

TABLE 1. AVERAGE AGE AT FIRST EGG AND TOTAL EGG PRODUCTION IN BROAD BREASTED WHITE HENS GIVEN STIMULATORY LIGHT (16L:8D) AT DIFFERENT AGES FOLLOWING A PERIOD OF 6 WEEKS LIGHT RESTRICTION (8L:16L)

Hatch no.	Date of hatch	No.	Age given light restriction*	AV. days to 1st egg	AV. age at 1st egg
			weeks	days	days range
1	1/20	62	24-30	25	235 (230-241)
2	2/3	43	22-28	27	223 (216-232)
3	2/17	19	20-26	27	209 (205-221)
4	3/3	41	18-24	29	197 (188-207)

\* All birds given 8 hour light per day for 6 weeks and 16 hours light per day thereafter.

Results from this study indicate that best turkey egg production is obtained from winter-hatched poults that are stimulated to lay at about 30 weeks of age following an exposure to 6 weeks of restricted light. Hens given stimulatory light earlier (at 24 and 26 weeks of age) produced fewer and smaller eggs over a 20 week period of lay. These younger hens also tended to pause more frequently than older hens, and a greater percentage of the younger birds terminated egg production prematurely. It was of interest to note that approximately 54% of the hens in hatch 4 did not pause in lay at any time during the 20 weeks of lay, as compared with 77% of the hens in hatch 1. The incidence of pausing, irrespective of age of the hen, also appears to be concentrated in certain families within this study. The trait of broodiness has been greatly reduced in certain strains of chickens and small breeds of turkeys. Consequently similar genetic gains in decreased incidence of pausing can be anticipated in medium-to-large strains of turkeys. Thus increased rates of lay through improved genetic control of pausing may make it possible and economically profitable to supply light to hens before 30 weeks of age.

TABLE 2. AVERAGE EGG PRODUCTION IN B.B. WHITE HENS GIVEN STIMULATORY LIGHT AT DIFFERENT AGES

Hatch	Age at lighting	Period of production	
		10 wks	20 wks
	weeks	no. eggs	
1	30	47.3	86.5
2	28	43.2	80.6
3	26	41.3	70.2
4	24	43.0	78.2

TABLE 3. THE INCIDENCE OF PAUSING IN B.B. WHITE HENS GIVEN STIMULATORY LIGHT AT 30, 28, 26 AND 24 WEEKS OF AGE

Hatch no.	Hens	Duration of pauses		Hens showing pauses
		Period of production		
		1 to 12 wks.	13 to 20 wks.	
	no.	days	days	%
1	62	19.6	19.8	22.6
2	43	16.4	32.1	32.6
3	19	30.2	39.1	57.9
4	41	23.5	35.6	46.3

# LIGHTING TURKEYS FOR OFF-SEASON EGG PRODUCTION

ALLEN E. WOODARD • HANS ABPLANALP

UNDER NATURAL CONDITIONS turkey poults are hatched in late spring and reared during the summer and early fall. The hens approach sexual maturity at 7 months of age, but are inhibited from laying eggs by the naturally shorter day-length at that time of year. Only after the natural daylight reaches about 12 hours (in mid-March), will the hens begin to lay.

Using artificial light in controlled chambers, researchers have been able to demonstrate that sexual response in turkeys is dependent upon two essential factors associated with photoperiod. In order to induce maximum rates of lay hens must (1) undergo a period of preconditioning under a short daily light increment prior to reaching the age of sexual maturity. This short-day light period must then be followed by (2) stimulatory conditions of long or increasing day lengths. Failure to precondition turkey hens under short-day light conditions results in erratic onset of lay and unfavorable rate of lay thereafter. Such adverse reactions are encountered in the field when poults are hatched out of season during the fall or early winter months. However by means of artificial darkening in closed houses during the spring, turkeys hatched in the fall can be induced to lay during the summer and fall after receiving and being maintained under stimulatory light.

Recent evidence indicates that uniform

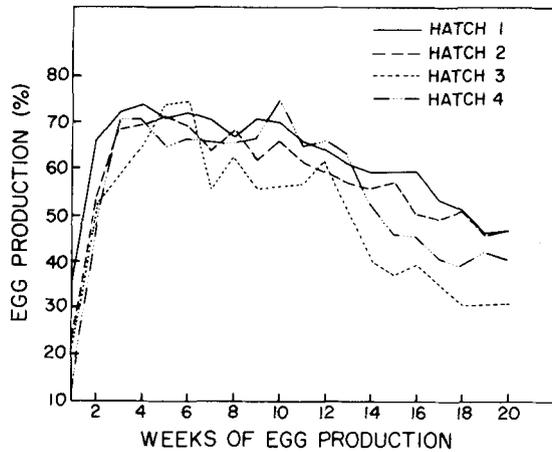
sexual maturation of fall and winter hatched turkeys can be obtained by holding the hens under short daylight (about 6 hours light and 18 hours darkness per day) for from 6 to 8 weeks. Following such a preliminary treatment most hens will begin to lay within 3 to 4 weeks if given 12 hours or more light per day, provided they are old enough to lay.

## Large strains

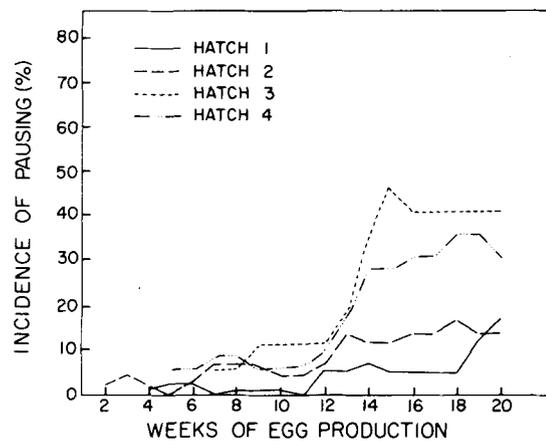
Because large strains of turkeys are expensive to maintain, much interest has recently developed in inducing hens to lay at the earliest possible age while maintaining high reproductive performance later on.

In this study, four age groups of medium size Broad Breasted white turkeys, hatched at 2-week intervals (hatch 1—Jan. 20; hatch 2—Feb. 3; Hatch 3—Feb. 17; and hatch 4—March 3, 1971) were reared in open range pens under naturally increasing daylength to July 7. At that time the hens were 24, 22, 20 and 18 weeks of age and were randomly assigned to individual cages in an enclosed house, and were then given restricted light of 6 hours light and 18 hours darkness per day for a period of 6 weeks. Beginning Aug. 6, the hens were then given long days of 16 hours light and 8 hours darkness. At the onset of this long-day treatment the hens of the four hatches were 30, 28, 26, and 24 weeks of age respectively.

GRAPH 1. AVERAGE WEEKLY EGG PRODUCTION IN FOUR DIFFERENT AGE GROUPS OF BROAD BREASTED WHITE TURKEYS GIVEN STIMULATORY LIGHT AT 30, 28, 26 AND 24 WEEKS OF AGE



GRAPH 2. AVERAGE INCIDENCE OF PAUSING IN FOUR DIFFERENT AGE GROUPS OF BROAD BREASTED WHITE TURKEYS GIVEN STIMULATORY LIGHT AT 30, 28, 26 AND 24 WEEKS OF AGE



### Age at onset of lay

A 6-week period of restricted light given to turkey hens of different ages prior to stimulatory lighting resulted in a rapid and uniform onset of lay (table 1) when stimulatory light was introduced. First eggs were laid within 25 and 29 days by hens from hatches 1 and 4, respectively. Among the youngest group of hens (hatch 4) only one failed to lay eggs during the 20 weeks allowed for production.

Since the youngest hens responded to increased light almost as rapidly as their older sisters, it would appear that early egg production can be induced successfully at six months of age by the methods used here. However it is also suggested, by our results, that light treatments at still earlier ages could very likely result in delays and greater variability in the onset of lay.

### Egg production and pausing

Since an average of 27 days was needed for hens to respond to stimulatory light, egg production was measured over a 20-week period starting 3 weeks after the hens were first given increased light. The number of eggs laid per hen during this time is given in table 1. Average per cent egg production for hens in separate hatches is shown in graph 1. These

TABLE 4. AVERAGE WEIGHT OF EGGS LAID FROM HENS GIVEN STIMULATORY LIGHT AT DIFFERENT AGES FOLLOWING A PERIOD OF LIGHT RESTRICTION

Hatch no.	Average egg weight		
	First 10 eggs	At 10 wks of lay	At 20 wks of lay
	gm	gm	gm
1	74.5	83.1	87.0
2	76.2	82.1	88.0
3	71.2	79.1	86.7
4	70.4	78.0	86.0

results show that hens given stimulatory light at 30 weeks of age reached their peak of lay some 7 weeks after onset of stimulatory light, and maintained a more persistent rate of lay than younger females (hatches 2, 3 and 4). A moderate decline in egg production of hens in hatches 3 and 4 occurred after 12 weeks of lay due to a sharp rise in the incidence of pausing in these groups (graph 2).

### Pausing

The term "pausing" is defined here as cessation of lay for a period of 7 consecutive days or more. Pauses in production usually occur as a result of broodiness known to be due to the secretion of the pituitary hormone prolactin. This physiological condition (broodiness) is most evident in hens kept in floor pens and on the open range and is characterized by frequent visits to the nest and acts of protective behavior such as the ruffling of feathers, and hissing at intruders while the hen occupies the nest. These same behavioral signs of broodiness are less evident in hens kept in cages and pauses in lay are often the only indicator of broodiness.

Results shown in table 2 indicate that the earlier turkey hens are given stimulatory light the higher their incidence of pausing. Thus females of hatches 3 and 4 showed twice as much pausing during the 20 weeks of production as the older hens that were lighted at 28 and 30 weeks of age. The younger hens also paused a total of 32 to 36 days duration as compared with 20 days for older hens. It was also observed that many of the younger hens stopped laying altogether after about 13 to 15 weeks of egg production.

### Body weight

Because of the difference in age of the hens at housing (24, 22, 20 and 18 weeks of age respectively) the range in weight at that point between the youngest and oldest birds of approximately 1.9 pounds was to be expected. However this difference in body weight was considerably less some 6 weeks later (at the start of the stimulatory light period) and weights of females in all hatches were approximately the same at lay of first egg (table 3).

### Egg weight

The first 10 eggs from each hen were weighed and further measurements were obtained at 10 and 20 weeks of lay (table 4). The average weight of the first 10 eggs laid by hens of hatches 3 and 4 was approximately 3 to 6 grams below that of eggs from hens in hatches 1 and 2. This difference in egg weight persisted after 10 weeks of lay, but by the 20th week of lay these differences in egg size had disappeared. Similar observations on egg size of chickens suggest that initial egg size can be increased if onset of sexual maturity is delayed.

*Allen E. Woodard is Associate Specialist, and Hans Abplanalp is Professor, Department of Avian Sciences, University of California, Davis.*

TABLE 5. AVERAGE BODY WEIGHT OF B.B. WHITE HENS GIVEN STIMULATORY LIGHT AT DIFFERENT AGES FOLLOWING A PERIOD OF 6 WEEKS LIGHT RESTRICTION

Hatch no.	Average body weight			
	At housing*	Start of light period	At 1st egg	Terminal wt
	gm	gm	gm	gm
1	6770 (24)	7449 (30)	7801	8176
2	6822 (22)	7701 (28)	8173	8592
3	6021 (20)	7168 (26)	7820	8051
4	5894 (18)	7220 (24)	8042	8639

\* Figures in parenthesis indicate age of the hens in weeks.