Understanding Nutrition - Vitamins

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Food that is eaten by an animal has several fates. Some is used for energy so that the animal can perform the various other activities that an organism must do for survival. A second use is to build new tissues, repair degenerating tissues or produce new organisms of its own kind. A third function of food taken in is to use it in biochemical processes so that the above two functions are possible. Some food materials are used in several of the above capacities. Amino acids are used to build muscle tissues and, when in the form of enzymes, aid in the chemical changes of the organisms. Carbohydrates which will be discussed next month are substances that are used basically for energy. Fats are used for energy and in the structure of the cell membranes. The vitamins which are the topic for this issue are restricted in their activity. Vitamins serve only to aid in the chemical transformations that occur in the organism.

Before we consider this aspect of vitamins let us consider some basic information about this important but most often misunderstood group of metabolites. Vitamins were largely discovered in the early part of this century. Several malnutritional diseases were easily cured when small amounts of these compounds were added to the diet. The name vitamin comes from two words, vital and amine, the word amine being a group of chemicals that have the element nitrogen in it. Later it was discovered that not all of these micronutrients had amine groups, but by then the name had been popularized and the name stands for any compound that is needed in small amounts in the diet.

An aspect of vitamins that soon became apparent was that the body could not produce its own vitamins and that the diet must provide these nutrients. Thus we come to our first important concept concerning vitamins, this being that the diet must provide these nutrients, for no matter how complete the diet of an organism is, if the vitamin is not there, nutrition problems will always arise.

Vitamins are formed largely in plant materials. However, as we have seen with the amino acids, we find that a single plant is not a rich source of all the vitamins. This means that the organisms must eat a varied diet in order to obtain all that is needed. Certain animal tissues store these vitamins for limited times; thus, the observation that liver is a rich source of certain vitamins. But it should never be forgotten that plant material is the original source of vitamins. There are one or two exceptions to the above rule. For example, vitamin K, which is important for blood clotting, is synthesized by the bacteria in the intestine and absorbed by the organism. Vitamin D is formed by the action of sunlight on a molecule made by the animal itself. But for a majority of vitamins, the animal must gain them from the diet.

As we look at the vitamins as a group we see that they fall into two subgroups, based on what they dissolve in. These two subgroups are the water-soluble forms and the fat-soluble forms. The water-soluble vitamins have chemical properties that allow them to go into solution in water. The fat-soluble vitamins are structurally related to fats and as such have the characteristic that they will not dissolve in water but only fatty fluids. Both these forms are required for optimal health.

It should be definitely stated that the vitamin requirements for any of the cage birds kept has not been determined. So we are in a similar dilemma with that of the essential amino acids. How then does the aviculturist determine the needs of the birds in his care? Two major approaches have been taken. The first is to purchase a commercial vitamin mix and then add it to either the water or the seed. Many aviculturists provide a vitamin solution on a daily basis for their birds. Others supplement the normal drinking water on a weekly or some other regular interval. The second approach is to give the birds a seed mix that contains a wide variety of seeds and assume that the birds are getting their requirements from the mix.

A danger presents itself, however, in either approach. In the first example there is the danger of giving the birds too

much of the various vitamins. There seems to be an idea that pervades our society that if a little is good, then a lot more must be better. Thus we see people taking megavitamins for themselves, and some do the same for the animals that they keep. It is important to realize that real dangers exist to the bird that takes an overdose of the certain vitamins, because they adversely affect the metabolism and may even have a poisoning effect. The danger of the second approach where the bird is expected to obtain all its vitamins from its food is that in most cases the bird does not eat its natural foods but feeds on foods that are available to the bird keeper. Since we do not know the requirements of any cage bird, there is the distinct possibility that the food may not contain the needed nutrients. Perhaps the best solution to the above dilemma would be to provide a varied seed mix along with weekly or biweekly feedings or waterings of a dilute vitamin solution.

It appears that a common mistake made in aviculture is to assume that what you are presently doing is the cause of the failure to breed the desired bird. It should, however, be stated that a bird may not breed for a dozen reasons and that to not look at the entire culture program but only focus on one or two aspects may never give the desired results.

An understanding of just how a vitamin functions will, perhaps, give certain people security to not overdose their birds with a vitamin solution.

As we have stated previously, the function of a vitamin is to aid in the chemical transformations. No vitamin is used as part of any physical structure in an organism. That is to say, a vitamin is not used to build the structure of bone, muscle or what have you. A vitamin aids in the building of these structures. A simple example will, perhaps, demonstrate this feature. Presently I am building a treehouse for my children. The materials I am using are boards, nails, some plastic pipe and shingles. These building materials could represent the various amino acids, fats and carbohydrates that go into the building of an organism. The tools I use—the hammer, saw, and level—would represent the vitamins in the respect that they aid in the construction of the treehouse but do not become part of the final structure. Thus a hammer, saw and level could be used to build a hundred treehouses, but the same could not be said of the building materials used, for once they are part of the structure, they are no longer readily available for use in some other structure. This simple example should give some feeling as to why vitamins are not needed in large amounts, for in the body they are used over and over to *aid* in a metabolic process leading to an end product but never become the end product.

If the above is true, then why are vitamins continually needed in the diet? To use our treehouse example again, not all hammers last forever and neither do other tools. So it is in the body. Vitamins are used and sometimes they are broken down or lost. The body is also not an escape-proof structure. The body must eliminate metabolic poisons and other excretory products. Because some of these excreted materials may have similar structures to the vitamins, they cannot retain all the good and eliminate all the bad, although they attempt to do so. As a result, there is a continual loss of the vitamins that are taken in.

The final article in this series will concern itself with compounds that are largely used for energy production—the carbohydrates and the fats.