

LIGHTING AND BREEDING

by Dawn M. Cryberg

The prospect of more eggs is one reason you as a bird breeder should understand how day length affects your birds' desire to breed. Do you know whether your breeding success is being affected by your photoperiod?

Photoperiod Defined

My what? Photoperiod is simply the number of hours of light and darkness you are exposing your birds to on a daily basis. By controlling your birds' photoperiod you can possibly stimulate your birds into breeding more often or just into breeding for the first time. You already carefully control their choice of mates, food, nest boxes, nesting materials and numerous other things to encourage or stimulate breeding. Controlling light periods will be easy.

More precisely, the term derives from two Greek words, photo, meaning "light" and periodos, signifying "extend of time" or "to go around in a circle. Since the earth makes one complete turn of its axis every 24 hours, photoperiod is used to describe the number of hours of daylight and darkness occurring during each 24-hour day.

Thus, controlling the alternation of light and dark periods in your bird room you can simulate the lighting pattern of your birds' native environment. Your birds' instinctive gene-encoded memory recalls the best time of year to breed. You need to produce the right cues of light and dark to help the bird do what comes naturally. Breeding cycles, color changes, feeding behavior, and activity patterns are some of the features of animal biology known to be influenced by day-length.

To understand how breeding cycles, photoperiods/day-length, latitude and seasons are related, you need to understand what causes the different day lengths at different geographical locations. This knowledge will help you determine the best photoperiod for your particular species of bird.

Earth, Latitudes, Seasons and Birds

When the number of hours of light and darkness change, the seasons change. Why? It's the earth's rotation pattern around the sun that causes the change. The earth's axis is tilted 23 1/2 degrees from the vertical to its orbital plane.

If you can determine the approximate latitude of a bird's native land you can also calculate the normal light and dark periods they experienced in their native land. For example, a finch that is from near the equator may very well have different light/dark needs than a finch from Australia. If the birds' range was very wide, such as that of the Wydahs, you probably need to determine where exactly your subspecies of birds originated. You need to remember the seasons in the Southern Hemisphere (latitudes below the equator) are the opposite of those in the Northern Hemisphere, if your bird is a wild caught bird. A bird may take a season or two to set its internal clock to your summertime because that used to be its wintertime. In an enclosed, windowless, heated area you may decide it is easier to keep the bird on the original day length schedule. Breeding in the winter gives you something to do besides watching snow or rain.

Four Stages of Annual Breeding Cycle

So what does all of this stuff have to do with bird breeding and avian eye? Let's refresh your knowledge.

The four stages of the annual breeding cycle of birds are preparation, progressive, reproductive and regressive. Sex organs go through changes depending on the stage of the cycle. What causes birds to go from one stage to the next? How do you recycle your birds back into the reproductive stage? These four stages of a bird's life also are influenced by age, food availability, territory/nest site availability, temperature, humidity, rainfall/water source, parasitism, and light. This article will only deal with light.

Preparation stage is the dormant time when reproductive organs are small and nonfunctional, yet it is very important for the success of the next breeding cycle. During preparation stage the fat layer is built up on all birds.

The importance of the dark period is more significant in this stage than in the light period. One researcher stated his conclusions about the early preparation stage like this: "Physiological changes that occur during this stage appear to require that the bird be in a short day situation. In fact, it has been found that the birds require a long night. Number of hours of light is less important than the numbers of hours of darkness each day."

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How long is this stage? It can vary from bird species to bird species. The same researcher stated: "About six weeks of long nights are needed to complete the preparation stage and to advance to the progressive stage of the cycle."

Progressive stage is an active time when there is a swelling of the sex organs due to the hormones that are being produced by the pituitary gland. This stage also prompts birds to fatten up and migrate. In breeding, the progressive stage "can be greatly speed-ed up by exposing the birds to long day photoperiods" as it is found to be dependent on the daily amounts of light which add up to determine the rate of development. One study with sparrows showed "less than about 9 hours of light per day halts development and fastest development occurs with a day length of 16 or more hours."

Reproductive stage is a visibly active stage during which the birds build nests, mate, and rear young. Reproductive stage follows progressive and is also affected by photoperiodism, which influences the rate at which this stage is completed. In research done on caged sparrows "the reproductive stage can be greatly prolonged by keeping the birds under a short day photoperiod of about 12 hours of light and 12 hours of darkness per day. Under such conditions, the birds do not lay a greater number of eggs, they simply take longer to produce their seasonal quota. On the other hand, long days, such as 16 hours of light and 8 hours of darkness, have the effect of intensifying and shortening the reproductive stage."

Regressive stage is seen as a quieting down period during which the shrinking of the reproductive organs is caused by less reproductive hormones being produced by the pituitary gland. The regressive stage does not seem to be sensitive to photoperiod. However, the time of year that it occurs is determined by the effects of photoperiod on the previous stages of the cycle. It is during the regressive stage that molt occurs.

To go full circle, or full cycle, the bird goes back into the preparation stage.

Photoperiod Responsiveness

Different animals' breeding cycles are affected differently by the change in day and night length depending on their environment and way of life. Each bird species can vary in its responses to light and darkness; in fact, individual birds within the species vary in number of light/dark hours needed to respond. Even the rate of responses can vary.

One of the first studies on the exact nature of the influence of day length on migration and breeding stages was done in 1925 by William Rowan. Later studies confirmed his results. He found that an artificial increase in day length results in the recrudescence, or regrowth, in the size of the bird' gonads.

Your knowledge of your bird's native region's rainfall, temperature, and season variations can also be important in the proper conditioning of the breeding bird.

In warm tropical areas of the globe, birds are influenced by many factors besides light periods to synchronize their breeding activities. Light still plays a part in some tropical birds' cycles.

In colder temperate areas of the globe, birds must be able to synchronize their growth and activities with their particular area's seasons. For instance, birds must be able to hatch young when food is plentiful or the babies will die from lack of food. Longer daylight periods allow for more lush growth. This overview is a simplistic look at complex interrelationships. One of the ways birds synchronize their breeding cycle is in their reaction to the length of light/dark periods.

Timing and Intensity of Light

The timing rather than the total energy of light received is critical in photoperiodism. There are certainly threshold light energies below which photoperiodism fails to operate. But for the most part it is the timing and not the intensity that cause the photoperiod reactions.

Proper timing is essential so you can repeat your successes and avoid the timing schedule that did not bring the results you wanted. Proper timing is easy to achieve if you have a windowless room and two or three good timers which you can get at your local hardware store. Timers plug into wall sockets. Lights, to be run by timers, are plugged into the timers.

It is essential to be consistent with periods of light and darkness. If you are not using timers, an error of leaving the light on overnight at the wrong time may start your birds into a reproductive stage before you are ready. Once they are started into the next stage of breeding due to a «tight break" there does not seem to be an easy off switch without losing an entire season.

Keep in mind that photoperiod is not the cause of the breeding cycle but rather its interaction with hormones, food supply, age, temperature, water supply, nesting sites, and many other factors.

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