

## FOREWORD

# Nutritional Wisdom: Adding the Science to the Art

It is indeed gratifying that the discipline of nutrition has received official recognition within the American Zoo and Aquarium Association under the Scientific Advisory Group designation. This special issue of *Zoo Biology* presents selected reports from NAG's (Nutrition Advisory Group) initial conference dedicated to comparative animal nutrition.

In many respects, zoo animal nutritionists have a philosophical advantage over classically trained nutritionists because of their continual comparative exercises in anatomy, behavior, and physiology. By comparison, the complexity of nutrition as a discipline is only recently being appreciated within the human medical community, working with only one species of concern. Specific examples include the introduction of international and nutrient interactions sections into the *Journal of Nutrition* (official publication of the American Institute of Nutrition) just since 1993 - areas that zoo animal managers have dealt with for decades. With wildlife and exotics, species specific differences are becoming apparent, and limitations of domestic animal models are being identified. We recognize that although the basis of nutritional requirements can be found in domestic models, our production goals in zoo populations differ distinctly from those of the pet or livestock industries. Furthermore, the unique metabolisms, behaviors, and physiologies of numerous species are simply not duplicated in domestic animal models. Thus numerous disciplines encompass the feeding of zoo animals.

Yet, proper feeding involves far more than hard science, i.e., management skills that we as nutrition specialists must not minimize or ignore. Aviculturists, herpetologists, and wildlife rehabilitators, to name a few, provide numerous examples of successful diets developed for a variety of species, or that work in specific circumstances. Comments, observations, and ideas garnered through such experience should be examined critically and also acknowledged as potential starting points for scientific pursuit. Working jointly to quantify these vast amounts of data would benefit all groups, as well as maximize our limited resources of personnel, animals, finances, and more critically, time. We simply do not have the luxury of trial and error in developing feeding programs as we may have had in the past.

Additionally, we must be open to the lessons of nature. We can rarely duplicate ingredients of any animals' diet in a captive situation. What we can duplicate are the nutrients contained within that diet. Using nature as a basis for evaluating nutrient

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composition, we can then locate available, palatable, and economical substitute foodstuffs. Again, however, the nutritionist must bear in mind that no single chemical constituent consistently underlies animal food choices. Feeding behaviors may simply not be dictated by nutrition. Taste, texture, odor, size, shape, color, movement are all important facets in feeding programs, at times even more so than actual nutrient composition of diets. By the same token, the animal manager must not allow perceived animal choices to override the significance of nutritional balance.

To some extent, we've come full circle in this area. Balanced zoo diets developed earlier this century, a la Ratcliffe or Wackernagel, may have provided solid nutrition but little variety. More recent psychological enrichment programs based heavily on food, in contrast, often favor nutritionally imbalanced items. We really need to strike a compromise to optimize our efforts.

A most basic tenet of any managed feeding program is knowledge of feedstuff composition. Yet, a dearth of available information on composition of purchased forages, browses, whole prey, and even many commercial diets persists within and among our institutions. Until we fill this basic information gap, we're working in a black hole and cannot comprehend complex animal responses to diets.

As in other fields of expertise, communication appears to be the key for rapid advances in the field of zoo animal nutrition. Collaborative evaluation of entire diets, specific products, and techniques used in our facilities - not only comparing regional or geographic variability in individual feedstuffs, but also individual animal responses - will ultimately provide answers. Particular ingredients may indeed underlie successful reproduction and health in some locations, but only in combination with proper feed handling, storage, presentation, and animal care. Likewise, environmental factors must be considered. For example, exposure to sunlight, ingestion of animal matter, vegetation, and/or substrate in exhibits, all impact overall nutrition. It is naive to think we control or even know what is being consumed by animals in mixed species and naturalistic exhibits, indoors or outside. Only if we first acknowledge that these sometimes intangible variables exist can we begin to document, understand, and optimize opportunities for balanced nutrition of zoo species at a global level.

The heightened recognition of the value of implementing the science of nutrition into the management of wild animals within the zoo community excites us and certainly can provide lifelong challenges as we try to understand, and redefine, the role of nutrition as a foundation of wildlife conservation.

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