

## **Lighting for Broilers**

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The modern broiler is a product of genetic selection for a large bird and improved nutrition which has offered the serviceperson a challenge at times. One management tool available to maximize performance for a long time has been manipulation of light. Lighting for poultry production can be thought of in terms of specific recommendations for wavelengths of lamps, intensity of the lighting system and duration of the light during the day. All of these impact production of the broiler, however specific recommendations may not be as necessary now as they were several years ago. Implementation of a light program on a particular farm is an understanding of a farm's situation and a understanding as to how the lighting programs can modify behavior and/or the physiology of the growing bird. When this is optimal the bird should be able to respond to the nutrition and the other factors of the environment and management that is imposed upon the bird.

The impact of altering behavior or physiology of the bird through light can be seen in pattern of light duration which influences feed consumption activity which alters growth pattern, thus capable of altering the incidence of metabolic disorders and thus mortality. Changes in the amount of activity can be influenced by intensity which again can modify the skeletal and muscular systems which impact leg strength. The duration and intensity utilized in the light program can also impact the immune system and the ability of the bird to survive to processing time.

Processing plant efficiencies are influenced if feed is retained in the crop at the time of processing. The lighting program imposed upon the bird prior to transport can impact carcass contamination.

### **Daylength**

Typically, chickens grown for commercial meat production use extended periods of light (23 to 24 hours) to encourage feed consumption and thus increased weight gain. Modern broilers, which have been intensely selected for fast growth, have also experienced increased metabolic problems such as ascites, flip over disease, sudden death syndrome and skeletal (leg problems) disorders. Attempts to reduce the incidence of these problems by slowing down the early growth rate of the broilers have been successful. This has been accomplished by physically restricting feed and by reducing the amount of light

the birds receive during the first several weeks, therefore, reducing feeding time. Physiological effects of these early reduced lighting programs have shown increased testicular growth, but no effect on body composition.

Intermittent light programs with alternating periods of light and darkness such as one hour of light and two hours of darkness (1L:2D) throughout the 24 hour day have been successful in improving feed conversion, increasing body weight and decreasing the incidence of leg disorders. Broilers can anticipate changing from a period of light to a period of dark and increase feed consumption activity just before lights go out. However, it is important as birds near market age to return to continuous lighting to ensure proper feed withdrawal prior to processing.

### **Light Intensity**

Light intensity has also been found to influence growth in meat-type poultry. There is much conflicting data with regards to the effect of bright or dim lights, but most of it is the result of what the investigators termed bright and dim. Many investigators have demonstrated that reduced light intensity promotes heavier birds and, in some instances, improved feed conversions because of reduced physical activity, and thus, a decrease in energy expended. Increased light intensity at certain times can also be advantageous. Investigators have discovered that increased activity, such as wing stretching and other non-injurious activity, reduces the incidence of leg abnormalities such as tibial dyschondroplasia and enlarged hocks. Additionally, low light intensity (0.5fc, 5 lux) has been shown to increase fat pad size when compared to a higher intensity (15 fc, 150 lux).

### **Light Color**

Evidence supporting the importance of a particular wavelength or color of light is not clear. Part of this may be due to the interaction of wavelength and intensity with regards to the bird's spectral sensitivity, and must be kept in mind when evaluating research using different colors. It has been shown that broilers reared under blue, green, red, and white lights and subsequently given an opportunity to select a color, preferred first blue and then green light. The ability of broilers to discern intensity has also been demonstrated. When assessing the broiler's ability to recognize the intensity of either blue or red light, it has been shown that broilers require approximately 3 times greater intensity of blue than red. This may be due to the spectral sensitivity of the broiler for different wavelengths.

Blue light has been found to result in increased weight gain in turkeys and chickens, but how much of this is an intensity rather than a color effect is unknown. Where attempts to equalize intensity have occurred, red light has been demonstrated to increase activity with regards to wing stretching and other non-injurious activity. This increased activity has been shown to decrease leg problems in fast-growing birds. The timing of exposure to the red light has

also been evaluated when both red and blue lights were used for growing broilers. Red light provided during the first half of the growing period was superior to red light during the second half of the growing period; this is possibly due to increased activity during the early growing period which increased bone strength thus reducing leg problems.

### **Other Effects of Light**

The pineal gland, a small gland located near the top and center of the brain, produces a hormone called melatonin. Periods of light will inhibit melatonin production and periods of darkness stimulate it. Melatonin is an antioxidant that help cells remain healthy by destroying free radicals and has been shown to enhance the immune response. Therefore, it is believed that intermittent light and dark periods are advantageous for growing poultry for reasons other than simply stimulating and controlling broiler activity.

### **Summary:**

The tools we have available today are much improved from both the ability to deliver a specific program and the ability to conserve energy in the broiler house.