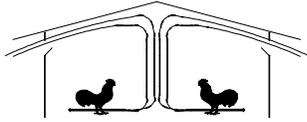




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Poultry Housing Tips

Broiler Lighting Programs

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It wasn't that long ago that a broiler "lighting program" was pretty straightforward; 24 hours of light from day one until the birds were picked up. Some producers provided an hour of darkness at night so the birds would get accustomed to darkness. That way in the event there was a power outage at night the birds would not panic. Others might have even dimmed their lights slightly as the birds grow older to reduce activity to improve feed conversions. But for the most part, the objective of the "lighting program" was to keep the birds growing at a maximum rate by keeping the lights on 24 hours a day.

Today, controlling the light environment has become significantly more involved. With black curtains and power ventilation, broiler growers are not only controlling the number of hours of light each day, but the number of light periods each day, as well as light intensity. Making matters even more complicated is the fact that all of these variables can change multiple times over the life of the flock. The question many producers have is "Why all this emphasis on light?". What are we trying to accomplish through controlling the light environment?

First, it is important to note that in a black curtain broiler house, light intensity and duration are not totally controlled as in breeder pullet houses. During the day, the amount of light is dependent upon not only how much light the bulbs are providing but other factors, such as how much the side wall inlets are open and how many fans are on and their placement. Though ideally we might want total light control at this time, it is not a practical option. Most homemade attempts to keep light out of a house tend to restrict the exhaust fans' ability to pull air into the house resulting in more heat stress related problems and increased electricity usage. Commercially available light traps, though less restrictive than any homemade light restriction options, are very expensive and would easily add \$20,000 to the price of the broiler house. Furthermore, it is questionable how much would really be gained having total control of the light environment.

Genetic selection of broilers over the last 40 years has been one of the primary reasons for the dramatic improvement in the increased growth rate of broilers. In 1960 typical 42-day-old broilers weighed only 3 pounds. Today's modern bird grows to nearly 5 pounds at the same age. Some of the problems that broiler growers are faced with producing a high performance bird are increased occurrence of sudden death syndrome (flipovers), ascities (water belly), and leg problems. These causes of death are often a consequence of poorly developed skeleton and cardiovascular systems.

In the early 1990's, researchers from the University of Saskatchewan in Canada experimented with a step-up lighting program. In this original experiment, they provided broilers with six hours of lighting from three to seven days of age,

and then gradually increased the amount of light each day to 10, 14, 18, and 23 hours, at 14, 21, 28, and 35 days of age respectively. When the step-up lighting program was compared with continuous lighting (providing 24 hours of lighting throughout the growout), it was determined that the step-up lighting decreased leg abnormalities by 60% and total mortality was also significantly reduced. Average body weight at the end of the growout was not adversely affected by the step-up lighting program.

How does providing an increasing lighting program reduce leg abnormalities? The answer to the question is two fold. Broilers subjected to an increasing lighting regimen tend to be more active when the lights come on compared with birds exposed to constant lighting. The increased activity or exercise has been suggested to stimulate bone formation. Secondly, lighting programs reduce early-rapid growth, which enables the skeletal system to develop before rapid weight gain occurs resulting in less leg problems.

Since 1990, U.S. broiler companies have used modified versions of the “Canadian Lighting Program”. These modifications are often less restrictive than the original lighting program to help compensate for reduced growth rate due to heat stress conditions encountered during the summer months. One Georgia company conducted field studies with 7-week old broilers comparing a modified version of the “Canadian Lighting Program” with constant lighting. It was found that the modified “Canadian Lighting Program” resulted in a 2-point improvement in feed conversion, 2% reduction in mortality, and 0.52% decrease in condemnations.

The goal of most lighting programs is to have reduced light intensities during the day and to schedule “dark periods” after the sun has gone down. Low light intensities help control bird activity, thus improving feed conversion. The reduced late mortality also results in increased total market pounds produced per house and thus better flock feed conversion.

Another advantage with increasing lighting programs is improved bird health. Melatonin is a hormone produced in the brain. It enhances the chick’s immune system and serves as an antioxidant, which helps to maintain healthy cells. Melatonin production is inhibited by light. Field results indicated that birds reared with an increasing lighting program had less respiratory lesions and better immunity to respiratory disease than birds exposed to constant lighting.

If the duration of dark periods are too long, when the lights come on broilers may have excessive activity. This can lead to an increased occurrence of condemnations. Condemnations account for economic losses approximating 70-80 million dollars annually to the broiler industry due to losses of meat and associated cost with trimming and salvaged processing lines. Infectious process (cellulitis) and gangrenous dermatitis are the primary skin diseases causing condemnations. With both of these disorders, bacteria causing the disease enters through a scratch or a wound in the skin. One way to reduce the occurrence of condemnations originating from infectious process or dermatitis is to minimize scratches during the growout.

For the same reason, growers should be careful about increasing light intensities suddenly during the day (as, for example, when picking up daily mortality). Crowding, which leads to increased scratching, can also occur when a grower or farm worker walks through a poultry house in a hurry to check for mortality. Checking on the birds in a fast manner can encourage the birds to pile up with the consequence being excessive scratching. We have noted flock condemnation increasing from 0.70 to 2.0% from simply having workers checking for mortality improperly.

One of the most important things to realize about birds and lighting programs is that birds quickly “learn” what the lighting program is and anticipate the lights shutting off. After a few days of the lights turning off at a specific time, birds start to react by increasing feed and water consumption about six hours before the lights are scheduled to turn off. Then within two hours of the lights turning off, feed consumption begins to drop. By the time the lights shut off, there are essentially no birds still eating and drinking (Figure 1).

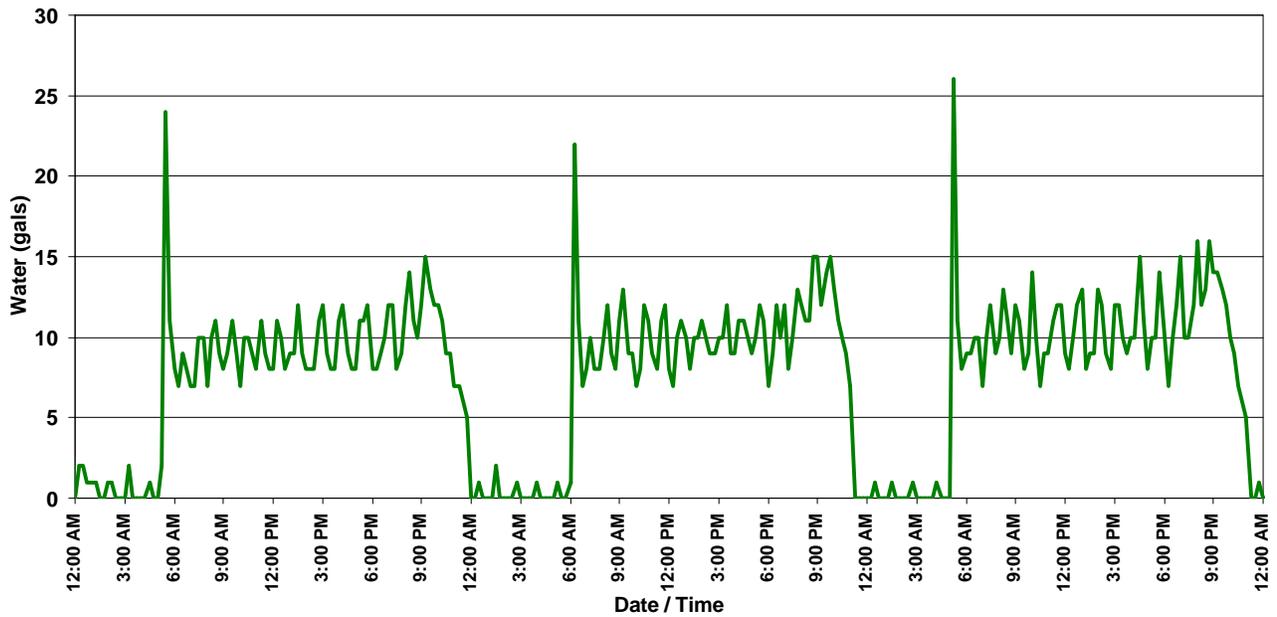


Figure 1. 15 minute water consumption for birds on lighting program where the lights turn off at midnight.

In Figure 2, it can be seen how well the birds learn the lighting program. The birds in the house are expecting the lights to shut off at midnight. Feed/water consumption starts to decrease around 10 p.m and by midnight the birds are no longer eating and drinking. What is interesting is that due to a malfunctioning timer the lights did not shut off at midnight. In fact, the lights did not shut off at midnight for the next two days.

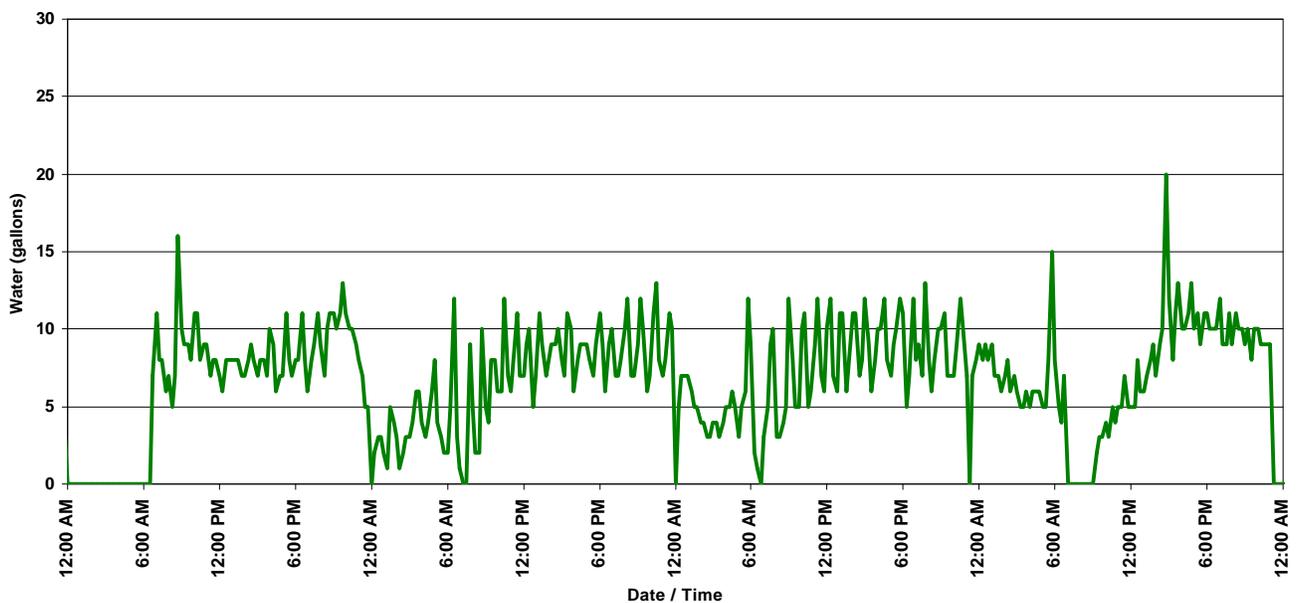


Figure 2. 15 water consumption of broilers in a house where the lights were scheduled to shut off at midnight but did not.

The fact that the birds learn a lighting program is of great importance. The birds expect the lights to turn off and on at a certain time and adjust their eating accordingly. If a producer constantly changed the lighting program, the birds would likely become confused as to when they were supposed to eat and performance might suffer. For instance, if the lights in Figure 1 were to suddenly shut off at 8 pm, the birds would not eat a large portion of the feed they had planned to eat that day and therefore weight gain would decrease. If the next day the lighting program were again to change, the birds once again might not eat the feed they need before the lights shut off. Bottom line, if the birds know when the lights are going off, they will adjust their eating pattern to make sure they get the feed they need.

How long does it take the birds in a house to learn a lighting program? It appears it only takes four to six days. The learning process can be seen in Figure 3. The lighting program was changed from six hours off time to two hours off time on the 18th. Over the next few days the water consumption pattern gradually changed as the birds slowly became accustomed to the new lighting program. It wasn't until about the 23rd that the birds established a new, stable feeding/drinking pattern. Since it takes such a relatively long time to learn a new lighting program, it is probably best not to have a lighting program that has a large number of changes over the course of the growout.

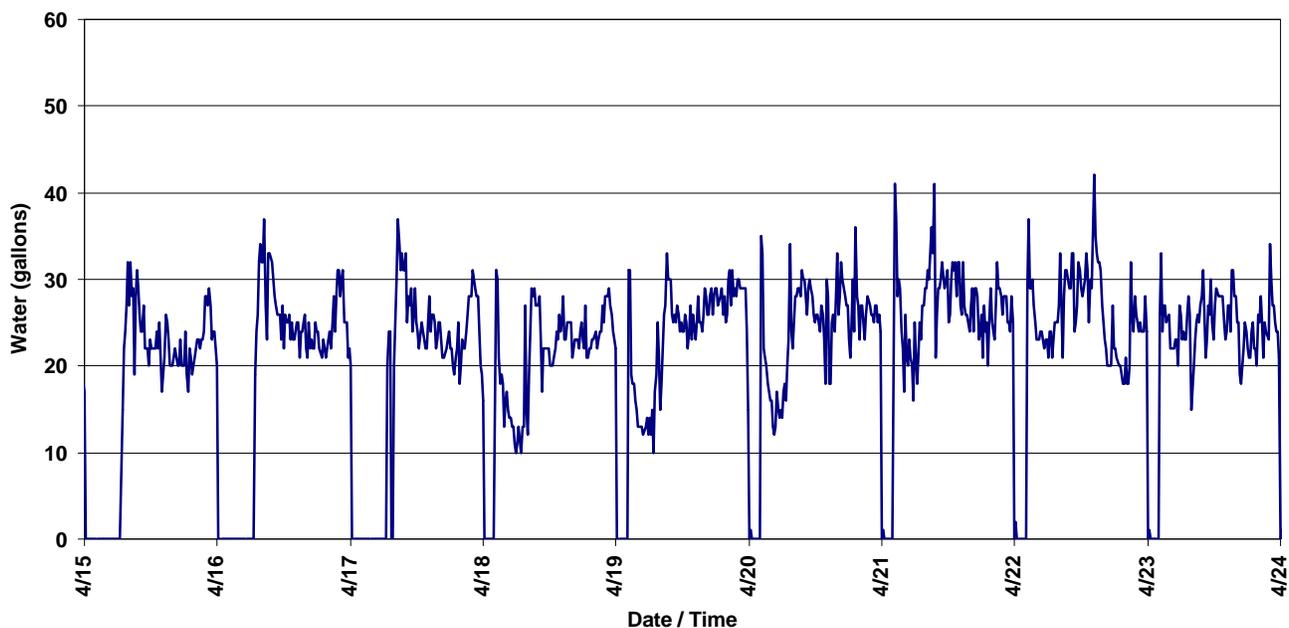


Figure 3. 15 minute water consumption during period when lighting program changed.

Another factor to consider when making changes to the number of hours of light the birds have each day is that it is probably less stressful for the birds if the lights turn off at the same time each day throughout the growout. In other words, changes to lighting duration should be made by adjusting when the lights come on. The time when lights go off should probably not be changed. When the off time changes the birds may not receive the feed they need for that day. But, if the number of light hours were to be reduced by having the lights come on later in the day, i.e., 6 am instead of 4 am., the birds would have the remainder of the day to adjust their eating pattern to compensate for the loss of light hours.

The lighting system and program that is best for a particular company or producer depends on the type of housing

(curtain, enclosed, tunnel, conventional), the type of bird grown (breed, strain, roaster, male, female, fast food, further processing) climate (hot, cold, season of year) and electricity costs. A number of different lighting programs options have resulted in documented improvements in performance. The key is obtaining enough light restriction early on to slow growth slightly but not too much to affect ultimate market weight.



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