

Full Spectrum Lighting

Avian Lighting Needs

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The following information is designed to answer some basic questions and provide suggestions on the subject of full spectrum lighting. The information offered is not based upon scientific research. It is the opinion of the author, based on careful observation that companion parrots do respond positively to daily supplemental lighting. It is important for each bird owner to adjust the brightness and amount of lighting to the needs of his particular avian species.

Some of this information deals with electrical fixtures and wiring. For those who are not experienced or knowledgeable about electricity and safe wiring practice, I suggest that you enlist the help of a qualified electrician to actually install the electrical fixtures. In some cases, limited full spectrum lighting can be supplied by a ready-made floor standing or cage-mounted fixture. However, the most desirable arrangement uses suspended, ceiling-mounted fluorescent tubes of the proper type, driven by flicker-free electronic ballasts.

Avian Lighting Needs

First, let's address why your bird might need extra light in the form of a full spectrum lighting fixture. The answer depends upon where you live, and the arrangements you have made for lighting the birds living area during daylight hours. Bird owners that keep their birds in outdoor aviaries where they have easy access to direct sunlight

probably do not need supplemental full spectrum lighting. However, a dark apartment, or a room with limited natural lighting simply will not provide enough light for the birds mental and physical well being.

Most of our avian companions have evolved in warm, sunny climates. It makes sense that at least part of the bird's day should include bright, sun-like light. I first noticed the beneficial effects of full spectrum lighting while observing my Cockatiel. He would follow me around the house during my daily chores, squealing and fidgeting all the time. I happened to turn on a full spectrum light one day and noticed that my bird immediately perched directly underneath the light. After a few minutes of grooming, he calmed down and went to sleep. I began adding a few hours of extra lighting over his cage and noted an improvement in his general well being and an overall calming effect on his personality. I also noted that the Cockatiel's feathers became more lustrous and shiny after using the light for a few weeks. These observations are difficult to document in a scientific way, but I encourage others to do some experimenting along the same lines. I think you will find that adding full spectrum lighting for at least a few hours each day will improve your bird's behavior and appearance, and it will make him happier.

What exactly is full-spectrum light? The term refers to a light source that closely approximates the mixture of visible light given off by the noon-time sun on the equator. There is a handy number that tells you how closely a particular light source approximates noontime sunlight: it is called the Color Rendition Index number, or CRI.

The CRI of a light source is given as a percentage. A CRI of 100 indicates that the lamps visible color spectrum is exactly like that of noontime sunlight. A CRI of 90 would indicate a 90% approximation of noontime sunlight. For our purposes, a CRI of about 86 and above can be called full spectrum. Another method used to specify the color mixture of a light source is the Kelvin temperature rating. A full spectrum light source will generally have a Kelvin temperature rating of 5000 to 5500 degrees. Both rating methods are in use today, but the CRI rating seems to be the most reliable method.

Notice that we are concerned with visible light only. Full spectrum light does not imply that we are going to be adding infrared or ultraviolet light to our birds environment. Significant amounts of UV light can be hazardous to humans and birds, and for that reason we do not use UV lighting. Although most fixtures do emit small amounts of UV, the amount is not significant. Infrared light, on the other hand, can be understood as radiant heat emitted by the warm lamp. We are specifically interested in supplying bright, sun-like light across the whole visible spectrum. Our fixtures should produce enough light to brighten the entire cage area without emitting an undue amount of heat.

Household Lighting

What is wrong with normal household lighting? This is a very interesting question and the answer will surprise most people. By far the most common type of indoor lighting is still the incandescent bulb. The bulbs most often burn in table lamp fixtures to illuminate small areas of the room. Incandescent bulbs produce a yellowish light, and a large amount of heat. They

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are inefficient and not suited to the task at hand. At least one company does produce a full spectrum incandescent bulb, however. Such a bulb might best be used for bedside reading, but it is not nearly bright enough or efficient enough for supplemental cage lighting.

Many people have replaced the incandescent bulbs in their homes with screw-in fluorescent replacements. These are far more efficient than incandescent style bulbs, so you get more light with less heat, while using less electricity. The same qualities apply to tubes found in overhead fixtures. In addition to greater efficiency, we also have control over what spectrum of light is emitted in a fluorescent lamp, by altering the composition of the internal phosphor coating. Once again, we find that most household fluorescent lamps give off a yellowish or greenish light. These lamps are usually labeled CW or WW for cool white or warm white respectively. This limited color spectrum is chosen because it is cost-effective (i.e., the most light for the least electricity). Neither color type is full-spectrum but with the correct mixture of internal phosphors, fluorescent lamps can produce full-spectrum light with a CRI of 86 or above. Note that the CRI does not indicate how much light a particular lamp emits. It only refers to the mixture of various colors that the light contains, and how closely this mixture comes to imitating natural sunlight. Our next task is to determine how much light is needed to do the job of improving the daily environment for our birds.

I cannot cite scientific studies that quantify the amount of light that is necessary to improve avian health. However as the owner of companion parrots, I have had excellent results with fixtures that fully illuminate the birds living area to a relatively high light level. My observation is that the brightness levels required for optimal avian lighting go a bit beyond the levels found in the average home or office. However, the level is still not excessive for humans, and might be found useful,

for instance, above craft work areas or wherever detailed work is done. Each person must determine what works best by carefully observing his particular parrot. What we are trying to do is supply bright, full-spectrum light of sufficient quantity to improve the birds physical and emotional health, while avoiding dangers such as too much heat or hazardous electrical wiring. A word of warning is important at this point do not use lighting that is intended to maintain aquatic environments! This type of lighting is much too bright and is usually dangerously hot. Birds simply do not need this much intensity.

We have already touched upon the idea of color mixture and the use of the CRI rating. Now, we will discuss an undesirable quality of fluorescent lighting called flickering. Early fluorescent lamps were driven by magnetic ballasts. These devices are a necessary part of all fluorescent fixtures and regulate the current flow through the lamp. Magnetic ballasts work at the power line frequency of 60 Hertz. The fluorescent lamp actually goes through a bright/dark cycle 60 times per second. Many humans report that they can see this flickering and experience fatigue and dizziness from the 60 Hertz flickering of the lamps. Avian studies indicate that the optic nerve in birds operates much faster than in humans, allowing the birds to see details in high speed motion much more clearly. If this fact is true, your bird will easily be able to see the flicker of a standard television set,

and will see a fluorescent light flicker on and off if driven by a magnetic ballast. This condition is not desirable and for that reason, we *must* avoid using magnetic (60 Hertz) ballasts. Fortunately, a modernized ballast is available that does not flicker and is called an electronic ballast. To avoid potential health problems with birds (and humans), supplemental lighting must use the electronic ballast system.

Another aspect of providing supplemental lighting will be to determine how long to leave the lights on. A 24-hour timer for the lighting is highly recommended. Personally, I have not found that constant high brightness light is either necessary or beneficial. You will find a number of opinions on this subject, all of them conflicting. It may not be best, for example, to leave the bright lights on constantly throughout the day. With Cockatiels, I have found that too much supplemental light tends to make the birds hyperactive, noisy, and stressed. It has also been observed that too many hours of bright light will stimulate hormonal behavior in the birds by imitating the longer days of spring and summer. After a morning of full-spectrum light, my Eclectus pair really look forward to some down time in the afternoons, which are reserved for napping and chattering (they can do both at the same time). So, in summer months when there are more hours of bright sunlight, I give the birds about 2-3 hours of light in the morning, and another one hour in the late afternoon.

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In winter when we might have only 4 to 5 hours of dim daylight available, the lights are on from 7:00 A.M. till 1:00 P.M., and again from 5:30 P.M. to 7:00 P.M. They would otherwise spend the majority of the day in the dark. Everyone should develop a schedule that works best for his own pet.

To summarize the important points so far, I have found that:

- Supplemental lighting is an important aspect of the avian environment.
- Extra lighting can improve the physical and emotional health of companion parrots, especially where the birds cannot enjoy direct sunlight. (Sunlight shining through the windows does not count!)
- The mixture of colors in the light should be close to natural sunlight and can be determined by using lamps with a high CRI rating (87 or above is good).
- The light should be of relatively high brightness, but not blindingly bright.
- The light source should ideally be at the top of the cage, to simulate sunlight.
- There should be enough coverage to flood the entire cage with bright light, instead of just illuminating a small corner.
- A timer should be used to adjust the number of hours of bright lighting to the particular birds needs,
- All precautions should be taken to prevent the light fixtures from becoming a hazard to the bird, either from heat or exposed electrical wiring. (Remember many birds will happily chew on electrical wires!)

The following information describes the specific lamps and fixtures that I currently use to provide lighting for my two Eclectus parrots. I have a 48inch long fixture suspended over each cage, 14 inches above the highest point. This arrangement gives the birds enough room to frolic on the cage top. Fixtures that are designed to hold two 4-foot lamps are inexpensive and can be obtained from Home Depot, Lowes, or any electrical parts supply. The fixture should have a curved metal reflector to focus the light downward. The lamps are size T8, 32 watt, (standard wattage for a 4-foot lamp). They provide a sufficient amount of bright light while remaining cool to the touch. T8 lamps are designed to run on electronic ballasts (see above), which should be included with the fixture itself. One such fixture is listed with Cooper Lighting Company as part # IC-232-UNV-EB81-U. This fixture will hold two, 32-watt T8 fluorescent lamps, and comes with the correct electronic ballast, and curved reflector, A more elaborate (and expensive) suspended fixture, called a parabolic troffer, can hold two or more lamps, and adds a reflective cell structure that focuses the light downward more efficiently. The latter type of fixture is very effective in cutting down side glare from the lights.

A word about suspended fixtures: the intensity of the light source diminishes rapidly if the fixture is more than 12-18 inches above the cage. For that reason, fixtures that

mount in the ceiling may not be able to supply enough supplemental light. Suspending the fixture above the cage is clearly the best way to get most of the light to your birds. Making the fixtures look attractive in your home is not difficult. One possibility is to surround the fixture with an attractive wood molding, for example.

Here are some specifics on the lamps themselves, which may have to be specially ordered from an electrical parts supplier. Full spectrum phosphor, 32-watt, T8 lamps are what we are looking for. Phillips makes two lamps that are satisfactory for our purposes. Both lamps are instant start, something that should be specified on the fixture. The two Phillips lamps are as follows:

- F32 T8 TL950: This lamp comes closest to natural sunlight and has a CRI of 98. The drawback is that the lamps are not as bright and are more expensive than the TL850.
- F32 T8 TL850/PLUS/ALTO: This lamp might be easier to find in stock at Home Depot. It has high brightness and a useable CRI of 86.

In either case, you will need two lamps for each fixture that you are installing. The lamps will typically last several years (the brightness slowly decreases). If you have a very large cage, you may even elect to use a 3-lamp overhead fixture instead of a 2-lamp fixture, especially if you have decided to use the TL950 lamps.

The lights should be connected to a 24-hour timer mounted in an electrical outlet box near the cages. There are electronic programmable timers that fit into the same space as a standard on/off light switch and I have found that they work very well. Note that you will only be switching approximately 70 watts for each 2-lamp fixture. This is a very low figure and will not limit your choice of timers. (Most in-wall timers are rated for 600 watt loads.) Please do not confuse 24-hour timers with incandescent lamp dimmers. Fluorescent lamps cannot be dimmed with the same device commonly used to dim incandescent bulbs. Special ballast types do exist that are capable of dimming fluorescent lamps, however we do not need this capability for supplemental cage lighting.

There are alternatives to suspended lighting fixtures. Basically, nothing comes close to the efficiency and brightness that is available from suspended four-foot fluorescent lamps. A distant second best would be a floor standing full-spectrum lamp with gooseneck. These lamps are manufactured by OTTLITE, among others, and use what is called a compact fluorescent lamp. The light mixture should be specified as full-spectrum, 5000 degrees Kelvin, or CRI of at least 86. The amount of light available from such a floor lamp is about one-quarter of the light from two four-foot overhead lamps. Also, the quality of the light is inferior because the ballast arrangement is almost never optimized

for compact fluorescent light. While the compact ballasts do not flicker at 60 Hertz, they do not emit truly flicker free light either. Another possibility is to mount a small fixture on the side of the cage (OTTLITE offers such a fixture). The same drawbacks apply to this type of arrangement, because once again we are using a compact fluorescent fixture with an inadequate ballast. This fixture gets hot and has an exposed electrical cord, so the bird must be inside the cage during use. High brightness S.A.D. fixtures (used in treatment of Seasonal Affective Disorder in humans) are not recommended because they stand horizontally, get very hot, and are designed for short periods of use only.

Lighting technology is constantly adding new and interesting products to our list of possibilities. We are in a transition period from the use of T8 fluorescent lamps to an even more efficient, and slimmer T5 lamp, T5 lamps and fixtures are not readily available at this time, but you will be seeing more of them in the near future. The same fundamentals apply equally to the T5 lamp (5/8 diameter), and to the T8 lamp (1 inch diameter). Light Emitting Diode or L.E.D. technology also holds future promise for high efficiency, high intensity lighting of any color or wavelength.

I hope that this information has answered some basic questions and motivated you to add supplemental lighting to your bird's environment. There is plenty of room for creativity in designing an avian environment and I look forward to hearing about your ideas and solutions. I shall leave it to others who are so inclined to dream up ways to quantify the effects of full-spectrum indoor lighting on birds. However, I suggest that moderation and common sense be your guides in deciding how much light to offer and at what times. I know you will be pleased with the end result of a happier and healthier companion bird. ❖

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