

SO YOU (DON'T) THINK YOU NEED A NUTRITIONIST?

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Introduction

The first zoo nutritionist was hired at the Smithsonian National Zoo in 1978 (Crissey, 2001a). At the time, this zoo and others were acknowledging the importance of a qualified zoo nutritionist and the value of a zoo nutrition program to the health and welfare of the animals in their collection. To date, nearly 20 AZA accredited facilities in North America, and several others world-wide, have followed suit. However, even given the clear value of a qualified professional on staff to focus their attention on the nutritional care and welfare of the collection, most AZA accredited zoos have not hired full time nutritionists. In lieu of a full time nutritionist, many zoos rely on either their veterinarians, curators, and other animal care staff, or consultants for this pivotal responsibility. There are likely a wide variety of reasons for this, but most may revolve around available resources (primarily financial), an over-valuing of a part-time or consulting focus on collection animal nutrition, and a limited understanding of the benefits of a qualified nutritionist dedicated to the zoological collection. This brief paper addresses some of these issues, and provides background for zoos to justify the hiring and maintenance of a qualified zoo nutritionist as part of their animal care team to meet the mission of their institution and build capacity.

Brief history of Zoo Nutrition in North America

An excellent summary of the history of zoo nutrition was provided by Crissey (2001). Briefly, the discipline of zoo nutrition was initiated in 1918 by Dr. Ellen Corsen-White at the University of Pennsylvania Medical School, who initially studied metabolic bone disease at the Philadelphia Zoological Garden and introduced the recipe for “Zoo Cake” (an uncooked composite ration containing minerals and vitamins).

“My experience as Prosector to the [Philadelphia] Zoological Society convinced me that during the first six months of the existence of the Garden, the principle causes of death were three: First, improper food, both in quantity and quality; Second, effects of temperature; Third, ill-constructed cages....” H.C. Chapman, M.D., 1876

Dr. Herbert Ratcliffe, a pathologist at the Philadelphia Zoological Garden, outlined the use of Zoo Cake to develop controlled diets for collection animals that remained in place from the mid 1930's until the late 1970's (Amand, 1980). Ratcliffe reported the development and success of the formulated diets in a clear statement that remains applicable to date: “My aim has been to design diets at reasonable costs that are readily acceptable, that prevent nutritional disease, and that allow animals to develop and maintain high levels of resistance to many of the common

agents of disease. Current knowledge of nutrition indicates this may be accomplished by a number of equally satisfactory formulations.”

In 1974, the Metro Toronto Zoo hired the first professional commissary manager (Sergio Oyarzun), who developed the position into that of a nutritionist over the years. In the United States, the Smithsonian National Zoological Park hired the first official zoo nutritionist (Olav Oftedal) in 1978, followed shortly thereafter by the creation of a zoo nutrition program at the Chicago Zoological Society’s Brookfield Zoo in 1980. The Philadelphia Zoological Garden (1984) and the Wildlife Conservation Society (1986) followed by hiring nutritionists and developing programs. All of these programs grew through the decade(s) after their inception, and other zoos followed suit through the turn of the century. Of note, a zoo nutrition residency program was initially established by Dr. Susan Crissey at the Brookfield Zoo in 1991, which produced three trained nutritionists in place at AZA zoos (currently, Fort Worth Zoo, Cincinnati Zoo & Botanical Gardens, and Smithsonian National Zoo and Conservation Biology Institute). After Dr. Crissey’s death in 2002, a residency was established in her honor (Sue Crissey Animal Nutrition Residency Fund), to train future zoo nutritionists, which has generated two zoo nutritionists to date. At the date of this publication, nearly 20 AZA zoos in North America employ at least one trained zoo nutritionist to attend to the nutritional needs of their collections. This represents less than 10% of all accredited AZA zoos in North America.

The field of zoo nutrition began with the documentation of nutritional disease (metabolic bone disease; Amand, 1980) evidenced by pathology. Over the years some employment of nutritionists occurred with more evidence of pathologies related to nutrition – vitamin E deficiency, iron storage disease, metabolic bone disease (again), and vitamin A deficiency, to name a few. Without employment of a pathologist or significant funds dedicated to diagnostic laboratory work, diseases of nutritional etiology may not be accurately diagnosed. Additionally, most institutions do not have dedicated staff, expertise, tools, and/or detailed records to indicate the positive or negative impact of historical diets on the collection. The effects of inadequate/inappropriate feeding can be profound and obvious, but are more often subtle - poor reproduction (or complete lack thereof), poor growth, failure to thrive, predisposition to disease, etc. The root cause of such non-specific “symptoms” is often difficult to discern, at best. The continued growth and development of zoo nutrition as a field, and the increased employment of qualified zoo nutritionists by AZA facilities, will continue to enhance our ability to link these disorders (subtle and otherwise) to their root causes, and provide solutions for the good of animal care, health, and welfare.

Utility spectrum of a Zoo Nutritionist – What can they do for you?

A qualified nutritionist is imperative to the appropriate care and welfare of the zoo animal collection. Among other benefits this individual can bring to the institution are:

- diet evaluation and formulation
- commissary management (inventory and budget management)
- education
- research
- engagement with the professional community via AZA programs
- outreach

Diet evaluation and formulation.

The positive impact on animal care through the formulation and constant evaluation/re-evaluation of diets is difficult to quantify. However, the role of appropriate nutrition was recognized by H.C. Chapman in 1876, and has not fundamentally changed since that time (if anything, its role has been enhanced). Diet formulation is a complex process best described as a matrix of health, requirements, consumption, and management (Crissey, 2001b). Requests for the “ideal” diet for a species or recommendations that can meet the needs of all individuals are unrealistic. Diet formulation is continuous – a change in any aspect of the matrix can cause a cascade of changes throughout, all ultimately impacting the diet formulation. In addition, most collections are dynamic, as well. An investment in a nutritionist is capacity building in that it allows dealing with the needs of enriching and training the collection, changes in the composition of the collection, and unexpected challenges such as hand rearing and critical care. The dynamic nature of the diet evaluation and formulation process challenges the efficacy of consultants (often singular diet review and no provision of implementation, follow-up, or necessary continued re-formulation based on current conditions). The development of diet formulation software and record keeping systems that allow for nutritional data to be maintained and utilized for collection management decisions, and someone to maintain such systems, is, and will be, paramount for providing metrics as a testament to the value of a zoo nutritionist on staff. Though significant developments have been made in the area of computer software, the data generated requires expertise to interpret and apply appropriately. Due to the complexity and ongoing nature of this task, it is best not left to someone on a part time or sporadic basis (staff or consultant), but rather a dedicated and qualified nutritionist able to assess and implement appropriate changes. Critical review of literature and common practices (both peer-reviewed and popular press sources; Ullrey, 1996), knowledge of interrelationships among nutrients, non-nutritive components, and attention to variation in feeds or formulas, among many other things, is essential (Ofstedal and Allen, 1996). A qualified nutritionist is trained to consider these aspects and many more to ensure appropriate diets are formulated and evaluated continuously over time. Proactive management, quick response to changing needs, and attention to detail requires significant time and focus, warranting a full time position, rather than part time focus or sporadic attention.

Commissary management (inventory and budget management)

The role of a qualified zoo nutritionist goes beyond diet formulation and evaluation. Having a qualified individual to provide a consistent link between appropriate diets and the provision of those diets is crucial. Often the largest part of any zoo’s budget is the food bill, and a qualified nutritionist responsible for not only diet formulation, but also budgeting, allows for fiscal efficiency (Maslanka, 2015). Capacity building and long-term planning includes not only pricing current diets, but also forecasting and providing input on cost of feeding additional/new animals in collection plans and appropriate building of food handling/storage areas in future exhibits. A qualified individual with a solid nutrition background, simply focused on diet ingredient waste (inventory overruns, acceptance of poor quality food items that spoil quickly, overfeeding animals/exhibits, etc) can often initially save a zoo more than their annual salary by focusing on the budget of the operation, efficiency, and waste minimization. Even in well monitored programs “diet drift” occurs over time, and constant assessment over time minimizes its likelihood and impact. Additionally, a nutritionist can set nutrient specifications, knowledgeably negotiate feed contracts, critically evaluate feed manufacturers, establish quality control

programs, and adjust feeds/ingredients based on availability, sustainability, and cost. Expertise is also required to critically review and select laboratories for nutritional analyses including appropriate laboratory methods and costs. Significant time is needed to critically evaluate food product and industry trends for appropriateness and impact on the health of the collection. A nutritionist has the expertise to oversee biosecurity, food safety/sanitation and the monitoring required for diet ingredients. It is critical to remain up-to-date on product recalls, as well as establish and maintain a food tracking program which allows an appropriate and quick determination of the effect of a recalled product. This may include determining appropriate substitutions, addressing the issue within the supply chain, and follow up with animal care staff regarding how to assess and mitigate the impact of a potentially dangerous food item.

Education

From K-12 programs to local college and university classes/courses, a qualified nutritionist can augment the more “formal” aspects of a zoo education program. Such engagement allows for the dissemination of knowledge and the zoo’s mission to a wider audience than just those who come through the gate. It also can clearly define the zoo’s commitment to quality animal care and welfare simply by their presence on staff. A zoo with a nutritionist and/or a formal nutrition program can easily contribute to the development of the field through the establishment of volunteer, undergraduate, graduate and post graduate opportunities. Partnerships with local universities can not only expose students to the field of zoo nutrition but also provide students for data collection and research.

Research

Annually, zoos are charged with engaging in conservation research as part of their role within AZA. The field of zoo nutrition remains very much in its infancy in terms of research programs and projects that can positively impact the health and welfare of both zoo and free-ranging animals. The ability of a qualified zoo nutritionist to develop, conduct, and publish research, whether small or large scale, basic or applied, results in an improvement in the health of the collection animals, provides additional notoriety to the zoo itself, as well as further expands the field of zoo nutrition as a whole. Often institutions have current long running field research projects involving animal management and/or animal health staff. A nutritionist can exist as a focus, in and of itself, or it can complement other disciplines and enhance these projects through participation in grant writing, overall guidance, and active participation. Such collaborations increase not only the strength of the existing project, but enhance the knowledge of feeding and nutrition.

Engagement with the professional community via AZA programs

The Association of Zoos and Aquariums is our professional society. As members of that society (as well as, hopefully the Nutrition Advisory Group – the nutrition SAG within AZA), it is each zoos role to contribute when and as they can to the professional goals of AZA. A qualified zoo nutritionist is able to do this not only through providing quality care for the animals of their collection, but also via involvement with SSP and TAG programs (nutrition advisor), through Conservation Grant Fund (CGF) evaluations, through AZA accreditation inspections, and simply through active involvement in the NAG. All of these represent considerations for not only AZA accreditation of the zoo, but also the variety of conservation research metrics requested by AZA annually.

Outreach (consulting, fund- and friend-raising)

A qualified zoo nutritionist is an excellent representative of the zoo and its dedication to quality animal care (simply by their presence, but also given their extensive knowledge of a wide variety of taxa, their detailed knowledge of the zoo's collection, and their experience). Due to the comprehensive nature of a nutritionist's training and background (knowledge of not only nutrition but staff management, statistics, population management, natural history, etc), a qualified zoo nutritionist also can be a well-qualified resource for topics beyond nutrition. Because so few zoos currently employ nutritionists, often they are called upon for assistance from other zoos (a double-edged sword, for several reasons). In this way, they can serve as a direct revenue generator. Indirectly, a trained nutritionist can also generate revenue through participation in marketing or special events. Many institutions promote/sell unique experiences to their members or potential donors. These experiences can range from behind the scene tours of nutrition facilities (most are off public view and consequently of interest for this reason alone), to presentations by staff, to active engagement in activities centered around nutrition and feeding of the collection.

Qualities of a Qualified Zoo Nutritionist

To date, there remains no specific certification or verification process for a qualified zoo nutritionist. The zoo nutritionists who currently are functioning in the field have a wide variety of education credentials, experience levels, and applied backgrounds. There is not one single factor that defines a qualified zoo nutritionist or serves to disqualify someone from the discipline. The long term zoo nutrition programs that exist in North America are directed by individuals with extensive knowledge and experience of all aspects of zoo nutrition (operational, clinical, research, etc), but regardless of directing comprehensive programs or not, they all have common traits leading to their success. Some of the common traits of zoo nutritionists are:

- Demonstrated problem solving ability. We don't know all of the answers, nor will we ever. Being able to apply a wide range of somewhat associated information appropriately to the "issue" at hand is crucial - including the ability to critically review literature (both peer-reviewed and popular press) and extrapolate appropriately.
- Demonstrated basic knowledge of natural history as it relates to nutrition and diet of all taxa included in the animal collection.
- Demonstrated ability to work within a team to problem-solve and think/act decisively
- Advanced degree in and/or definitively/clearly demonstrated knowledge of nutrition (human or animal), and the clear ability to apply information across taxa. Advanced degrees in nutrition or nutrition-related disciplines clearly provide a foundation in problem-solving and research thought processes.
- Demonstrated engagement in the professional community (membership in the NAG and/or CNS – Comparative Nutrition Society, attendance at meetings, etc) to be aware of current topics in the field, for continuing education, to share limited resources, and collaborate when possible.
- Other skills useful to your specific zoo and/or operation (equipment operation, demonstrated inventory management skills, personnel management skills, budget management, laboratory methods/operations, public speaking, publication record, etc).

Ways of Hiring a Qualified Zoo Nutritionist

Once the decision is made to hire a nutritionist for the zoo collection, it is important to access and evaluate as many qualified individuals as possible. Usually, this process begins by clearly defining the institutional goals for the position, developing the position/job description, and defining the desired characteristics (as described in the previous section). Failure to clearly define expectations/responsibilities or a purposeful approach of “we’ll see how it develops” (with no guarantees) may not attract qualified individuals. Pay scale should be comparable to positions within the institution with a similar level of responsibility, expectations, education, and experience. To date, five zoo nutritionists have been produced through specific zoo nutrition residency programs, and the SCARF program remains a viable source for a qualified zoo nutritionist (keep in mind that it theoretically produces a graduate/qualified zoo nutritionist every 2-3 years). The AZA Nutrition Advisory Group (NAG) and the Zoo and Wildlife Nutrition Foundation (ZWNF) are excellent points of contact for this program, as well as outlets for position announcements that are targeted for zoo and wildlife nutrition professionals. The Comparative Nutrition Society (CNS), along with the NAG and ZWNF have websites and (in some cases) list serves to more efficiently distribute the announcement. In addition, wildlife-focused online job lists, including AZA, Texas A&M wildlife jobs boards, etc, are excellent ways to distribute announcements to qualified candidates. As a small but growing discipline, consider that you may desire not to target a newly trained nutritionist from the residency program or a recent graduate, but rather a current zoo nutrition professional at another facility around the world. Based on your goals, and the position description complexity, requirements, and/or benefits/compensation, you may be able to hire an experienced zoo nutritionist from an existing program that is looking for a new experience, additional challenges, or a different collection. All of these are viable options. Additionally, attending nutrition conferences such as the NAG/ZWNF biennial conference which runs concurrent with AAZV, can allow an interested institution to meet nutritionists, current and former residents, and students to learn their areas of interest and expertise as well provide an opportunity for communication/interaction.

Resources

The AZA Nutrition Advisory Group is a scientific advisory group established by AZA in 1994 to provide nutrition expertise and guidance to the members of AZA (institutions and individuals). The stated mission was (and remains): to promote the welfare of animals in captivity by incorporating the science of nutrition into their husbandry. It was hoped at the time that, “through the formation of a Nutrition Advisory Group that the role of nutrition in the science of maintaining captive wild animals and sustaining endangered animals in the wild [would] move to the forefront.” With the development of a new website format (www.nagonline.net) and the continued efforts of the steering committee and the general membership to serve not only the AZA zoos who employ us, but also the SSP, TAG, and SAG programs within AZA, the Nutrition Advisory Group has continued to grow and provide for the development and diffusion of knowledge to better manage the nutritional care of the animals in our charge. In 2012, the Zoo and Wildlife Nutrition Foundation (ZWNF) was formed. The Foundation was established for the purpose of contributing expertise and providing funds to support the field of zoo and wildlife nutrition worldwide, furthering the science of zoo nutrition, facilitating the dissemination of nutrition knowledge, and developing the next generation of zoo nutrition leaders. The ZWNF functions independently, but supports the goals and mission of the NAG.

The Comparative Nutrition Society (www.CNSweb.org) was founded in 1996 to foster communication among laboratory and field scientists from various disciplines with interests in comparative nutrition. It helps establish and promote a professional concept of comparative nutrition, and encourages education and professional development in the field. All of these groups can serve as resources for those interested in hiring a full time nutritionist – to determine what nutritionists can do, who is available, what skill sets exist and what skill sets are desired, among other useful functions.

A Final Word

Currently around 20 out of the over 200 AZA accredited zoos in North America employ at least one full time nutritionist on staff to focus on the nutritional needs of the animals in those collections. Given the fact that nutrition (provision of a diet) is one of the few daily influences over health and well-being (beyond environment) for the entire life of the animal, employing a qualified and dedicated staff member to focus on those nutrition needs is obvious. As we continue to focus (in word and deed) on animal care and welfare of our collections, it is incumbent upon zoos to hire qualified nutritionists for this critical aspect of appropriate animal care.

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