POULTRY SCIENCE AND TECHNOLOGY GUIDE

Extension Poultry Science • North Carolina State University • Raleigh, N.C.

Induced Molting of Commercial Layers

Induced molting can be an effective management tool, enabling you to match egg production with demand and reduce bird cost per dozen eggs. Through an induced molt, the productive life of a flock can be extended up to an age of 105 weeks. You can adjust the timing of a molt as part of a total profit plan that maximizes egg production over the life span of the hens and matches periods of highest egg production to periods of highest egg prices.

The decision to molt a flock should be based on sound management principles and a thorough analysis of your management practices and economic situation. Refer to Poultry Science and Technology Guide No. 9, *Induced Molting as a Management Tool,* for a detailed discussion of molting program economics.

The purpose of an induced molting program is to rejuvenate the reproductive system of the hen. For complete rejuvenation and optimum postmolt performance, the reproductive tract must experience complete regression—that is, egg production must completely stop. Complete regression results in the flock being totally out of production for 14 to 17 days. Because weight loss is closely associated with reproductive tract regression, body weight is closely monitored throughout a molt.

The following factors, which are essential to a successful induced molt, are addressed in this guide:

1. Age of the flock
2. Nutrition
3. Lighting
4. Flock history
5. House and equipment design
6. Season of the year
7. Variations among strains

The procedures described for a successful six-week molt have been used extensively by the commercial layer industry. Much of the information in this guide is based on practical experience coupled with continuing research. Be sure to follow the recommendations closely. Deviating from the program can produce less than satisfactory results.

The age of the flock has a profound influence on the success of an induced molt. Attempts to molt a flock less than 57 weeks old will be hampered by the hen's resistance to ceasing production. Some of the hens will likely not experience an adequate regression and rejuvenation of the reproductive tract. On the other hand, if the flock is more than 67 weeks old, the potential for restoring shell quality is greatly diminished, and the overall economic advantage of an induced molt is considerably reduced. The second laying cycle of the flock should end at 100 to 105 weeks of age.

An induced molting program consists of three phases: (1) a premolt period, (2) a period of fasting and weight loss, and (3) a return to production after the fast.

Premolt Phase

Body Weight Sampling

The success of a molt depends on accurate body weight sampling. The premolt weight of the hens is one of the most important pieces of information in the entire program. Do not cut corners in sampling the flock for body weight. One week before withdrawing feed, weigh all the birds in a cage at several locations throughout the house. Select sample cages from all decks, rows, and areas in the house. *Mark these cages* so that you can weigh the same birds for subsequent body weight samples.

Targeting Body Weight Loss

The amount of weight loss necessary for complete regression of the reproductive tract depends on the premolt weight of the hens. Table 1 indicates target weight loss for various premolt weight ranges. Many factors affect the method for achieving these goals. Read the fasting and weight-loss section of this guide closely.

Table 1. Weight-Loss Targets

Premolt Weight (pounds)	Target Weight Loss (percent)
Up to 3.6	30
3.6 to 3.8	33
Over 3.8	35

Lighting Program

To cause the birds to stop laying abruptly, they should be "conditioned" by exposing them to constant light (24 hours per day) for seven days before withdrawing feed. The hens will then experience the maximum decrease in day length at the time of feed withdrawal.

Premolt Calcium

The addition of supplemental calcium to the feed during the final two days before the feed is removed improves the shell quality of the final eggs laid before production ceases. Adding 100 to 200 pounds of oyster shell per ton in addition to normal ingredients produces the best results. Alternately, oyster shell can be top-dressed in the house at the rate of 5 pounds per hundred hens.

Fasting and Body Weight-Loss Phase

Monitoring Weight Loss

Weight loss must be closely monitored in the fasting phase and compared to the target body weight established in the premolt phase. Weigh all the hens in the same cages as were sampled during the premolt period. Measure body weights on the seventh and ninth day after feed withdrawal, and calculate the average weight loss per day. From this estimated rate of weight loss you can predict when the birds will achieve the target weight loss. Weigh the hens in the sample cages every other day until two days before they are predicted to reach their target weight loss. Then weigh the sample birds *every day.*

Seasonal Influences on Weight Loss

A cool environment causes birds to lose weight more quickly. If weight loss occurs too rapidly, regression of the reproductive tract will not be complete. If a flock achieves the target weight loss before the twelfth day after feed withdrawal, the temperature within the house has been too low. In subsequent molts, steps should be taken to keep the temperature somewhat higher. For the flock that has lost weight too rapidly, begin limited feeding as soon as the target weight loss has occurred. Offer 15 pounds of Molt 1 feed (to be discussed later) per hundred hens per day until the twelfth day after feed withdrawal, at which time full feeding can resume. This procedure will maintain body weight and allow full regression of the reproductive system. Under normal circumstances this limited feeding is not required; it is described here only for situations when weight loss has been too rapid because of low house temperatures (less than 72°F) or high air velocities (greater than 500 feet per minute).

High house temperatures retard weight loss. If the target weight loss has not occurred by the eighteenth day after feed withdrawal, limited feeding should begin. Offer the birds 10 pounds of Molt 1 feed per hundred hens per day. Continue to monitor weight loss as described above.

Housing and Equipment Influences on Weight Loss

Many factors related to housing and equipment may cause poor uniformity in body weight. They include temperature differences and other ventilation problems, feed equipment problems, or localized problems with parasites or diseases. It is important to be aware of these factors.

Within a house there may be zones that repeatedly produce birds with heavier or lighter weights. For example, hens in cages at different levels may consistently have considerably different weights. In such cases, hens in each cage level can be sampled for weight separately and a target weight loss established for each level. Those hens reaching the target weight loss first may be offered 15 pounds of feed per hundred hens per day to hold their weight constant until all hens have achieved the target weight loss.

In other situations where it is not possible to feed the hens of differing weights separately, steps should be taken to eliminate the conditions that produce the nonuniformity. If the weight of birds in the flock is highly variable and an attempt is made to molt them as a single unit, the results may be less than satisfactory.

Strain Influences on Weight Loss

The North Carolina Layer Performance and Management Tests have shown that the rate of weight loss during a fast varies considerably with strain. Provided that the minimums discussed earlier are considered, strains should be allowed to lose weight at their own relative rate. The rate of weight loss has little or no influence on subsequent performance. Comparisons between strains without regard to these facts are not valid.

Livability During Feed Withdrawal

Livability should be more than 98 percent through the fasting period. There will be a notable decrease in livability as the flock approaches the target weight loss.

Flock History and Livability

If the flock has experienced some sort of challenge (such as disease, exposure to mycotoxins, or environmental stress) that has significantly affected egg production or livability in the first cycle, livability during the fasting period may decrease below 98 percent. The extent of the decrease depends on the nature and severity of the challenge and how long the flock has had to recover from the challenge. Before initiating a molt, examine the production records for the flock. If there was a notable challenge during the last 8 to 10 weeks of the first cycle of the flock, expect livability during the molt to be lower than normal. If this challenge was severe and very recent, it might be wise not to molt the flock.

Lighting Program

Appropriate management of the lighting program for the flock is critical during the fasting and weight loss phase. *The fundamental requirement is to provide constant or decreasing day length for 21 days after feed withdrawal.* The best way to accomplish this depends on the house type and season. The following recommendations for closed housing *assume absolute light control.* If your house is not completely light tight, use the open housing recommendations. The lighting programs outlined in Table 2 begin on the day of feed withdrawal.

In many parts of the United States the natural day length will far exceed the minimum day lengths suggested in Table 2. In midsummer, 30-minute increases in day length on days 21, 24, and 28 will result in extremely long day lengths after the molt. Make certain that the hens experience at least a 15-minute increase in day length on these days. Maximum day length does not need to exceed 16 hours for adequate stimulation.

Return to Production

When the target weight loss has been achieved, the flock must be closely managed as feeding resumes and production begins.

Returning the Fasted Flock to Feed

Hens that have been fasted must never be returned immediately to full feed. For the first two days offer only 10 pounds of feed per hundred hens to prevent severe crop impaction. After this adjustment period, the hens should be given full feed.

Nutrition During the Recovery Period

Before the onset of production, the hens must be fed diets that promote rejuvenation of the reproductive tract and maximize feather growth. Two diets are recommended to meet these requirements. The exact formulation of these diets depends on availability of feedstuffs and feed prices. The recommended minimum levels of key nutrients are shown in Table 3.

Table 3. Minimum Nutrient Levels of Recovery Diets

Nutrient	Molt 1 Diet	Molt 2 Diet
Crude protein	16%	17.5%
Metabolizable energy	1,275 kcal/lb	1,300 kcal/lb
Total sulfur amino acids	0.65%	0.70%
Lysine	0.80%	0.95%
Calcium	2.0%	3.75%
Available phosphorus	0.4%	0.4%

The Molt 1 diet should be fed from the time the flock is returned to feed until egg production reaches the 5 percent level. The Molt 2 diet should be fed from 5 percent to 50 percent production. When 50 percent production is reached the diet should provide daily intakes of 290 kcal of metabolizable energy, 610 mg total sulfur amino acids, 735 mg lysine, 3.8 g calcium, and 400 mg available phosphorus. These levels of nutrients should continue until peak production is reached. The flock should then resume the standard nutritional program used in the first production cycle.

Housing Effects

The difference in rearing and laying environments between open and closed housing produces fun-

Table 2. Lighting Schedule

Days After Feed Withdrawal	For Closed Houses (Light Tight)	For Open Houses	
		Molts Starting June 1–Nov. 30	Molts Starting Dec. 1–May 31
0–20	12 hours	12 hours or natural day length* on day of feed withdrawal, whichever is longer.	Use natural day length* on 21st day or 12 hours, whichever is longer
21	13 hours	Increase day length by 30 to 60 minutes to total at least 13 hours.	
24	13.5 hours	Increase day length by 30 minutes if the increase on Day 21 was less than 60 minutes, to total at least 13.5 hours.	
28	14 hours	Increase day length by 30 minutes to total at least 14 hours.	
35	Resume normal lighting program. Day length should be at least equal to that before the molt, totalling at least 15 hours.		

*Natural day length begins 30 minutes before sunrise and ends 30 minutes after sunset.

damental physiological differences in birds. These differences cannot be explained solely by differences in light intensity. High air velocities resulting in "wind chill" contribute to this effect. One result is that flocks in closed housing return to production more slowly after molting than those in open housing. However, there is no corresponding difference in second-cycle productivity. Excellent performance can be attained with either type of housing. Care should be taken not to compare the performance of flocks housed in dramatically different environments without regard for the effects of those environments.

Second-Cycle Performance

The success of an induced molt is measured by the performance of the flock during the second laying cycle. No exact standards exist for second-cycle production. Field experience and recent North Carolina Layer Performance and Management Tests have produced general goals for molted layer performance. It is most accurate to express second-cycle performance in reference to the first-cycle production of the flock. Generally, molted flocks will lay 60 fewer eggs per hen housed, have a hen-day egg production rate 15 percent lower, and peak 10 percent below first-cycle performance. An example of these differences is presented in Table 4.

Table 4. Typical Egg Production Rates for the First and Second Cycle of a Molted Flock

	First Cycle (20–62 weeks)	Second Cycle (63–105 weeks)
Eggs per hen housed	222	162
Hen-day production	78%	63%
Peak production	90%	80%

Summary

Throughout an induced molt it is essential to remember the underlying objective of the process. Maximum regression and rejuvenation of the reproductive tract will occur when the induced molting procedures described in this guide are conscientiously applied. Remember these important steps:

Premolting Phase

- Assure proper body weight sampling
- Establish proper body weight loss goal
- Begin constant lighting seven days before withdrawing feed
- Consider providing supplemental calcium

Fasting and Weight-Loss Phase

- Monitor weight loss very accurately
- Be cognizant of other influences, such as housing and equipment, strain effects, and flock history
- Use the proper lighting program

Return to Production Phase

- Never return birds to full feed immediately
- Feed appropriate nutrient levels
- Be aware of potential housing effects
- Know what to expect during the second cycle

Additional Sources of Information

The publications listed here provide specific information on induced molting.

Copies of the following publications are available from Extension Poultry Science, Campus Box 7608, North Carolina State University, Raleigh, NC 27695-7608.

Carey, John B. 1986. Molting Report (435–490 Days) for the 26th North Carolina Layer Performance and Management Test. July 14, 1986.

Carey, John B., and J. Brake. 1987. Induced molting as a management tool. Poultry Science and Technology Guide No. 9. North Carolina Agricultural Extension Service.

Carey, John B. 1987. Final Report (140–728 Days) for the 26th North Carolina Layer Performance and Management Test. March 3, 1987.

Carey, John B. 1988. Twenty-Seventh North Carolina Layer Performance and Management Test Final Report. Vol. 1, No. 3. May 1988.

The following articles appeared in *Poultry Science*, copies of which may be obtained from libraries.

Baker, M. J., J. Brake, and G. R. McDaniel. 1983. The relationship between body weight loss during an induced molt to postmolt egg production, egg weight, and shell quality in caged layers. *Poultry Sci.* 62:409–413.

Brake, J., J. D. Garlich, and T. A. Carter. 1984. Relationship of dietary calcium level during the prelay phase of an induced molt to postmolt performance. *Poultry Sci.* 63:2497–2500.

Andrews, D. K., W. D. Berry, and J. Brake. 1987. Effect of lighting program and nutrition on reproductive performance of molted SCWL hens. *Poultry Sci.* 66:1298–1305.

Carey, John B. 1989. Influence of protein and energy of molting recovery diets on three strains of commercial laying hens. *Poultry Sci.* 68(Suppl 1):176.

Prepared by John B. Carey, Extension Poultry Specialist, and John T. Brake, Professor and Physiologist

Published by
THE NORTH CAROLINA AGRICULTURAL EXTENSION SERVICE

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10/89—1.5M—TWK—190629 PS&T Guide No. 10