

# **AN EXAMINATION OF VARIOUS METHODS OF DIET PACKAGING**

*Kerri A. Slifka, MS*

*Nutrition Department, Dallas Zoo, 650 S. R.L. Thornton FWY, Dallas, TX 75203 USA*

## **Abstract**

Diet packaging is one of the most visible uses of resources from an operations perspective. It is specific to the individual institution; however, most utilize a combination of plastic bags and containers. Evaluation of the environmental impact of this packaging is essential as are the resources to appropriately clean and sanitize reusable materials. There is no single right answer.

## **Introduction**

“Saving animals starts with saving habitats, and by choosing to act responsibly in our business practices, we provide support for our field conservation work around the world and our conservation education programs at home. We cannot, as an industry, be serious about saving wildlife without being serious about natural resource conservation”. Wanda Evans, Chair of AZA’s Green Scientific Advisory Group (2016).

Diet packaging is one of the most visible uses of resources from an operations perspective. As Green Teams in individual institutions look for ways to reduce plastic, packaging, and environmental impact, the topic of diet packaging frequently arises.

## **Utilization**

What products are being utilized across our respective institutions? A NAGNOTES questionnaire resulted in responses from 30 institutions. Not surprisingly, packaging is specific to each institution’s operation and combined a variety of options. Every institution uses containers, pans, buckets, or bins. These can be for delivery of pre-packaged individual diets, for bulk food sent to be prepared by keepers in the animal area, or for the individual diets themselves. Primary material used was plastic in various forms and thicknesses but also included metal, stainless steel, and repurposed produce boxes. Over 80% of responding zoos use plastic bags of various types in some capacity in their diet packaging. Other materials in the bag category included wax, biodegradable ‘plastic,’ and cloth mealworm bags. Of those that used plastic bags, the ultimate destination included discard (24%), recycle, reuse (57%), or a combination of both depending on use (19%). When it comes to cleaning, 52% wash by hand only, 28% use a dishwasher, and 20% use a combination or both. The nutrition department is the final cleaning location for 73% of institutions responding.

Institutions utilizing plastic bags would welcome a more eco-friendly option; however, cost and availability of appropriate products limit implementation. In more centralized systems, space for storing, drying, and delivery vehicle size also hinders moving from plastic bags to only containers. Heavy duty plastic containers that hold up to impacts and freezing would be welcomed.

## **Assessment**

### *Plastics*

Plastic bags are recyclable in many locations and can be made into new products. They are waterproof and thus great for wet diets, as well as being lightweight, and taking up less space both for storage and when filled with food. Plastic bags are cost effective overall, and the energy required to manufacture plastic bags is less than that of the same weight of paper bags. However, plastic bags are manufactured from petroleum-based, non-renewable products. All recycling plants do not accept plastic bags, and recycling compliance in the overall population was less than 10% in 2014 (EPA, 2016). Containers can be reused multiple times, and many can be recycled when useful life has been exhausted. However, washing for multiple use takes energy, water, chemicals, and staff time.

### *Paper /cardboard*

Paper products are manufactured from a renewable resource. The majority of recycling programs accept paper products; 65% of paper and cardboard products were recycled in 2014 (EPA). However the paper manufacturing process generates more pollutants than plastic production. The recycling process is less energy efficient and takes up more space both in landfills and for storage (Florida State Department). Paper products are generally not suitable for extended use with wet items.

### *Alternative products*

Alternative products encompass the full spectrum of compostable and biodegradable plastics. Biodegradable plastics must decompose within one year after customary disposal. They may degrade in soil or water. Compostable plastics degrade into soil conditioning material (aka compost) under a prescribed set of conditions. All compostable plastics are biodegradable, but not all biodegradable plastics are compostable. Bioplastics are manufactured from plant material instead of petroleum based products. They may or may not be biodegradable or compostable depending on the individual product. Neither compostable nor biodegradable plastics can be recycled in the traditional manner and can contaminate and disrupt the recycling stream. Compostable plastics will only degrade in a commercial composting facility where the temperatures reach appropriate levels. Product options are limited but continue to expand. Costs for alternative products can be up to 7x that of similar plastic products.

### *Machine vs hand washing*

Stamminger (2004) found that a household dishwasher uses roughly 17% less water and 50% less energy than the average hand-washer (the appliances used average of about 4 gallons of water and about 1 kWh of electricity per load for a standard washing cycle). The automatic dishwasher used less detergent and got the dishes cleaner as well. In 2014, the Fort Worth Zoo looked at the cost of plastic bags vs containers, including cleaning costs. In that study based on 1000 staff hours per year, the commercial washer used 24,455 gal of water per year and 3120 kWh of energy per year. Machine washing adds the ability to sanitize with high temperatures, while hand washing requires a multistep method and appropriate mixing of chemicals to sanitize containers.

## **Conclusions**

As stewards of the environment we must consider all options to create the least environmental impact in our operations. Budget and staff time play an important role in implementation of eco-

friendly products. This balancing act will continue as further options become available. Share your successes!

### **Acknowledgements**

Thanks go out to the following institutions or individuals for responding to the packaging questionnaire: Brookfield Zoo, Busch Gardens Tampa Bay, Caldwell Zoo, Cincinnati Zoo and Botanical Gardens, Columbus Zoo, Denver Zoo, Ellen Dierenfeld, Disney's Animal Kingdom, Fort Worth Zoo, Georgia Aquarium, Lincoln Park Zoo, Milwaukee County Zoo, Oklahoma City Zoo, Omaha's Henry Doorly Zoo, Oregon Zoo, Philadelphia Zoo, Potawatomi Zoo, Saint Louis Zoo, San Diego Zoo, San Diego Safari Park, Santa Barbara Zoo, Smithsonian's National Zoo, Toronto Zoo, Tulsa Zoo, Zoo Miami.

### **Literature Cited**

Environmental Protection Agency. Frequently Asked Questions about Plastic Recycling and Composting. <https://www.epa.gov/trash-free-waters/frequently-asked-questions-about-plastic-recycling-and-composting>. Accessed August 16, 2017.

Environmental Protection Agency (2016) Advancing Sustainable Materials Management: 2014 Fact Sheet: Assessing Trends in Material Generation, Recycling, Composting, Combustion with Energy Recovery and Landfilling in the United States. November 2016. [https://www.epa.gov/sites/production/files/2016-11/documents/2014\\_smmfactsheet\\_508.pdf](https://www.epa.gov/sites/production/files/2016-11/documents/2014_smmfactsheet_508.pdf) Accessed August 16, 2017.

Evans, W (2016) Sharing our collective impact. *Connect* 2:17.

Florida State Department (2010) Plastic Bags vs Paper Bags. Pros and Cons. [www.dep.state.fl.us/waste/forum/attachment0356.doc?attachmentid=39SimilarFile](http://www.dep.state.fl.us/waste/forum/attachment0356.doc?attachmentid=39SimilarFile). Accessed July 31, 2017.

Stamminger, R. (2004). Is a Machine More Efficient than the Hand? <http://www.homeenergy.org/show/article/page/9/id/180>. Accessed July 31 2017.