



Guide to Pest Management in New York State Food Handling Establishments *

See slide sets referenced in this document: [Part 1](#), [Part 2](#), and [Part 3](#).

Purpose of this Guide:

Food Safety Inspectors protect public health by identifying and mitigating risks to the food supply. The most common "Critical Deficiency" noted during inspections in New York State is activity from insects, rodents, birds and other vermin that are likely to result in contamination. This guide provides insight about the common pests in food handling establishments, and techniques for their management.

Part I. Regulations & Common Pests

Regulations: Several state and federal codes relate to pest management in food handling establishments.

- New York State Sanitary Code 14-1.160: [Insect and Rodent Control](#)
- Food and Drug Administration Code of Federal Regulations, Part 117, Subpart B – [Current Good Manufacturing Practice](#).
- Food Safety Modernization Act, [Final rule for Preventative Controls for Human Food](#).

Food Pest Problems.

Pests are a problem in food handling establishments for several reasons. Pests consume products, but contaminate much more with their feces, urine, hair, body parts or carcasses, requiring disposal. Pests can also transfer pathogens to food surfaces from their bodies. Below are some common pests or pest groups that are found in food facilities.

- **Cockroaches.** Several species of cockroach can be pests in food handling establishments. [Pictorial keys](#) help to identify which pest is present, and identification offers insights about pest preferences for food, shelter and requirements for water. Cockroaches are a problem because of their ability to transfer pathogens carried on their bodies to food preparation surfaces. Cockroaches are also a significant source of allergens that can induce asthma. Feces contain proteins that sensitize adults and children, and can lead to a sustained allergic reaction.
 - The *German cockroach* is the most common cockroach pest in food handling establishments. Adults are tan in color with two black stripes near the head, and measure approximately ½ inch long. They prefer moist and warm conditions and feed on food spillage. They are commonly found in kitchens, bathrooms and areas where food is spilled or stored.
 - The *American cockroach*, sometimes called the palmettobug (in southern states) or waterbug, is the largest structure infesting cockroach in New York. They are brown to reddish-brown in color and adults can be as large as 1.5 to 2 inches long. They live in moist, warm areas such as basements, steam tunnels, sewers and drains, where they feed on decaying organic material.
 - *Oriental cockroaches* are slightly smaller than American cockroaches (up to 1.25 inches), and are dark-brown to black in color. The wings of Oriental cockroaches are short and do not extend past the abdomen. They prefer damp areas and are more cold tolerant than American cockroaches. They can be found in crawl spaces, basements, sewers, and drains, but are also associated with sprinkler systems and laundry facilities.

* This document compiles and slightly expands text from three [Pest Management in New York State Food Handling Establishment](#) slide sets. The intent is to consolidate information to one place and limit paper use for printing. If printed material is desired, we recommend printing this document and not the slide sets.

- *Brownbanded cockroaches* are about the same size and shape as German cockroaches, but have two light-colored bands near the head that run across the body. These cockroaches can live in drier conditions and may be found in offices or other locations within a food handling establishment where people spill food.
- **Flies.** Knowing the species of fly can tell you what breeding conditions are present to support fly development. While adult flies are most obvious and often seen, fly management actually depends on finding and eliminating the breeding sites - areas with moisture and poor sanitation.
 - Lifecycle: flies have four stages of development.
 - *Eggs* may be laid singly or in groups; flesh flies give live birth to maggots.
 - *Larvae* are maggots: eyeless, legless, cream-colored with mouth hooks for tearing.
 - *Pupae* are dark brown in color, and have lines that circle the body.
 - *Adult* flies are unique in the insect world because they only have two flight wings. All other winged insects have four wings. Once an adult fly emerges, their body size and shape remain unchanged - it is not possible for small flies to grow into large flies.
 - *Drain Fly.* Adult flies appear moth-like because of their hairy bodies and wings. They are often seen resting on walls, and have an upside-down V shape. Larvae develop in drains and other places with wet, organic material, including standing water.
 - *Fungus Gnat.* Small, mosquito-like flies. The larvae feed on fungus that grows in the soil of over-watered potted plants, the overflow trap of sinks, and drip pans associated with condensation (ex. refrigerator). Adults are attracted to lights, including electronic screens from computers, tablets and cell phones.
 - *Phorid Fly.* Adult flies are light tan in color. Using magnification, you can see a dark portion on the front of their wings and four wispy veins/lines on the main part of the wing. They move erratically on foot and in flight. Phorid fly larvae breed in rich organic material such as septic waste, rancid dairy products and human remains in coffins. Adults can indicate a sub-slab sewer problem that requires specialized investigative techniques.
 - *House Fly.* Adult flies are gray in color with four black stripes on their thorax (where wings and legs attach). They typically develop outdoors in decaying organic materials such as garbage and grass clippings. Adult flies enter buildings through open, broken or improperly installed window screens or doors, or pulled indoors from negative building pressure. Fly resting areas often contain small, round fecal spots that vary in color.
 - *Bottle Fly.* Adult flies are metallic green, blue, or bronze. When found indoors in large numbers, this could indicate the presence of a dead animal. Bottle flies will also feed on pet feces, garbage, human foods, and naturally decomposing materials.
 - *Cluster Fly.* Adult flies are called 'overwintering pests' because they enter buildings in the fall for protection against the winter cold. They look like a house fly, but have a gray body with golden hairs on the thorax (body segment behind the head). They can be found in large numbers, especially in agricultural areas. Larvae are parasites of earthworms and develop outdoors in the soil.
 - *Flesh Fly.* These flies are large and grey with three black stripes on the thorax. They have a black checkered pattern on the abdomen, which ends in an orange tip. The larvae of flesh flies feed primarily on decomposing animals, typically the size of a rat, squirrel or larger.
 - *Dark-Eyed Fruit Fly.* Adult flies are dark-grey to black in color, rest on walls, and have a slow, hovering flight. As larvae, they feed on yeast associated with decaying plant and animal material. They are a common problem with wet food spillage.
 - *Red-Eyed Fruit Fly.* Adult flies are tan to beige in color, have red eyes and a slow, hovering flight. The larvae feed on yeast found primarily in fermenting fruits, but they can also be associated with damp cloths (dish rags, mop heads) and sugary beverage lines like beer taps and soda fountain nozzles.

- **Ants.** Ants in food handling establishments either come from outdoor areas, or nests in the facility. While ants are not considered a threat for the mechanical transfer of pathogens to food surfaces, their bodies can contaminate product. Ants in food handling establishments can often be traced back to the nest by following trails. When winged ants are present, these either emerged from an indoor nest, or entered through windows from outdoor areas.
 - *Odorous House Ant.* This is a common indoor ant species that is found near warmth and moisture. They can create nests in a variety of spaces, and may be found on any floor of a building. A main identifying trait is the smell when crushed, which is said to be like “blue cheese”. Identification of this species is critical to selecting a pesticide that will kill the colony.
 - *Pavement Ant.* These ants are typically found on the first floor or lower levels of a building. They make their nests in the ground by excavating soil under stones and concrete, so nest openings may have dirt piles nearby. They may be seen in large numbers in outdoor areas on pavement, and can be found trailing indoors to a food source.
 - *Pharaoh & Thief Ant.* These two similar-looking ant species are very small, and often difficult to see unless they are crawling on a white surface. They are pale yellow to reddish-brown in color and feed on a variety of food items.
 - *Carpenter Ant.* These are a structure infesting pest that forage indoors and can create nests in voids and damaged wood. They are considered wood-destroying insects. When present in food facilities, they can represent a contamination risk.
- **Rodents.** In New York State, three types of rodents can cause problems in food handling establishments: the Norway rat, house mouse and *Peromyscus* mice (white-footed mice and deer mice, two species that are difficult to differentiate by sight). Rodents are public health pests because they are known carriers of pathogens that affect people. Exposure comes from contamination of food and food preparation surfaces with feces and urine. Rodent ectoparasites, including fleas, lice, mites, and ticks that live on rodent bodies, can also be a source of pathogen spread from rodents to people and pets. Rodents cause physical damage by chewing on electrical wires and burrowing under plants.

Rodents are cryptic pests, but problems can be identified early by looking for pest evidence.

- *Sebum or grease marks* are oily deposits left on surfaces where rodents walk or squeeze through regularly. Thick or dark sebum trails indicate frequent activity, possibly from a large population.
- Heavy foot traffic from rodents can leave *paths of bare soil* within grass or vegetation.
- *Droppings* are a sure sign of a pest problem, and can help to distinguish which pest is present. Rodent droppings are pinched at the end and may contain fur, unlike American cockroach droppings that are blunt at the end and have lines or grooves that run along the length (from tip to tip). Mouse droppings are 1/8 to 1/4 inch long, whereas rat droppings are 3/4 to 1 inch long. Mice can produce between 40 and 100 droppings per day, while rats can deposit between 25 and 40 droppings per day.
- *Gnaw marks*, like dropping sizes, can distinguish which rodent pest is present. Impressions left by a pair of teeth that measure 1-2 millimeters wide are from mice, whereas adult rats leave impressions of 3.5 to 4 millimeters wide.
- Rats leave *footprints* and may leave a *tail drag line*. Mice leave “toe prints” that often do not resemble footprints.

Rats drink 1 to 2 ounces of water per day – and require standing water. This includes puddles, condensation on pipes, or food with a high water content (fruits and vegetables). Mice will drink standing water, but can also acquire water through metabolism when they eat fatty foods. Removing water sources can make a site less attractive to rodents.

- Adult *Norway rats* weigh about one pound and can grow to 16 inches in total length, with the tail being slightly shorter than the body. Norway rats have two-tone fur, with the underside being lighter than the top. Fur color can vary from tan to brown to gray. These rats have small ears and eyes, and a blunt muzzle/snout. Each day, adult rats drink one to two ounces of water and eat up to 2.5 ounces of food (juveniles consume less). Norway rats prefer to build nests in the soil, creating 3.5 to 4-inch burrow openings. Rats can also use small, dark empty spaces in walls or similar sites for a nest. Active rodent burrows are smooth from heavy traffic.
- *House mouse* adults weigh 0.5 to 1.1 ounces, are 2.5 to 3.75 inches long, with an average tail length of 3.75 inches. Compared to young/juvenile rats, they have larger ears and eyes. Their body is uniformly colored meaning that their backs and bellies are roughly the same color.
- *Peromyscus* mice, white-footed mice and deer mice (collectively referred to here as *Peromyscus* mice) are about the same size or slightly larger than house mice. These mice can be distinguished from house mice by their two-tone fur, with a darker back (grey or tan) and white belly. A behavioral difference between house and *Peromyscus* mice is that house mice tend to live within 15 to 30 feet of their food source, and will spend their entire lives indoors if possible. They will visit and nibble on food sources, making many trips. Alternatively, *Peromyscus* mice spend most of the year outdoors, but come indoors in cooler months. They may create caches of food from items collected in and around a facility like seeds and nuts.
- **Birds: Pigeons, Starlings and Sparrows.** Birds are pests of food establishments when they nest within or on the exterior of a facility. Bird droppings are food contaminants, can spread disease (ex. histoplasmosis) and deface buildings. Nests can clog gutters and may contain people-biting mites. Federal regulations protect most birds from management, but pigeons, European starlings and house sparrows are not protected. During inspections, look for nests and droppings that may lead to contamination. Wildlife experts recommend removing nests every two weeks in the spring to avoid problems with English sparrows and pigeons.
- **Stored Product Pests.** Stored product pests are insects that infest food items. They represent a diversity of insects, including [moths](#) and the [beetles](#). Stored product pest infestations may be found in areas that are difficult to clean, such as storage racks and under equipment. A flashlight and keen eye can identify movement from pests feeding in these areas. Many facilities have monitoring devices for stored product pests, including pheromone traps. Inspect traps during visits to determine if pests are present and that monitoring efforts are up to date.

Management of stored product pests requires identification and remediation of the source. Monitoring can help identify areas of higher pest activity. *Mating disruption* is a technique that saturates the space with pheromones, confusing adult insects and making it difficult to find a mate and reproduce. In severe infestations, *fumigation* may be needed (Note: pheromones and fumigants are pesticides, and must be applied by a licensed applicator).

Part II. Conditions Conducive to Pest Problems in Food Handling Facilities

Where do pests come from? Pests are attracted to enter buildings by temperatures and food odors, facility lighting, harsh outdoor environmental conditions (too hot, cold, wet, or dry), the structure of the building (attractive to overwintering pests) or based on exploratory movement in a new area. After entering, conditions inside the building can support their feeding and reproduction, resulting in an infestation.

Pest Access. When pests become an issue, look for entry points that provide access to the facility. Entry points are particularly problematic for rodent pests, because chemical cues created by one rodent can tell another rodent where to find food or shelter. Consider this: the importance of exclusion (pest proofing) is commonly mentioned in regulations, but how often is it cited as an issue?

- **Opening Sizes** for rodent entry are determined by dimensions of the skull. If an opening is equal to or greater than the sizes below, a rodent can enter. “Gaps” refer to the space a rodent can squeeze under [determined by skull height], and “openings” are holes a rodent can squeeze through [determined by skull width].
 - Mice can enter gaps 1/4 inch tall and openings 3/8 inch wide.
 - Rats can enter gaps 1/2 inch tall and openings 3/4 inch wide.
 - Entry points for insect pests are estimated based on their body size, but these are less reliable because the insect exoskeleton is flexible. Therefore, if a business card fits into a gap, it is considered vulnerable to insect pests.

- **Common Openings:**
 - *Open Doors & Windows.* Doors left open or propped (especially at night), and windows without screens invite rodent and insect pests indoors.
 - *Gaps under doors*
 - *Astragal Gaps.* In many cases, the vertical gap between double doors is not sealed, even if door sweeps are placed on the bottom of each door.
 - *Windows.* Screens that are loose fitting, contain tears, or have large mesh size can grant access to insect pests. Weep holes, where water leaves the window casing, can provide pest entry too. Weep hole covers prevent insects from entering, but allow water to escape the window frame.
 - *Loading Docks.* Dock doors that are damaged or missing a compression seal provide gaps for pest entry under the roll-up door. Dock levelers move to accommodate trailers of different sizes. If not sealed on the sides, gaps provide access into the facility. The pull-chain is used to release/raise the dock plate. Rodents (and other pests) can climb the chain and enter through the hole.
 - *Weep Holes.* These structures allow water trapped behind the exterior façade to drain out. However, they can provide an entry point for pests. Weep holes should be pest proof, and exclusion materials must allow water to pass through.
 - *Ventilation.* ½ inch mesh size is used to allow for proper airflow, but does not prevent mice or insects from entering the facility. Therefore, the space inside should be isolated and pest proof to protect the rest of the facility from pests. Louvered vents can be installed to provide additional protection when vents are not in operation.
 - *Utility Penetrations.* Pipes and wires for plumbing, electrical, data, gas, oil, etc. can provide access for pests if the space around the pipe or wire is not sealed properly.
 - *Drains.* Rodents and cockroaches can enter buildings through sanitary lines: especially uncapped, unused dry drains, including floor drains.
 - *Vertical Surfaces.* Rodents can climb rough-textured walls, pipes less than three inches in diameter, corners /wedges of walls, drain downspouts.
 - *Vegetation Bridges.* Pests can gain access to facilities using vegetation that connects to the building at ground or roof level.
 - *Interior Connections.* Pests can move through a food handling establishment using interior connections if the building has multiple tenants or multiple rooms/areas.
 - *Utilities* connect rooms and floors within a building
 - *Hollow wall* spaces are made by concrete block, partition walls, etc.
 - *Drop Ceilings* hide an open void that typically spans the entire floor. These spaces can connect to the floor above and to adjoining rooms, even if they appear to be separated by walls in the facility.
 - *Expansion Joints,* gaps in floors or walls for expansion of building materials, could lead to sub-slab hiding places for rodent and insects pests.

- *Missing Tile Grout* - deep gaps between floor tiles provide breeding and/or feeding sites for flies, cockroaches, ants and rodents.
- **Pest Origins.** Think about which pests infest the building (rodents, American cockroach), and which might have been introduced (stored product pest, German cockroach). This can help determine the source of the problem, especially if introductions happen that can start new infestations.
 - *Suppliers.* Pests can arrive on deliveries. They may have infested the materials prior to shipment, the transport vehicle, equipment (hand truck), or the driver/personal items.
 - *Employees.* Pests can be transported from home on personal items of employees. Monitoring in locker rooms and other employee areas can help determine if pests originated from staff belongings, or if locker rooms provide pest harborage.
- **Sanitation.** Poor sanitation sustains pest populations, and is often the reason that pests are present indoors. Improving sanitation to remove food and water sources is critical to solve pest problems. Spilled food under grocery store gondolas provides nourishment for rodents, ants and stored product pests.
 - *Challenges.* Food spillage can occur in hard to reach, see or clean locations. For example, items can get stuck in the support beam of a storage rack, providing nourishment for mice.
 - *Water.* Water is highly attractive to some pests, such as rats. Water can come from a number of sources, including drip pans on refrigerators, leaks, and condensation on pipes.
 - *Refuse Storage.* Refuse containers stored near the facility, especially near staff doors, can be a problem for pests if doors are propped open.
 - *Wet Floor Washing.* Cleaning procedures can create conditions favorable to pests, or interfere with pest management practices. Wet floors provide water, displace food particles in hard to clean areas, or wash away pesticide applications.

Part III. Pest Management in Food Handling Facilities

Pest Management Laws & Regulations. Before we learn about the specifics of a pest control program, let's review some laws and regulations that relate to pesticide use. In New York, the only people who can apply pesticides in a food-handling establishment are applicators certified by the New York State Department of Environmental Conservation (NYSDEC), or those who are both working under the direct supervision of a certified applicator and employed by the same company as that applicator. Based on these laws and regulations, the only people who can apply pesticides anywhere in a food facility are a certified applicator, or someone who is employed by the applicator's registered pesticide business and works under the direct supervision of the applicator. If you find a pesticide in a food facility, ask who is using it, if they meet certification/supervision requirements, and if it is labeled for the stated use. For questions about using pesticides in New York, contact the Pesticide Management Education Program at Cornell University: <https://psep.cce.cornell.edu/staff.aspx>.

In addition to *who* can apply pesticides, there are restrictions on *what* pesticides can be used and *where*. Pesticide labels are approved by the US Environmental Protection Agency (EPA) and the NYSDEC, and following label directions is required by federal and state law. [Pesticide labels](#) specify where a product can be applied in the *Directions for Use*. In NYS, the desired site-pest combination must be on the label (e.g., cockroaches in food areas of food-handling establishments).

Definitions.

- Some pesticide labels specify that products cannot be used in "Food areas of Food Handling Establishments." This includes: receiving, serving, storage (dry, cold, frozen, raw), packing

(canning, bottling, wrapping, boxing), preparing (cleaning, slicing, cooking, grinding), edible waste storage, closed-processing systems (mills, dairies).

- Nonfood areas of Food Handling Establishments include: garbage rooms, locker rooms, lavatories, floor drains (to sewers), entrances and vestibules, offices, machine rooms and boiler rooms, garages, mop closets, and storage areas for canned or bottled items (not raw materials).

Rodenticides. The 2008 EPA Rodenticide Risk Mitigation Decision changed the way rodenticides can be sold and how they can be used by professionals. The goal of this decision (and subsequent modifications) is to minimize risk of exposure for children and the environment. Specific requirements for rodent control include:

- Bait stations are required for all outdoor, above-ground placements of second generation anticoagulant rodenticides.
- Bait stations are required indoors if exposure to children, pets, or non-target animals is possible.
- Fence and perimeter baiting beyond 100 feet from a structure is prohibited.

Pest Management in Food Facilities. The goal of pest management programs in food handling facilities should be *early detection* and *rapid response*. This requires a focused monitoring program and a management plan for when pests are introduced to the facility.

- **Inspections.** The most important part of a pest management program is a thorough inspection. Inspections tell you if pests are present, what factors attracted them, where they are living, how they get in, and provide insight about the best way to reduce pest numbers and eliminate attractive conditions, harborage and entry. Remember: pests are cryptic animals that tend to hide during the day when people are present. Search for pest evidence such as damaged goods, droppings, tracks, or odors that pests leave behind.
- **Tools of the Trade:**
 - *Notebook and Pencil:* for taking notes about the site and conducive conditions
 - *Tape Measure:* determine distances, measure for exclusion
 - *Rodent Bait Station Keys:* access bait stations on site
 - *Pocket Ruler:* measure pest evidence and small openings for entry point
 - *Frye Inspection Tool:* identify rodent evidence and entry points
 - *Tweezers:* collect evidence in the field, such as droppings
 - *Collection Vials:* collect samples of insects and evidence you observe
 - *Multi-bit Screwdriver:* to access areas, such as access panels and equipment voids
 - *Tack Lifter:* for easily inspecting drop ceiling tiles, carpet edges
 - *Cotter Pin Remover:* to pull floor drain covers up
 - *Telescoping Magnet:* to retrieve multi-catch traps under equipment
 - *Inspection Mirror:* for seeing the under and backside of hard to access locations
 - *Pliers:* for access to areas sealed with a nut and bolt or other spaces
 - *Spatula:* to probe cracks and crevices for pests and identify conducive conditions
- **Identification** of pests or their evidence is a critical skill. Use university-based resources and field guides to help identify pests. **Do not** rely on internet searches or social media. If you are not sure about a pest identification, consider bringing a sample to the Cornell Cooperative Extension office in your county or sending a sample to the [Cornell University Insect Diagnostic Laboratory](#). Incorrect or mistaken identification can lead to errors in treatment and recommendations.
- **Pest Reduction.** When pests are found in a facility, the response by pest professionals should be two-fold: reduction of the pest population and prevention to avoid future problems. Pest Reduction includes the use of traps, baits and sprays to kill pests. Options that minimize pesticide exposure are best, considering the sensitive nature of food handling establishments. Therefore, trapping and baiting are preferred to pesticide sprays. When pesticide sprays are needed, two main types of treatments are possible: Non-residual and Residual.

- *Non-residual treatments* kill on contact, but do not have a lasting effect after the treatment. This includes space treatments and fumigation, which are performed when the facility is not in use.
- *Residual treatments* use products that remain active after the treatment is complete. This can be days to weeks, and will vary with conditions inside the facility. For example, wet and hot environments can breakdown certain pesticides and reduce the life of active ingredients. Residual treatments can be made when a facility is in use, unless prohibited by the pesticide label. There are three types of residual treatments:
 - *General Treatment* are applied to broad expanses of surfaces. They are allowed only in non-food areas with products registered for this use type.
 - *Spot Treatments* are applied to limited areas where insects are likely to occur, and not in contact with food preparation surfaces, utensils, or workers. Spots do not exceed two square feet (see label: some products can be used in food areas, most cannot).
 - *Crack and Crevice Treatments* are applications of product into the opening of a crack or crevice. Excess product should not drip out.

With any pest problem, think about, “what is required for control?” In some cases, a pesticide bait can be used to wipe out pests (ex. cockroaches, ants). In other situations, elimination of food spillage and other breeding sites will be required (ex. flies), while preventing access to the building is necessary to avoid rodent problems. Keep in mind that pesticide applications are not always the solution.

- Learn to recognize different types of pest management equipment observed during an inspection, and what pest they target. Ask questions of site staff if you don’t know! You may see bait stations for ants, cockroaches and rodents, or different types of monitors that provide insight about current or former pest concerns.
 - *Baits*. Keep an eye out for poor use of pest management products. Whereas gel baits are an effective cockroach management strategy, these baits should be applied in small placements. When baits are applied like a caulking material, this can signify a lack of understanding about the product and pest biology. Furthermore, think about how different pest management approaches may interact. Applying a pesticide spray on top of baits can repel certain pests and ruin product efficacy. Similarly, no-pest strips that release a pesticide (dichlorvos) can taint bait.
- *Rodent management* requires an integrated approach, including **sanitation** to remove food and water sources, **exclusion** to prevent pest entry, and **pest reduction** with trapping and baiting.
 - *Sanitation*. Look for spilled food items in hard to reach places. These often support pest populations.
 - *Multi-catch traps* are commonly used for monitoring and intercepting rodent and insect pests. Traps should be *functional* (ramps work, paddle wheel wound) and *not damaged*. Some traps contain glue boards, which are useful for monitoring insect pests. Keep in mind that rodents may escape broken traps, and devices are not effective if they are not checked. Devices deployed in areas that are consistently wet may also serve as harborage for insect pests, such as German cockroaches.
 - *Snap traps* are used for monitoring and to supplement multi-catch traps, but are difficult to successfully use in food establishments. Traps only catch one rodent at a time and can be tripped by people or vibrations. Snap traps are also easily over-baited, which can reduce their efficacy. Too much bait can affect the traps ability to deploy, feed other pests in food facilities (ants, cockroaches), or be a contamination risk (peanut allergies, etc.).
 - Glue boards tend to capture juvenile rodents only. This is because adult rodents have specialized hairs near their feet that alert them to texture changes. While glue boards are

important for insect monitoring and facilitate ease of trap cleaning, they may be more cruel than snap traps.

- Outdoor stations often contain rodenticide baits that kill rodents by damaging blood vessels and causing internal bleeding. *Rodenticide baits do not cause rodents to leave a building in search of water.* Instead, poisoned animals are lethargic and sick, and therefore look for protected places to hide. Some rodenticide baits can be used in food facilities, but this use is not often justified. Review pesticide labels to verify that a specific use is permitted. Bait stations used in food facilities must contain a tray to prevent bait from leaving the station. Keep in mind, poisoned rodents can die indoors in areas that are not accessible, leading to problems of contamination, bad smells, flies and pests that feed on the carcass. Snap traps confine dead rodents to a known area, and are easily removed.
- *Tracking Powders* are a formulation of rodenticides. Rodents walk or climb through powders, which stick to their fur or feet. Powders are later ingested during normal grooming. These products have a **Restricted Use** label, and extreme caution is needed to avoid contaminating water, food, food surfaces, or equipment that comes into contact with food. During inspections, be cautious of white powders in voids where rodent activity is detected.
- *Bird management* includes the use of pesticides, shooting, harassment, and exclusion (netting, spikes, electrical shock tape, physical prevention, etc.) to manage bird numbers or prevent birds from roosting. Bird management is often performed by a wildlife professional.
- *Pest Prevention.* Pest problems can be prevented using *exclusion*. This refers to sealing all openings into a facility from the exterior, and all the connections between rooms and floors. Note that some exclusion products are better than others at keeping pests out. For more details, see the resources linked on the [Scientific Coalition on Pest Exclusion](#) website.
- *Monitoring and Interpretation.* You can learn about a pest population and control efforts by looking at monitoring devices. While finding a pest on a monitor or in a trap can be considered a violation, think critically about what you see on glue boards, snap traps, light traps and multi-catch rodent traps. Is this an *introduction* (one or more individuals in a new area) or an *infestation* (breeding population with adults and juveniles)? While *infestations* can pose a health risk to food handling establishments, *introductions* are often an opportunity to find the source before the problem escalates.
- *Inspection versus Monitoring.* Keep in mind the distinction between *monitoring* and *inspection*. An inspection represents a moment in time: what was observed while you were present. Monitoring, on the other hand, represents a record of time: what happened between visits, including at night and other times when staff is not present. Identification and interpretation of monitors is used to determine the source of an infestation, and if it relates to food safety.
- *Interpretation of Monitoring.*
 - *Peromyscus* mice tend to live outdoors, but can nest inside from fall to spring. Finding a *Peromyscus* mouse indoors suggests that an exterior entry point into the facility should be located and properly sealed.
 - Juvenile rodents do not travel far from the nest. If you find rodent pups, this suggests that a nest is somewhere nearby.
 - Juvenile cockroaches also stay close to the nest. Finding only adult cockroaches on a glueboard suggests an interior connection to an area where cockroaches are breeding, though it may be some distance away. Adult cockroaches are distinguished from juveniles by the presence of wings. Late instar nymphs may also travel further distances than other juvenile stages.
 - Crinkled/deformed wings on adult cockroaches is a sign that pests are being treated with an insect growth regulator. These products interfere with the molting process and prevent insects from developing to fully functional, reproductive adults.

- If you find green, red or blue rodent droppings, this suggests that they are feeding on a rodenticide bait. If a baiting program is in place, but none of the droppings are colored, this means that rodents are feeding on other food sources that may be competing with the bait.
- Size of droppings can tell you more than just what rodent is present. Finding droppings of mixed sizes suggests that both adults and pups are present. In other words, females are reproducing and the population is growing.
- Keep in mind that a single mouse can produce 40 to 100 droppings per day, while a rat can produce 25 to 40 droppings per day. The sudden appearance of many droppings may not indicate an infestation, but should be taken seriously. Droppings are usually left in areas that are protected, or on pathways that are used often by rodents. Sometimes the pathway is overhead and droppings fall to the ground.
- Learn to differentiate between droppings and other similar evidence left by pests. Pupal cases of flies (the life stage between larvae/maggot and adult) can look like rodent droppings, as can cockroach egg cases. Fly pupa cases have segment lines that circle the pupa. Rodent droppings do not have any lines, often have a pointed end, and may contain hair. American cockroach droppings have lines from end to end, and ends are more blunt.
- **Record-Keeping with a Logbook.** If there is a pest problem at a food handling establishment, ask to review records from the pest management contractor. This may be a binder left on site or digital reports sent to site management. Look for details like the scope of services (what is included each visit), frequency of service, what was done, and other documentation - including the use of a site map to record activity and labels of pesticides used during service.
- **Common Issues in Pest Management.**
 - *Insect light traps* are useful in monitoring many flying insects. They can be used to detect pest species that are breeding indoors, and flying insects that are attracted to lights from outdoor areas. Species identification is critical to determine the origin of pests. Several factors contribute to the proper functioning of light traps.
 - *How they Work.* Many insects are attracted to ultraviolet light. Light traps used indoors exploit this behavior and attract insects to the trap. Insects then get stuck on a glue board installed behind or below the light bulb. Some light traps create an electrical field to “zap” flying insects. These traps must NEVER be used in food areas of a food handling establishment.

Light traps that electrocute insects can be used in non-food areas of a food handling establishment, including refuse areas and loading docks. Lights should be installed so they are not visible from outdoor areas, which can attract pests into a facility. However, electrocution traps do not allow for monitoring with glue boards and therefore provide less information.
 - *Installation.* Look for light traps to be installed four to six feet above ground level. Are devices accessible? Traps hidden behind shelving units and other equipment are not likely to be inspected or maintained. Light traps can be plugged in and operational at all times (24/7). Check to see that lights are on, and ask for an explanation if lights are unplugged.
 - Ideal locations for light traps are dark corners with reduced airflow. This makes it easier for insects to access and get stuck in the trap. Lights should be installed less than 5' off the ground to maximize fly capture. Most traps are installed too high.
 - To maximize flying insect catch, traps should not be installed near a competing light source. Overhead light and nearby windows can reduce efficacy of the trap. Traps should be in areas that will assist with early detection, such as shipping/receiving, food storage, and refuse areas.

- Examine glue boards to see what insects were captured, and if the boards have been changed recently. Over time, glue boards can fill up with insects and lose the ability to catch additional insects.
- Are bulbs functional? While research shows that [bulbs can remain functional after the manufacture-recommended replacement time](#), old bulbs may not attract pests at all. [Light meters](#) are available to test bulb output. Look on trap back/side to see when bulbs were replaced.
- *Pesticide Label Violations.* A common observation in food handling establishments is off-label, misuse of No-Pest Strips containing dichlorvos. These products can be used to treat confined spaces, and different sizes are used for different areas. For example, the 65 gram size is used to treat areas up to 1200 cubic feet, including crawl spaces, sheds, attics, and trash rooms, whereas 16 gram strips are used to treat up to 100 cubic feet (pantry, cupboard, closet). However, these products are NOT labeled for use in food areas of food handling establishments. Some specific label language for these products:
 - “Do not use in kitchens (except cupboards), restaurants or areas where food is prepared or served.”
 - “Do not use in kitchens (except cupboards) or in food areas of food-handling establishments.”
- *Calendar Sprays.* When reviewing pest management logs, verify that pesticide applications are justified by the presence of pest activity. Calendar-based or routine pesticide applications represent unnecessary risk, especially in food handling establishments.

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