

COMMISSARY RENOVATION AND CENTRALIZATION AT THE SMITHSONIAN NATIONAL ZOOLOGICAL PARK

David R. Polete, BS,^{1} Karen J. Lisi, MS, MEM,¹ and Mark S. Edwards, PhD^{1,2}*

¹Smithsonian National Zoological Park, Department of Nutrition, 3001 Connecticut Avenue NW, Washington DC 20008; ²Currently: California Polytechnic State University, Animal Science Department, 1 Grand Avenue, San Luis Obispo, CA 93407 USA

Abstract

Renovation of Smithsonian National Zoological Park (NZP) commissary facilities, evaluation and revision of procedures, and the addition of staff and volunteers were implemented as part of a programmatic shift from decentralized to centralized commissary operation and an overall renewal of the clinical nutrition program. Existing facilities were renovated and new equipment was obtained using hazard analysis and critical control point methodology (HACCP) to address concerns regarding ingredient flow, biosecurity, safe food handling, portion control, and cross contamination. Preparation of ready-to-feed diets, standardized mixes and/or ready-to-feed bulk diets were systematically implemented throughout the living collection. Centralized food preparation is supported by the HACCP approach to food safety and management, by effectively reducing the number of critical control points that have to be considered and monitored. Consistent with other centralized food systems, both in zoos and other industries, this has been an effective approach to standardize the feeding program, consolidate high cost equipment, reduce loss of food resources and contribute to overall improved animal health.

Introduction

Zoo animal feeding programs objectively based in the science of nutrition, along with clinical medicine and pathology, are an inseparable component of preventative animal health. One misconception about a zoo animal nutrition program is that the program and the commissary are one and the same. The commissary is simply an instrument of the program, in the same manner that an animal hospital supports a veterinary medicine program.

Shortcomings in the Smithsonian National Zoological Park (NZP) animal nutrition program were identified as part of a broader review of animal care and management conducted by an ad hoc subcommittee of the National Academy of Sciences.¹ To meet, and hopefully exceed, the recommendations of the National Academy of Sciences, the following activities were completed: renovation of the physical facilities, accompanied by staff enhancement with professionals trained in animal nutrition; increased staffing to meet the immediate needs of the nutrition program; supplementation of the labor force with a pool of trained volunteers; standardization of protocols and procedures to further reduce opportunities for lapses or miscommunication; and revision of diet records consistent with the full utilization of nutrition program support facilities (i.e., centralization).

Design of the original facility

The existing commissary facility, which opened in 1976, was well designed with the capacity for all functions described: receiving, inventory storage, preparation, and distribution; but, until the on-set of this effort, was never fully utilized as a centralized resource. This design concept was progressive based on the state of zoo animal nutrition programs in the early 1970's, as it addressed concerns of biosecurity, ingredient flow and work efficiency. By 2004, the structure was showing physical signs of deterioration, which required immediate attention to prevent further structural damage.

Justification for centralization

In addition to zoological parks, groceries, correctional facilities, schools and universities, and related industries that practice large-scale food preparation have demonstrated the rationale and benefits of centralized food preparation.

The higher level of individual ingredient usage in the centralized operation results in increased product turn-over. This creates more opportunity to improve ingredient freshness and quality, as well as producing fewer reservoirs of a given ingredient to monitor for consumption, spoilage or adulteration.

Food preparation and storage facilities are dependent on a variety of equipment to operate. Duplication of this equipment across multiple food preparation areas increases the initial investment and cost of ongoing maintenance. In many cases, an organization has invested significant financial resources to purchase these foods. Failure of a freezer or a refrigerator could result in the loss of several thousand dollars worth of product. One advantage of centralization is eliminating the need to duplicate freezer and refrigerated storage in satellite kitchens throughout the facility. This reduces the scope of the preventive maintenance program described above. For example, failure of a remote (decentralized) freezer in a carnivore area can result in significant financial losses for the organization, as well as potential animal health implications if the compromised product is not properly identified.

With a staff dedicated to food preparation, more attention can be given to portion control, including the preparation of diets based on weight, not volume or other less objective measures.

These are just a few obvious examples where the economies of scale: bulk material purchases, limited duplication of specialized equipment, and specialization of managers and front-line staff, can contribute to improved animal health, efficient resource utilization and cost savings for the organization.

Renovation and transition to centralized preparation

Many aspects of the facility, program and procedural renovation and review were occurring concurrently. Most of these changes were synergistic in nature, although we have limited the discussion to a select number of examples.

Footbaths were placed and maintained at critical control points at perimeter entries within the commissary facility. Maintenance of footbaths, and adherence to their use, was integrated as part of employee performance plan and standards.

As thermal, insect and dust barriers, forced-air curtains were placed at the entry into the commissary facility itself, as well as an internal facility entry into the refrigerated produce cooler. Entry into this produce cooler was reconfigured from an original access point within the meat preparation room, creating a significant potential for biological cross-contamination, to a dedicated entry from the inventory warehouse.

Worn floor surfaces were replaced throughout the facility, including freezer and refrigerated areas with a fiberglass compound to create a surface that is easily sanitized, while providing proper footing in a high moisture environment.

All freezer and refrigeration equipment, including the insulated boxes themselves, were replaced with contemporary technology and materials. These upgrades not only provided more reliable operation and back-up systems to compensate for a compressor failure, but also nearly a 30% increase in energy efficiency. A preventive maintenance program, including routine remote surveillance and documentation of temperature, humidity and related parameters was implemented to protect the investment.

Yet another example integrating the hazard analysis and critical control point methodology (HACCP) approach to routine operations was the implementation of color-coding sanitation equipment dedicated for use in specific areas in the operation (e.g., produce room = green equipment; meat preparation = red equipment).

Specific areas within the facility were designated for storage of non-food supplies (e.g., bedding, marine salt premix, equipment). An employee break area was increased in size to support the larger employee and volunteer staff.

The task of preparing hundreds of diets seven days a week was a significant change for the existing commissary staff. As such, every attempt was made to reduce the complexity of this process. For example, a single scale model was used across all diet preparation stations to facilitate training, calibration, and create duplication in the event of individual equipment failure. A standardized diet format with large, legible font was used to communicate individual diet components. These diets were presented in document holders that encouraged improved employee ergonomics, as well as organization of records. Finally, diets were packaged and delivered in one of three container styles with a single, interchangeable lid to reduce the time require for packaging finished diets.

To achieve successful and long-term application of centralized diet preparation, an incremental implementation strategy was selected (Table 1). The goal of this strategy was to allow commissary staff the opportunity to become familiar and then proficient with new procedures and work processes, while the animal care staff became accustomed to a change in the organization's work culture. Once a level of proficiency was achieved, the next series of diets were transferred to central preparation. Candidate management areas were selected based on the

animal species, the complexity of animal diets, and the total number of individual diets required for the area.

From April to May 2006 a series of animal diets were selected as the initial diets to be prepared by the Department of Nutrition Animal Keepers, and delivered in a ready-to-feed form to the management areas.

In June 2006, the process of centralizing the majority of diets fed at the Bird House was initiated. This multi-step process included documenting all existing diets as-fed by the Bird House staff, transferring that information to the standardized record format used in the commissary, and preparation of the diets in the commissary by Bird House staff, with commissary Animal Keepers “shadowing” to learn important preparation details. Finally, the commissary staff assumed responsibility for all aspects of diet preparation.

This process proceeded systematically through the collection. Additionally, as new specimens or species were introduced into the living collections, these diets were evaluated, revised as required, and integrated into central preparation during, or immediately following the quarantine period.

The centralization process was not limited to read-to-feed diets, but also included larger volumes of standardized mixes (e.g., mixed greens, mixed vegetables) and thawed, ready-to-feed bulk quantities of carnivore diets.

Future directions

Not all aspects of the feeding programs have been integrated to centralized facilities, although the justification for their inclusion is equally as strong as other aspects included. Central hay storage at NZP is within enclosed semi-truck trailers parked near the commissary. This type of storage is inadequate and has contributed historically to hay quality concerns. The capacity of these trailers is limited in relation to the current collection needs.

The desire to increase the quantities of fresh plant materials in animal diets continues to be a priority. When properly refurbished, an insulated, environmentally controlled room located within the commissary facility can serve as a centrally located storage facility for these perishable, labor intensive materials. These valuable resources could then be appropriately allocated to animal areas, along with other foods, from this central location.

Not all foods used in animal feeding programs are delivered in bags or can be stored under refrigeration. At this time, live aquatic prey are received directly from the supplier and transferred into animal environments without an interim holding place or screening process. This practice is inconsistent with both safe food practices, as well as animal health and quarantine procedures. Space in the commissary has been designated to establish central holding facilities for aquatic animals and insects.

Increased scrutiny by regulatory agencies, enhanced standards established by professional organizations, and expectations of the general public require that trained staff manage animal

nutrition, food preparation and related issues within facilities appropriate to the task. These improvements, along with a revised strategic plan for the Department of Nutrition, are important first steps that will position the organization as a global leader in a science-based approach to animal care. The integration and application of an objective animal nutrition program as part of routine animal care will be an essential component to achieve that goal.

Acknowledgments

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LITERATURE CITED

1. National Academy of Sciences. 2005. Animal Care and Management at the National Zoo: Final Report. National Academy Press, Washington DC.

Table 1. Centralized commissary operation implementation at the Smithsonian National Zoological Park.

Phase 1 (Apr 2006)	Process	Species
Elephant House	diet preparation	capybara
		pygmy hippopotamus
		giraffe
Cheetah Conservation Station	diet preparation	Grevy's zebra
		scimitar-horned oryx
		Speke's gazelle
		emu
Prairie Trail	diet preparation	Przewalski's wild horse
		collard peccary
Phase 2 (Jun/Jul 2006)		
Bird House	diet preparation	multiple species
	bulk meat, fish thawing	multiple species
Reptile House	bulk vegetable mixes	multiple species
Cheetah Conservation Station	diet preparation	wallaby
Lion & Tiger	diet preparation	giant anteater
Phase 3 (Sep 2006)		
Asia Trail	diet preparation	clouded leopard
		fishing cat
		small-clawed otter
		sloth bear
		red panda
Phase 4 (Nov 2006)		
Lion & Tiger	bulk meat, fish thawing	multiple species
Beaver Valley	bulk meat thawing	multiple species
Small Mammal House	bulk meat thawing	multiple species
Pandas	diet preparation	giant pandas
Phase 5 (Mar 2007)		
Small Mammal House	bulk "salad" preparation	Multiple species