for a normal flock as shown in the light calendar. The light schedule is applied after they have reached their production peak. This is shown on the chart as 60 days after the pullets are placed in laying house.

If pullets reach 5 months of age during the last of December, January or February, the natural light increase will be enough to stimulate high production until late April. While days continue to increase in length until June 21, the rate of increase during May and June is not enough to maintain a high rate of lay. Therefore, layers should receive artificial light starting during the latter part of April and continuing for the remainder of the laying period. The daily light increase must be at least 15 minutes per week. If you can supply light at the variable rate, the light schedule shown on the light calendar for pullets raised under normal daylight is used.

Should Light Be Increased Daily, Weekly, or Monthly for Best Results?

To help provide the answer to this question, 45 Leghorn pullets grown to maturity (5 months) on 6 hours light were divided at random into 3 pens of 15 birds each. Pen 1 was given a daily increase of 2 minutes of light per day. Pen 2 was given a weekly increase of 14 minutes of light per day, and Pen 3 was given an increase every 4 weeks of 56 minutes of light per day, or approximately 1 hour per month. The data from this test are given in Table 3.

TABLE 3. EFFECT OF PROVIDING LIGHT INCREASE DAILY, WEEKLY, AND MONTHLY ON EGG PRODUCTION

Item	Light increase		
	Daily 2 min. per day Pen 1	Weekly 14 min. per day Pen 2	Monthly 1 hour per day Pen 3
Average production (11 months), per cent	68.2	71.5	66.0
Eggs laid per hen (11 months), number	227	238	220
Mortality (11 months), per cent	0	7	7

The results indicate that the light increase given weekly is a little more stimulating than that given daily or monthly. When the light increase was given monthly, there was a tendency for rate of egg production to decrease toward end of the month and before the next light increase. This, of course, resulted in lower average production.

How Do Pullets Raised on 6 and 12 Hours Light Compare When Both Have 14 Hours Light During Laying Period?

Since the lighting schedule is based on raising pullets on 6 hours light and also giving them a daily increase of 18 minutes once a week during the laying period, it would be desirable to know what proportion of the increased production obtained is due to restricting light during the growing period. In this test, 15 Leghorn pullets grown on 6 hours light per day were placed in a laying house with 15 pullets of the same source and age but grown on 12 hours light per day. The laying test started when the pullets were 5 months old. At that time all pullets received 14 hours light per day. This light schedule was maintained without change for the 12 months duration of the laying test. The results are given in Table 4.

TABLE 4. EFFECT OF RESTRICTED LIGHT DURING GROWING PERIOD ON EGG PRODUCTION

Item	Light during growing period	
	6 hours Pen 1	12 hours Pen 2
Average production (12 months), per cent	68.9	63.4
Eggs laid per hen (12 months), number	252	231
Mortality (12 months), per cent	10	0

These results indicate pullets grown on restricted light of 6 hours per day were somewhat superior as egg producers to pullets grown under 12 hours light per day. The difference in eggs laid per hen amounted to 21 eggs per year.

How Will 14 Hours Light During Laying Period Compare with Weekly Increase of 18 Minutes per Day?

The answer to this question would determine the value of the recommended lighting schedule for the laying birds. In this test 30 Leghorn pullets grown on 6 hours light were divided at random into 2 pens when they were 5 months of age. Pen 1 received 14 hours light per day throughout a 12-month laying period. Pen 2 started on 6 hours light per day and received weekly increase of 18 minutes per day throughout a 12-month laying period. The results are given in Table 5.

TABLE 5. EFFECT OF WEEKLY LIGHT INCREASE OF 18 MINUTES PER DAY ON PRODUCTION

Item	Light schedule during laying period	
	14 hours per day Pen 1	Weekly increase 18 min. per day Pen 2
Average production (12 months), per cent	68.9	72.3
Eggs laid per hen (12 months), no.	252	264
Mortality (12 months), per cent	10	13

These results indicate that pullets getting weekly increase of 18 minutes per day laid at a slightly higher rate than pullets getting a constant 14-hour-light-day. The difference amounted to 12 eggs per hen per year.

How Would Pullets Raised on 6 Hours Light Plus Weekly Increase Compare With Layers Reared on 12 Hours Light and 14 Hours Light During Laying Period?

The answer was determined by results from 2 years' work involving 30 Leghorn pullets per pen and using a new flock of birds each year. Pullets in Pen 1 were raised on 6 hours of light, and continued on 6 hours of light with a weekly increase of 18 minutes per day during the 2, 12-month laying periods. Pen 2 pullets were raised on 12 hours light and given 14 hours light per day throughout the 2, 12-month laying periods. All flocks started their laying year when 5 months of age. The results are given in Table 6.

LIGHT SCHEDULE CALENDAR

For pullets raised on restricted light or normal daylight using either a constant or variable light increase

HOURS of LIGHT

24
23
22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6

Schedule — pullets raised on normal light

Peak of production

18-minute increase per week

3% increase per week

Schedule — pullets raised on 6 hours light

0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360

DAYS in LAYING HOUSE

DIRECTIONS

Cut bottom calendar strip along trim line and thumb tack strip to light schedule so that the date when pullets are 5 months old is directly under zero (0) days. Then note when each 15-minute light increase is to be given.

Trim along this line

Trim along this line

JANUARY 31 FEBRUARY 28 MARCH 31 APRIL 30 MAY 31 JUNE 30 JULY 31 AUGUST 31 SEPTEMBER 30 OCTOBER 31 NOVEMBER 30 DECEMBER 31

CALENDAR

TABLE 6. EFFECT OF RESTRICTING LIGHT DURING GROWING PERIOD AND INCREASING LIGHT WEEKLY DURING LAYING PERIOD

Item	Light schedule during laying period		
	18-minute increase Pen 1*		14 hours per day Pen 2**
Average production (2 years), pct.	73.9		65.0
Eggs laid per hen per year (2 years), number	270		237
Difference, number eggs		33	
Mortality (1 year), per cent	16.6		13.3
Feed consumed per dozen eggs (1 year), pounds	3.6		3.6

* Pullets raised on 6 hours light per day; this amount of light was increased 18 minutes a day each week of the laying period.

** Pullets were raised on 12 hours light per day; during the laying period this amount was increased to 14 hours per day.

An increase of 2¾ dozen eggs resulted from growing out pullets on restricted light and from increasing the amount of light during the laying period.

Pullets raised on 6 hours light and a weekly increase of 18 minutes light per day during the laying period averaged 270 eggs per hen. In contrast, pullets grown out on 12 hours light a day and supplied 14 hours light during the laying period laid an average of 237 eggs per bird, or 33 fewer eggs than the restricted light group. From results given in Tables 4 and 5, it is evident that ⅔ of the increase was the result of restricted light during the growing period; ⅓ resulted from increasing the amount of daily light each week throughout the 12-month laying period.