Captive Invertebrate Nutrition

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KEYWORDS

• Invertebrate • Arthropod • Nutrition • Arachnid
• Insect • Food

Proper nutrition is paramount in maintaining healthy captive animals, be it a horse, dog, cat, or tarantula. Delivering appropriate nutrition is relatively easy in domestic animals, as excellent prepared diets are readily available. Providing acceptable diets for captive wildlife is more difficult, as commercially produced diets are often not available, and in many cases knowledge is lacking regarding the exact nutritional needs of a species. In addition, because of the limited market for diets specifically formulated for nondomestic species, few companies are willing or able to commit the resources necessary to research nutritional needs of a species and produce diets for sale. These issues with wildlife nutrition may seem daunting, but it is important to understand that great advances have been made over the last 20 to 30 years. These advances, enhanced by ongoing research, allow animal keepers greater success in feeding nondomestic animals in captivity than was possible in the past.

A large portion of the literature regarding nutrition of invertebrates is geared toward creating an animal that is appropriate for consumption by vertebrate species. Many dietary programs for invertebrate prey species are not intended to keep the invertebrate healthy for extended periods, but aim to fill the gastrointestinal tract with as much calcium and other nutrients as possible (ie, gut-loading). When fed many of the ''gut-loading'' diets, insects will often become terminally constipated and die within a few days.[1,2] This is not a concern when the invertebrate is intended as food, but is obviously undesirable when trying for long-term maintenance of a species.

Many invertebrate species are kept as pets by private individuals, as display or education animals by museums or zoos, as breeding stock by those producing food animals, or as agricultural animals (silk moths, honey bees). Proper nutrition for these animals is important to keep them healthy and make long-term maintenance, propagation, and production possible. Fortunately, the nutritional requirements of most invertebrate species kept in captivity are relatively easy to meet. There are some species that are dietary specialists (ie, silk moths), which feed exclusively on a particular species of plant or animal,[3] but most are fairly broad in their preferences and requirements. As with any nondomestic species it is important to have an understanding of the animal's natural history in an attempt to duplicate the wild diet in captivity.

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This article focuses on terrestrial arthropods in the orders Insecta and Arachnida. For information regarding the nutrition and feeding of aquatic invertebrates, the clinician is advised to consult other references, such as any of the available invertebrate zoology texts and *Invertebrate Medicine* by Lewbart.[4]

WATER

Despite its undeniable importance, water is frequently overlooked when discussing nutrition. Inappropriate water quality, presentation, and availability are frequently implicated in captive invertebrate morbidity and mortality. Water requirements vary according to species, with desert-adapted species capable of efficiently conserving water, while those from rain forests or semi-aquatic environments will dehydrate quickly if not provided with enough water in the proper fashion. Some species, regardless of natural habitat or diet, can obtain all of the water they need from a proper diet. Nevertheless, most species will drink when water is available, so every effort should be made to provide appropriate access.

Water quality is important. It is probably safest to use water that would be appropriate for fish for maintenance of terrestrial invertebrates. Tap water can be used safely, but should either be allowed to de-gas overnight (for chlorine-treated water), or be treated with sodium thiosulfate (for chlorine- or chloramine-treated water). Offering chlorinated water to terrestrial invertebrates usually does not result in acute morbidity or mortality, but is thought to be associated with shortened life spans or ill-thrift syndromes by some keepers (Dan Dombrowski, personal communication, 2006).

Methods of presenting water can be problematic with invertebrates. Many species will drink from standing water sources; however, the risk of drowning is always a concern. For this reason, many pet stores and lay publications recommend providing water via a small sponge in the animal's enclosure. This is inappropriate for many reasons, not the least of which are the inability to keep a sponge clean and the possibility of toxic chemicals being present in commercially available sponges. A much more effective solution is to provide water in a shallow water dish with stones or gravel in the bottom, so the animal can easily escape if it falls in (**Fig. 1**). This type of set up can easily be removed and cleaned to maintain proper hygiene.

Many species will maintain adequate hydration by drinking water drops, following occasional misting of the enclosure. Terrestrial invertebrate species do not typically

Fig.1. A layer of gravel on the bottom of a shallow water dish allows captive invertebrates to escape without drowning if they fall in.