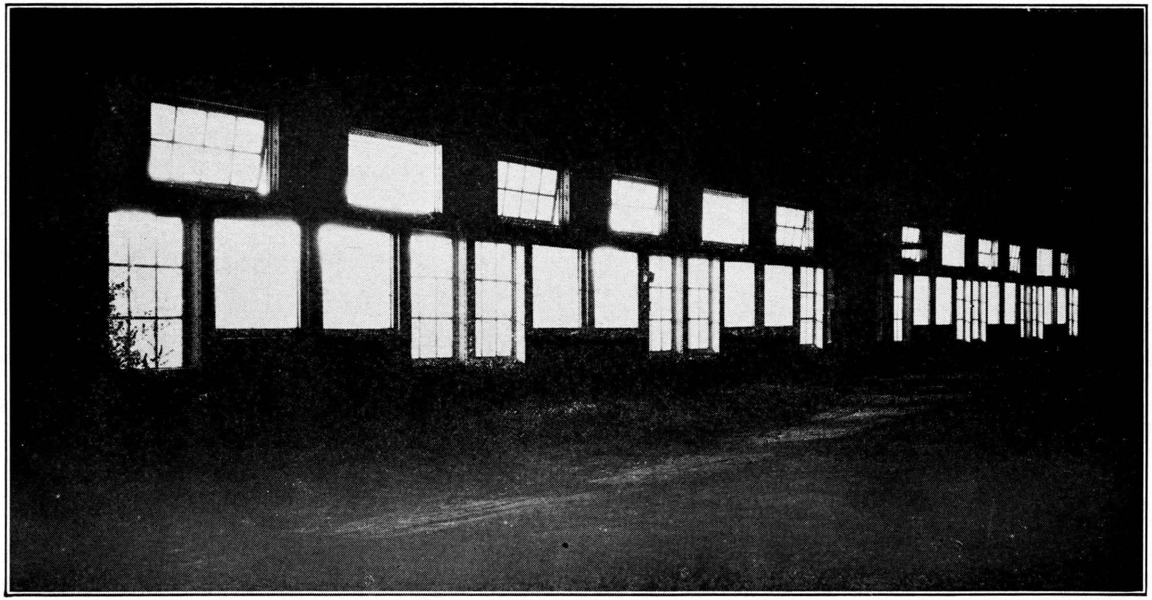
BULLETIN 476 MAY, 1931

All-night Light for Layers

D. C. Kennard and V. D. Chamberlin

OHIO
AGRICULTURAL EXPERIMENT STATION
Wooster, Ohio



All-night light has proven practicable and effective for increasing winter egg production

ALL-NIGHT LIGHT FOR LAYERS

D. C. KENNARD AND V. D. CHAMBERLIN

Modern poultry keeping owes much to the use of artificial light in laying houses. A more recent development in this connection is the use of all-night light for winter layers. Morning or evening light to give a longer working day for layers has been widely practiced to advantage for years. It has been generally assumed that light must be used with great precaution in order not to overdo it. A 14-hour day was usually considered the limit and obviously all-night light was supposed to be out of the question. Many important contributions to science have come about by accident or by failure to observe customary practices; the present use of all-night light came about in this way. A poultryman, J. E. Morris, in southeastern Ohio initiated the practice when he disregarded the precautions generally observed in order to use natural gas for lighting the laying house. His difficulty was to turn the gas on and off automatically, as is the practice when electric light is used. The problem was solved by leaving the light on all night—surprisingly good results followed. This was in 1925 and since that time he and others in that vicinity have used all-night light with satisfactory results, especially for securing winter eggs from hens. The question of all-night light for winter layers and its demonstrated success by poultrymen in southeastern Ohio was first brought to the attention of the Station by Arthur H. Smith, County Agent of Monroe County, Ohio, November 22, 1928. Tests were immediately started by the Station with five groups of Leghorn pullets which were given all-night light.

Three groups each of 40 backward, inferior pullets, averaging 19 per cent egg production on November 23, increased to 39 per cent within 2 weeks after they were given all-night light and to 57 per cent in 4 weeks. These pullets averaged 49 eggs per bird from December 1 to March 1. At the same time a fourth group of better quality, more mature pullets, laying 40 per cent, increased to 65 per cent within 2 weeks and to 75 per cent in 4 weeks. They averaged 57 eggs per bird from December 1 to March 1. A fifth group of January-hatched pullets were out of production and molting so that only two pullets were laying on November 23 when they were given all-night light; practically all of the pullets were laying 2 weeks later. Their production averaged 63 per cent from this time to April 1. The mortality of all the pullets averaged 13 per cent from

December to June, which was low for their quality and breeding. It seemed that beneficial, rather than the supposed ill, effects resulted from the use of all-night light. We know of no other procedure which could have brought such pullets into production as promptly and maintained production as effectively.

ALL-NIGHT LIGHT IN REFERENCE TO WINTER EGG PRODUCTION, FEED CONSUMPTION, AND BODY WEIGHT OF PULLETS

The primary function of artificial light in the laying house has been considered to be a means of increasing feed consumption, which, in turn, enabled the birds to lay more eggs. The tests conducted by the Station at Wooster, where accurate daily records of feed consumption were taken, Table 1, appear to substantiate this contention in principle, but the differences in feed consumption, whether the pullets received no light, morning light, or all-night light, hardly accounted for the marked differences in egg production. The question then arises, if the use of light did not materially increase feed intake, why or how did increased egg production invariably result? Another factor which might be expected to offer a possible explanation for the increased production without much increased feed consumption is the body weight of the pullets.

TABLE 1.—Egg Production, Feed Consumption, and Body Weight of Leghorn Pullets as Affected by Light

	No light	Light at 4 A.M.	All-night light
Egg production per bird, October 2–February 5	39	46	57
Feed consumption, pounds per bird, October 2–February 5	24.66	25.16	27.74
Body weight, monthly average, pounds	3.35	3.25	3.36

It is generally assumed that pullets in heavy winter egg production without light or subjected to other handicaps may lose body weight and cease laying to regain their normal weight. According to weight records given in Table 2 and Figure 1, this theory may at least partly explain why the pullets receiving no light suffered a loss of production during December whereas those pullets receiving morning or all-night light maintained higher production. It seems that a very slight loss of the body weight of the layers may prove a critical matter when it comes to egg production. Why the pullets which received morning light never attained the weight of the other groups we are unable to explain unless the morning light enabled that group to lay more eggs at the expense of their body weight as compared to the group without light; whereas all-night light permitted those pullets to lay more eggs and at the same time enabled them to maintain their body weight for a longer period.

TABLE 2.—Bi-weekly Egg Production and Monthly Weights of Leghorn Pullets

Dates of 14-day periods	Egg production–14-day periods			Monthly weight of pullets		
	No light	4 A. M. light	All-night light	No light	4 A. M. light	All-night light
	Pct.	*Pct.*	*Pct.*	*Lb.*	*Lb.*	*Lb.*
October 2–15	21	21	16			
October 16–29	41	40	35	3.34	3.27	3.34
October 30–November 12	47	49	42			
November 13–26	50	52	60	3.51	3.40	3.43
November 27–December 10	42	49	66			
December 11–24	29	42	64	3.42	3.31	3.52
December 25–January 7	18	28	59			
January 8–21	13	20	37	3.27	3.18	3.28
January 22–February 4	22	32	37			
February 5–18	29	59	40	3.51	3.30	3.36
February 19–March 4	48	62	34			
March 5–18	62	62	42	3.65	3.23	3.62
March 19–April 1	62	61	46			
April 2–15	60	64	43			

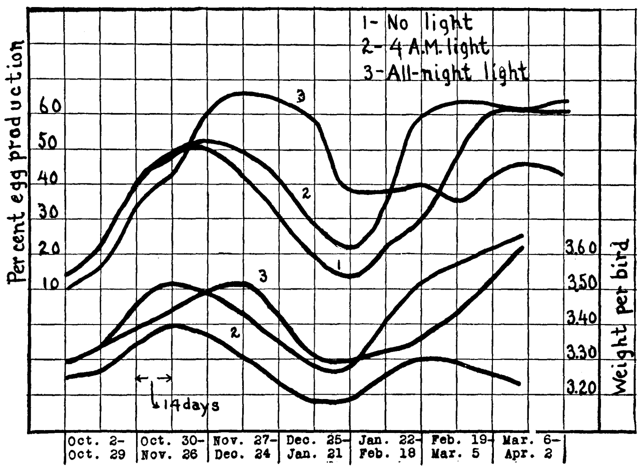


Fig. 1.—Winter egg production and body weight of layers as affected by no light, 4 A. M. light, and all-night light

May another possible explanation for the increased egg production and better maintenance of body weight with but little increased feed consumption from the use of all-night light be that it promotes a greater efficiency of the digestive processes? If so, possibly the greater efficiency is due to the fact that the birds with all-night light, having feed and water always available, never need to suffer the discomfort of hunger nor the possible ills of indigestion which may arise from gorging themselves with feed night and morning as the birds do when they receive no light or even morning light?

ALL-NIGHT LIGHT FOR WINTER EGG PRODUCTION FROM HENS

The tests with all-night light in 1929 were conducted with four groups of yearling Leghorn hens which, as pullets, had been on other tests until September 3 of the previous year. At this time the hens were transferred to another house and carried as one flock. The hens had previously been confined indoors but after moving they had access to a fairly good outdoor range. At the same time, two parts of whole corn were added to one part of the all-mash feed mixture previously used. Oyster shells and chopped legume hay were kept before the birds at all times. This method of feeding and management was continued until December 3, when the best hens were removed for other tests. The remaining, more inferior hens were divided into four lots and given all-night or morning light. The feeding of whole corn was discontinued and followed by an all-mash-oats feed mixture composed of coarsely ground yellow corn, 45; coarsely ground wheat, 20; whole oats, 15; wheat bran, 5; meat scraps (medium), 10; dried milk, 5; poultry bone meal, 2; salt, 1; and cod-liver oil, 1. No additional grain or moist mash was fed. The results are recorded in Table 3.

TABLE 3.—All-night Light vs. Morning Light for Winter Egg Production from Yearling Leghorn Hens

	Per cent egg production			Eggs per bird December 3 to March 1
	December	January	February	
1 All-night light, 40 hens	42	55	50	44
2 All-night light, 40 hens	48	50	46	42
3 All-night light, 60 hens	29	51	57	40
4 Morning light 4:30 A. M., 60 hens	18	46	60	36

These hens should have had the artificial light and the laying ration on November 1, but, owing to unavoidable delay, the test was not started until December 3. After this the hens promptly came into production, especially those receiving all-night light; for instance, in Lot 1, 40 hens started with 3 eggs December 3, and 6 days later laid 23. Lot 2 did practically the same. In Lot 3, of 60 hens, but one laid before December 11; at that date others began, and 8 days later they laid 28 eggs. The group given all-night light laid a greater number of eggs in December and January, but in February the hens with morning light slightly exceeded the others. The better production in December from Lots 1 and 2 was due to the better grade of hens used. However, the better hens in this case were only second grade ones left after the best had been previously selected for other tests. The hens not only laid well during the winter months but also increased their body weight. The average weight of Lot 3, with all-night light beginning December 3, was 3.45; January 1, 3.60; February 1, 3.68; and March 1, 3.73 pounds per bird. At the same time Lot 4, with morning light, weighed 3.42, 4.14, 4.05, and 3.71 pounds, respectively.

Eggs from Lots 3 and 4 were hatched weekly from January 20 to February 10. Those from Lot 3 were 84 per cent fertile, and 82.5 per cent of them hatched. The eggs from Lot 4 were 88.5 per cent fertile, and 80.2 per cent of them hatched.

Hens molted in July and September.—The use of light resulted again in a marked increase of egg production, and all-night light proved more effective than morning light at 4 A. M., Table 4.

TABLE 4.—Egg Production, Feed Consumption, and Body Weight of Yearling Leghorn Hens as Affected by Night and Morning Light

Records for July-molted hens—October 2-March 4, 1931
Records for September-molted hens—November 13-March 4, 1931

	Time molted	No light	4 A. M. light	All-night light
Eggs per bird	July	....	48	56
	September	28	....	48
Feed consumption, pounds per bird	July	....	31.15	32.63
	September	23.44	....	26.31
Body weight, average monthly weight in pounds	July	....	3.55	3.41
	September	3.55	....	3.48

The July-molted hens were given all-night light and the laying ration October 2; whereas the September-molted hens received them on November 13, or 6 weeks later. The latter were only 8 eggs per bird behind the July-molted hens on March 4. It is obvious that in this instance the difference in egg production did not justify the early molting of the hens in July. The September-molted hens without light laid only 58 per cent as many eggs but consumed 90 per cent as much feed as the hens given all-night light. The July-molted hens on 4 A. M. light laid 86 per cent as many eggs and consumed 95.5 per cent as much feed as those which received all-night light. This is indicative of the importance of all-night light for securing winter eggs from hens.

WINTER EGG PRODUCTION—HENS VERSUS PULLETS

One hundred of the best Leghorn pullets that could be purchased for $1.50 each in the vicinity were placed in one half of the 20 x 40 laying house at the Clermont County Experiment Farm on September 18. The pullets received morning light at 4 A. M. and the same all-mash laying ration as the hens. On September 27, 100 yearling hens were purchased in that vicinity for 63 cents each and placed in the other half of the laying house. The ration was composed of coarsely ground yellow corn, 35; coarsely ground wheat, 20; finely ground oats, 20; wheat bran, 5; alfalfa leaf meal (No. 1), 5; medium meat scraps, 10; dried buttermilk, 3; oyster shells (chick size), 2; salt, 0.5; cod-liver oil, 1 (November to March, inclusive); oyster shells in hoppers; and chopped legume hay in racks. When the hens were purchased they were given the same all-mash to which were added two parts of whole grain (corn 2, wheat 2, oats 1) to one part of the mash. This whole grain-mash ration was continued until November 1 when the whole grain was omitted and the birds were fed the all-mash laying ration, the same as received by the pullets, and at this time they were given all-night light.

The 100 hens laid 19 eggs the first day after they were purchased and transferred to the laying house, September 27, and averaged 10 eggs a day for the next 3 weeks. The lowest egg production was 2 eggs on October 30; the following day they laid 5 eggs. The next day, November 1, the hens were given the laying ration and all-night light. They reached 50 per cent production on November 16 just 7 weeks after they were purchased. The average egg production from November 15 to March 1 was 46 per cent, or 48 eggs per bird, and the mortality was 10 per cent. The pullets, during the same time, averaged 48.2 per cent, or 51 eggs per bird, with a mortality of 16.6 per cent.

A similar test was conducted at the Station's Northeast Test Farm at Strongsville. In this instance the pullets were raised on the farm where they had favorable range conditions, and they were considered first class pullets worth $1.50 each when they went into the laying house on September 20. They laid well except during an outbreak of chicken pox which lessened production in November. They received morning light at 4 A. M. and the same all-mash laying ration as the yearling hens.

The yearling hens, 106, were purchased September 8 from a poultryman nearby for 75 cents each. They were put in suitable quarters which had been prepared in the barn so that the housing conditions of the pullets and the hens were equally favorable. The hens were fed the two to one whole grain-all-mash mixture until November 1, when the whole grain was discontinued and they were given the all-mash laying ration and all-night light as in the Clermont test.

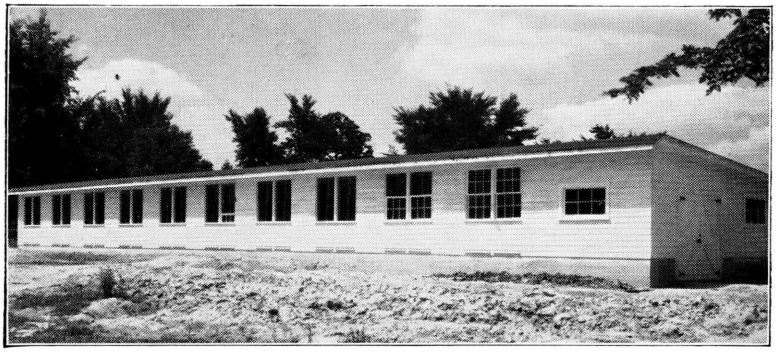


Fig. 2.—The new laying house at the Ohio Experiment Station used for conducting tests concerning egg production and hatchability

The hens laid 30 eggs the first day after they were purchased and transferred, September 8, and ceased to lay soon after. No eggs were laid from November 1 to 10. Five hens laid on November 11, 40 laid 8 days later, and on Thanksgiving, November 25, they laid 55 eggs. The hens averaged 56.2 per cent production from November 15 to March 1, or 56 eggs per bird, with a mortality of 6 per cent. The pullets, during the same time, averaged 45.3 per cent production, or 48 eggs per bird, with a mortality of 9 per cent.

In both tests the hens at half the fall value of the pullets produced practically the same number of winter eggs as the pullets with less mortality, and, needless to say, the hen's eggs were larger and commanded a higher price.

Other advantages of select yearling hens over pullets of same breeding.—The hen has demonstrated her ability to live and come through the first year's production in good physical condition and be ready for a second year's performance. She lays larger winter eggs which command a higher price, and, if her eggs are used for hatching, they will usually produce a larger chick and possibly a more vigorous one, which may make a better layer and might be more likely to live 2 to 3 years instead of 1 or less.

Yearling hens are less subject to colds, roup, pox, coccidiosis, range paralysis, and worms. On the other hand, hens are more subject to tuberculosis and certain organic diseases, such as liver disorders. Where the premises are known to be contaminated with tuberculosis infection, the retention of yearling hens the second year may prove inadvisable.

Promising opportunities.—Getting winter eggs from hens offers an opportunity for some who do not have the room or facilities to raise first class pullets, or those who fail with pullets, to succeed without having to raise or depend upon pullets for winter eggs. In nearly every community there is a splendid opportunity for a few such enterprises which should prove profitable for those who can distinguish good flocks of hens when they see them; in that case they can go out and purchase suitable hens which are plentiful in August. The select hens could be kept for winter egg production, and the others not qualifying for this purpose could be marketed. The hens kept for winter egg production might in many cases be sold in the spring when eggs become cheap, or after they are no longer desired for hatching eggs. At this time market poultry usually commands a better price and the hens would often sell for more, after laying 3 to 4 dozen winter eggs, than they cost before; whereas the pullets, which can be expected to lay about the same number of smaller eggs, would suffer a depreciation of about half their fall value when they became hens in the spring. For example, Charles Tessmer, Hartman, Ohio, who has made it a practice to keep only hens for winter eggs, secured 500 hens for 49 to 79 cents a head in the fall of 1929, and, after securing an average of approximately 50 per cent egg production during the winter months, sold them on the market in April for $1.10. In this case the increased value of the hens from fall to spring more than paid for their feed during the fall molt and reconditioning period.

The retention of the select yearling hens for another year, especially for winter eggs, should result in greater economy of production of market eggs and the high quality hatching eggs from hens for chicks in January and February will prove a distinct advantage to the hatcheryman and the poultry raiser, because early hatching eggs from hens are, for obvious reasons, preferable to eggs from pullets of similar breeding.

When the practice of keeping the select yearling hens for a second year's production becomes general, such hens will undoubtedly have a marked increase in value over the present. Once the select yearling hen becomes rcognized as comparable to the pullet for winter egg production, instead of being valued at about half that of the select pullet in August or September, she should command about the same price as the pullet. The present difference in value of the hen and pullet in August has been due mainly to the potential value of the pullet for winter egg production not heretofore credited to the hen.

PREVENTION OR RECOVERY FROM FALL OR WINTER MOLT BY MEANS OF ALL-NIGHT LIGHT

After the pullets are transferred to winter quarters the poultryman's chief concern is how to prevent a premature fall or winter molt and the consequent loss of production, or, if he has failed to prevent it, what can be done to recover production as soon as possible? It seems from the results given in Table 5 and Figure 3 that the best answer to both these questions is all-night light.

TABLE 5.—All-night Light for Recovery of Loss of Egg Production of January-Hatched Leghorn Pullets

Dates of 14-day periods	Egg production–14-day periods			Monthly weight of pullets		
	Lot 1	Lot 2	Lot 3	Lot 1	Lot 2	Lot 3
	Pct.	*Pct.*	*Pct.*	*Lb.*	*Lb.*	*Lb.*
July 1–9	31	19	13	3.3	3.04	2.94
July 10–23	58	46	38			
July 24–August 6	53	46	56			
August 7–20	49	39	45	3.1	3.01	3.03
August 21–September 3	51	37	50			
September 4–17	43	45	47	3.29	3.26	3.1
September 18–October 1	41	41	40			
October 2–15	36	35	34	3.58	3.41	3.3
October 16–29	22	28	30			
October 30–November 12	12	15	18			
November 13–26	48	44	51	3.4	3.37	3.26
November 27–December 10	44	50	59			
December 11–24	48	51	55	3.48	3.48	3.48
December 25–January 7	36	36	24			
January 8–21	40	28	17	3.49	3.24	3.21
January 22–February 4	47	36	30			
February 5–18	48	45	36	3.54	3.38	3.33
February 19–March 4	49	47	38			
March 5–18	41	46	37			

All sorts of feeds and methods of feeding, management, and housing have been tried with varying degrees of success or failure. Even a complete ration and heated laying house failed to prevent the fall molt of the pullets without light, Table 2 and Figure 1. At the same time January-hatched pullets in an unheated house promptly returned to production when given all-night light, Table 5 and Figure 3. The phenomenal recovery from loss of production of the three different groups each of 50 January-hatched Leghorn pullets shows the promising possibilities of all-night light both for prevention and recovery of loss of winter egg production from a premature molt. In this case the pullets were without light until November 1; they were then given 4 A. M. light until November 7, when they received all-night light for recovery. It is obvious that for prevention of the molt and better maintenance of production the all-night light should have been started about October 1, or when egg production went to 40 per cent or below.

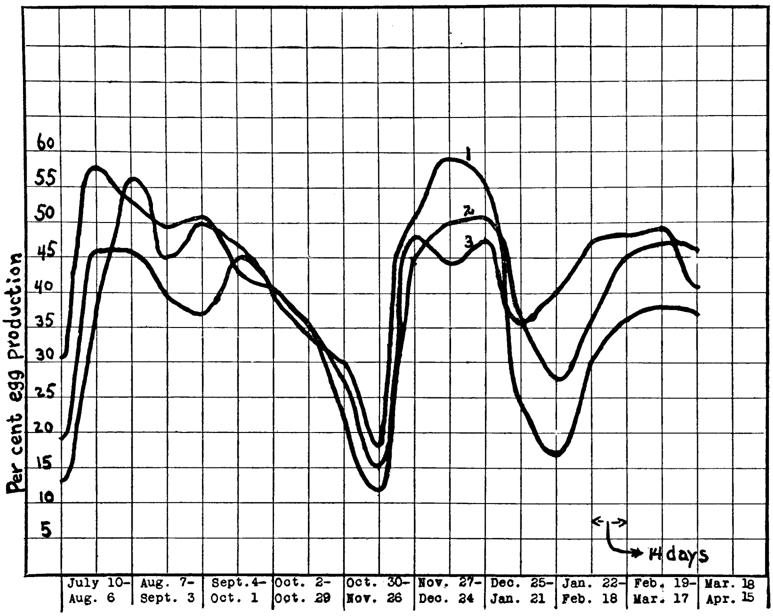


Fig. 3.—All-night light for recovery of loss of egg production of January-hatched pullets resulting from the onset of a molt in October

HATCHABILITY AS AFFECTED BY LIGHT OR NO LIGHT

How will all-night light affect hatchability? This is one of the first questions asked by poultrymen and hatcherymen. In fact, many have questioned the use of artificial light of any kind for the breeders. In Table 6 it will be observed that both hens and pullets subjected to morning or all-night light produced eggs of better hatchability than those without light. This is still more significant when it is considered that the hens with all-night light laid 42 per cent more winter eggs. Much the same advantage was secured from pullets.

In Table 2 and Figure 1 it will be observed that the pullets without light laid less eggs in December and January but more in February, March, and April, or, to put it the other way, when heavy production is secured from pullets or hens by the use of all-night light during November, December, and January it will usually mean less spring eggs. In anticipation of this it may be advisable not to subject all of the hens or pullets to all-night light when it is important to have an uninterrupted supply of hatching or special market eggs during February and March since the layers without winter light should reach their peak of production during this time.

TABLE 6.—Hatchability of Eggs as Affected by All-night Light, 4 A. M. Light, or no Light

Average of weekly hatches

Light or no light	Total eggs set	Fertile eggs	Chicks hatched to	
			Total eggs set	Fertile eggs
	No.	*Pct.*	*Pct.*	*Pct.*
No light:				
Pullets	1182	96.86	62.69	64.71
Hens, September-molted	991	94.65	61.95	65.45
4 A. M. light:				
Pullets	1185	97.55	68.69	70.41
Hens, July-molted	1218	95.48	68.80	72.05
All-night light:				
Pullets	1232	95.45	68.01	71.25
Hens, July-molted	1240	94.75	70.16	74.04
Hens, September-molted	1251	96.80	68.50	70.76

PREMOLTING AND RECONDITIONING HENS FOR WINTER EGG PRODUCTION

Success with all-night light for securing profitable winter egg production from hens depends largely upon the kind of hens and when and how they are premolted and reconditioned. Each poultry keeper has a variable combination of factors and conditions to deal with and must be governed accordingly. The method which has been successfully used by the Station and a considerable number of poultry keepers is offered as a suggestion for a general procedure which may be subjected to a variety of adaptations.

Kinds of hens to use.—The hens to be selected for winter eggs should be in good condition, vigorous, and up to size; that is, they should show no indications of being afflicted with disease or intestinal parasites. Yearlings are much to be preferred, although 2-year-olds may sometimes be used to advantage; older hens would seldom, if ever, prove suitable.

Pullets which have laid well during the previous winter and continued in heavy production the following spring and summer afford an important source of yearling hens. Such hens generally fall off in production after July and become available in August or September, and after being reconditioned by the molt and rest period of 6 to 8 weeks they are, if well bred and in good physical condition, particularly well adapted not only for winter egg production but for high quality early hatching eggs for chicks in January or February.

The hens that are displaced by the pullets in August and September furnish the largest source of valuable yearling hens. Thousands of these hens go to market each year, which, if properly prepared for winter production, could in many instances be made more profitable than the pullets that displaced them.

There are also the hens which for one reason or another molt early. The practice has been to market these birds in July, August, and September. However, such hens, if in good condition, may well be separated from the late molters and prepared for winter production. Where a special breeding flock is maintained, the early molters can be selected and prepared for winter production while the late molters can be continued in production so as to give them a chance to qualify for the breeding flock.

Special feeding and management.—Throwing the hens out of production and into a molt can be effectively accomplished by moving the birds to strange quarters, although this is optional, and feeding liberally of whole grain. When practicable it is desirable, though not essential, that the hens have free access to a good range where they can have an abundance of succulent green feed and direct sunlight. The hens should be available for premolting and reconditioning any time from August 1 to September 15. As soon as the hens are available, they are fed two parts of whole grain (which may be either whole corn alone or a mixture of whole corn 2, wheat 2, oats 1) to one of an all-mash—4 parts of the whole grain to one part of a mash intended to be used in connection with whole grain. The 2-1 or 4-1 whole grain-mash mixture should be kept before the hens at all times in suitable feeders, Figure 4. If the hens do not have access to an abundance of succulent green feed on the range, it is well to supply all the green feed they will eat or, if this is not available, high quality alfalfa, clover, or soybean hay, chopped into one-half-inch lengths, should be provided.

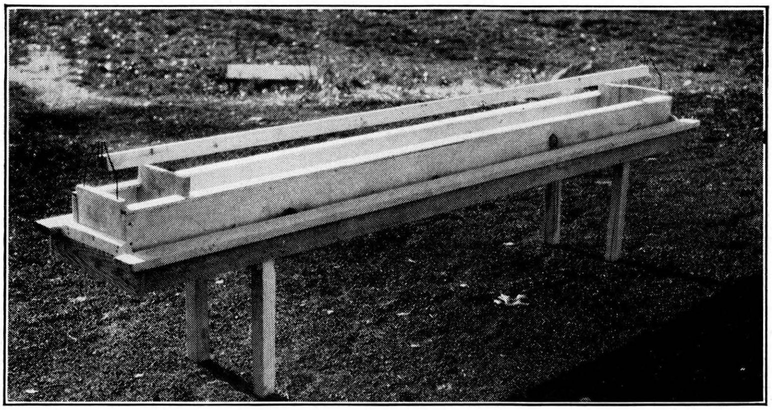


Fig. 4.—An open box type feeder 4 inches deep, 8 inches wide inside, and 8 feet long to serve 50 layers of the lighter breeds. Such a feeder with ample feeding space provides the best place for feeding whole grain, wet mash, sprouted oats, or condensed buttermilk, as well as the dry mash.

After 6 to 8 weeks the hens may be moved to, if not already in, their permanent winter quarters and given all-night light and the regular laying ration. One of the rations used by the Station, which gave good results, was an all-mash feed mixture composed as follows:

Yellow corn, coarsely ground	35
Wheat, coarsely ground	20
Oats, finely ground	20
Wheat bran, coarse	5
Meat scraps, medium (50-55% protein)	8
Dried skimmilk or buttermilk	5
Oyster shells (chick size) or limestone grit	2
Salt	0.5
Cod-liver oil	1

Chopped alfalfa, clover, or soybean hay, oyster shells, and limestone grit, before the birds at all times.

The dry mash was fed daily from 3 to 5 P. M. in about the amount that would be consumed before the next feeding period so that there was always some mash available. Warm water to drink was provided during cold weather. The mash was fed in open box type feeders, Figures 4, 5, and 6.

A grain and mash ration may be used by those preferring to feed the grain and mash separately. If both grain and mash mixtures are employed, it is preferable to feed the grain in the mash feeders on top of the mash rather than in the floor litter, which is always more or less unsanitary. In like manner, if it is desired to feed moist mash, condensed milk, germinated oats, etc., the best place to feed such materials is in the mash feeders on top of the dry feed. Moist mash may or may not be fed—it is not essential. But it is essential for best results that warm water be available night and day during cold weather.

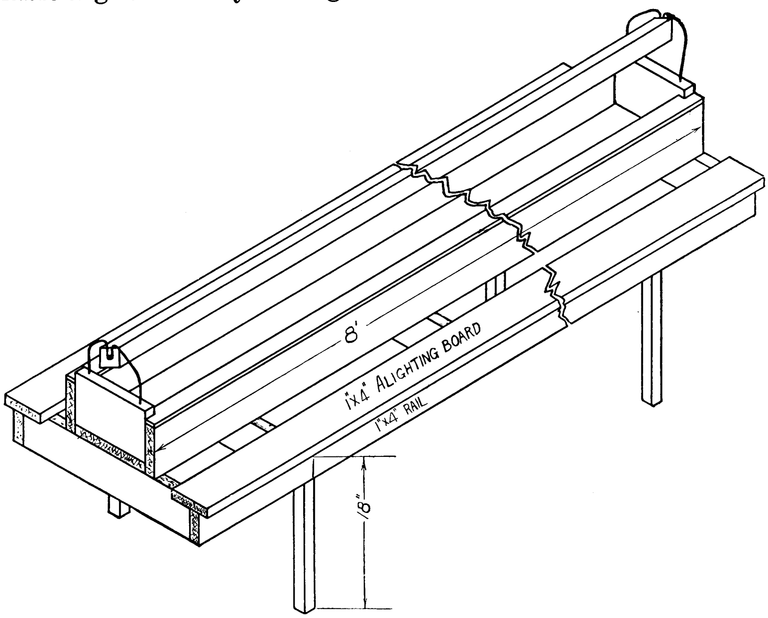


Fig. 5.—Sketch of feeder

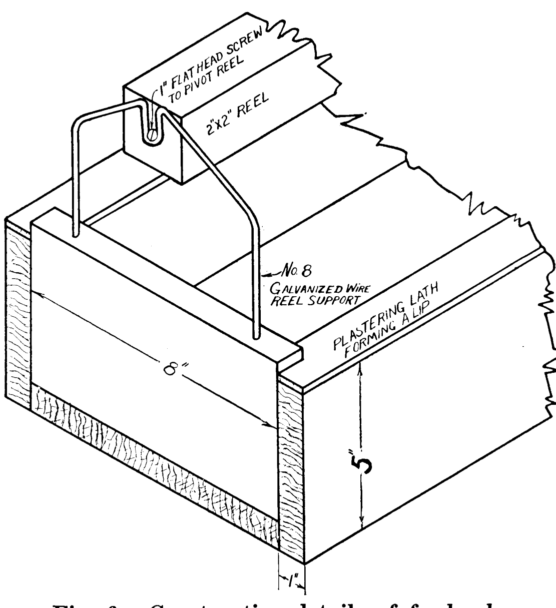


Fig. 6.—Construction details of feeder box

Suitable feeders and ample feeding space.—Next in importance to the ration itself is to have adequate feeding equipment. In fact, there is no one thing that many poultry keepers could do that would increase their profits as much for the small expense involved as to scrap all of their present obsolete feeding equipment and replace it with new and improved feeders. An open box type of feeder, such as shown in Figures 4, 5, and 6, providing ample feeding space, has been found the most satisfactory for feeding layers. By ample feeding space is meant 2 feeders 8 feet long for each 100 layers of the lighter breeds, and, for 100 layers of the heavier breeds, 2 feeders 10 feet long.

The sketches and photograph are self explanatory so that construction of the inexpensive feeders is a simple procedure. The feeders are waste proof and keep the feed clean. The revolving pole keeps the birds out of the feeder and prevents them from roosting on it. There is a 6-inch compartment at each end of the feeder for shells and grit, Figure 4. This is a very desirable feature since it makes the best place to keep the shells and grit clean and always available for the birds. In order to prevent any mixing of feed and shells or grit the partitions extend to 2 inches above the sides of the feeder or nearly to the bottom of the revolving pole. These same feeders are equally desirable for feeding pullets on summer range. In that case the stand may or may not be used.

Detailed list of material for one feeder 8 feet long (all material to be of white pine or spruce):

1—1″ x 8″—8′ long—bottom	
2—1″ x 5″—8′ long—sides 2—1″ x 5″—8″ long—ends	or 1—1″ x 10″—10′ long
2—1″ x 4″—8′ long—alighting boards 2—1″ x 4″—8′ long—sides of stand 4—1″ x 4″—2′ long—ends and cross ties of stand	or 5—1″ x 4″—8′ long
1—2″ x 2″— 8′ long—revolving pole 4—2″ x 2″—18″ long—legs	or 1—2″ x 2″—14′ long
4—plastering lath 4′ long—lips of feeder	
2—wire reel supports 24″ long, No. 7 or 8 galvanized steel wire	
¼ pound 7d box nails	
2 No. 10 flat-headed screws 2½″ long for axles of pole	

INSTALLATION OF ALL-NIGHT LIGHTS

All-night light requires no special wiring, switches, or equipment. The simplest of wiring and a switch to turn the light off and on are all that will be needed. The light can be turned on when convenient in the evening and off in the morning at a time most convenient for the caretaker, or those who prefer can easily install an automatic time switch operated by an alarm clock.

A dim light sufficient.—Those accustomed to the use of bright morning or evening light in the laying house when it used to be the practice of feeding grain in the litter instead of feeders, as at present, are often inclined to use more light than is necessary or desirable. For all-night light a 10- or 15-watt electric bulb furnishes ample light for a 20 x 20 pen accommodating 100 to 120 layers and two 10-watt bulbs will serve 150-200 layers in a house 20 or 24 x 30 feet. Two small bulbs in each pen are preferable to one larger bulb—then if one burns out the other will prevent a possible interruption of the light, which might result in a loss of production.

Location of lights.—The customary location of the lights for morning or evening light serves equally well for all-night light; that is, the bulbs are usually located 6 to 7 feet above the floor in the center of the house from front to rear and the lights are spaced 10 to 15 feet apart. A suitable shade is desirable but not essential. In any event the light should be in such a position as to permit it to reach the rear roost so that the birds can see to go to and from the roosts without difficulty. The feeding and drinking equipment can be located where the best light effect is secured.

Kinds of light.—Electricity is preferable for obvious reasons, but where it is not available a kerosene barn lantern can be used to advantage. One lantern will serve for 100 layers in a pen 20 x 20 feet. The lantern can be hung in such a position as to give the best light effect, which will usually be in the center and 2 to 3 feet above the floor. It should be emphasized that every precaution must be exercised to prevent any possible fire hazard which may attend the use of lanterns. Besides keeping the wick and burner in proper condition, it is especially necessary to make sure that there is never any stoppage of the opening or duct along the outside of the wick channel which serves as a vent to equalize any difference of pressure that might otherwise develop between the inside and outside of the oil container. For double assurance and protection against this possible hazard, it is well to puncture the oil filling cap of the oil container with a small nail from the inside of the cap so as to make a hole about the size of a common pin.

Natural or artificial gas also makes a very desirable means for providing all-night light. The light can best be supplied by means of an inverted gas mantle which will supply a dim light comparable to a 15-watt electric bulb to serve 100 to 200 layers.

When to use all-night light.—This is such a many-sided question that no definite or comprehensive answer is yet available. However, there are some suggestions which may have a general application.

January- or early-hatched pullets generally continue in good production until during October when they are often inclined to fall off more or less in production and a number of the birds may go into a light molt. Whenever this is observed or when the birds go below 40 per cent production, all-night light should be started. This will allow the few pullets already affected to recover and will encourage the balance of the flock to continue laying. Should January pullets, for any reason, suffer a loss of production and molt prematurely in August, the better plan in most instances would be to let them go off production and recuperate until sometime during October before giving them all-night light. In other words, when January pullets go below 40 per cent production before October there is generally a definite cause, either weakness or faulty condition, responsible for it and usually the best correction of such causes or complications is a few weeks' reduced production and recuperation, especially at that time of the year. If the pullets have a rest and recuperation in August, then with all-night light during October and after, they should be in condition to maintain heavy production throughout the winter.

Pullets hatched during March, April, and May can usually be given all-night light to advantage sometime during October or about 3 weeks before it is desired to bring them into full production. In the case of prolific pullets which may be inclined to lay beyond their ability to maintain such heavy production, it would, in many instances, be advisable to start in gradually with morning light and when this seemed insufficient, all-night light could be resorted to in November or December, depending upon the condition and behavior of the pullets.

When it is desired to hasten maturity and production of inferior, late-hatched, or immature pullets, they would usually be given all-night light about October 1.

To secure winter eggs from hens they should receive all-night light 4 to 8 weeks after the beginning of their premolting and reconditioning period, depending upon the kind, quality, and condition of the hens in question. If the hens are started to molt and recondition during August to the middle of September, they should be in condition for all-night light sometime during October so as to be in heavy production during November and December. Whenever winter hatching eggs are desired from hens they may be given all-night light about 3 weeks before heavy production is desired, assuming of course that the hens have had ample opportunity to molt and recondition before that time.

Since all-night light has proven effective for the prevention of the fall or winter molt of pullets, it seems obvious that it can be used to a similar advantage for prolonging fall production by delaying the usual fall molt of hens. In that case the all-night light may be started any time after August when the need of it is indicated by reduced production and the usual beginning evidences of the onset of a fall molt.

When to discontinue all-night light.—Ordinarily there would be no reason to continue all-night light after March unless any interruption of production which may attend the sudden discontinuation of all-night light would be undesirable on account of production of hatching eggs or special market eggs. In either case, the light may well be continued until a later date. In other instances the light may well be discontinued in February or March when egg prices are low and especially if the birds have been in heavy winter production and are in need of rest from heavy production temporarily so as to be in better condition for summer and fall production when eggs usually command a better price. In many cases the hens may be sold to advantage in February and March when they will often bring a better price than later, or the hens could be retained until June when they could be replaced by January-hatched pullets.

When it has been desired to discontinue all-night light it has been the Station's practice to do so all at once. Lessened production may follow for a short time, or it may not, depending upon the time of year and the condition of the birds. We are unprepared to suggest whether it would be worth while to reduce the light period gradually to avoid the temporary effect upon production which may follow.

ALL-NIGHT LIGHT FOR PREVENTION OF THEFT

Another important use for all-night light in some instances would be for prevention of theft. Thieves would find it unsafe to work with the lights on, and they could not turn them off without the liability of attracting attention.

FACTORS CONTRIBUTING TO THE SUCCESSFUL USE OF ALL-NIGHT LIGHT

WARM WATER FOR WINTER LAYERS

Warm water is one of the essentials for best winter egg production. Hens drink sparingly of cold water but relish warm water. A liberal intake of water increases egg production by stimulating feed consumption and supplying the large amount of water required for egg formation.

The insulated water pail and electric heater, illustrated in Figure 7, is a simple, effective, and inexpensive device for its purpose. This outfit, with a 16-quart pail, amply serves 100 layers.

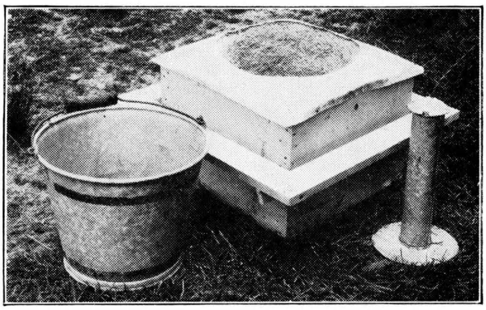


Fig. 7.—Warm water device

Insulation of water pail.—The construction of a box container is self-explanatory from the photograph, Figure 7, and the sketch, Figure 8. The galvanized iron cover is cut to fit snugly under the rim of the pail and sloped so as to carry off drip water to keep the inside packing dry. The bottom of the box is removable so as to pack easily or renew insulation around the pail. When the box with iron cover is completed the pail is put into place and the box turned upside down so as to pack straw, excelsior, or newspapers firmly around the pail. The bottom is then fastened in place. The pail can then be removed when desired and the packing will stay in place. One packing will usually last through the winter season. The 1- by 3-inch boards for hens to stand on are placed 4 inches below the top of the pail and one inch from the box. The size of box should be such as to provide 1 to 1½ inches of space for packing between the top edge of the box and the pail.

An inexpensive electric heater.—Figure 7 shows a simple, highly satisfactory electric heater used at the Ohio Experiment Station during the past four winters. It consists of a piece of galvanized iron conductor pipe 12 inches long and 2½ or 3 inches in diameter, water tight at one end. To this bottom end a 6-inch disc of galvanized iron is attached so as to keep the heater upright. Then one inch of sand is put in the bottom and an extension cord inserted in such a way that the bulb rests in the center and on the sand. More sand is then added to fill around the bulb and to a point 3 or 4 inches above so as to hold the heater on the bottom of the pail when it is full of water. A tin cap[1] is put on top of the heater to keep out any water the hens might flip about, as the heater must be kept dry inside to prevent a short circuit. Carbon filament bulbs are best suited for heating as they give off more heat and less light than other types. Bulbs of 16 to 50 candle power may be used, depending on requirements. If carbon filament bulbs are not available locally, they can be secured from wholesalers of electrical supplies.

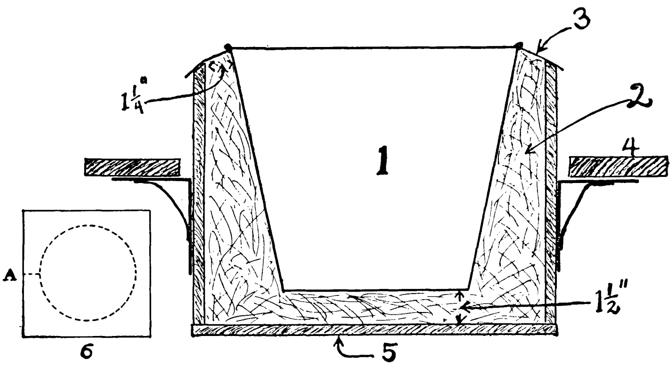


Fig. 8.—Insulated water pail and container

1. 12, 14, or 16 quart galvanized water pail.
2. Straw or excelsior for insulation.
3. Galvanized sheet iron top to keep insulation dry.
4. 1- by 3-inch running board.
5. Removable bottom.
6. Sheet iron top marked for cutting.

INSULATION NECESSARY AND ARTIFICIAL HEAT DESIRABLE FOR BEST RESULTS

In order to realize the full advantage of all-night light for winter layers it is necessary that the laying house be effectively insulated against cold weather so as to prevent the temperature from going below the freezing point, regardless of the weather outside. This can usually be accomplished by closing the well-insulated house as tightly as possible during severely cold weather.

[1]If 3-inch-diameter conductor pipe is used, a rubber force cup used for dislodging stoppages in waste pipes of sinks or wash bowls can be used to advantage for capping and insulating the top of heater.

However, artificial heat is very desirable to keep the temperature around 35 to 40 degrees Fahrenheit during cold weather and at the same time prevent excessive dampness by providing better ventilation. A comparatively small amount of artificial heat will serve this purpose in a well designed and insulated house. The layers seem quite comfortable and appear to suffer no ill effects of cold weather when the inside temperature can be kept from going below 35 to 40 degrees Fahrenheit. When the temperature goes below freezing, the layers are inclined to become inactive and are reluctant to leave the roost for feed and water; whereas a temperature of 35 to 40 degrees Fahrenheit encourages a normal activity both day and night.

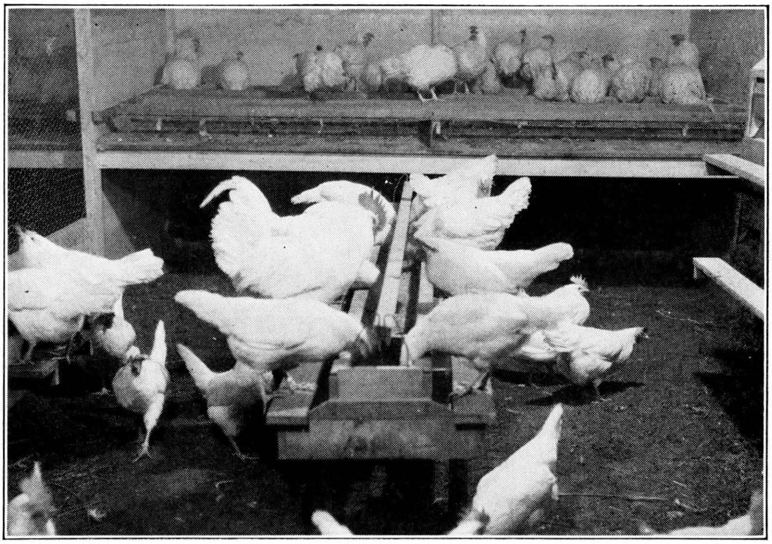


Fig. 9.—A typical night scene when layers receive all-night light

SUMMARY

A restricted amount of artificial light has long been used to advantage for increased winter egg production. All-night light is a more recent development and extension of the same principle. The evidence presented would seem to indicate that all-night light is the most effective way to realize fully the value of artificial light for winter layers. The supposed ill effects from the unrestricted use of light failed to materialize.

Pullets or hens subjected to all-night light laid a considerably greater number of winter eggs than those without light or with morning light at 4 A. M. But the latter laid more spring eggs.

For a more uniform supply of hatching eggs or special market eggs in February and March, it is suggested that a certain proportion of the hens or pullets should be carried through the winter months without light so they would come into their peak of production during February and March.

Winter egg production from select yearling hens, comparable to select pullets, was a new accomplishment made possible by the use of all-night light.

The liberal winter egg production from hens permits the use of eggs from hens in preference to pullet eggs for hatching in January and February.

No ill effect upon fertility or hatchability of eggs resulted from the use of all-night light.

All-night light proved especially valuable for bringing slow maturing, late-hatched, or inferior pullets into production.

All-night light proved effective for prevention of a premature fall or winter molt. Likewise, its use resulted in surprising recovery of egg production from pullets which had started to molt in October.

September-molted hens with all-night light laid 42 per cent more eggs and consumed 10 per cent more feed from November 13 to March 4 than did a similar group of hens without light.

Suitable open box type feeders providing not less than 30 feet feeding space, counting both sides of the feeder, and the feeding of fresh, coarsely ground mash daily, preferably in the evening, in the amount that will about be consumed before the next feeding period are requirements for most effective results from all-night light.

A coarsely ground or granular feed mixture is preferable to finely ground materials. A single complete feed mixture made up as much as possible of coarsely ground or granular feed materials was successfully used with all-night light for securing heavy winter egg production from hens and pullets. Whole grain or moist mash may or may not be employed, depending upon the poultry keeper's preference.

For best results with all-night light a well insulated laying house was found necessary, and some artificial heat during cold weather proved beneficial; otherwise the layers were inclined to become inactive during severely cold weather. When the temperature in the laying house was kept from going below 35 to 40 degrees Fahrenheit the birds maintained their usual activity both day and night.

The use of all-night light offers promising possibilities for prevention of theft.