FOOD SAFETY AND SANITATION

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ABSTRACT

Food Safety and Sanitation is a big aspect of our daily operation and by providing a safe and clean environment you can maintain quality food for the entire collection. The purpose is to help others understand that by doing everything possible to reduce and, or eliminate the threat of food-borne illnesses, that you can keep your food, equipment and staff safe. Cleaning and sanitizing is an important aspect of our daily operations and by not following proper procedure, we are creating a home for bacteria, parasites, insects and rodents. Keeping your pests under control will keep the food, animals and staff safe as food-borne illnesses can be transmitted by pests. There are different methods on how to clean and sanitize your food areas and dishes, anywhere from chemical sanitation to sanitizing with hot water. Following the instruction from the invertebrate supplier on how to store your inverts is the easiest to do. Knowing where all your food products originate from is very important, as some products come from foreign countries. Following the guidelines of your local health department and or other government agency will help you keep your work environment safe.

Introduction

Food Safety is a scientific discipline describing handling, preparation and storage of food in ways that prevent food borne illness.

Regardless of the source or type of food involved, the manner in which it is used or abused will have a critical bearing on its safety. Foods that may be perfectly safe to start with can ultimately end up being a genuine health hazard simply because of poor handling or consumption practices.

Even though the United States has one of the safest food supplies in the world, there are still millions of cases of food-borne illness each year. Most of the food-borne illnesses are contributed to unsafe handling and preparation of food.

Signing up for recalls thru websites such as FDA and USDA will get you the information fast so you can take proper action. This has been an effective tool for all professions. You can sign up by going to www.fda.gov and click on E-Mail updates.
One of the biggest recalls in the past years has been because of Escherichia coli (E. coli) and Salmonella found in spinach and other produce items, as well as the recent E. coli outbreak in Germany.

Local sanitation requirements may vary by state. Always check with your local inspection agency such as USDA and Health Department for any changes in protocols.

Some of the key misconceptions people have regarding food-borne diseases are:

- A belief that food-borne illnesses are not serious and can cause only minor gastrointestinal disorders with little to no consequences
- A belief that food-borne illnesses occur very rarely
- An understanding that risky food is always easily detectable by appearances or smell

The 4 key principles:

1. Prevent food contamination:
   - Keep your work area clean at all times

2. Separate raw and cooked foods:
   - Keep all your meats, whole prey, and produce separate until needed for diet preparation or feed out.

3. Store food at the proper temperature:
   - Freezer: – 30 to – 18 C (-22 to 0 F) or lower
   - Cooler: 3 to 5 C (38 to 42 F)

4. Use safe water and raw materials:
   - Do not use water or food items from an unknown source as these might harbor bacteria and other food borne pathogens.

Equipment

Safety is the number 1 thing we should think about. Choosing the right food safety equipment is crucial during daily operations. To choose the right equipment look at your Commissary needs and evaluate what is important.

Making sure that all your equipment is safe to use is the first thing you should look at. Having dull, rusty knives or broken equipment can cause serious injury to staff and collection if pieces fall into the diet. Therefore you should check your equipment regularly and replace it if needed.

Here is a list of safety equipment that is commonly used in kitchens:

- Cut resistant gloves/butcher gloves
- Sharp knives/knife sharpener
- Shielded blenders and choppers
- Masks
- Cutting boards – Green or White = Produce, Red = Meat, Blue = Fish and Seafood
- Hair Nets
- Latex gloves
- Peelers

Cleaning and Sanitizing

Good sanitation minimizes attraction of pests, increases life of equipment, and improves employee moral.

All chemicals should be stored in a cabinet or closet dedicated to chemicals only. Always store your chemicals away from food preparation areas. A MSDS sheet (Material Safety Data Sheet) should be accessible for employees.

Equipment such as utensils, cutting boards, food containers, tables, gloves, knives and clothing can harbor pathogens and should be properly cleaned and sanitized daily.

USDA requires that kitchens and other food-handling areas should be cleaned at least once a day and sanitized at least once a week. This includes all surrounding surfaces such as floors, tabletops, and doors and handles.

Sanitizing these can be achieved by washing with hot water of 82 C (180 F) or higher and soap or detergent in a mechanical dishwasher or by washing all contaminated surfaces with a detergent solution followed by a safe and effective disinfectant.

If manual sanitation methods are required, these can be accomplished by one of the following options (IDPH 1993):

- Contact with a solution of 100 parts per million (ppm) chlorine solution for 20 seconds or 50 ppm for at least 1 minute.
- Contact with a solution of 25 ppm available iodine for 1 minute.
- Contact with 200 ppm quaternary ammonium for 1 minute
- Contact with water of at least 77 C to 82 C (170 F to 180 F)
- Use of a dishwashing machine with approved sanitizing methods (chemical or hot water)
- Washing all surfaces with a detergent solution, followed by washing with a safe and effective disinfectant

Here at the central Florida Zoo we wash all dishes by hand. Dishes that have been in contact with the collection are washed and bleached in a 100 ppm solution of bleach then brought into the commissary for washing and rinsing with hot water a second time to kill off bacteria.

Personnel Hygiene is very important for keeping yourself and food safe. Wash hands constantly with an antibacterial soap.
Hand sanitizer is optional but will decrease the spread of bacteria and other diseases

All chemicals should be stored in a cabinet or closet dedicated to chemicals only. A MSDS Sheet (Material Safety Data Sheet) should be accessible to all employees.

The following chemicals are some of the ones used in commissaries:

- Bleach
- Dawn dish soap
- Ecolab Floor Cleaner and Disinfectant
- Windex
- Shaklee H2
- Sani-T-10
- Nolvasan

Pest Control

Insects and Rodents which spread disease and damage food are the targets. These include but are not limited to rats, mice, flies, cockroaches, moths and beetles. Insects carry disease-causing bacteria in and on there bodies.

The benefits of proper cleaning and sanitizing of equipment and utensils and food handling can all be wasted if insects and rodents are allowed to contaminate foods and food contact surfaces.

The key element is prevention. However no single measure will effectively prevent or control insects and rodents. It takes a combination of three separate activities to keep pest in check.
You must:

- Prevent entry of insects and rodents
- Eliminate food, water and places where insects and rodents can hide
- Implement an integrated pest management program to control insects and rodents

Always look for obvious signs of pests and other vermin such as but not limited to feces, spider webs, egg sacks, gnawing and tiny holes in your feed bags and bins.

Some pest control measures that are used by us and other facilities:
UV sticky tape, Fly fans, Rodent bait stations, live traps, Snap Traps and Roach bait

More pest control is necessary during the warmer months when flies and other vermin are more active and breeding. Every facility has different pest control measures and should use what is more effective for them.

Produce handling and inspection

A good part of the problem with produce results from increasing consumption coupled with a much greater proportion of produce being imported from countries where hygienic controls and agricultural standards leave much to be desired. Contamination with parasites such as Giardia and bacteria such as Salmonella and E. coli have been reported in the past decade.

All Produce should be “FIFO” - first in, first out. Quality control and rotating stock is imperative when receiving a new shipment. Always ask for the freshest produce when ordering. This will save you the hassle of having to get the items replaced.

Rinse produce before use, to wash off any chemicals used by the produce company that might be harmful to your collection. Store all produce between 3 C to 5 C (36 F to 42 F) to reduce the growth of mold and bacteria. Remove produce that is starting to spoil, as it might contaminate the rest of the produce. Some obvious signs of spoilage are smell, mold and bruising. Updating your produce list seasonally will give you an advantage. This will keep the spoilage to a minimum as these products are of better quality. Also know your source of the produce received. Have your produce company give you a list of suppliers they use as we receive a lot of produce from foreign countries.

Meat and Whole Prey

Meat is generally defined as muscle tissue of commercial animals such as cattle, pigs, sheep, goats and horses. Meat contains 75% water and is therefore an excellent ground to support the growth of a variety of parasites and microorganisms.

Freezer:
Store on pallets or shelves, at least 3 inches from wall to allow proper airflow. Do not store product more than 6 cases high as this might affect your freezers ability to operate properly.
Freezer temperature should be between – 30 to – 18 C (-22 to 0 F) or lower.

Cooler:
Meat should be thawed in the refrigerator, using a 3” shallow pan for proper air circulation or in an enclosed container at 3 C to 5 C (38 F 40 F). Meat should never be thawed at room temperature or in a pool of water.

Bones and large Whole Prey should be pulled at least 24 to 48 hours to allow proper thawing. Keeping your cooler at the proper temperature will help keep the growth of bacteria and other food-borne pathogens to a minimal.

If possible store all meat in a separate cooler. If meat has to be stored in the same cooler as produce, keep your meat on a separate shelve and or below all produce.
Never store meat at room temperature, as the growth of bacteria is increased and will dry out and spoil your meat.

Handling Thawed Meat

Only pull enough meat to get you thru the day. This will allow you to prepare the meat fresh every day to assure a better quality product. Discard thawed meat after 24 to 48 hours. Once taken out of the cooler for diet preparation it should be prepared quickly and stored back into cooler to keep it from spoiling.

Invertebrate Storage and Cleaning:

The chart below is used here at the Central Florida Zoo & Botanical Gardens:

Species	
Fruit Flies	Store at room temperature in container provided by supplier. Containers are rotated after each shipment.
Crickets	Store at room temperature in a clear plastic container, using wheat bran as bedding and a food source. Clean crickets daily. Fresh water provided by soaking a paper towel.
Meal Worms	Store at room temperature in clear plastic container with wheat bran as substrate. Add food source such as sweet potato. Clean as needed or before every new shipment.
Wax Worms	Store Wax Worms in their original shipping container and store in refrigerator (36F-42F). No feeding is necessary.
Bait Worms	Store worms in a plastic container with soil. Feed them newspaper and coffee grinds. Replace soil every 2 - 3 weeks.

All of these storage recommendations are from invert suppliers and can be followed if needed.

Hay and Feed Storage

Hay and feed should be stored in a dry, cool place; such as hay barn or feed room. Store feed and hay on pallets to keep them off of the ground. Feed should be stored on shelves at least 8 inches off the ground and a minimum of 3 inches from the wall if the area is prone to flooding.

Hay and feed quality should be checked on a regular basis as animals tend to not eat hay or feed that has been stored for long periods of time.

You have a higher risk of contaminating your feed with insects and other vermin if feed bags are torn or the feed bins are not sealed properly.
This can be prevented by checking your product upon arrival for tears in the bags and by keeping your feed bins sealed tight when not in use.

CO2 Euthanasia

CO2 is the preferred method for euthanizing whole prey such as rabbits, chickens and rodents.
If appropriate techniques and equipment are used by trained personnel, the use of CO2 as a euthanizing agent ensures the animal a painless and quick death as well as being safe for animal consumption.

Some ways to use CO2:

- Use a clear plastic container with lid. Drill a hole in the lid for CO2 hookup. A clear container helps you to observe the euthanasia process.

- If using CO2 inside a building, make sure the building has adequate ventilation. CO2 is a heavier gas than air. Using the CO2 outside a building eliminates the concerns associated with gas build up.

- Some institutions prefer to euthanize chicks by placing the box, as packaged by the plant, in a garbage bag and run CO2 thru it until the chicks have expired.

- Using a 2 person rule when using CO2 gives you an extra set of eyes as well as a back up incase of an accident.

- Keep CO2 levels down, because high levels of CO2 can be stressful to some animals.

- Cervical dislocation is another option for euthanasia of whole prey items.

Because CO2 is heavier than air, incomplete filling of the chamber may permit animals to climb or raise their heads above the higher concentration and avoid exposure.

Conclusions

Food Safety is something we can always improve on. Always check your equipment and temperatures in coolers and freezers. Refreshing your current staff as well as new employees on food safety and sanitation guidelines will help you maintain those standards and creates a better and safer work environment.

Having the knowledge of where all of your food is coming from is a very good resource to have.

The 4 key principals are a great thing to have posted in your prep areas as this is good for staff to look at on a daily basis to keep it fresh in their memory.

Using the resources provided by your local agencies will help you stay informed of any new changes happening.

The following websites are a great resource on food safety:

www.nagonline.net
www.fsis.usda.gov
www.fda.gov
www.avma.org

Product information:
Shaklee Basic H2 Organic Super Cleaning Concentrate, www.Shaklee.com
Spartan Sani-T-10 Disinfectant Sanitizer, www.uclean.com
Windex Glass and Multi Surface Cleaner, www.windex.com
Ecolab Floor Cleaner and Disinfectant, www.ecolab.com
Nolvasan Disinfectant, www.wyeth.com/divisions/fort_dodge.asp

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REFERENCES

AVMA Guidelines on Euthanasia (Formerly Report of the AVMA Panel on Euthanasia), Inhalant Agent – Carbon Dioxide, June 2007

Bennet, G.W., J.W. Owens, and R.W. Corrigan – Truman's scientific guide to pest control operations 1997

California Department of Health Services 1994

McSwane, D., N. Rue., R. Linton – Essentials of food safety and sanitation 2003

Satin, M, Food Alert – The Ultimate resource guide to food safety 2008

USDA, Crissey, S.D, K.A. Slifka, P Shumway, and S.B. Spencer - Handling Frozen/Thawed Meat and Prey Items fed to Captive Exotic Animals, 2001