Pest Management in Food Processing Facilities: A Resource Guide
Abstract:

Pest management is challenging in a food processing facility—the abundance of food, ideal moisture and temperature conditions, extended business hours and various harborage sites create conducive conditions that allow pest infestations to thrive. Maintaining a safe, clean site requires facility managers to be fully aware of these challenges and be ready to face them.

Pest Management as a Priority

In the world of food processing, facility managers have a long list of standards that must be met and pest management is just one of them. However, the health dangers that insects can pose demand that pest management be made a priority in food facilities. Many insects can carry disease-causing pathogens that can be passed to food through their feces and saliva. Two common food handling pests serve as examples of the true danger. Filth flies have been proven to spread more than 65 kinds of human diseases including E. coli, Staph, and several kinds of food poisoning. What is worse is that they feed by regurgitating saliva and stomach contents onto their intended meal. The fly then consumes the former contents and newly dissolved food. Cockroaches, some of the most difficult insects to control, have been reported to spread at least 33 kinds of bacteria, six kinds of parasitic worms, and seven other human pathogens.

Insects can also be accidentally processed into the product—a surefire way to risk a company's reputation among customers and its quality assurance scores among inspectors. Stories of foodborne illnesses and rampant pest infestations topped the news recently—everyone remembers the rats in a New York restaurant. Although this was an extreme case, it demonstrates the media frenzy and public outcry that can develop around a pest infestation. Pest management failures can be extremely damaging to an individual processor and to the food manufacturing industry at large.

It is also important for food processors to meet standards set forth by different regulating agencies. Proper pest management allows processors to avoid unnecessary fines or closure due to failed inspections.

Regulations and Regulators

The food processing industry is subject to a number of regulating bodies. There are specific guidelines and regulations that dictate what products can be used, where those products can be used and what level of control must be achieved.

The Food and Drug Administration (FDA) inspects food production facilities and food warehouses, collects and analyzes samples for physical, chemical and microbial contamination. The FDA also develops model codes, ordinances and guidelines, and works with states to implement them. Good manufacturing practices and other production standards are also developed by the FDA, including plant sanitation, packaging requirements, and Hazard Analysis and Critical Control Point (HACCP) programs. More information about the FDA can be found at www.fda.gov/cvm/.

In conjunction with the FDA and other federal agencies, state and local governments implement food safety standards for foods produced within state borders. State and local governments also inspect food manufacturing plants inside local jurisdictions and have the right to embargo, stop the sale of, or recall unsafe food products made or distributed within state borders.
The United States Department of Agriculture (USDA) is also tasked with regulating food safety. The USDA has been instrumental in the coordination of a national food safety strategic plan among various partner agencies, including the Department of Health and Human Services and the Environmental Protection Agency. USDA food safety regulations and policies can be found at [www.fsis.usda.gov/Regulations_&_Policies/index.asp](http://www.fsis.usda.gov/Regulations_&_Policies/index.asp).

The United States Environmental Protection Agency (EPA) is not directly involved in food growing, processing or storage, but does have a critical role in regulating food safety. All pesticide products must be registered by the EPA, including those used in food handling areas. Registration is granted after the EPA has determined that use of the product according to the label instructions will not cause unreasonable risk to the applicator, facility operators or to people consuming the food. The later is accomplished by the establishment of tolerance levels for pesticide residue levels in foods. For more information about EPA regulations and pesticides labeled for use in food handling facilities, visit [www.epa.gov](http://www.epa.gov).

More information about specific food safety regulations can be found at these helpful websites:

**Gateway to Government Food Safety Information**  
[<www.foodsafety.gov>](http://www.foodsafety.gov)

**Code of Federal Regulations**  
[<www.access.gpo.gov/nara/cfr.cfr-table-search.html#page1>](http://www.access.gpo.gov/nara/cfr.cfr-table-search.html#page1)

**FDA Regulatory Manual Series**  
[<www.courts.state.ny.us/queenslib/holdings.htm>](http://www.courts.state.ny.us/queenslib/holdings.htm)

**FDA Training Manual for Analytical Entomology in the Food Industry**  
[<www.fda.gov/ora/science_ref/lpm/lpchtr18.html>](http://www.fda.gov/ora/science_ref/lpm/lpchtr18.html)

**USDA Food Safety Regulations**  

**An Overview of HACCP**  
[<www.cfsan.fda.gov/~comm/haccpov.html>](http://www.cfsan.fda.gov/~comm/haccpov.html)

In addition to inspections by the government entities outlined here, food processors are also subject to reviews by third party auditors. AIB International, NSF Cook & Thurber, and ASI are all third party auditors that serve the food processing industry. Audit programs differ, but most include inspections of the food manufacturer’s sanitation program, food safety and good manufacturing practices, and food defense and allergen audits. Superior and Excellent ratings in these areas can merit special designation from the auditor.

![AIB International](http://www.aib-international.com) ![NSF](http://www.nsf.org) ![ASI](http://www.asi.com)

**Using a Pest Management Professional**

To ensure that a facility is meeting regulations and passing inspections, it is imperative that it be under the care of a trained professional. Whether in-house staff or contracted, the pest management professional (PMP) must be an integrated member of the food safety team. Thorough knowledge of the plant’s prerequisite programs, manufacturing practices, approved product lists and sanitation programs is critical to success. Access to areas that are ordinarily locked or restricted is also important since these sites may provide conducive conditions for pest infestations. PMPs should also be aware of new pest control products and application techniques to fully offer the facility the best pest management program. Production or regulatory changes can also greatly affect a pest management program, making it essential that facility managers know about these changes and effectively communicate them to his or her pest professional.
### What Pests to Expect

<table>
<thead>
<tr>
<th>Stored Product Pests</th>
<th>Roaches</th>
<th>Ants</th>
<th>Flies</th>
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<td><strong>Including:</strong></td>
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<td>Darkling Larva Beetle,</td>
<td>German, American,</td>
<td>Acrobat, Argentine,</td>
<td>House, Vinegar and Filth Flies</td>
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<tr>
<td>Saw-tooth Grain Beetle,</td>
<td>Brown-Banded and Oriental</td>
<td>Big-headed, Ghost,</td>
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<td>Red Rust Flour Beetle,</td>
<td>cockroaches</td>
<td>Odorous House,</td>
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<td>Confused Flour Beetle,</td>
<td>are the most common</td>
<td>Pavement, Pharaoh and Thief</td>
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<td>Red Flour Beetle and Merchant</td>
<td>cockroach pest species</td>
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<td>Beetle</td>
<td>in the United States</td>
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<td>Food Sources:</td>
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<td>Flour, cereals, dried pet</td>
<td>Cockroaches are truly omnivores,</td>
<td>Food sources vary depending on ant</td>
<td>Flies feed on anything that can</td>
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<td>foods, whole grains,</td>
<td>and they will eat most anything</td>
<td>species but the above mentioned</td>
<td>process into liquid form through</td>
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<td>oats, seeds, dried fruits,</td>
<td>available to them</td>
<td>ants feed on processed foods,</td>
<td>regurgitating their stomach</td>
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<td>rice, grain meals, sugar,</td>
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<td>sugar, syrup, fruit juice, meat,</td>
<td>contents.</td>
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<td>chocolate, drugs, pasta and</td>
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<td>eggs, oil and fat, dry pet food,</td>
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<td>Cockroaches have been reported</td>
<td>Ants could contaminate food by</td>
<td>Houseflies have been known to</td>
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<td>damage food products during</td>
<td>to spread at least 33 kinds of</td>
<td>accidentally being processed into</td>
<td>carry over 100 different disease-</td>
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<td>feeding. These pests can also</td>
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<td>the food product.</td>
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### The Pest Management Industry Takes a Proactive Step

The National Pest Management Association (NPMA) is a non-profit organization with more than 5,000 members established to support the pest management industry’s commitment to the protection of public health, food and property. In 2007, NPMA released *Pest Management Standards for Food Plants* to provide minimum operational criteria for PMPs servicing food plants. With the help of food manufacturers and third party auditors, the pest management industry developed these standards to provide consistency in service for this important customer segment. To purchase a copy of these standards, please visit www.pestworld.org.
Food Handling Pest Control Products

Even the most rigorous inspection and maintenance protocols are sometimes not enough to keep insects from infesting a facility. Scientific advancements in professional pest management are delivering new products to the marketplace that can be used to supplement any pest control program. Although a PMP will serve as the expert consultant when it comes to diagnosing a pest infestation and prescribing a treatment program, it is important for a facility manager to have a basic understanding of the products available.

Undetectable liquids are the newest technology available to the food handling industry. These pesticides can be applied as crack, crevice or spot treatments inside and outside the facility. The treatment is undetectable to the insects, so pests unknowingly contact and/or ingest the active ingredient and may share it with other pests. These pests may be affected without having to come into direct contact with the pesticide.

Dust formulations consist of a fine powder pesticide that is applied to cracks, crevices, or wall voids because the insecticide can easily penetrate these cavernous spaces. In addition, some dusts are waterproof, making them great for treating drains and other damp spaces.

Insect growth regulators (IGRs) are products that interrupt or inhibit the life cycle of an insect. By inhibiting the maturing of insects, an IGR will keep insect young from reaching the critical adult stage, thus stopping the life cycle, killing the pest and reducing the infestation.

Foams are similar to dusts in that they can be easily applied to wall voids, cracks and crevices. Many different pesticides can be made into foam formulations to take advantage of their ease of application.

Baits are often used to treat for cockroach, fly and ant infestations and come in either a bait station, powder or gel forms. Bait gel can be positioned deep inside cracks, crevices, and wall voids. Baits attract insects, which then ingest the bait, return to their hiding places and die shortly after. Other roaches may ingest the bait product when they feed on the dead insects or their excretions. Baits have been a standard method of insect control for many years, causing some cockroaches to develop a resistance and/or aversion to some products.

Fumigant pesticides are in a solid or liquid form and after application a fumigant gas is released. The pesticide is able to permeate the facility and penetrate locations that other pesticides cannot reach. Despite this fact, fumigants do not provide residual control. Before fumigation, a facility must be sealed and have danger signs posted. Some fumigants are being taken off the market, but some facilities can receive critical use exemptions.

Heat treatments are growing in popularity as a chemical-free approach, despite the costs associated with this method. During a heat treatment a facility is heated to 130 degrees Fahrenheit for 8 to 20 hours using propane, electric or steam heaters. Heat treatments do not provide any residual control and do require a facility to be closed during the treatment.

Aerosol insecticides are easy to use and provide a quick knockdown when the product comes in direct contact with the pest.

Integrated Pest Management

Integrated Pest Management (IPM) is a comprehensive approach to solving pest problems. Instead of simply trying to eradicate a pest, an IPM approach considers all of the information, accounts for multiple objectives, and considers all available preventative and curative options. Based on that foundation, informed treatment decisions are implemented to achieve optimum results. However, in general terms the goal of IPM is to provide a safe, effective, and economical outcome.

In the IPM approach, a pest management professional must first identify the pest and understand its biology and the environment in which it exists. Then the PMP can monitor for the pest and implement other natural controls including removing the pest's food and water sources. After establishing natural controls, an appropriate management strategy can be developed and implemented. The most successful IPM programs are a result of both the PMP and facility manager combining their expert knowledge and respecting the end-goal of food safety. It also requires their cooperation in meeting the challenges to achieving success.
**Organic Facilities**

Although currently only two to three percent of all produce grown in the United States is organic, retail sales are increasing by more than 20 percent each year. As this growth continues, more food processors will be requesting that their pest management services meet the National Organic Program (NOP) requirements.

The idea that pest management services in an organic processing/handling facilities means that absolutely no conventional pesticides can be used is erroneous. Conventional pest management products can be used when needed to achieve the desired level of control, after the facility manager and PMP have tried other required steps including preventing pest introduction, using mechanical or physical pest management exclusion techniques and the application of materials consistent with the approved product list. If pest problems persist to an unacceptable degree, a conventional pesticide may be used. The Organic Pest Management Protocol consists of these four steps, the last of which includes the application of a material not on the NOP Approved list. This step can only be implemented after the first three have proven to be unsuccessful and authorization for application is given by a certifying agency.

**Preventative Maintenance**

To ensure that a facility does not develop future infestations, a preventative maintenance program should be developed. Close collaboration between the PMP, facility manager and trained plant employees, is the hallmark of a successful pest prevention program.

Most processing facilities have training programs in place that include job-specific training, employee safety instruction, and food safety procedures; but these training programs do not typically include pest management basics. In order to have an effective pest management program, every facility should have an employee-training program that underscores the importance of pest management and sanitation. A facility’s pest professional can walk employees through basic pest identification, hot spot monitoring, and sanitation techniques. Employees most closely involved in the pest management and sanitation programs will benefit from ongoing training around their responsibility. It is also important to perform self-inspections to measure the effectiveness of the training based on the performance of the employees.

Sanitation is critical to pest prevention in food facilities. Processing equipment should not only be clean but sanitized. Cleaning is simply removing dirt or debris, whereas sanitizing actually removes surface bacteria and microorganisms. One kernel of wheat, approximately 35 milligrams, can support the development of 3 red flour beetles, 21 flat grain beetles, and 1 Indian meal moth larvae. Research has shown that pests can survive pesticide exposure when they have access to even small amounts of food. Therefore, proper sanitation is essential for pest control products to work effectively.

For a sanitation program to be effective, accountability and follow-through must be stressed. Sanitation may fall under the responsibilities of one individual or a team; but to be effective at directing the sanitation program, the authority must be delegated by upper management. A sanitation plan and self-inspection regimen must be created and clearly communicated to all employees. Written procedures that provide systematic methods for properly cleaning and sanitizing all of the appropriate areas can assist in reinforcing the program, including a list of what needs to be cleaned, the equipment that is needed to clean, a list of cleansers and sanitizer, and a list of protective clothing and equipment that should be worn while cleaning. Cleaning schedules provide a documented program for the frequency that each task is to be completed and by whom. There should be a master schedule that can be broken down by monthly, weekly, and daily schedules. 24-hour facilities present challenges in maintaining the sanitation schedules, but an early morning unannounced inspection is good way of checking employees’ compliance to the program.

Regular maintenance and proper sanitation will ensure that facility management will be prepared to effectively treat and prevent future pest problems.
Monitoring Hot Spots
Threats to food safety exist both indoors and outdoors and it is essential for facility managers to monitor their facility's pest hot spots: areas where conditions conducive to infestation are commonly found. While specific hot spots can vary from location to location, there are general areas of any structure that require special attention to ensure a pest-free environment.

Waste Storage: The most common outdoor hot spots develop in dumpster areas due to improper garbage storage and disposal, as inadequate waste management systems are often overlooked.

Entrance and Exit Points: It is easy for employees to mistakenly leave doors ajar or open, inviting pests to enter the facility. Using air curtains outside main entryways and fixing missing or torn window screens will help keep flying insects from entering.

Outdoor Lighting Fixtures: Proper outdoor lighting is important because pests are attracted to light. Using lighting that avoids directing insects to outside entry points and sodium vapor lights will help prevent infestations.

Cleaning Supply Storage: Proper cleaning supply storage is critical. Moist mops, buckets, and rags left in cleaning supply closets create perfect breeding sites for many insects. Mops and rags should be hung to dry in a closet away from food preparation areas.

Conclusion
Pest management is a universal challenge in the food processing industry, but not a challenge that cannot be overcome. Preventative measures and a skilled pest management team are the best defenses against pest infestations.

Phantom® termiticide-insecticide
While there are many options for treating commercial facilities, the advanced technology of undetectable liquid treatments is making an impact on how pest management programs are approached. The versatility of these products is a true benefit for the commercial food handling establishments.

Phantom’s active ingredient, chlorfenapyr, makes it completely undetectable, meaning pests cannot taste it, smell it, or detect it. Once ingested, Phantom attacks pests by preventing their cells from generating energy. This leads to paralysis, and ultimately, death. However, the process is not immediate. Unlike faster acting products, Phantom will not cause an accumulation of dead insects in a particular spot—a signal to other pests to avoid those areas, which, in turn, undermines the success of the treatment. Phantom delivers impressive control when used alone or in conjunction with existing pest management programs, including baits and insect growth regulators.

Fast Facts
- Undetectable, nonrepellent technology
- Virtually-odorless, low visible residue formulation
- Low human hazard
- Long residual
- Targeted application
- Works with existing pest management programs

For more information on Phantom, visit www.phantomhome.com/food
Always read and follow label directions.

www.PestControlFacts.org • Phantom is a registered trademark and the Phantom logo is a trademark of BASF.
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