Introduction to Avian Nutrition

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History

Avian nutrition has a history going back to the 1800s when some of the first vitamin investigations relied heavily upon the use of chicks. Today the commercial chicken is perhaps one of the most studied and best understood nutritional models. Nutrition of exotic and pet birds, however, has only recently been studied in a systematic and scientific manner. There have been many obstacles to being able to provide a complete and balanced diet to these birds including the lack of knowledge of their diets in the wild, lack of funds for research and a lack of interest by researchers. Now, though, things are definitely improving.

As most people have come to realize, proper nutrition is essential to good health. Nutrition effects all aspects of the body including growth, reproduction and immune function. Many of the most common problems seen in exotic pets are noninfectious diseases which may stem from nutritional imbalances. Often times the needs of a particular species are simply unknown and there is little information on their diet in the wild. There is a small amount of information available but it is simply very difficult to obtain information on the dietary habits of free ranging birds (Ullrey et al 1991). Frequently, the owner provides an inadequate or unbalanced diet. The belief that an all seed diet is proper for pet birds is still widely held by owners. Other times the bird may be offered an adequate diet but through individual preference pick out only a certain type of food stuff and create an imbalance.

The commercial chicken is physiologically and anatomically very similar to exotic birds. At first, it was thought that parrot information could be extrapolated directly from the chicken data. Unfortunately, though, studies have proven that the nutritional needs of a chicken do not necessarily translate to the needs of a psittacine. Various amino acid and vitamin deficiencies studied have found different expressions in Cockatiels as opposed to chickens (Grau and Roudybush, 1985, Roudybush and Grau, 1991).

It must be remembered that the chicken is a precocial species while psittacines are altricial. Thus, studies involving the species of interest must be conducted to truly define the nutritional needs of that bird. A few have been done for the Budgerigar (Earle and Clarke, 1991) and the Cockatiel (Roudybush and Grau, 1991).

Nutrients

There are six basic nutrient groups which serve as the foundation for nutrition. These include water, protein, carbohydrates, fats, vitamins, and minerals. Nutrients are food constituents which serve to support life processes. They perform functions such as being structural components, metabolism, transport of other substances, and supply energy.

Water

Water is the most important nutrient. Animals can live much longer without food than without water. A 10% loss in total body water can cause severe illness. Poor water quality can be a source of many health problems. Too frequently, people feel it is adequate to simply top off the water containers for their birds and neglect proper hygiene. Bacteria reproduce quickly in wet and warm conditions. The use of water soluble vitamin supplements, the presence of foodstuff or fecal matter and lack of clean water dishes can lead to substantially high bacterial counts in your birds' drinking water. Many aviaries have adopted automatic nipple drinkers to avoid these problems. Also, bottled water is not necessarily sterile water. Keep this in mind when mixing formula for handfeeding. If your nursery is having a problem with handfeeding youngsters, be sure to evaluate your water source.

Protein

Protein and specifically amino acids provide the building blocks for growth and maintenance of your bird's body. Protein can also serve as an energy source but it is a far less efficient and more expensive source then carbohydrates or fats. There are 10 essential amino acids for birds including lysine, methionine, arginine, histidine, tryptophan, threonine, leucine, isoleucine, valine, and phenylalanine. Quality and bioavailability are important factors in evaluating protein sources. The quality varies with the number and amount of essential amino acids. The bioavailability or biologic value refers to the amount of a protein the animal actually utilizes versus that amount which is simply excreted in feces or urine.

Carbohydrates

Carbohydrates and fats provide energy to the body. Carbohydrates are usually classified into soluble and insoluble. Soluble carbohydrates are more easily digested, while insoluble carbohydrates resist digestion. Soluble carbohydrates provide energy and make up much of the foods fed to birds. Excess carbohydrates are stored as glycogen or fat for later use. Insoluble carbohydrate is also known as fiber. Fiber can act to affect gastrointestinal function; it can be used to treat both diarrhea and constipation. Fats serve to allow absorption of fat soluble vitamins such as A, D, E and K, enhance palatability and provide essential fatty acids. Birds have a dietary requirement for linoleic acid. These essential fatty acids act as components in cell membranes and are important for synthesis of other compounds such as prostaglandins.

Vitamins

Vitamins are organic compounds required by the body in small amounts which act as catalysts in chemical reactions. Seed-only diets are considered deficient in almost all the vitamins but

especially Vitamins A and D. Vitamin C which is required by humans is not required in the diet of most birds, except for the Red-vented Bulbul and a few others. However, supplemental Vitamin C may be beneficial especially in stressful situations.

Minerals

Minerals constitute a very small amount of body weight but certain ones are essential.

Calcium and phosphorus are familiar minerals needed by the bird as major constituents of bone and for egg formation. A seed-only diet provides little calcium. Additionally, Vitamin D plays an important role in calcium metabolism and must be present in adequate amounts for the most effective use of dietary calcium. Iodine is an important mineral for thyroid function. Budgies are often seen for goiter (enlarged thyroid) due to a lack of iodine. Certain goitrogenic foods such as some nuts or high levels of calcium may have higher requirements for dietary iodine to prevent problems (Ryan, 1991). Minerals should not be supplemented carelessly as imbalances can prove very detrimental. Many, such as selenium, are needed in small amounts and a deficiency or excess are both potentially harmful.

Feeding

Most people have gotten into the habit of feeding their birds *ad libitum* for the convenience. This is not an ideal situation. There are a variety of reasons to feed your birds in meals just as most people do their other animals and themselves.

The first reason is simple hygiene. Food left out for hours may go bad. This is especially important in warm humid climates. Vegetables, fruits, pellets, sprouted seed, and breads provide excellent environments for the growth of mold, bacteria and fungi. Soft or moist foods should be not be left for more than a couple hours. This also allows you to monitor food consumption in your birds and a change in appetite is often the first sign of illness.

In addition to better hygiene, this forces you to better monitor your birds. Problems can be caught earlier including non-related problems such as trauma. You learn normal behavior at various times of the day and will be more attuned to changes. This also allows interaction between the pet bird and owner and will strengthen the bond between them.

Diets

Traditionally, parrots were fed an all seed diet in captivity. This was thought to be totally appropriate and the birds seemed relatively happy (though not necessarily healthy) to hull seeds all day. We now have realized we can do much better and must do better to ensure a healthy and reproductive life for our birds. Seeds are very deficient or have improper ratios of some nutrients to serve as a single diet for most pet birds.

There are now on the market many commercially available pelleted complete diets for exotic birds. Though it is impossible now to guarantee these diets meet all the needs of exotic

species since we have yet to elucidate all those needs, many seem to work well in the field and are often a simpler way to offer a more balanced diet with less labor and thought. Some of these companies maintain breeding and research flocks to evaluate and refine their diets. Pelletized diets have the advantage of being balanced in every bite, that is a bird cannot select only one or a few ingredients and ignore the rest. They are also 100% edible, unlike seeds where the hulls account for much of the weight and create waste.

Aviculturists who choose not to utilize a commercial diet usually blend their own from a mixture of seeds, vegetables, fruits, sprouted seeds, and nuts. Another option as a diet or addition to the diet are the soak and cook mixtures consisting mainly of beans, pasta and corn. Many of these diets provide a wide selection of ingredients which should meet the needs of most avian species. Several authors have developed diets which have worked well for mixed collections as well as more specialized diets for collections restricted to certain groups of birds. (Abramson et al, 1995, Kollias, 1995). It is well worth your time to research the specific needs of the birds you manage and to look at the values of individual nutrients contained in the foods you feed. One of the advantages of this approach is that if a bird has a specific need it can select out more of the ingredients rich in these nutrient to meet that need. By offering a large selection we are more likely to meet that need.

Additionally, the wide variety of choices in textures and colors provides psychological enrichment missing from a single color and texture diet as the pellets often are. Foods such as nuts and seeds also provide an outlet for the naturally destructive behavior necessary in the wild for feeding and nesting.

The disadvantages of this route include the time involved in preparation and feeding this type of diet and the fact that many start out with good intentions but as prices and availability fluctuate the birds often end up receiving a diet quite different then the one planned.

Nutritional Disorders

Hypovitaminosis A

Vitamin A is considered by many to be the most important vitamin from a practical standpoint. (McDowell, 1989). Vitamin A itself is not found in plants but the precursors or carotenoids are. Vitamin A is perhaps most associated with vision but has many other functions in the body including maintenance of normal epithelium, reproduction and immune function. Some of the most common problems seen in deficient birds include bacterial and fungal infections of the respiratory system. An early sign of hypovitaminosis A is often a blunting or absence of the papillae along the choanal slit in the mouth. One may also find abscesses frequently in the choana or mouth. The usual history on birds with this problem includes an all seed, iceburg lettuce or other improper diet. A major part of therapy for this condition is immediate improvement of the diet and supplementation with beta carotene or Vitamin A. Supplementation with Vitamin A should be done with caution as hypervitaminosis A can be fatal. The response to treatment is often remarkably quick and dramatic.

Hemochromatosis or Iron Storage Disease

Hemochromatosis is a disorder of iron metabolism. One form of the disease is known to be genetic in people but the form occurring in birds is less well understood. This has been a devastating disease for softbills including toucans, toucanets, mynahs and birds of paradise (Panigraphy and Senne, 1991). Iron is considered an important mineral nutritionally and is required by all animals. Why it becomes a problem for many captive softbills is not yet understood. Some of the main signs seen with this problem include respiratory distress, abdominal distention, anorexia and even death (Panigraphy & Senne, 1991). The only recommended treatment currently is periodic phlebotomy. Additionally and as a preventive measure it is recommended to feed a diet low in iron to these birds and to avoid items which may increase iron absorption. Citrus fruits, such as oranges, and tomatoes or any other ingredient high in Vitamin C act to increase iron absorption in the gastrointestinal tract.

Metabolic Bone Disease

As the name suggests, metabolic bone disease is a problem involving the bones resulting in fractures or deformities that is generally traced back to a nutritional imbalance involving Vitamin D, calcium or phosphorus. The birds affected are often chicks being handfed which have spontaneous fractures or limb deformities. The disease is treated by altering the diet to provide proper amounts of Vitamin D, calcium and phosphorus and if necessary supplementing to allow healing. The fractures are treated as normally. Just as with Vitamin A, supplementation of Vitamin D must be undertaken with caution due to the possibility of toxicity.

Perhaps this presentation will serve as a primer and stimulate interest in learning more about your bird's nutrition. More research is currently being conducted in this area and aviculture's continued support is needed.

Reevaluate your bird's diet and determine if there is room for improvement. The investment to provide a better diet may be small but the rewards in improved health and reproduction can be fabulous.

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