NUTRITIONALLY COMPLETE FOOD-FREE DIETS FOR PRIMATES: POTENTIAL BENEFITS AND CONCERNS

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Abstract

Many zoos and institutions offer nutritionally complete foods (NCF) in the diets of captive primates (Oftedal and Allen, 1996). These foods, which often take the form of extruded biscuits, canned diets or gels, provide a source of important nutrients like protein, fat, fiber, vitamins and minerals, thereby helping to meet minimum estimated nutrient requirements (Oftedal and Allen, 1996; NRC, 2003). These nutrients can otherwise be difficult to fully supply with commercially available produce and other items appropriate for nonhuman primates. Additionally, NCF provide an energy and nutrient dense diet item for animals with increased energy or nutrient needs (e.g. for weight gain/underweight, pregnancy/lactation, etc). Furthermore, NCF are cost-effective and operationally easy to procure, store and provide in the diet. These combined benefits address many of the considerations involved in formulation (Crissey, 2005).

Even though NCF provide many nutritional and operational advantages, there are anecdotal and documented concerns about providing them in primate diets (Ball et al., 2008; Less, 2012; Cassella, 2012). They have the potential to provide excess calories and contribute to obesity due to their energy density. However, if diets are formulated appropriately and monitored regularly, they can be adjusted to avoid over-feeding. It is important to examine the ingredients within the products offered and the nutrients they provide (Schmidt et al., 1999). Another concern, which is largely anecdotal, is the perception that NCF might adversely affect gastrointestinal tract function and perhaps stool quality (e.g. contributes to regurgitation, diarrhea/loose stool) (Ball, et al., 2008; Gould and Bres, 1986). Some zoos report individual animals with chronic loose stool, with NCF suspected as contributory; some of these animals seem to respond to removal of the NCF from diet, while others do not, and it is important to consider the multifactorial nature of gastrointestinal abnormalities (Shaw and Rich, 2007). Yet another objection to NCF is the belief that they are not "natural" and thus do not belong in the diet. Other stated concerns include perception that NCF contribute to behavioral problems (e.g. dominance or feeding aggression issues in groups) and that they contain ingredients perceived to be non-ideal for or allergenic to nonhuman primates (e.g. wheat, corn, soy). Though allergies to or intolerances of specific ingredients should be considered, so must nutrient levels in food items and the overall diet. For example, it has been suggested high levels of fat, starch and sugars in the diets of wooly monkeys may lead to metabolic and cardiovascular problems, rather than NCF specifically (Ange-van Heugten et al., 2008). Furthermore, NCF formulations and options have changed over the years, with many primate NCF now available in lower-sugar, lower-starch, and higher-fiber varieties. These confounding factors may contribute to varied responses to diet changes in primates (Ball et al, 2006).

Institutions that decide not to include NCF in their primate diets face several challenges. First and foremost is difficulty meeting minimum nutrient needs, particularly protein, fiber, and some micronutrients, with a related challenge of finding or providing appropriate novel protein sources

(operational challenges, acceptance issues, etc.). Commercially-available produce, for instance, has been found to be much lower in fiber than wild plants and fruits that would be part of free-ranging primate diets (Schmidt, 1999). While browse may be a suitable source of protein and fiber, and should be considered in primate diets whenever possible (Oftedal and Allen, 1996), many zoos are unable to regularly provide this item. Meeting nutrient needs without NCF may be especially challenging in animals with increased and/or special nutrient needs (e.g. underweight, pregnancy/lactation, nutrient deficiencies). Finally, the ability to monitor and assess individual animals to ensure dietary adequacy will be even more important without NCF in the diet.

The benefits and concerns of feeding nutritionally complete foods as part of captive primate diets, and the challenges of formulating diets without them, will be further explored in an interactive discussion session.

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