

How to Guide - Effective Pest Management

INTRODUCTION & OBJECTIVE:

Consumers finding pests or fragments of pests in product can cause significant damage to the image of a product, brand and company. Often the presence of a pest is not harmful or dangerous to the consumer, however it is very emotive and consumers will often react similarly to when a harmful foreign object is found. This results in consumer complaints, customer reactions, legal cases, negative publicity and potential brand damage.

Pests can also pose a food safety risk to product such as spoilage, disease, choking & cross contamination

Pest outbreaks can be costly to treat and will often result in raw ingredients, packaging and finished goods having to be dumped. Early detection is key to control the size of the outbreak. Often secondary spoilage and secondary pest outbreaks can occur if the problem is not acted upon and controlled quickly. Pest outbreaks can also cause damage to equipment particularly rats and mice in electrical controls, this can also increase the risk of fire in the facility.

The following sections of the Woolworths WQA standards outline the requirements and further information is available below as a guideline.

- WQA v8 Manufactured Food, Section 14. Pest Prevention
- WQA v8 Primary Production Produce, Section 14. Pest Prevention
- WQA v8 Primary Production Seafood, Section 14. Pest Prevention



Further pictures of pest FOs in product to be inserted.

FREQUENCY

A representative from the company should verify the effectiveness of the pest controller by walking the facility and inspecting bait stations with the controller at a frequency of every 3 months. However, the frequency may increase based on assessment of risk and can vary depending on the product, location of factory, seasonality and previous checks. If a high number of pests were found in the previous check it might be decided to increase the frequency for when this occurs. It is important that checks are analysed to determine the optimal frequency and also determine any preventative measures that should be taken.

RESPONSIBILITY

Detection of pests and potential preventative measurement solutions is the responsibility of everyone in the manufacturing facility. All staff are required to report any pests that they view within the factory in the pest sighting log. Trained personnel shall check facility and inspect bait stations throughout the facility in a timely manner and conduct analysis on the results. The results shall be reported to a manager to enable preventative solutions if required.

PROCEDURE EXPECTATIONS*Pest Control through GMP*

The principles of Good Manufacturing Practices (GMP) are key to helping control pest infestation and outbreak. Facilities and equipment should be clean and well maintained, both internally and externally. Establishing a culture of cleanliness and GMP is critical to the success of pest control. Staff should be vigilant in detecting and acting on pest outbreaks and should know exactly what to do when pests are observed. Early detection and action is critical to ensure that the outbreak is controlled.

Methods of Prevention & Control

Factory layout and design can play an important part in controlling the pest activity of the site. Equipment should be a clean design and hangup points should be eliminated where possible. Lighting in and around areas will help to deter pests from activity and nesting.

The business shall have a pest management policy established by the QA team and endorsed by the management team. All workers should be trained in GMP and pest sighting procedures.

Sources of Pests

There are numerous paths of entry of pests into the food manufacturing and packaging facility. In order to reduce the risk of pest foreign objects into the plant and subsequently into the product a holistic approach must be taken to all of these potential paths of ingress.

Raw materials: Contaminated raw materials are one of the most common methods of entry of pests into the process, and can be one of the most difficult to check. The raw material can be

harbouring eggs, larvae or even full grown animals and these can be hidden within the leaves, grains, powders and even in the packaging.

Factory grounds and surrounding environment: The surrounding environment and grounds of the facility can be a potential source of all manner of pests including rodents, birds and insects. Facilities in bushland or areas of agriculture will typically have a greater risk of pest infestation and appropriate methods must be undertaken as a result. The grounds of the facility should be well maintained to reduce the potential homes for pests, with no vegetation within 5 metres of the facility or open doors. Paths should be concrete or hard bitumen, not dirt or gravel. Doors shall be a closing style such as automatic, self closing or rapid roller door arrangement

Storage of raw materials: Open and exposed raw materials can be a prime source of infestation outbreak for pests. Raw materials should not be stored outside unless in a secure vessel or container that prevents the ingress of pests of all kind. Raw materials stored inside should be in pest proof sealed containers. Raw materials should not be stored on the floor, but in racking or shelves. Bulk storage vessels such as bulka bags, pallecons, tanks and bins should be sealed and secure. Pipework, pumps and hoses should be capped. Any spills or contamination should be cleaned up immediately..

Primary & secondary Packaging material: If packaging material is stored in unclean or infested areas, there is a big risk that pests can enter into the packaging. Vendor audits are an important part of your quality system to ensure confidence in the raw packaging material that you are using. Once on site, packaging should be treated like other raw materials, stored on racks, shelves or pallets. Packaging should be sealed either in boxes, bins or sealed pallets (wrapped in plastic to prevent ingress and divider boards between layers).

Workers: Workers can potentially bring in pests to the site through external food. They should not be allowed to bring in food into the factory and food should not be kept in personal lockers and drawers. Food should be kept in fridges or dedicated storage areas. If workers go offsite for breaks, they should change out of their work uniforms. Work uniforms should be cleaned regularly to prevent pest outbreak.

Open doors: All doors leading into the facility should be the pneumatic/hydraulic self closing style and have bristles on the base to prevent pests from crawling underneath. Forklift doors to the outside should be the rapid roller self opening/closing style. Coolrooms and processing rooms should be separated by closing doors or screens

Poor hygiene: The workplace should be tidy and clean and free from food and product residue, packaging, paper and other waste that could potentially harbour pests or allow them to nest. Bins should be emptied on a regular scheduled basis and all spills and contaminations should be cleaned up immediately. Raw materials should be used in a FIFO (First In, First Out) Rotation system.

Cross contamination: Cleans and inspections should be carried out as per the schedule on all equipment and surrounding areas between products. Raw materials storage bins should be dedicated to one raw material only, or if not possible (eg day bins or batching bins) then cleaned thoroughly and inspected for any residue that may harbour pests.

Pest Control Plan:

Factory Audit inspections: The business should organise a periodic (6 monthly) factory Audit inspection across all areas of the facility, process and raw material storage areas.

- If it is a large facility it can be divided up into areas and rostered across a number of smaller audits. The building and the surrounding grounds should also be periodically inspected for any pest evidence.
- Evidence of pests or pest activity should be identified and addressed immediately. This should involve immediate action to control the outbreak and longer term investigation and control measures to prevent further outbreak.
- The pest control contractor should be contacted immediately if the evidence of pest activity is large enough or if the outbreak cannot be controlled in house.
- Details of the sighting should be completed in the pest sighting log and followed up with the Pest Control Contractor on his next scheduled visit.
- The factory audit inspections should be carried out by a QA manager or team member and a Production manager.

Finished goods inspection: Prior to being released product should undergo a final QA inspection of the finished goods.

- It would be rare to find any outbreaks immediately after production, however quality checks should still be looking for any potential evidence of pests during processing.
- Part of the QC process should be to ensure there is no pest activity in the finished goods that may be stored in the warehouse prior to be despatched. This may be carried out by the warehouse or despatch team and involves looking at the cartons or pallets of stock prior to being loaded onto the truck.
- Warehouse staff should also monitor for outbreaks or evidence of animals or insects in the facility. If any activity is noticed, the pest control contractor should be contacted with details of the outbreak and its location.

Raw materials inspection: All incoming raw materials should be inspected upon receipt to the site. This is to ensure firstly that the contaminated raw is not used, and secondly to prevent the outbreak from spreading to other raw materials or into the processing facility.

- Action must be taken immediately to isolate and contain and quarantine the affected material. QA should be notified immediately and a quarantine plan determined for the raw material.
- The raw material should be clearly marked and sealed up. Once secure, the raw material should be carefully disposed of in the appropriate bin under the instruction of the QA team. Product may need to be incinerated or placed into an approved Australian Quarantine and Inspection Service (AQIS) Quarantine bin. Treatment can involve freezing the affected raw material to kill off the pest and prevent further outbreak.

- Once a raw material has been identified as having a pest problem it must not be used. Infested bins, once emptied of contaminant should be cleaned thoroughly and treated either through fumigation, steaming or freezing.
- A defective material or out of specification report should be filled out and the supplier should be notified immediately. Other raw materials from that supplier should also be inspected to determine if the problem is more widespread.

Pest sighting register / History: All sightings of pests or pest activity shall be written in to a pest sighting log. The log acts as a good tool for monitoring any pest activity and allows the Pest Control Contractor to pinpoint in the facility where he needs to focus attention.

- The log should record date, nature of the pest, exact location of the sighting and who saw the pest. There should also be a follow up column where the Pest control contractor can list details of what the animal was, the size of the outbreak and actions taken.
- Details of the sightings from the log can be used to trend the history of pest activity or can even be used to map activity within the facility. This can help determine hot spots for pest outbreaks.
- Mapping can then be used in a more localised fashion by setting up a series of traps in an infested area to determine the source of the outbreak.
- Details of an outbreak can also be filled out in a Foreign object report with additional details including photographs or samples of the pests.

Talking to staff, Pest control agent, cleaners: These people are the eyes and ears of the factory and surrounding environment and the QA team should establish good relationships with all these team members so that they know who to talk to and what to do in the event of a sighting.

A representative from the company should verify the effectiveness of the pest controller by walking the facility and inspecting bait stations with the controller at a frequency of at least every 3 months

Trap Monitoring: Staff should periodically check the pheromone traps in their work area to identify if there are any spikes in pest activity and report any increases to QA as well as filling out the Pest sighting register.

Other production records: Cleaning and inspection records should be maintained and monitored from production and cleaning staff after an area is cleaned and inspected.

- End of week /end of production cleans and shutdown procedures should be completed properly and records signed off to say that the area is clean.
- When a facility is shut down over an extended period of time (eg. Christmas/New Year shutdown), excess raw materials should be either disposed of or securely sealed to ensure that pests are not able to access them over this time.

Detection systems

There are a couple of systems that can be used on products and raw materials that can detect pests within the material itself.

- Optical sorters can be used to look for pests and pest residue in raw materials by looking at a colour variation from a background standard of an ingredient, however this relies on the raw ingredient being a single uniform colour and the pest being a significantly different colour from the raw ingredient. These are good for use in situations such as nuts, grains, spices and produce.
- X-rays can be used to determine foreign objects in a raw or finished good by passing an x-ray beam through the material. This relies on a difference between atomic weight of the ingredient and the foreign object as well as it's size. This means that larger animals (such as rodents and frogs) are able to be detected, however insects and larvae are harder to find.
- Electronic Bottle Inspectors (EBI) are used to check bottles for foreign objects. These rely on detecting a shadow against a light source through the base of the bottle.
- Filter use for liquid and powders can be used as a system for control of all foreign objects including pests.

Pest Proofing the Facility

There are several strategies and measures that a business can undertake in their processing or storage facility to help reduce or eliminate pest outbreak. This includes inside the facility, the outside of the building and the surrounding grounds and involves eliminating areas that will harbour and encourage pests, provide them with food or a mode ingress into the building. Maintaining the grounds by keeping it well groomed, no rubbish or waste stored on the ground, secure pest proof bins and no vegetation in direct contact with the building will all help.

- Bug Zappers in several locations throughout the facility, particularly near the doorways to prevent flying insects travelling into the facility. Rodent bait stations should be located around the outside perimeter of the building as well as the perimeter of the fence line. Pheromone traps can be used in raw material storage areas, warehouse, batching and processing areas where there is a potential for moths and other flying insects.
- All doors into and within the facility should be designed in such a way that they prevent the movement of pests into and around the facility. These should include rapid roller doors, swinging plastic doors, self closing sliding cold room doors, automatic and self closing personal access doors. The doors should always be in the normally closed position when not in use. Staff must not disable or wedge the doors open. The doors should be a good fit for the doorway opening and gaps at the bottom should be filled with Bristle strips or strong rubber strips.

- The facility and equipment should be well lit to discourage pests from nesting and hiding in dark areas. There should be no holes or gaps in walls from where previous pipework was. Where holes are required for pipework, the gaps should be plated over, filled or covered with strong mesh to prevent animals from chewing it. Floor drains should have screens or grates over them & removable mesh filters that can be taken out and cleaned. This prevents buildup of food supply in the drains that will attract pests.
- Raw materials should be stored up off the floor either on racking or shelving, and storage should be in such a way that FIFO principles can be adopted easily. Racking and shelving should be located in a way that can facilitate easy cleaning and inspection all around. Raw material bins, vessels and containers should be robust, secure and strong with tight fitting lids to prevent pest ingress. Where suitable raw materials should be stored in a controlled environment such as a cool room or modified atmosphere room.
- The outside of the building should have bird spikes fitted in areas that could allow bird nesting. In bigger areas such as truck loading awnings, netting can be used to enclose the roof space. Bird deterrents, scarers, deterrent lights and deterrent sounds can also be used inside larger facilities where the risk of birds is high.
- Electric Strips can also be employed in doorways of facilities in areas where there is a high risk of rodent ingress, particularly rural areas.

Pest Specific Information

Birds

Source: Birds can be defined as warm-blooded egg laying vertebrates, distinguished by their feathers, wings, and beaks. Birds that have the ability to fly are the most concerning when looking at pest control. Birds can be attracted to factories through source of shelter or through finding resources such as food or nesting materials within the factory. This can lead to debris from creation of nests, feathers, eggs, insects from feeding, carry diseases and parasites that are transmissible and destruction of materials.

Evidence: Birds can often be seen flying around and within the factory or settling on the roofs or ledges of the factory. They can also be heard through their calls or flapping of their wings. Often evidence of their presence is clear through droppings, debris from nesting and feathers and footprints in or within the factory.

Damage caused: Birds can cause contamination of food. Bird droppings, regurgitated pellets (produced by gulls), feathers and nesting materials are common contaminants. The close association of birds gives rise to the possibility of disease transmission. Nests and droppings block gutters and downpipes. The resulting overflowing water leads to timber decay, broken rendering, ruined decorations and even structural damage. Birds' nests harbour insects and

mites which live as scavengers on the nest material or droppings or as external parasites on the birds.

Prevention: Removing opportunity for birds to land and nest can prevent the likelihood of birds becoming a pest. This can be achieved through measures such as removing foliage from around the factory, adding nets on roofs to prevent birds from nesting. Removing raw materials (including packaging materials) and waste material from outside areas so that birds are not able to access them.

Rodents

Source: Rodents comprise a group of furred, warm blooded animals which include rats and mice. There are a number of introduced (feral) rodents which are pests around homes, shops and warehouses. These are:

- the ground rat (also called the Norway rat)
- the roof rat (also called the climbing or black Rat)
- the house mouse (also called the field mouse)

Rodents can become an issue within the manufacturing process mostly through hunting for food. They may also come into the factory for shelter.

Evidence: Rodents are mainly nocturnal, if a live rodent is seen during the daytime it generally means that they are short of food, there is a heavy infestation or a harbourage has been disturbed. Large numbers of rodents, particularly mice, have a characteristic smell. Rodent droppings can often be seen, the shape and size of droppings will help you to identify the species. The smears left by rodents are formed when the animal's fur deposits a dark, greasy film on surfaces with which it makes regular contact. Footprints and tail swipes can be found in deposits of dust or flour and in soft mud. Damage to wood may be caused by both rats and mice when trying to gain access to a building. Hearing scratching noises at night from above may suggest their presence.

Damage caused: Rodents that are able to access products are able to damage the product, raw materials, production equipment and other elements of the factory through scratching and gnawing at product. There is also potential for contamination (both physical and microbiological) of product through droppings, fur, and direct exposure of rodents with product.

Prevention: Decreasing the risk of rodents entering the factory through sealing of holes and cracks within the factory. Proper storage of raw materials, ensuring that they are stored in a sealed room and all materials are covered. Removing all waste material away from production. Regular cleaning of potential food material.

Crawling Insects

Source: Cockroaches and other crawling insects can enter via tiny cracks and crevasses in walls/floors, under doors through drains etc. They often nest in gardens, pipes, in hollow walls, ceilings and when in a factory environment under or behind warm equipment (eg. ovens, fridge mechanisms). Many species prefer warmer and moister environments and will often enter a building when it cools in the evening, however some crawling insects and different species are more cold tolerant. Ants to a lesser extent are pests and can find their way into food premises and into food by following scent trails.

Evidence: Cockroach and ant activity is often evident by visually observing the insects in and around the factory, alive or dead. Other evidence of cockroach activity is faeces around nesting sites, cracks in wall, around warm equipment etc, egg cases (oothecae) deposited on surfaces, brown smear marks on horizontal surfaces, skin that has been shed, unpleasant/musty odour around nesting sites. Webbing is the most common indicator of spider presence.

Damage caused: Crawling insects or other by-products (eg. shed skin, faeces, egg cases, webbing etc.) can end up in product. Crawling insects, particularly cockroaches are a vector of various biological contaminants including pathogens. Spiders are an issue as a foreign object contaminant where they are present on the product when packed (eg. fruits and vegetables where they may be living on the plant).

Prevention: Eliminate sources of food or access to sources of food - ensure all raw materials and WIP are stored in tightly sealed containers or bags. Stop insects from entering with general maintenance - fixing cracks in ceiling, covings, sealing/brushes around doors etc. Avoid storing anything directly on the ground where possible, particularly where it will be stored for long periods (eg. warehouse racking) to avoid harbourage. Clean up any spilt product or raw material and ensure general housekeeping is in order. External insecticide spraying including barrier spraying.

Elimination: Spraying and baiting of premises using appropriate chemicals, dusts, baits is necessary for elimination of crawling insects where nesting has occurred (this should be discussed with your pest control contractor). Crop spraying (where appropriate) for spider and other insect control in produce.

Flying Insects

Source: Flying insects are very mobile and generally enter a food premises through an opening such as doors or windows or with raw materials (often as a larva or maggot). Flies are less active at lower temperatures <10C and will not fly at levels reaching zero. They can be a particular problem where waste is stored prior to disposal and where they can readily access (eg. warehouse doors).

Evidence: Flying insects are often attracted to smells and light so are usually observed around these areas. Dead insects observed around insectocutors.

Damage caused: Whole insects or parts of insects ending up in food and flying insects can lay maggots and larvae in product. In addition flying insects, particularly flies, are common vectors of pathogen and other disease causing contaminants due to their mobility.

Prevention: All external openings are to be kept closed at all times unless they are being used. Ensuring any external waste outside of the building is kept covered and as far away from opening as practical. External flowering plants near openings should be removed as these attract flying insects. All food containers should be kept tightly covered when not in use to stop insects entering and laying eggs & larvae. General housekeeping and cleaning regimes including drains.

Elimination: External of premises - baiting programs for adult flying insects, external insecticide treatments, elimination of breeding sites around premises. Window/door screening and seals, strip curtains, air curtains and to a lesser extent internal positive pressure can be effective in eliminating entry of flying insects. Light traps/ Insectocutors can be used internally but it must be ensured that they are placed away from exposed product and that insects are contained once killed. Auto-sprayers can be used in some areas of facilities but away from any food preparation and packing areas.

Stored Product Insects

Source: Other insects such as beetles, moths and weevils which like to hide and breed in particular food types are of large concern as a foreign object pest. These insects commonly enter a food through raw materials such as flour and other milled products, grains, dried fruits & vegetables and commodity type products. Some of these insects can infest intact nuts, grains, seeds where larvae will develop inside.

Evidence: Apart from observing adult insects in and around raw materials it can be difficult to identify an issue of stored product insects as the eggs or larvae may only be present and potentially inside grains/nuts/seeds etc.

Damage caused: Stored product insects are an issue from a foreign object point as they can easily make it into a finished product if present in raw materials as they are often difficult to detect. Also infestation of raw materials can also move to finished product if not controlled sufficiently.

Prevention & elimination: Raw material inspection is important in detecting an infestation to avoid it becoming a larger issue in the facility. Stopping the insects gaining access to foods and

raw materials in the facility by ensuring all containers/ bags are sealed. Insecticide treatments as per other flying insects.

Other Pests e.g. snails, slugs, lizards, frogs, snakes

Many other types of pests can be a issue such as snails, slugs, lizards, frogs and snakes depending on location of premises and production type. It is suggested where more unusual pests are a problem, this is discussed with your pest contractor to determine the cause (eg. food source) and decide the best course of action in prevention and elimination.

Further reading

http://www.cieh.org/uploadedfiles/core/policy/publications_and_information_services/policy_publications/publications/pest_control_food_industry.pdf

http://www.aepma.com.au/Resources/FMFiles/Meetings/CoP/CoP_Pest_Management_in_the_Food_Industry_in_ANZ_V2.0.pdf