A Code of Practice

For Pest Management in the Food Industry in Australia & New Zealand

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AUSTRALIAN ENVIRONMENTAL PEST MANAGERS ASSOCIATION LTD

PEST MANAGEMENT pmanz ASSOCIATION of NZ

Pest Management in the Food Industry in Australia and New Zealand

CODE OF PRACTICE

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Definitions

ACVM - Agricultural Compounds and Veterinary Medicines (NZ)

AEPMA - Australian Environmental Pest Managers Association Ltd.

Appropriate enforcement agency - an enforcement agency prescribed by the regulations under the Act for the purposes of enforcement of the Act or similar purposes.

APVMA - The Australian Pesticides and Veterinary Medicines Authority.

Authorised Officer - a person authorised or appointed under the Act or other legislation for the purposes of enforcement of the Act, or similar purposes, such as an 'authorized officer', 'environmental health officer' or 'inspector'.

Best Practice - involves the identification and adoption of current methods, equipment and products proven to best meet pest management objectives.

Both parties' organisations - the Food Business and the Pest Manager.

Contaminant - any biological, chemical or physical agent, foreign matter, or other substances that may compromise food safety or suitability.

Control - measure that is modifying risk. The restriction of an activity, tendency or phenomenon.

Corrective Action - a short term or long term action taken to directly solve a problem or remove its cause.

Duty of Care - responsibility or the legal obligation of a person or organisation to take actions or to avoid acts or omissions (which can be reasonably foreseen) which are likely to cause harm to others.

Equipment - a machine, instrument, apparatus, utensil or appliance, other than a single-use item, used or intended to be used in or in connection with food handling and includes any equipment used or intended to be used to clean food premises or equipment.

ERMA - The Environmental Risk Management Authority (NZ). Since renamed Environmental Protection Authority (NZ).

Food Business - a business, enterprise or activity (other than primary food production) that involves:
(a) the handling of food intended for sale, or
(b) the sale of food, regardless of whether the business, enterprise or activity concerned is of a commercial, charitable or community nature or whether it involves the handling or sale of food on one occasion only.

Food Premises - any premises including land, vehicles, parts of structures, tents, stalls and other temporary structures, boats, pontoons and any other place declared by the relevant authority to be premises under the Food Act kept or used for the handling of food for sale, regardless of whether those premises are owned by the proprietor, including premises used principally as a private dwelling, but does not mean food vending machines or vehicles used only to transport food.

Food Safety Program - a program set out in a written document retained at the Food Premises of the Food Business, including records of compliance and other related action, that:
(a) systematically identifies the potential hazards that may be reasonably expected to occur in all food handling operations of the Food Business;
(b) identifies where, in a food handling operation, each hazard identified under paragraph (a) can be controlled and the means of control;
(c) provides for the systematic monitoring of those controls;
(d) provides for appropriate corrective action when that hazard, or each of those hazards, is found not to be under control;
(e) provides for the regular review of the program by the Food Business to ensure its adequacy; and

(f) provides for appropriate records to be made and kept by the Food Business demonstrating action taken in relation to, or in compliance with, the food safety program.

Food Safety Standards - the standards contained in Chapter 3 of the *Australia New Zealand Food Standards Code*.

Good Manufacturing Practices (GMP) – Food Industry Practices to ensure that products produced meet specific requirements for integrity, quality and consumer safety.

Handling of food - includes the making, manufacturing, producing, collecting, extracting, processing, storing, transporting, delivering, preparing, treating, preserving, packing, cooking, thawing, serving or displaying of food.

Hazard Analysis and Critical Control Points (**HACCP) -** a Food Business process control system designed to identify and prevent microbial and other hazards in food production, based on seven principles: hazard analysis; critical control point identification; establishment of critical limits; monitoring procedures; corrective actions; record keeping and verification procedures.

Level of Risk - magnitude of a risk or combination of risks, expressed in terms of the combination of consequences and their likelihood.

MSDS – Material Safety Data Sheet (Aust) / **SDS** – Safety Data Sheet (NZ)

Non Residual Pesticide - Pesticides which have no residual activity.

Pest Control Contact – Food Business employee assigned to liaise with Pest Management Technician and/or Pest Manager.

PMANZ - Pest Management Association of New Zealand Inc.

Pest Management Technician - a person qualified to perform pest management and in the context of this document is the person who conducts the work in the field.

Pest Management Technician's Licence - a full or restricted certification to use pesticides held by Pest Management Technicians, issued by relevant State or NZ authorities.

Pest Management Program – a program to manage the Pest risk.

Pest Manager – a person who is knowledgeable in pest management and in the context of this document represents the pest management business engaged.

Pesticide - a substance used to manage pests and required to be registered by the Australian Pesticides and Veterinary Medicines Authority or Environmental Risk Management Authority (NZ).

Pests - include birds, rodents, insects and arachnids. The intention is to ensure that the requirements cover all animals that could contaminate food either directly or indirectly. It is not restricted to the animals listed.

Post Harvest - between the times of harvest to consumption.

Preventative Measures - measures put in place to prevent a problem from occurring or re-occurring.

Residual Pesticide – A pesticide which remains effective for some period of time after application.

Review – activity undertaken to determine the suitability, adequacy and effectiveness of the subject matter to achieve established objectives.

Risk – effect of uncertainty on objectives**.** A combination of the consequence of an event (including changes in circumstances) and the associated likelihood of occurrence.

Risk Assessment – overall process of risk identification, risk analysis and risk evaluation.

Risk Management – refers to the architecture (principles, framework and process) for managing risks effectively. Coordinated activities to direct and control an organisation with regard to risk.

Safe and suitable food – food that will not cause harm to a person upon consumption according to it's reasonable intended use.

Validation - to establish the soundness of processes and systems.

Verification - to establish or confirm the truth or accuracy of a fact, adherence to validated processes and systems and their effectiveness.

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Food Standards Australia New Zealand
Australian Quarantine Inspection Service – Pest & Vermin SOP
AS/NZS ISO 31000:2009 – Risk Management

1. Introduction

This Code of Practice (CoP) has been written to complement the Australia New Zealand Food Standards Code and is intended to promote Best Practice in Pest Management in Food Premises.

2. Aims

The aim of the CoP is to provide a reference document for use by Pest Managers and Food Industries to define Best Practice in managing Pests at Food Premises.

Specific aims are to:

- Define Best Practice in Pest Management that Food Businesses and Pest Managers can achieve in partnership.
- Define the roles and responsibilities to achieve the desired outcomes to assure food safety.
- Incorporate IPM practices into the Food Industry.
- Provide Pest Management that complements the Food Standards Australia New Zealand (FSANZ), Food Standards Code and Food Businesses Food Safety Programs.
- To provide a source of reliable information to Pest Managers and Food Businesses on some of the key drivers in each of their industries and for them to better understand the decisions and needs of each.
- To be a source from which training will be developed.

3. Scope of the CoP

The CoP will include the following areas; commencing post harvest and concluding at point of sale to the consumer:

- Good Manufacturing Practices (GMP)
- Occupational Health, Safety and Environmental requirements
- Security requirements
- Risk Management procedures
- Pest Management procedures
- Assessment of the Pest Manager's Performance
- Training for management and staff of Pest Management and Food Businesses.

4. Food Standards Australia New Zealand

Food Standards Australia New Zealand (FSANZ) is an independent statutory agency established by the *Food Standards Australia New Zealand Act 1991*.

The system for the development of joint Australia New Zealand food standards was first established under a treaty between Australia and New Zealand signed in December 1995.

Within Australia, the system is based upon the initial 1991 Commonwealth, State and Territory Agreement in relation to the adoption of uniform food standards. This system continues in operation under the Food Regulation Agreement 2002, and is implemented by food legislation in each State and Territory and in New Zealand, and by the *Food Standards Australia New Zealand Act 1991* (FSANZ Act) of the Commonwealth of Australia.

The FSANZ Act establishes the mechanisms for the development and variation of joint food regulatory measures (a food standard or a code of practice) and creates Food Standards Australia New Zealand (the Authority) as the agency responsible for the development and maintenance of a joint *Australia New Zealand Food Standards Code* (the Code).

Although the Authority develops food standards, responsibility for enforcing and policing food standards rests with the States and Territories in Australia and the New Zealand government in New Zealand. Further, in relation to food imported into Australia, the Commonwealth, through the *Imported Food Control Act 1992*, enforces the Code. Within each jurisdiction there are one or more agencies responsible for food surveillance charged with the task of ensuring the requirements of the Code are met.

Australia New Zealand Food Standards Code
The Code is a collection of individual food standards. Standards on related matters are grouped together into Parts, which in turn are collected together into four chapters.

Chapter 1 deals with standards which apply to all foods, with the exception of Maximum Residue Limits (MRLs) and processing requirements for which New Zealand has its own regulations.

Chapter 2 deals with standards affecting particular classes of foods. Food hygiene is not part of the joint food standards system.

Chapter 3 covers food hygiene issues specific to Australia. New Zealand has its own food hygiene arrangements.

Chapter 4 contains standards dealing with the primary production of food in Australia. Again, New Zealand has its own arrangements for primary production of food.

Food standards have the force of law. It is an offence in New Zealand, and a criminal offence in Australia to supply food that does not comply with relevant food standards.
Notwithstanding food standards, it is also an offence to sell food which is damaged, deteriorated or perished, which is contaminated, or which is unfit for human consumption.
Because food standards are given legal effect by State, Territory and New Zealand laws, it is important to read the Food Standards Code in conjunction with the relevant food legislation.

All Food Businesses are required to comply with relevant food standards.

There are four additional national food safety standards which apply to Food Businesses in Australia.

FSANZ developed these standards in consultation with national and state Health Authorities, the Food Industry, and other interested organisations and individuals.

The New Zealand Food Safety Authority is responsible for the development of food safety standards in New Zealand and for implementing the Food Standards Code. There are a range of food regulatory requirements in New Zealand. Importantly, all food for sale in New Zealand must comply with the Food Act 1981, the Food (Safety) Regulations 2002 and the New Zealand Food Standards 2002. The NZFSA is responsible for food regulation in the domestic and export sectors including that made under the Animal Products Act 1999. NZFSA is also accountable for the implementation of regulations made under the Agricultural Compounds and Veterinary Medicines Act 1997.

A Risk Management Programme (RMP) is a documented programme designed to identify and control hazards and other risk factors in relation to the production and processing of certain animal material and animal products, to ensure that the resulting animal product is fit for its intended purpose.

The Food Act's provisions relating to composition and labelling, including those found in the Food Standards Code, apply regardless of whether operations are managed under a food safety programme (FSP), RMP or the Food Hygiene Regulations. RMP operators must comply with the Food Standards Code.

4.1 The Five Food Safety Standards (in Australia)

The five Food Safety Standards are:

- 3.1.1 Interpretation and Application.
- 3.2.1 Food Safety Programs.
- 3.2.2 Food Safety Practices and General Requirements; and
- 3.2.3 Food Premises and Equipment.
- 3.3.1 Food Safety Programs for food service to vulnerable persons.

Together, these standards are based on a preventative approach to the incidence of food-borne illness in Australia (only) and are designed to help ensure Food Businesses produce food that is safe to consume.

Pest Managers servicing a Food Business should understand and comply with the sections of the Food Standards Code applying to Pest Management (refer to appendix).

5. The Regulatory Environment

The Pest Manager and the Food Business have an obligation to conform to all required Statutory Regulations. Both parties will need to be aware of these requirements to ensure a correct service is applied.

5.1 The Pest Manager Requirements

A person must be licenced to use pesticides in pest management procedures in the course of a pest control business. Licencing is a State/Territory responsibility in Australia and national in New Zealand. (For further information see Chapter 17).

A licenced Pest Manager seeking to comply with this Code is required (but not limited) to:

- Comply with all Occupational Health, Safety and Welfare Acts, applicable Codes of Practice and Standards.
- Comply with all National and State regulations that apply to pest management.
- Apply pesticides in accordance with the product label directions and industry and government approvals (eg. AQIS & NZFSA).
- Keep records of pesticides applied.
- Hold current policies for Professional Indemnity and Public Liability Insurance.

5.2 The Food Business Requirements

In addition to all legal requirements, a Food Business may also need to comply with additional standards for commercial reasons. The Food Business should explain to the Pest Manager the relevant sections of the standards, Codes or regulations to which they must comply.

Examples of additional standards are, (but not limited) to;

- American Institute of Baking (AIB)
- BRC (British Retail Consortium)
- Global Food Safety Initiative (GFSI)
- HACCP (Codex Alimentarius)
- International Food Standards (IFS)
- ISO 22000
- SQF (Safe Quality Food)
- WQA (Woolworths Quality Assurance)

6. Relationship between Pest Management, Good Manufacturing Practice & Food Safety Programs

Pest Management is a GMP program pre-requisite for the Food Business.

Section 3.2.1 of the Food Standards Code is based upon the principle that food safety is best ensured through the identification and control of hazards in the production, manufacturing and handling of food as described in the Hazard Analysis and Critical Control Point (HACCP) system, adopted by the joint WHO/FAO Codex Alimentarius Commission, rather than relying on end product inspection alone. The Food Standards Code enables Australian and New Zealand authorities to require Food Businesses to implement a Food Safety Program based upon the HACCP concepts. The Food Safety Program is to be implemented and reviewed by the Food Business, and is subject to periodic audit by a suitably qualified Food Safety Auditor.

As a part of their Food Safety Program, the Food Business should ensure all physical, microbiological and chemical risks for all processes are identified including those related to pest control.

It is expected that the Food Business and Pest Manager would work together to ensure any risks are managed.

If a Pest Manager identifies any additional risks, these should be raised with the site Pest Control Contact for consideration in Food Safety Documentation.

7. Induction into a Food Business Site

7.1 Occupational Health & Safety

The Pest Manager and Food Businesses must comply with all Occupational Health & Safety laws and relevant Codes of Practice.

The Food Business is obligated to ensure all Pest Managers are inducted safely onto the site.

The Pest Manager should identify hazards and manage risks that could affect the installation and maintenance of a Pest Management Program.

7.2 Hygiene Procedures

Pest Managers are expected to maintain a high level of personal hygiene and cleanliness, they shall not be carrying disease or suffering from any contagious illness and shall not pose any contamination risk to food.

All Pest Managers must be aware of specific requirements relating to GMP, personal hygiene and disease control when entering a Food Business.

It is the responsibility of the Food Business to ensure the Pest Manager is inducted onto the site; this should include policy requirements for GMP (including hygiene), site security, OH&S and environment.

Specific GMP requirements for Food Businesses may include requirements (but not limited to) the following:

- Designated smoking areas
- Hand washing protocols
- Eating and drinking restrictions within designated areas
- The wearing of hairnets, beard nets, earplugs or specific footwear
- Specific garments to be worn in designated areas
- Prohibiting the wearing of jewellery in designated areas, except where the item may be covered (eg. gloves covering rings).
- Prohibition of specific items in designated areas

7.3 Security Procedures

It is the responsibility of the Food Business to ensure any relevant security policies and procedures are communicated to and understood by the Pest Manager. Pest Managers are required to abide by security policies and procedures at Food Businesses.

Pest Managers must keep a copy of their current Pest Management Technician's Licence and identification on their person at all times.

Pest Managers are to supply the Food Business with a copy of identification documents for all staff members who may enter the site on behalf of the Pest Manager.

7.4 Attire

The Food Business may supply applicable protective attire for their manufacturing areas. Where this does not occur, it is the responsibility of the Pest Manager to comply with Food Business Food Safety Standards.

Pest Managers will need to comply with all hygiene, OH&S, sanitation and bio-security measures in regards to protective clothing and equipment needed to enter the Food Business site.

7.5 Environmental Procedure

Pest Managers shall adopt responsible work practices which reflect relevant Acts (Hazardous Substances Act and Health Acts (Australia); Hazardous & New Organisms Act and Health & Safety Employment Act (NZ)), and a Food Business's policy on the environment.

Examples of areas could include (but not be limited to);

- Storage of onsite chemicals.
- Environmental risk management process on all chemical preparation has been completed and authorised by the Food Business.
- Ensure all chemical spills are contained and cleaned up.
- Ensure all chemical containers are disposed of in accordance with labelling requirement and in accordance with the Hazardous Substance Act (Australia). Hazardous Substances and New Organisms Act 1996 and Health & Safety Employment Act (NZ).
- Dispose of all refuse by removing it to an appropriate site.
- Dispose of, or recycle, all plastic bait stations, batteries, cardboard etc by removing to an appropriate site.

8. Role of the Pest Control Contact(s) at the Food Business

The Food Business should appoint a Pest Control Contact as the point of contact for the Pest Manager company and the Pest Management Technicians who visit that site. The Pest Control Contact should have the authority to carry out the Pest Manager's recommendations.

It is the responsibility of the Pest Control Contact to:

- Advise the Pest Manager of any relevant issues (eg. Potential site risks, sensitive issues or unused areas which may harbour pests), either current or past, which may affect their work.
  This will include any significant past Pest activity history, site history as well as issues that affect the Pest Management Technician's work on site (Refer to chapter 7).

- Facilitate access to all areas where inspection and/or treatment will be required.

- To encourage continuous feedback from the staff of the Food Business, especially Pest activity. A system of recording this information and passing it to the Pest Manager should be developed.

The Pest Manager will report on their activity (frequency of visits, areas treated and type of re-treatment, trend analysis and recommendations) to the Pest Control Contact. They will agree on the frequency of face-to-face meetings to discuss the reporting and recommendations. When Pest activity is high this can be as frequent as each time the Pest Management Technician is on site. Less frequent face-to-face meetings may be appropriate when Pest activity is low.

9. Designing a Pest Management Program

The Pest Management Program is the risk management method against Pests, designed by the Pest Manager in conjunction with the Food Business. The Pest Management Program should support the Food Safety Program of the Food Businesses. The Pest Management Program is to include a management plan which covers all legislative requirements and ensures Industry Best Practices.

Setting Objectives

The Food Business and the Pest Manager should agree on the objectives of the Pest Management Program. This is undertaken by both parties after the initial inspection.

The Pest Management Program should be a pro-active program rather than a reactive program.

Service Intervals

Because of the variability of Pest Management as influenced by conditions, seasons, location, site, and other factors such as industry standard requirements, the frequency of service can only be established by the initial and ongoing risk assessment which takes these factors into account. Accordingly this Code does not specify frequency of services.

Step 1. Complete Site Inspection

The Pest Manager will complete a thorough site inspection identifying and documenting all Pest evidence or potential activity, and IPM procedures required. The Food Business should also advise the Pest Manager of any issues, unusual or infrequent Pest activities that are not obvious during the inspection.

Step 2. Identifying Areas of Requirement for Pest Management

Both parties' organisations should identify areas that have varying requirements for the control of Pests. These are likely to differ from site to site.

For example: after the Risk Assessment is completed, the following areas may be identified and their pest management requirements specified:

Area 1 Production, Process area.

Area 2 Warehouse, Storage areas (including incoming and finished goods).

Area 3 Voids – roof, sub-floor, service ducts.

Area 4 Maintenance, Administration, Plant rooms, Service rooms.

Area 5 Exterior Building Perimeter and Outer buildings and grounds.

Area 6 Perimeter Fence Line.

Area 7 Neighbours

Step 3. Identify Pests and Treatment Recommendations

Identify the targeted Pests for each area.
The Pest Manager should identify options for prevention and control and make recommendations for the areas.
Refer to Chapter 12 – Targeted Pests and Control Options.
Chapter 10 – Pest Management Documentation Required.
Document procedures to be followed if a non-targeted pest infestation occurs.

Step 4. Ensuring compliance with site OH&S requirements

The Pest Manager must confer with the Food Business to ensure that all elements of the Pest Management Plan comply with site OH&S requirements.

Step 5. Identify Resources

Both parties' organisations should identify resources that are employed to meet the treatment recommendations identified in Step 3. Note: it is not necessarily the case that all recommendations will be carried out by the Pest Manager. Many aspects of IPM are GMP related and will be controlled by the Food Business (eg. Waste management, cleanliness, door operation).

Resources will include: personnel, processes, systems, technology, tools, information systems and decision making process. The frequency and level of service from the Pest Manager should be agreed. Appropriate record keeping and information flow should also be identified.

Step 6. Responsibility

The Pest Management Program should identify responsible persons in both organisations to maintain the Pest Management Program.

Step 7. Communications and Reporting Mechanism

The Pest Management Program will identify the supporting documentation the Pest Manager will prepare, retain or give to the Food Business. This will be agreed in consultation with the Food Business. (Refer to Chapter 10).

Step 8. Monitoring and Reviewing

Both parties will agree on a process and frequency for monitoring, reviewing, and if necessary, adjustments to improve the Pest Management Program. (Refer to Trend Analysis – Chapter 10 - Section 10.2)

Step 9. Scope of Works (or Services)

All of this will be included in a Scope of Works.

10. Pest Management Documentation Required

10.1 Scope of Works

The Scope of Works should include, but is not limited to, the following:

- Pests covered
- Frequency of service
- Area of service
- Time of service
- Response times
- Warranties
- Agreed reporting
- Method of treatment
- Pest Management Program
- Pest monitoring plan
- Resource plan
- Schedule of conditions
- External notification of treatments

10.2 Service Report

Service Reports should include the following:

- Client Name
- Site Address
- Date of Service
- Technician's Name
- Station identification

- Formulations/catching device installed in station at time of service
- Pest activity
- Type of Pest activity (e.g. droppings, gnawing)
- Formulation(s) used
- Formulation amount recorded
- Pest Management Program improvement recommendations
- Any other legislative requirements

All service reports will need to be supplied to the representative of the Food Business within the agreed time frame (as set out in the Scope of Works).

10.2.1 Pesticides and Chemicals Batch Numbers

Recording of Pesticides batch numbers on service reports may be necessary under the Food Safety System of specific sites. This recording mechanism allows the Pest Manager to trace the locations of the Pesticide batch usage if required upon recall, which adequately facilitates auditing requirements.

10.2.2 Trend Analysis

Trend Analysis is a continuous improvement planning and risk management tool. It is not a substitute for a proactive program based on a pest risk assessment and designed accordingly. It is now common on many food manufacturing sites and reflects the influence of quality management and third party auditing.

The form of the trend analysis needs to be agreed between the Pest Manager and the Food Business. Many Pest Managers have their own system that is supported by their own training, experience and equipment. However the Food Business may have its own corporate requirements or those of an auditing regime.

Data used in the trend analysis will depend on the Pest. Some examples of data sources are:

- Sticky boards for flying and crawling insects
- Catch traps
- Bait consumption
- Formal counting
- Photography

In all examples the identification of the data source, location, dates and/or time must be kept.

Pest sightings can be a useful source of data indicating a Pest and location. However as they are often based on casual observation and inconsistent reporting they can be an imprecise source of data. It is preferable that more formal and standardised data collection be used in the trend analysis. The data needs to be collected and recorded in a way to allow “drill down” of broad information to location specific information. The bigger the site the more important this becomes.

Reporting can be hard copy, electronic (disc or memory stick) or web based. It will be by agreement between the Pest Manager and the Food Business. It is recommended that verbal, face-to-face reporting in conjunction with the hard copy/electronic report be also done. The frequency of this most often depends on the level of Pest activity and the need to make changes on the site to reduce the Pest activity.

The Pest Managers report should include all aspects of Integrated Pest Management (refer to Chapter 11) that need to be addressed. Items that have been reported previously but not addressed should be repeated in subsequent reports until they are addressed.

Pest management is an activity where success is indicated by a null result (eg. the better it is the less is seen.). Therefore trend analysis showing low Pest activity should not be an automatic trigger to reduce the pest management effort. Reduction in the effort can lead to a Pest outbreak and the time and cost to regain a satisfactory low level of Pest activity can be more than the saving from reducing the pest management effort.

10.3 Location Maps

Location Maps are to be maintained documenting the uniquely identified pest management stations. Station Maps to be dated and reviewed at least annually.

10.4 Pest Sightings Register

The Food Business should maintain an accurate record of pest sightings (including specimens where possible).

Any sightings considered urgent should also be immediately communicated to the Pest Manager by the Food Business and recorded.

Any pest related customer complaints should be recorded in the Pest Sighting Register.

Pest Sighting Register(s) must be checked by the Pest Manager as part of every service.

An example of important information to be included on the Pest Sighting Register:

- Date
- Pest (if known)
- Specific Area
- Reported By
- Immediate Action Taken (eg. Sample pest taken, maintenance contacted)
- Corrective Action by Pest Management Technician
- Date Completed
- Pest Management Technician's name & Licence Number.

The Food Business should maintain an accurate record of pest sightings (including specimens where possible).

11. Integrated Pest Management

11.1 Introduction

Integrated Pest Management is the systematic combination of the safest, effective methods that may be used to reduce or eliminate Pests from an area. It would normally include, but is not limited to, the following:

- Exclusion of Pests
- Elimination or reduction of harbourage used by Pests
- Elimination or reduction of food
- Use of pesticides, baits or traps
- Systematic improvement program

In some of the above it will more appropriately done by the Food Business. However the selection of the best option will require an understanding of Pest biology and behaviour and the Pest Manager will have a role to advise the Food Business.

11.2 Exclusion

Preventing the Pest(s) from entering the area to be protected is an obvious first step. This can take several forms, such as design of the building to prevent access, installation of barriers, inspection of incoming goods for Pests, and minimisation from Pests from surrounding areas. Section 12 *Main Targeted Pests* has specific information for each of the main Pest types. The following is general comment for all Pests on all sites.

11.2.1 Building Design

As well as being appropriate for the activities for which the premises are used, the design and construction of food premises should:

- not permit the entry of Pests
- not provide harbourage for Pests.

These are not always well considered in the building design and the Pest Managers may need to identify building and design problems which may lead to Pest harbourage and infestation on the Food Business site. This is most likely done at the initial inspection but may also become apparent during on-going servicing. The Pest Manager needs to recommend to the Food Business steps they can take to correct building design faults.

11.2.2 Barriers

The installation of barriers to an existing building is a likely outcome of the identification of design faults.

Examples may include, but are not limited to, the following:

- Exterior vents are sealed.
- All unsealed piping penetrations are sealed.
- Construction joints area sealed.
- Gaps between outer walls and pavement are sealed.
- Holes in roof and walls are sealed.
- Doors are self closing.
- Strip curtains or air curtains on doors that are open for long periods.
- Positive pressure ventilation that provides an outward-moving barrier to flying insects (and dust) when doors are opened.
- Screens installed on windows.
- Drains are sealed/screened.
- Electrical penetrations are sealed.

11.2.3 Inspection/Warehousing

Incoming goods can be a source of Pests incursion. Warehouse procedures need to be developed to manage this access mode. The Pest Manager can advise on what to look for and where.

Any goods that are infested should be quarantined until treatment to eliminate the Pest is carried out.

11.2.4 Surrounding areas

If there are high numbers of Pest in the immediate area outside of the area to be kept free of Pests, this adds to Pest pressure on the barriers. In these instances IPM would include steps to reduce the exterior Pest pressure. These are Pest specific and covered in Section 12.

11.3 Harbourage

All Pests seek areas where they are sheltered and protected. These areas are also Pest breeding sites. The type of area is Pest specific and details are found in Section 12. The Pest Manager should advise after the initial site inspection and as necessary. Some general comments that cover all situations are:

- All areas to be kept neat and tidy, free of rubbish and clutter.
- All products to be stored off the ground.
- All products to be a suitable distance off the wall perimeter to allow access for inspection and cleaning.

Other situations that provide harbourage can be:

- Incorrectly stored plant and machinery on interior and exterior of the Food Business.
- Incorrectly stored items in roof void.
- Inappropriate vegetation – long grass.
- Overhanging trees.
- Incorrectly storing pallets.
- Incorrectly storing foodstuffs on the exterior.
- Canopies, verandas and roof spaces.
- Drains and sumps – both internal and external

If necessary the Food Business management should approach neighbouring properties if that property provides harbourage for Pests that could impact on the Food Business.

11.4 Food Sources

Elimination of the food sources for the Pests is a standard component of IPM. Not only does this discourage the increase of Pest populations but also it will increase the success of baiting programs where these are used.

A high level of cleanliness is a necessary start. Not only does lack of cleanliness afford food sources for Pests, it can lead to poor hygiene and increases the risk of bacteria and other food contaminants. Specific steps can include:

- Removing pools of water remaining on the floor of production areas and amenities after the cleaning operation to provide a dry environment.
- Cleaning of the Food Business lunch room on a regular basis.
- Routine cleaning of amenities and personnel lockers.
- Routine cleaning under product pallets held in stores/warehousing areas.
- Routine cleaning of drains and sumps

- Securing/taping or otherwise securing broken packages or cartons holding ingredients, food product and product wrapping materials and immediately cleaning up any spilt food source.
- Having lidded refuse bins on concrete slabs with regular housekeeping procedures in place.
- Hauling waste material in watertight trailers that do not spill contents.
- Spills contained and cleaned up without delay.
- Not holding waste material on surfaces that cannot be cleaned effectively.

11.5 Pesticides and Traps

In most situations, even when all the above steps are in place, actions will need to be taken to eliminate Pests. The use of pesticides, baits or traps will be required. The type to be used will be Pest specific. Sections 12 and 13 have more information on the type to be used.

As a general comment it is unwise to rely on the one type of pesticide, bait or trap. Insects develop resistance and rodents develop trap shyness and bait aversion. A good IPM will use a range of methods to eliminate the Pests and vary the time and location of use.

11.6 Improvement Program

Systematic recording of the components of IPM and the results can assist to develop more effective Pest Management. It should be based on trend analysis that allows identification of the Pest and location on the site. As noted above the Pest Manager should note in his reports to the Pest Control Contact those items outside his agreed scope of works but which impact on the IPM.

The Pest Manager should consult with the Food Business on those IPM items that should be addressed by the Food Business. It is recommended these items should continue to be reported by the Pest Manager until they are addressed by the Food Business.

12. Main Targeted Pests

12.1 Rodents

12 .1.1 Background

Rodents have been implicated in over 55 diseases representing a diverse range of pathogens from viruses to parasitic worms. Rodents are also responsible for a considerable loss of food supply by consumption and contamination. By gnawing, other consequences include damage to facilities causing potential fire hazard and loss of communications.

12.1.2 Rodent Species

The rodents of concern are mice and rats. Following are some facts that are useful to know for the understanding of control options.

These behaviours are common to all three commensal rodents:

- Rapid breeding cycles
- Excellent route memory
- Excellent senses except for vision
- Good at climbing and jumping
- Nocturnal animals
- Omnivorous

12.1.3 House Mouse - *Mus musculus/domesticus*

The House Mouse has the most extensive distribution of any pest mammal throughout the world. In Australasia, mice have established throughout the entire region and are found in areas where no native mammals are present. Mice have a range of behaviours that facilitate invasion and quick establishment. These behaviours allow mice to maintain population sizes at high numbers and even reach plague proportions.

Varying food intake, modifying diet depending on what is available, varying breeding rates and modifying nesting behaviour are some of the adaptations which allow mice to invade areas quickly. When attempting to control mice it is imperative that control measures commence prior to breeding otherwise many small satellite populations can develop quickly and mice numbers can grow rapidly.

General Behaviour

- Mice are good climbers, however they do not move between elevated and low lying areas to the same extent as Roof Rats.
- Mice often nest in tight concealed corners, in grain and stock bags and in makeshift nests formed from available materials.
- Mice are curious and will investigate new features within their environment.
- Mice are very efficient burrowers, however burrow systems are not as extensive as Roof Rats and Norway Rat burrows.
- Mice burrows are relatively shallow with only a few entry or exit points.
- Mice have a low requirement for water.
- Mice are able to enter through gaps as small as 8mm.

12.1.4 Roof Rat – *Rattus rattus (*also known as the Black Rat or the Ship Rat)

The Roof Rat is one of the most successful and widespread rat species around the world. In Australasia, Roof Rats have become significant pests in both urban and agricultural environments and, unlike other parts of the world, have a larger distribution than Norway Rats.

The ability of this species to utilise an entire area (low lying and elevated) due to their agility, to modify their breeding rate and live in colonies or independently, allows this species to flourish in many environments. Roof Rats reproduce throughout the year, however peak breeding is usually associated with warmer summer months, when food is plentiful.

General Behaviour

- Roof Rats are agile climbers and this forms an integral component of their feeding behaviour.
- Its ability to climb allows them to utilise food and nest sites unavailable to other animals.
- Climbing also allows them to avoid predators.
- Roof Rats are very accomplished burrowers, forming extensive burrow systems, but prefer to live at heights.
- Roof Rats are neophobic (fear of anything new or unfamiliar).

12.1.5 Norway Rat – *Rattus norvegicus* (also known as the Brown Rat or the Sewer Rat)

The Norway Rat is the largest and most aggressive of the commensal rodent species. This species has colonised and established well in urban areas, particularly refuse sites, wharfs, food production areas and sewerage systems.

A Norway Rat's aggressive nature, wide ranging diet, ability to feed on scraps and waste products, burrowing behaviour and rapid breeding rate make this species an accomplished pest.

General Behaviour

- Norway Rats are creatures of habit.
- They are very neophobic (fear of anything new or unfamiliar).
- They are excellent swimmers.
- Norway Rats often form extensive burrow systems with multiple entry and exit points.
- Within structures, Norway Rats will nest in debris, wall voids, culverts, stock piles pipes etc.
- Norway Rats often inhabit areas of lower hygiene standards in comparison to Roof Rats.
- Norway Rats are poor climbers and are rarely found in elevated areas.
- Due to their aggressive nature, Norway Rats can often out-compete other rodent species allowing them to make better use of food and nests within an area.

12.1.6 Rodent Management Options

Any program to control rodents should include exclusion and deterrence. Entry points need to be blocked and the area kept clean and free of food scraps. If possible, food storage should be off the ground – not because this prevents access, but it limits harbourage and undetected access.

However, even with the above systems in place rodents are likely to gain access. Their physical capabilities mean total exclusion is almost impossible to achieve. Therefore any rodent control program will include additional steps as outlined below.

12.1.7 Non Toxic Approach

Management Tool	Rationale	Recommended Action
Snap Traps	Good in areas where bait cannot be placed and a non-toxic approach is needed.	Place in areas where rodents run and near feeding sites. Make sure they are moved after a few captures to prevent trap shyness.
Confined Capture	Good for sites that want to catch and release.	Place in entry ways, near feeding sites and burrows.
Glue Boards	Good for sites that you cannot get access to for baiting or require non-toxic approach.	Place in areas where rodents run and near feeding sites. Make sure they are moved after a few captures to prevent trap shyness.

12.1.8 Toxic Approach

Management Tool	Rationale	Recommended Action
Baiting	A quick effective way to control rodents without having to see them and find the feeding and nesting sites.	Make sure bait is secure inside a station, kept palatable and checked regularly. Where appropriate, stations should be secured.
Bait Stations	Reduce access to the bait by some non-target species, provides a feeding site for rodents and keeps bait in good condition.	Number of bait stations installed will depend upon the potential level of activity, risk, industry standards and conducive conditions.

Before any baiting program commences the Pest Manager must confirm this is acceptable to the organisations policy or government regulations covering that business activity. For premises that come under the control of AQIS or NZFSA baiting within designated areas of the building may be forbidden.

Some organisations' own policies do not allow the use of bait due to the risk of the potential problems arising from rodent carcasses being non-retrievable, and accidental or deliberate contamination of their products from baits. Note also that non-retrievable rodent carcasses may provide breeding sites for blowflies.

Rodent baits are anticoagulants. While a rodent will usually consume sufficient in one feed to be a lethal dose, death usually takes several days. This has the advantage of allowing an antidote (Vitamin K) to be given if a non-target species consumes the bait and also avoids bait shyness by disassociation of the consumption with illness. The consumption of bait by non-target species is regarded by the Pest Management Industry as a consequence of poor placement of the bait. Good pest management practice will be considered when placing the bait. Bait effectiveness will be lessened if there is a plentiful supply of other food sources.

Baiting has a dual role of monitoring and control and has proven to be a reliable and effective control method. It can be used in conjunction with other methods.

12.1.9 Placement of Rodent Bait Stations

Positioning of rodent bait stations at Food Business premises should be at the Pest Manager's informed discretion based on the following factors:

- Type of area (perimeter, external grounds, outbuildings, store rooms, plant rooms, roof voids, production or packing area etc).
- Neighbouring environment and/or type of business neighbouring the Food Business.
- IPM processes in place at Food Business facility.
- Rodent numbers (if any).
- Rodent harbourage and breeding site areas within Food Business facility areas.
- Building design and fittings.
- Other rodent control methods used (eg. snap traps/glue boards/live capture).
- Availability of other food sources in area.
- Type and species of rodent.
- Access by non-target animals.

For monitoring or maintenance treatments, (where there is no rodent activity present), the distance between placement of rodent bait stations should take into consideration the likelihood of rodent access and harbourage within the particular area being treated.

Rodenticide wax blocks should be placed at intervals as per label. The distance of placement will depend upon the above factors, and the particular area and layout of the facility.

If rodent infestation occurs, it may be necessary to increase the number of bait stations until the rodent infestation is controlled, depending on the severity of the infestation.

12.1.10 Regulatory Issues

Currently there are restrictions on glue boards in some states in Australia and in New Zealand. Some other traps are also being reviewed due to concerns of the cruelty to the rodents that are caught. As these regulations are under review at the time of writing this CoP, the Pest Manager can advise what is acceptable in the various state or territory.

Regulations require daily inspection of live-catch traps. Any live rodents may need to be removed and released/relocated or humanely euthanized.

12.2 Flying Insects

Flying insects are a hazard to Food Businesses principally because:

- They are extremely mobile, invasive, prone to feeding on waste and animal excrement and highly attracted to a variety of food products;
- They carry organisms which they may deposit in foodstuffs, causing spoilage and transmitting disease;
- They may themselves become embedded in foodstuffs causing contamination;
- Their presence in food premises is contrary to food regulations.

12.2.1 Main Flying Insect Pest targets

In Australia and New Zealand, the most important flying insect pests in Food Businesses are flies. However, at times other flying insects such as moths, mosquitoes, wasps, bees, winged ants, termites, etc. also may constitute a hazard. An understanding of the biology of flying insects is important in their management.

12.2.2 Flies

Flies belong to the Order Diptera and are recognised by having a single pair of wings attached to the second or middle segment of the thorax, the second pair of wings having been modified into ‘halteres’ - knobled organs which act as gyroscopic stabilizers during flight.

It is helpful to divide flies into three broad groups – **houseflies, blowflies** and **fermentation flies** - for the purpose of considering their management. Sometimes collectively referred to as the 'filth flies' because of their attraction to rotting biological material and animal faeces – these three groups are particularly important pests wherever food is manufactured, prepared, served or consumed.

12.2.3 Houseflies

The common housefly *Musca domestica*, has achieved a special prominence because of its ability to adapt to and cause havoc within the human environment. In addition, most of the significant health and pest management issues relating to the filth flies are exemplified in this species.

Biology & habitat

In nature, houseflies have an important role in aiding the breakdown of **plant** material. Housefly adults prefer to breed in warm moist decaying **vegetable** material, as can be found in animal or human manure, compost heaps and human refuse.

Adults are principally nectar and 'wet-waste' feeders and need a protein food component to mate and develop eggs. Liquid feeding is facilitated by a specially adapted sponge-like proboscis and liquids ingested in previous feeds are regurgitated to assist the process. Feeding is a constant activity in warm conditions and the highly mobile and inquisitive flies may visit several separate feeding sites in the space of a few minutes, guided by their extremely sensitive odour receptors.

Copulation occurs only once per female which then oviposits (lays eggs) principally in decaying **vegetable** material where larvae feed then pupate nearby in soil or dry vegetable matter.

Adult flies often are attracted to the general vicinity of premises by an abundant food source such as flowering plants or refuse and then are attracted inside by other odours and favourable conditions (eg. moderate temperature, high humidity). They are extremely well equipped with sensory receptors to facilitate this.

Like most flies, houseflies have excellent vision, colour preferences (for reflected light, yellow is preferred over green or blue) and are photopositive to (instinctively move towards) the ultraviolet end of the light spectrum from light sources.

Houseflies are found in virtually every human habitat. Abundance is controlled largely by climatic and microclimatic conditions, hygiene and sanitation practices and availability of food. In warm climates adult flies are free ranging throughout the year and populations continuous. Where winters are cold, overwintering may occur or populations may be 'closeted' (eg. restricted to within warm locations like animal rearing facilities).

12.2.4 Blowflies

The term 'blow' refers to the tendency of this group to oviposit (lay eggs) or larviposit (lay live larvae) on human food. Common Australian urban blowfly pest species include; *Calliphora*, *Chrysomya*, *Lucilia* and species belonging to the family Sarcophagidae - very large blowflies (sometimes called flesh flies) with 'checkerboard' patterns on their abdomens and which deposit live larvae directly on food.

Biology & habitat

In nature, blowflies have an important role in aiding the breakdown of **animal** tissue. Blowflies share most of the features of their biology with the houseflies but there are some important differences. For example:

- All blowflies prefer a **protein-rich** breeding medium (eg. animal droppings, animal food, food waste, meat, dead and even live animals). Maggots found in exposed meat or animal carcasses are almost always from blowfly species. Presence of Sarcophagid adults typically indicates the presence nearby, of a dead animal;
- A few species of blowflies – notably Sarcophagid species and *Calliphora augur* - larviposit (lay live larvae rather than eggs) – a particular problem for food preparation businesses;

The incidence of blowflies mirrors that of houseflies except that abundance is determined by the availability of animal material. This may take the form of exposed human protein food, food waste, or dead animals – even very small ones like garden snails or other insects.

12.2.5 Fermentation Flies

'Fermentation Flies' is a term commonly used to describe a diverse assortment of small flies from a number of different families which have one common feature - they all breed in wet organic materials, typically **decaying food or food residue of either animal or vegetable origin**. In nature, Fermentation Flies aid in the breakdown of animal and vegetable matter, particularly where such materials have already begun to decompose.

Families falling within this description include for example: vinegar flies (Drosophilidae); moth flies (Psychodidae); some species of fruit flies (Tephritidae) and occasionally, scuttle flies (Phoridae) or small dung flies (Sphaeroceridae):

Vinegar flies (sometimes also called 'ferment flies') – Family Drosophilidae, are tiny flies found both inside and outdoors, mostly associated with decaying fruit or vegetation. The adults typically are brown or yellow in colour. They oviposit directly into the fermenting matter in which the larvae feed, frequently pupating in any dry site nearby.

Moth flies – *eg. Psychoda alternata* - are so called because of their hairy, moth-like appearance. The adults are not prolific feeders but frequently lay their eggs in and around drains and sewers, where the resulting larvae develop through to pupation. These flies commonly are found in food preparation areas in moderate to large numbers and bathrooms in smaller numbers.

Fruit flies – Family Tephritidae, are mostly colourful flies with a very distinct separation of head and thorax. Typically the female has a prominent ovipositor which she uses to 'strike' (oviposit in) ripening fruit. The developing larvae eat and hence spoil the fruit causing significant damage to some crops, before pupating in the soil.

Biology & habitat

Female Fermentation Flies lay their eggs and the larvae feed in wet, decaying food material (**'sludge'**). After feeding, the larvae find a drier site in which to pupate and they emerge as adults with a typical life cycle of between 8 and 15 days.

Fermentation Flies will breed in almost any place that even small amounts of wet organic waste accumulate and remain undisturbed due to the absence of cleaning activities.

Typical breeding sites in domestic houses or Food Premises are:

- Floor drains (even relatively small amounts of residual 'sludge' in drains can sustain an infestation). A high proportion of infestations have their focus here;
- Poorly cleaned and/or continually wet floor or in-cupboard areas (inevitably there are crevices in which wet sludge can persist and sustain an infestation);
- Wet or damp mops, cleaning cloths or refuse left in cupboards or other storage locations;
- Decaying fruit or vegetables (or residue thereof) in storage containers;
- Residue left in waste bins which have not been properly cleaned;
- Water receptacles which have accumulated sludge over time, such as refrigerator or air conditioner evaporation trays, water trays under pot plants, etc;
- Almost ANY area which is frequently or constantly wet and not subjected to regular, careful cleaning.

Fermentation Flies are found in virtually every human habitat. Abundance is controlled largely by hygiene, sanitation and waste disposal practices which control the availability of their food.

12.2.6 Exterior Flying Insect Management Regime

The actions which need to be taken to manage flying insects differ depending on the location of the pest, particularly on whether they are inside or outside the Food Business. Actions are determined during the pre-treatment inspection.

Exterior flying insect management focuses principally on two aspects:

1. ***Reducing the attractiveness of the site to flying insects.***
   The probability of flying insects entering a Food Business increases when insect numbers attracted to the location of food premises are high. Where exterior infestations have been identified, some examples of common management tools and recommended actions to reduce attractiveness of the site are:

Management Tool	Rationale	Recommended Action
Location of flowering plants	Flying insects are very attracted to flowering plants as they obtain most of their energy requirements from this source.	Ensure that no flowering plants are located within 10 metres of any entrance to the building.
Exterior cleanliness	External objects or furniture that is contaminated with food are highly attractive to flying insects.	Ensure that exterior furniture, garbage bins, pathways, surrounds, etc. are kept very clean and free of refuse.
Odour management	Poorly serviced building exhaust systems create food odour plumes that attract flying insects to the site, sometimes over considerable distances. This is especially true for blowflies	Ensure that a regular schedule of cleaning exhaust outlets and filters is in place and that the outlets are adequately screened.
Waste management	1. Dirty, open or overflowing waste skips containing exposed food waste are highly attractive to flying insects and retain them near the food premises. 2. Residual beverage or liquid in containers awaiting recycling are highly attractive to flying insects, especially fermentation flies	1. Ensure that a policy of sealed bagging of all waste is in place. That waste skips are cleaned before delivery and the skips are kept closed except when waste is being added. 2. Store empty beverage containers in a way which minimises residue content. This will depend on storage circumstances. For example cans might be crushed and bagged and bottles stored inverted and hosed down if circumstances permit.
Activities of neighbours	Poor hygiene or waste management practices of neighbours will attract flying insects to the site of the Food Business as well as the site of the neighbour. Also, some neighbourhood activities such as stables, recycling depots, composting facilities, etc., are highly attractive to flying insects and retain them in the neighbourhood.	Collect some data to support any observations made about insect numbers sourced from a neighbour (e.g. count or photograph flies on a defined area outside the food premises on the neighbour's and opposite sides, over several warm days). Meet with the neighbour to discuss the matter and try to reach agreement to rectify the problem. If several attempts fail, consider discussing the issue with your local council Environmental Health Officer.
External lighting	Bright lighting facing outwards from food premises can attract insects (especially flies and moths) to the building at dusk and during the night.	Where possible, locate external lighting so that it faces towards the building (e.g. on poles separated from the building).
Cleaning external drains and sullage pits	Dirty external drains and sullage pits are attractive to flies (especially fermentation flies) and retain them near the food premises.	Ensure that a regular program of thorough cleaning of external drains and sullage pits is in place. If necessary combine this with a treatment using a bio-cleansing agent.
Bird Nesting/ Roosting Areas	Bird nesting materials provide attractive harbourage sites for some flying insects which breed and harbour within nest.	Physical removal of bird nesting materials and preventative treatment or physical applications to stop re-occurrence of birds nesting at site.

2. ***Reducing numbers of adult flying insects or immature stages of the insects outside Food Premises.***
If numbers of adult and immature stages of insects are kept low in the vicinity of Food Premises, the probability of their entry into the premises is reduced. Where exterior infestations have been identified, some examples of common management tools and recommended actions to reduce insect numbers are:

Management Tool	Rationale	Recommended Action
Insecticide treatment of insect resting sites outside buildings.	Treatment of observed flying insect resting sites with residual insecticide can significantly reduce flying insect numbers.	Determine if flying insects are utilising external building surfaces as resting sites. Where appropriate, apply a residual insecticide registered for the purpose. Masonry surfaces may need to be sealed or painted beforehand to achieve satisfactory residual control.
External baiting of adult flying insects	A regular baiting program can significantly reduce flying insect numbers, especially houseflies and blowflies.	Institute a baiting program. Confirm effectiveness and bait replacement by monitoring numbers of insects killed. Lure attractants may be used where appropriate.
Elimination of external flying insect breeding sites.	Some Food Businesses inadvertently provide breeding sites for flying insects outside their premises. Some examples are: 1. Houseflies breeding in moist compost. 2. Fermentation flies breeding in dirty drains. 3. Houseflies and blowflies breeding in exposed garbage or other waste. All these sites need to be identified and eliminated, minimised or treated.	1. Eliminate from gardens, any heavily layered moist compost or mulch with high organic content. 2. Ensure that a regular program of thorough cleaning of external drains and sullage pits is in place (see table above). 3. Ensure that a regular program of waste management is in place and/or a site treatment with residual insecticide is applied if appropriate (see table above).

12.2.7 Interior Flying Insect Management Regime

Interior flying insect management focuses principally on two aspects:

1. Reducing the probability that flying insects will enter the food premises.
Where interior infestations have been identified, some examples of common management tools and recommended actions to reduce insect numbers entering the premises are:

Management Tool	Rationale	Recommended Action
Window & door screening	Where windows, doors or ventilation points are required to be open, insect screens can prevent ingress of flying insects.	Where appropriate, install tight fitting insect screens or screen doors and ensure that they are maintained in good condition.
Door opening & closure	Minimising the time doors and windows remain open, reduces the probability that flying insects will enter.	Where appropriate, fit self-closing or 'auto-open and close systems' to doors and ensure that the 'open time' is minimised.
Air curtains	Where entries or exits from Food Businesses must remain open, air curtains if correctly specified and installed, can provide a fast moving airstream which expels most flying insects which attempt to enter.	Where appropriate, fit air curtains to building entry and exit points. Ensure that they are operating to specifications and that the airflow is directed outwards.

Strip curtains	Where entries or exits from Food Businesses must remain open and air curtains cannot be justified, strip curtains can provide a physical barrier to deter some flying insects which attempt to enter.	Where appropriate, fit strip curtains to building entry and exit points. Ensure that the strips provide a continuous visual barrier to approaching insects when they are hanging motionless.
Door and window seals	When doors or windows are not completely sealed and gaps exist, flying insects (especially flies) may walk through the gaps to gain entry.	Ensure that all windows and doors provide no gaps when closed or around the edges of the screens. Ensure that seals on windows and doors are maintained in good condition.
Air-conditioning temperature, efficiency and positive pressure	It has been found that when air-conditioning and ventilation systems are well maintained and provide a cool, low-odour, environment, comfortable to humans, and with a positive indoor pressure, these conditions are relatively unattractive to flying insects.	Ensure that air-conditioning and ventilation systems are well maintained and provide a cool, low-odour, environment with a positive indoor pressure. A slight outward flow of air should be detectable when a door is partly-opened.

2. Eliminating flying insects which have gained entry into the food premises.

Where interior infestations have been identified, some examples of common management tools and recommended actions to reduce insect numbers within the premises are:

Management Tool	**Rationale**	**Recommended Action**
Light traps	Commercial traps are available which utilise ultraviolet light to attract flying insects and either adhesive boards or electrocution grids to capture or kill the insects. These traps are moderately effective at eliminating flying insects but only if they are properly maintained. In particular, adhesive boards should be changed at least monthly or whenever approx 70% of their surface is covered with insects. The light tubes must be changed as per manufacturer's instructions (even though still lighting). Boards and tubes should always be labelled with their installation dates.	Install light traps with shatterproof light tubes in all internal areas of the Food Business where flying insect infestation has been experienced. Follow manufacturer's instructions regarding number, location and servicing of the traps. Note in particular that adhesive board types are generally preferred as they are also useful as monitoring tools and that electrocution traps must not be installed in food preparation areas. Ensure that a program of trap monitoring and maintenance is established and routinely reviewed. As a minimum, data recorded should include: location of trap; numbers of large, medium and small flies; numbers of 'other' insects captured (with descriptions); dates of last board and light tube replacements.
Auto Sprayers (Timed release aerosols)	Auto-spraying devices are available which dispense a measured dose of aerosol insecticide at timed intervals into the air using a battery powered dispenser. Only pyrethrum formulations should be used as these have low mammalian toxicity but are moderately effective against flying insects. In the short term, these devices kill nearby insects but in the longer term, the aerosol is carried around the airspace and kills any insects which receive a lethal dose. These devices are only effective if they are properly maintained. The aerosol cans must be changed monthly and the batteries replaced as per manufacturer's instructions (typically annually).	Install Auto-sprayers in internal areas of the Food Business where flying insect infestation has been experienced but NOT in food preparation areas anywhere food is exposed other than for immediate consumption, or where they would spray directly onto people. Note also, that those auto-sprayers should not be installed within 3 metres of any light trap as pyrethrum is mildly repellent to insects and so may affect the catch rate of the light trap. Follow manufacturer's instructions regarding number, location and servicing of the sprayers. Where flies are seen to congregate near long windows, installation parallel to the window to direct the aerosol close to the insects can be especially effective.

Drain cleaning	Even small amounts of sludge/residue in drains, damp floor mops, cleaning cloths or un-noticed wet waste, can sustain infestations of some fly species, especially small fermentation flies.	Ensure that a regular program of thorough cleaning of internal drains is in place. If necessary combine this with a drain treatment using a bio-cleansing agent. Also ensure that mops and cleaning cloths are rinsed out and dried after use and all wet waste is eliminated.
General interior cleanliness	Flying insects that are attracted to and feeding on food-contaminated surfaces remain fairly immobile and less likely to be trapped or dosed with insecticide and hence eliminated.	Ensure that a high level of cleanliness is maintained inside food premises.

12.3 Cockroaches

Cockroaches are a hazard to Food Businesses because:

- Whole cockroaches, body parts, faeces and other secretions can contaminate food and equipment.
- Cockroaches spend time in unhygienic areas and may transfer pathogens from these areas to food utensils or food preparation areas or machinery.
- Cockroaches or their secretions may cause shorting of electrical equipment.
- Cockroaches have an odour and this may be imparted to the establishment or food.
- Clients will be discouraged from using the establishment if they see cockroaches and staff morale will also be reduced.

12.3.1 Main Cockroach Pests

An understanding of cockroach biology is important in the pest management of cockroaches.

The two principal pests in food establishments are the German cockroach *Blattella germanica* and American *Periplaneta americana*.

It is important to understand that cockroaches are nocturnal and forage for food and water at night. They spend the day hiding in cracks and crevices or other hidden spaces such as wall and ceiling voids.

German cockroach is the most common pest cockroach in food establishments. Adults are about 15mm long and first instar nymphs are about 3mm long. They are smaller than the other important Pest species and are able to live and breed in the numerous cracks and crevices present in commercial premises. Their small size means that they are initially tolerated or not noticed. Their rapid reproduction rate enables a few individuals to become a Pest problem over one season as each female produces an ootheca containing around 30 - 48 eggs, and females may produce between 4 - 8 oothecae. These eggs can become adult in 6 - 10 weeks in the warm conditions which means rapid population build-up.

American cockroach is the largest of the Pest species growing to around 45mm in length. It is relatively slow growing reaching maturity in 6 to 12 months. There are fewer generations per year than with the German cockroach and infestations are slower to build up. Because of the large size of both adults and nymphs people are less tolerant of these cockroaches in food establishments and they also find fewer places to hide in the daytime. When they establish they are normally found in wall voids or behind cupboards, in underfloor areas or roof spaces.

American cockroaches are often called “peri domestic cockroaches” because they can live around buildings. Common areas where they are found include gardens areas, around garbage, inside drains and in out-houses such as sheds or garages. They can be common in sewers and sewer manholes.

There are other pest species of *Periplaneta* in Australia, New Zealand, and throughout the world, and these may be as common as American cockroach in some areas. The Smoky Brown cockroach *Periplaneta fuliginosa* is

found in and around Sydney and Hawkes Bay NZ, and Australian Cockroach *Periplaneta australasiae* is found commonly in tropical and sub-tropical areas of Australia and northern NZ. Both are peri domestic cockroaches which feed mainly on garden organic matter and waste but they will forage inside buildings and establish in garages, outbuildings, under floor areas and wall voids. These species are not usually found in sewers, unlike the American cockroach.

12.3.2 Exterior Cockroach Management Regime

Exterior cockroach management focuses principally on two aspects:

1. ***Reducing the attractiveness of the site to cockroaches.***
   The probability of cockroaches entering a Food Business increases when exterior infestations have been identified. Some examples of common management tools and recommended actions to reduce attractiveness of the site are:

Management Tool	Rationale	Recommended Action
Waste management	Dirty, open or overflowing waste skips containing exposed food waste are highly attractive to cockroaches and retain them near the food premises as well as providing breeding sites.	Ensure that a policy of sealed bagging of all waste is in place; that waste skips are cleaned before delivery and the skips are kept closed except when waste is being added.
Activities of neighbours	Poor hygiene or waste management practices of neighbours will attract cockroaches to the site of the Food Business as well as the site of the neighbour. Also, some neighbourhood activities such as stables, recycling depots, composting facilities, etc., are highly attractive to cockroaches and retain them in the neighbourhood.	Collect some data to support any observations made about insect numbers sourced from a neighbour (e.g. count or photograph cockroaches on a defined area outside the food premises on the neighbour's and opposite sides, over several warm nights). Meet with the neighbour to discuss the matter and try to reach agreement to rectify the problem. If several attempts fail, consider discussing the issue with your local council Environmental Health Officer.
Cleaning external drains and sullage pits and grease traps	Dirty external drains, grease traps and sullage pits are attractive to cockroaches and retain them near the food premises.	Ensure that a regular program of thorough cleaning of external drains, grease traps and sullage pits is in place. If necessary combine this with a treatment using a bio-cleansing agent.
Minimisation of plants and mulch/ litter around buildings	Cockroaches can live in accumulated plant material around buildings.	Advise client to limit plantings close to buildings particularly near to entrances.
Exterior cleanliness	Accumulated equipment and rubbish around buildings provide hiding places for cockroaches.	Clear site of refuse.

2. ***Reducing numbers of cockroaches outside food premises.***
   If the number of American cockroaches living outdoors in warmer areas is kept low in the vicinity of food premises, the probability of their entry into the premises is reduced. Where exterior infestations have been identified, some examples of common management tools and recommended actions to reduce insect numbers are:

Management Tool	Rationale	Recommended Action
Insecticide treatment of cockroach harbourage sites outside buildings	Treatment of observed cockroach harbourages with residual insecticide can significantly reduce cockroach numbers.	Determine if cockroaches are utilising external building surfaces as resting sites. Where appropriate, apply a residual insecticide registered for the purpose.

Barrier sprays	Application of insecticide to areas which cockroaches must cross to enter buildings can reduce infestations.	Spray areas around potential entry points with residual insecticide, e.g. around window frames and doors.
External baiting of cockroaches	A regular baiting program can significantly reduce cockroach numbers.	Institute a baiting program. Confirm effectiveness and bait replacement by monitoring numbers of insects killed.
Elimination of external cockroaches breeding sites.	Some Food Businesses inadvertently provide breeding sites for cockroaches outside their premises. Some examples are: 1. Moist compost; 2. Dirty drains; 3. Exposed garbage. These sites need to be identified and eliminated or minimised.	1. Eliminate from gardens, any heavily layered moist compost or mulch with high organic content. 2. Ensure that a regular program of thorough cleaning of external drains and sullage pits is in place (see table above). 3. Ensure that a regular program of waste management is in place (see table above).

12.3.3 Interior Cockroaches Management Regime

Interior cockroach management focuses principally on two aspects:

1. ***Reducing the probability that cockroaches will enter the food premises.***
   Where interior infestations have been identified, some examples of common management tools and recommended actions to reduce insect numbers entering the premises are:

Management Tool	Rationale	Recommended Action
Window & door screening	Where windows, doors or ventilation points are required to be open, insect screens can prevent ingress of cockroaches.	Where appropriate, install tight fitting insect screens or screen doors and ensure that they are maintained in good condition.
Door opening & closure	Minimising the time doors and windows remain open, reduces the probability that cockroaches will enter.	Where appropriate, fit self-closing or 'auto-open and close systems' to doors and ensure that the 'open time' is minimised.
Pest free suppliers	Cockroaches may enter premises on delivered goods from other suppliers.	Suppliers should be inspected to check they have good cockroach control procedures and/or are required to carry out regular cockroach control.
Cartons and packaging	Cockroaches or their egg cases may be present in packaging.	Inspect packaging and goods on arrival. Remove packaging from premises once goods are unpacked.

2. ***Monitoring and eliminating cockroaches which have gained entry into the food premises.***
   Where interior infestations have been identified, some examples of common management tools and recommended actions to reduce insect numbers within the premises are:

Management Tool	Rationale	Recommended Action
Sanitation/hygiene	Surfaces and floors with residual food encourage cockroaches as do food and dirty utensils left out overnight.	Daily clean up of surfaces, floors and waste is essential for good cockroach control.
Building Maintenance	Cracked or missing tiles, poor wall surfacing and badly maintained fittings can provide harbourage for cockroaches.	Advise client of maintenance issues which are encouraging cockroaches.

Food storage	Open food containers or unwrapped food will provide food for cockroaches.	All food should be stored in closed containers or fridges.
Open water dripping taps	Cockroaches need water as well as food.	Limit access to water by advising of areas which could be providing watering points for cockroaches.
Drain cleaning	Even small amounts of waste in drains, damp floor mops, cleaning cloths or unnoticed wet waste, can provide food for cockroaches.	Ensure that a regular program of thorough cleaning of internal drains is in place. If necessary combine this with a drain treatment using a bio-cleansing agent.
General interior cleanliness	Cockroaches will feed on any spilled food on surfaces.	Ensure that a high level of cleanliness is maintained inside food premises.
Inspection torch/ flushing aerosol	Cockroaches have specific breeding and hiding places. It is important to target these during the control phase.	Prior to treatment the premises should be inspected to locate breeding sites and hiding places. The use of a torch and flushing aerosol will aid this.
Monitoring cockroach traps	Sticky cockroach traps with pheromone lure can catch foraging adults and nymphs. They can indicate infestations missed on visual inspections and flag problem areas.	Place out sticky traps with pheromone lure, mark with placement date, and monitor at each visit.
Exclusion techniques	Cockroaches need places to hide and breed. Minimising these will reduce the population.	Check fixtures for small cracks and crevices and fill these. Close holes into the establishment from wall voids. Put mesh over drains.
Baits/Gels	Cockroaches forage for food and will eat baits or gels and are killed. They may also transport the material back to their hiding places and cause death of other cockroaches.	Place baits or gel spots in areas where cockroaches hide and forage. Avoid placing baits or gels in high traffic areas, areas frequently washed, or food preparation surfaces.
Residual Insecticides	Cockroaches which walk over treated surfaces or stay in treated hiding places will be killed.	Spot treatments to areas where cockroaches walk or hide but which will not be contacted by people and food stuffs, e.g. wall voids, undersides of fittings. Crack and crevice treatments to small gaps where cockroaches hide e.g. expansion joints between fittings, gaps in the corners of cupboards.
Insecticidal Dust	Insecticidal dust can be used to penetrate deep into voids and to treat some electrical equipment which could be damaged by wet sprays.	Apply to cracks and crevices and wall and cabinet voids. They should be applied with care around electrical equipment.
Space treatments	Non residual/ flushing/ fast knockdown insecticides can be useful in heavy infestations. These can be applied via foggers or high pressure aerosols and CO_2 cylinders.	These need to be applied when the premises are vacated.

12.4 Other Crawling Insects

Crawling insects are a hazard to Food Businesses principally because:

- They are mobile, invasive, prone to feeding on waste and animal excrement and highly attracted to a variety of food products;
- They carry organisms which they may deposit in foodstuffs, causing spoilage and transmitting disease;
- They may themselves become embedded in foodstuffs causing contamination;
- Their presence in food premises is contrary to food regulations.

12.4.1 Main Crawling Insect Pest Targets

In Australia and New Zealand crawling insects such as ants, beetles, crickets, earwigs, millipedes, spiders (Araneida), fleas, slaters etc. may constitute a hazard. (Note: cockroaches are in a separate section – see 12.3.).

The actions which need to be taken to manage crawling insects differ depending on the location of the pest, particularly on whether they are inside or outside the Food Business. Actions are determined during the pre-treatment inspection.

12.4.2 Exterior Crawling Insect Management Regime

Exterior crawling insect management focuses principally on two aspects:

1. ***Reducing the attractiveness of the site for crawling insects.***
   The probability of crawling insects entering a Food Business increases when insect numbers attracted to the location of food premises are high. Where exterior infestations have been identified, some examples of common management tools and recommended actions to reduce attractiveness of the site are:

Management Tool	Rationale	Recommended Action
Location of garden beds, plants and other vegetation	Crawling insects are very attracted to garden beds as they obtain much of their energy requirements from this source.	Ensure that no garden beds are located within 10 metres of any entrance to the building. Maintain all garden areas.
Exterior cleanliness	External objects will act as a harbourage area for crawling insects.	Ensure that exterior is clear of objects within a 10 metre area of entrances.
Odour management	Poorly serviced building exhaust systems create a food odour plume that attracts crawling insects to the site, sometimes over considerable distances.	Ensure that a regular schedule of cleaning exhaust outlets and filters is in place and that the outlets are adequately screened.
Waste management	Dirty, open or overflowing waste skips containing exposed food waste are highly attractive to crawling insects and retain them near the food premises.	Ensure that a policy of sealed bagging of all waste is in place, waste skips are cleaned before delivery and the skips are kept closed except when waste is being added. Store empty beverage containers in a way which minimises residue content. This will depend on storage circumstances. For example; cans might be crushed and bagged and bottles stored inverted and hosed down if circumstances permit.
Activities of neighbours	Poor hygiene or waste management practices of neighbours will attract crawling insects to the site of the Food Business as well as the site of the neighbour.	Collect some data to support any observations made about insect numbers sourced from a neighbour. Meet with the neighbour to discuss the matter and try to reach agreement to rectify the problem. If several attempts fail, consider discussing the issue with your local council Environmental Health Officer.

External lighting	Bright lighting facing outwards from food premises can attract crawling insects to the building at dusk and during the night.	Where possible, locate external lighting so that it faces towards the building (e.g. on poles separated from the building).
Cleaning external drains and sullage pits	Dirty external drains and sullage pits are attractive to crawling and retain them near the food premises.	Ensure that a regular program of thorough cleaning of external drains and sullage pits is in place. If necessary combine this with a treatment using a bio-cleansing agent.
Seal buildings	Crawling insects will invade and harbour in the building.	Seal all buildings penetrations, vents, doors, windows, roof voids, sub floor to prevent crawling insect invasion.

2. Reducing numbers of adult crawling insects or immature stages of the insects outside food premises.

If numbers of adult and immature stages of insects are kept low in the vicinity of food premises, the probability of their entry into the premises is reduced. Where exterior infestations have been identified, some examples of common management tools and recommended actions to reduce insect numbers are:

Management Tool	Rationale	Recommended Action
Insecticide treatment of insect resting sites outside buildings	Treatment of observed crawling insect resting sites with residual insecticide can significantly reduce crawling insect numbers. Treatment of observed crawling insects with a non residual insecticide can significantly reduce crawling insects. Treatment of observed crawling insects with a bait insecticide can significantly reduce crawling insects.	Determine if crawling insects are utilising external building surfaces as resting sites. Where appropriate, apply an insecticide registered for the purpose. Determine if crawling insects are breeding in garden beds and low life vegetation. Where appropriate apply insecticide residual, non residual or bait formulation.
External Biological treatment	A regular baiting program can significantly reduce crawling insect numbers, especially millipedes.	Institute a biological control program. Confirm effectiveness and bait replacement by monitoring numbers of crawling insects killed.
Elimination of external crawling breeding sites.	Some Food Businesses inadvertently provide breeding sites for crawling insects outside their premises. Examples are: 1. Moist compost breeding a range of crawling insects; 2. Dirty drains breeding crawling insects.	1. Eliminate from gardens, any heavily layered moist compost or mulch with high organic content. 2. Ensure that a regular program of thorough cleaning of external drains and sullage pits is in place (see table above).

12.4.3 Interior Crawling Insect Management Regime

Interior crawling insect management focuses principally on two aspects:

1. Reducing the probability that crawling insects will enter the food premises.

Where interior infestations have been identified, some examples of common management tools and recommended actions to reduce insect numbers entering the premises are:

Management Tool	Rationale	Recommended Action
Window & door screening	Where windows, doors or ventilation points are required to be open, insect screens can prevent ingress of crawling insects.	Where appropriate, install tight fitting insect screens or screen doors and ensure that they are maintained in good condition.

Door opening & closure	Minimising the time doors and windows remain open, reduces the probability that crawling insects will enter.	Where appropriate, fit self-closing or 'auto-open and close systems' to doors and ensure that the 'open time' is minimised.
Door and window seals	When doors or windows are not completely sealed and gaps exist, crawling insects may walk through the gaps to gain entry.	Ensure that all windows and doors provide no gaps when closed or around the edges of the screens. Ensure that seals on windows and doors are maintained in good condition.

2. Eliminating crawling insects which have gained entry into the food premises.

Where interior infestations have been identified, some examples of common management tools and recommended actions to reduce insect numbers within the premises are:

Management Tool	**Rationale**	**Recommended Action**
Traps	Commercial traps are available which monitor crawling insects' activity. Traps include adhesive glue traps; a durable tamper resistant station with an adhesive glue trap secured inside. The stations will attract crawling insects by also including a pheromone for further attractant, e.g. an indicator block. These traps are moderately effective at eliminating crawling insects but only if they are properly maintained. In particular, adhesive boards should be changed at least monthly or whenever approx 70% of their surface is covered with insects. If the glue traps are contaminated the adhesive trap will need to be replaced. E.g. water and dust damage.	Install traps in all internal areas of the Food Business to monitor crawling insect infestation has been experienced. Stations should be secured to cover all crawling insect conducive conditions. If further monitoring is required stations should be secured at a minimum of 10 metre intervals. Follow manufacturer's instructions regarding number, location and servicing of the traps. Note in particular that adhesive board types are generally preferred as they are also useful as a monitoring tool. Ensure that a program of trap monitoring and maintenance is established and routinely reviewed. As a minimum, data recorded should include: location of trap; numbers of large, medium and small crawling numbers of 'other' insects captured (with descriptions).
Insecticide treatment of insect resting sites inside buildings	Treatment of observed crawling insect resting sites with residual insecticide, can significantly reduce crawling insect numbers. Treatment of observed crawling insects; a non residual insecticide that can significantly reduce crawling insects. Treatment of observed crawling insects with a bait insecticide can significantly reduce crawling insects.	Determine if crawling insects are utilising internal building surfaces as resting sites. Where appropriate, apply an insecticide registered for the purpose.
Drain cleaning	Even small amounts of 'sludge' in drains, damp floor mops, cleaning cloths or un-noticed wet waste, can sustain infestations of some crawling insect species.	Ensure that a regular program of thorough cleaning of internal drains is in place. If necessary combine this with a drain treatment using a bio-cleansing agent. Also ensure that mops and cleaning cloths are rinsed out and dried after use and all wet waste is eliminated.
General interior cleanliness	Crawling insects that are attracted to and feeding on food-contaminated surfaces remain fairly immobile and less likely to be trapped or dosed with insecticide and hence eliminated.	Ensure that a high level of cleanliness is maintained inside food premises.

12.5 Stored Product Pests

Stored Product Pests are a hazard to Food Businesses principally because:

- They can consume and/or damage both raw materials and finished goods.
- There is direct contamination of commodities by their excrement, dead bodies, cast larval skins etc.
- They may themselves become embedded in foodstuffs causing rejection of contaminated product by consumers, resulting, in many cases, quite significant social and legal costs and/or harm to a brand.
- Food commodities infested with Stored Product Pests often exhibit rapid mould growth which can include fungi that produce mycotoxins which may be toxic on consumption.
- Some can be, but are not necessarily, a vector for food borne illness or other microorganisms which cause spoilage.
- Their presence in food is contrary to food regulations.

12.5.1 Stored Product Pest – A Pest Management Overview

In Australasia, there are several important Stored Product Pests in Food Businesses depending on the commodity. There are approximately 18 species of Stored Product Pests that are of major economic importance. They include several species of moth and beetles in which the larval stage of the life cycle is the primary cause of concern. However all stages, eggs, larvae and pupae all contribute to the contamination of food.

Stored Product Pests are often categorised as primary and secondary invaders. Primary invaders can penetrate and infest intact grains, seeds and nuts. Primary Stored Products Pests cause damage to stored grains by directly feeding on the grain at some point in their lifecycle. They will attack grains that are intact and stable and can develop and reproduce very quickly when the conditions are optimal. Many species of stored product beetles feed internally in grain kernels as larvae. Of the beetles (Coleoptera) grain beetles, grain and rice weevils, and lesser grain borer all develop initially inside the kernel. The Angoumois grain moth is the only lepidopteron internal feeder.

Secondary invaders utilise damaged or milled cereals (rolled, kibbled or flours) and dried fruits. These include many species of beetles such as cabinet, carpet, cigarette, drugstore, flour, fungus, hide, larder, mealworm, spider and warehouse beetle, also several species of moths including almond, clothes, house, Indian meal moth, Mediterranean flour moth and warehouse, species of booklice and cheese and grain mites.

The actions which need to be taken to manage Stored Product Pests differ depending on the origin or location of the Pest, particularly on whether they are inside or imported from outside the Food Business. All participants in the supply chain must participate in protecting raw material or products from infestation by Stored Product Pests.

Stored Product Pests are mainly insects that have adapted to exploiting certain foods in storage. There appears to be an increase in Stored Product Pests in the supply chain. This is for a variety of reasons. It is not acceptable to directly treat food products with pesticides. There is less fumigation treatment occurring of raw material being done as many of these Pests are no longer a quarantine issue as they are already established and not eligible for official treatments and the inability for customer request (voluntary) treatments to be done with Methyl Bromide. This means more emphasis on receiving infestation free material and protecting it from such. This requires a combination of preventative measures such as exclusion (e.g. robust packaging), sanitation (cleaning to deny Pests access to a food source) and devices and treatments to safely intercept these Pests.

Detection can be difficult if only eggs or young larvae are present. Trapping devices can be installed in high risk production and storage areas, and servicing is at an appropriate interval. The species specific pheromone lures employed in the traps will have a designated replacement cycle. Note: these are useful to intercept adult moths dispersing and potentially incurring fresh infestation but cannot be relied on as a sole control measure. The source must always be dealt with by removal or where possible treatment. The larval stages are less mobile and require closer inspection and localised monitoring methods such as sticky board traps with appropriate lures or without (so called blunder traps).

Pesticides can only be used as environmental non product contact treatments. The material choice is further regulated by the risk of chemical contamination. Where product or product contact surfaces are present, relatively low mammalian toxicity and non residual only materials can be used in compliance with legislative and industry specific guidelines. Insects may only be actively mobile before or after pupation. Good housekeeping (deep cleaning) and vigilance of staff is important. The risk of infested raw material (source, type and history) must be heeded and managed. Because some of these Pests can penetrate flexible packaging, finished product must be protected or isolated from infestation potential during storage, retail and after sale in the customers' care.

12.5.2 Integrated Stored Product Pest Management Partnership Summary

It is clear that there are a number of factors involving both pest management and client personnel that need to be included in any Pest Management Plan. Early detection before infestations spread is essential. Where there is a high risk of Stored Product Pests infestation, an inspection and monitoring regime is necessary. Inspection must be for all life cycle stages. Larvae are generally the most destructive stage but less mobile stage. Adults are the dispersal and more mobile stage. Trapping with pheromone lures is useful for monitoring and mating disruption.

Preventative methods need to be implemented to discourage and exclude Pests such as sanitation, elimination of Pest habitat and denial of access to buildings and product.

- Inspection survey and risk assessment and management plan.
- Pest detection (interception on incursion). Knowledge of pest biology.
- Pest presence/absence/distribution.
- Potential controls - Interception devices, suppression, and elimination.
- Ongoing inspection, monitoring, recording, analysis and reporting.
- Approved mechanical, physical and biological methods.
- Permitted substances and treatments (there shall never be direct or indirect contact between products and prohibited substances).
- Sufficiently robust packaging should be used to prevent invasion of penetrators.

12.5.3 Raw Material Stored Product Pest Management Regime (Upstream and on site)

Raw material Stored Product Pest management focuses principally on two aspects:

1. ***Protecting the raw material from Stored Product Pests.***
   The probability of Stored Product Pests infesting food increases when Pests are present in the adjacent environment and there is inadequate protection. Where exterior infestations have been identified, some examples of common management tools and recommended actions to reduce attractiveness of the site are:

Management Tool	Rationale	Recommended Action
Reducing food source in the adjacent environment	Stored Product Pests are very attracted to suitable food sources and spillage and debris can sustain a population.	Good housekeeping and sanitation. Ensure a regular cleaning regime is maintained including a less regular intrusive deep clean in sync with the length of target Pest life cycle so that this is not completed in the building environment. This should include electrical wiring conduits and cable trays and other areas where food residues accumulate.
Storage cleanliness	Food residues remaining in dead legs in conveyance, impacted on silo walls and corners may cause carryover of Stored Product Pests.	Ensure that equipment design and maintenance is such that food source does not accumulate. Avoid ledges and severely angular surfaces by utilising swept bends, self cleaning measures. Allowing easy access to clean.

Fines management	Poorly designed and serviced building exhaust and fines management systems create fallout of Pest food source that attract and support Stored Product Pests to and on the site.	Ensure that a regular schedule of cleaning exhaust outlets and fines recovery or filtration is in place and that the outlets are adequately screened and cleaned.
Waste management	Dirty, open or overflowing waste skips containing exposed food waste are highly attractive to Stored Product Pests and retain them near the food premises.	Ensure that a policy of sealed bagging of all waste is in place; that waste skips are cleaned before delivery; and the skips are kept closed except when waste is being added.
Cleaning external drains, sumps and pits	Waste or spillage is a food source and these areas may be a harbourage	Surfaces that are not self cleaning may need manual removal of material that may become a Pest and microbial food source.

2. ***Reducing numbers of adult Stored Product Pests or immature stages of the insects outside food premises.***
   If numbers of adult and immature stages of insects are kept low in the vicinity of the food premises, the probability of their entry into the premises is reduced. Where exterior infestations have been identified, some examples of common management tools and recommended actions to reduce insect numbers are:

Management Tool	Rationale	Recommended Action
Insecticide treatment of insect activity sites outside buildings and storage facilities	Treatment of observed infestation with residual insecticide, can reduce Stored Product Pests including insects such as psocids (book lice) and arachnids such as mites and spiders (not strictly SPP's but potential contaminants).	Determine if Stored Product Pests are utilising external building surfaces as resting sites. Where appropriate, apply a residual insecticide registered for the purpose.
External baiting of adult Stored Product Pests	A regular baiting program can significantly reduce certain stored products pests especially rodents	Institute a baiting program. Confirm effectiveness and bait replacement by monitoring activity.
Elimination of external breeding sites.	Some Food Businesses inadvertently provide breeding sites for Stored Products Pests outside their premises. Some examples are: 1. Weigh stations and grain dumps; 2. Dirty drains; 3. Elevators and conveyance. These sites need to be identified and spillage minimised.	1. Prevent or clean spillage immediately. 2. Ensure that a regular program of thorough cleaning of external drains and sullage pits is in place (see table above). 3. Ensure that a regular program of waste management is in place (see table above).

12.5.4 Interior Stored Product Pest Management Regime

Interior Stored Product Pest management focuses principally on two aspects:

1. ***Reducing the probability that Stored Product Pests will enter the food premises.***
   Where interior infestations have been identified, some examples of common management tools and recommended actions to reduce insect numbers entering the premises are:

Management Tool	Rationale	Recommended Action
Window & door screening	Where windows, doors or ventilation points are required to be open, insect screens can prevent ingress of Stored Product Pests.	Where appropriate, install tight fitting insect screens or screen doors and ensure that they are maintained in good condition.
Door opening & closure	Minimising the time doors and windows remain open, reduces the probability that Stored Product Pests will enter.	Where appropriate, fit self-closing or 'auto-open and close systems' to doors and ensure that the 'open time' is minimised.

Risk profiling and inspection of incoming goods	Early detection, segregation, returning, or treatment will prevent importation of Stored Product Pests.	Use Stored Product Pest identification charts to guide inspection for evidence. Remove any infested goods to a designated quarantine area until required action is to be taken.

2. ***Eliminating Stored Product Pests which have gained entry into the food premises.***
   Where interior infestations have been identified, some examples of common management tools and recommended actions to reduce insect numbers within the premises are:

Management Tool	**Rationale**	**Recommended Action**
General interior cleanliness	Even small amounts of raw material or product residue can support a breeding cycle of SPP. Larval feeding stages remain fairly immobile and less likely to be trapped or dosed with insecticide and hence eliminated.	Ensure that a regular program of thorough cleaning is in place. A deep cleaning schedule is necessary to prevent Stored Product Pests completing their life cycle.
Light traps	Commercial traps are available which utilise ultraviolet light to attract some but not all Stored Product Pests.	Install light traps in all internal areas of the Food Business where flying insect infestation has been experienced. Data recorded can also help monitor SPP. Pheromone lures can be added to the trap.
Pheromone lure or bait traps	A range of traps are available that use synthesised attractants. These lures may be sexual and attract only males or aggregation and not gender specific. These may be single or multispecies. They may be purely mating disrupters and a monitoring tool rather than a control in their own right.	Traps are installed for the target risk species at intervals appropriate to the mobility of the life stage (generally adults). A risk management approach is necessary with good understanding of the Pest biology and habits. Data must be recorded and assessed for immediate response initiation and trend analysis for future improvement planning.
Dusting	Certain dusts can be used with pesticide properties. Some of these are mechanical in nature, which erode the cuticle of the insect causing desiccation.	Dusts are mobile and should not be used where there is a risk of food contamination.
Precision spraying	Targeted spot, crack and crevice treatments can be useful to arrest localised Stored Product Pest occurrence in a structural environment.	The success is dependent on adequate access and cleaning of loose or impacted residues. Only approved materials can be used with deference to preventing product contamination.
Auto-aerosol/ space sprayers	Auto-aerosol spraying devices are available which dispense a measured dose of aerosol insecticide at timed intervals into the air. Only pyrethrum formulations should be used as these have low mammalian toxicity but are moderately effective against Stored Product Pests. In the short term, these devices kill nearby insects. Experience shows location, reticulation design, distribution and maintenance are critical to achieve a useful effect.	These devices have limited value in most situations. Install auto-sprayers in internal areas of the Food Business where flying insect (including SPP) infestation has been experienced but NOT in exposed food areas. These devices are only effective if they are properly designed, located and maintained and should not be relied on as a sole control measure. At best adult insects may be knocked down during dispersal/migration.

Space treatment	Treatment of a processing or storage environment with ultra low volume finely atomised droplets containing approved pesticides can be useful for containing and preventing cross infestation. It is not acceptable for most pesticides to come into contact with raw material or product.	Thermal or cold foggers (2-30 micron droplets) or in some cases misters (20-80 micron droplets) can be used to dispense aerosols of approved pesticide. These can achieve 3 dimensional dispersal throughout the environment. These small droplets eventually deposit out or are vented from the air space. Re-entry of unprotected personnel is prevented until air borne contaminants are below the relevant threshold for safe ongoing occupancy.
Heat	Cooking or baking will kill all life stages of Stored Product Pests if temperatures are sufficiently high and of long enough duration. The higher the temperature the shorter the duration required. The product core must also reach the designated temperature for the required duration. Lower temperature of longer duration can be used to disinfest some raw material without affecting the quality.	Using heat as disinfestations means must be done early as any visible presence will still be objectionable and unacceptable. Fields (1992) reported the following generalised response of Stored Product Pests to elevated temperature: Above 62ºC - death in < 1 minute 50 - 62ºC - death in < 1 hour 45 - 50ºC - death in < 1 day 35 - 42ºC - population decline, movement to cooler environment.
Freezing	Low temperatures will kill all life stages of Stored Product Pests if temperatures are sufficiently low and long enough duration. The lower the temperature the shorter the duration. The product core must also reach the designated temperature for the required duration. This technique may not be suitable for all raw materials or products due to deleterious effect on quality. Other issues such as condensation on warming may damage packaging etc.	Constant temperature time period required for disinfestations (indicative only and may vary with species and acclimatisation factors) -5°C - death in 12 weeks -10°C - death in 8 weeks -15°C - death in 4 weeks -20°C - death in 1 week
Fumigation	This is the use of gaseous substances (fumigants) that are toxic to, and kill all life stages, of Stored Product Pests in raw material or product. The fumigant must be such that it does not leave unacceptable residues that could impact on consumer health.	Fumigation must be done in gas proof enclosures to contain the gas for long enough to achieve mortality. The material must be able to be uniformly penetrated to where the Pests are residing. Impervious packaging or density and depth of product may impede this. Fumigation is a specialised process and beyond the scope of this code.

12.5.5 Finished Product Stored Product Pest Management Regime (Downstream of manufacturing)

Protecting value added goods from Stored Product Pests.

The probability of Stored Product Pests infesting food increases when Pests are present in the adjacent environment and there is inadequate protection. Protection of value added goods is a vital part of the overall Pest Management Plan. Some common tools and recommended actions are detailed below:

Management Tool	Rationale	Recommended Action
Ensure strict adherence to sound warehouse storage and retailing display practice	Reduce risk of cross contamination.	Inventory controls. Stock rotation should be based on first in - first out. Avoid storage of raw materials, damaged, returned goods and packaging material in areas designated for finished goods.

Environmental temperature and relative humidity (R/H) control.	High R/H and warm ambient temperatures are very conducive to rapid insect population growth.	If possible maintain storage facilities at or below 16^0 C and R/H at 30% or less.
Reducing food source in the adjacent environment	Stored Product Pests are very attracted to suitable food sources and spillage and debris can sustain a population. If these include penetrators there is a risk of infestation of packaged product.	Good housekeeping and sanitation. Ensure a regular cleaning regime is maintained including a less regular intrusive deep clean in sync with the length of target Pest life cycle so that this is not completed in the adjacent environment such as in spillage under shelving providing food residues.
Robust packaging	Penetrators may infest some packaged products.	Sufficiently robust packaging can prevent infestation in storage, retail, catering and domestic situations.

12.6 Birds

Bird management can be a very complex process involving a wide range of techniques.

The management process can be further complicated by the fact that much work is performed at heights and all necessary safety precautions must be adopted. Ensure that any Pest Manager employed has adequate competencies in this field and is aware of all safety requirements.

A problem of even greater concern is the highly emotive nature of bird management, especially when native species are involved. It is imperative that any Pest Manager is fully cognisant of all relevant legislation and has obtained any permits required.

It is not uncommon for people to raise objection to removal of birds by baiting, trapping or shooting. It often proves essential for biological, emotional or commercial reasons that control measures are carried out in non-business hours, usually early morning or late evening.

It is a legal requirement that all birds are treated in a humane manner and disposed of according to Animal Welfare Acts.

12.6.1 Reasons for Management

Birds are a hazard to Food Businesses principally because:

- **Health Risk** – Birds, bird droppings and nesting materials can carry many different diseases which may be transmitted to humans. Ectoparasites e.g. Starling mites, can cause extreme annoyance to building occupants;
- **Property and Equipment Damage** – Bird droppings are acidic and will corrode many surfaces requiring restoration or replacement;
- **Finished Goods Damage** – Droppings, nesting material, feathers and dead birds can foul finished goods causing their rejection by clients;
- **Poor Image** – Birds roosting on a building or droppings on ledges and footpaths all convey an impression of a business not concerned with the welfare of its customers;
- **Slip Hazard** – Bird droppings can be slippery and cause customers or staff to fall, possibly resulting in legal action;
- **Economic Damage** – The need to clean up bird droppings and other debris on a regular basis can result in unnecessary costs;
- **Noise** – Roosting birds, particularly starlings can produce alarming levels of noise making it very unpleasant to remain in the area;
- **Employee Dissatisfaction** – Staff should not be expected to work in areas which are unsafe or unhealthy.

12.6.2 Main Pest Species

In Australia and New Zealand, there are many Pest birds. The most significant in this category are exotic but an increasing number in urban areas are native species. Some native species have long been considered agricultural Pests.

Some examples of the exotic Pest species are:

- Pigeon
- English House Sparrow
- European Starling, and
- Indian Myna.

Some examples of native species which can be Pests are:

- Silver gull or Seagull
- Sulphur Crested Cockatoo
- Corella (Little and Long-billed species)
- Australian White Ibis, and
- Welcome Swallows (WA).

There are different policies for the treatment of exotic and native species. Treatment methods which can be used against exotic species may be illegal for native species. Permits/licences may be required for native species from appropriate government departments, e.g. National Parks and Wildlife Service (Aust) or the Department of Conservation (NZ). In the case of native species, an officer from the authority may have to carry out a site survey before any treatments can be carried out. NZ and Australian State and Territory authorities have varying regulations relating to bird control.

The strategies which need to be employed for effective bird management are many and varied. They depend upon the particular Pest species, the roosting/nesting locations, "bird pressure" and the population density. "Bird pressure" can be defined as the "level of commitment" of the individual bird or flock to visit an area and their desire to reclaim their former territory after bird management techniques have been put in place.

A site with food, water, shelter and confined spaces for nesting offers high bird pressure. Open spaces with limited shelter from exposure to rain and full sun represent the lower end of the bird pressure scale.

12.6.3 Bird Management Strategies

There are two basic approaches to bird management:

- Alter the environment (roosting/nesting sites) to make it unattractive or impossible for birds to utilise, or,
- Remove the birds from the environment by trapping, baiting and shooting.

Which strategy is undertaken depends upon a range of factors including:

- An understanding of the target pest bird biology is essential.
- The susceptibility of the particular species to the proposed method;
- The nature of the building involved;
- The location of the building. e.g. shooting of birds in the middle of a business district may not be appropriate.

Recommended action for all management tools include:

- Ensure no foodstuffs are available to attract birds to the area.
- Discourage staff from leaving food scraps in eating areas.
- Remove potential nesting materials from the site.
- Remove bird droppings to avoid possible disease transmission.
- All tree branches overhanging buildings should be trimmed.

12.6.4 Alteration of Environment - Exposed Ledges/Lights/Tanks/Gardens

Management Tool	Rationale
Bird Spikes	Installation of polycarbonate or stainless steel spikes on ledges, conduits, flat surfaces and other perches will prevent pigeons from roosting on those sites. This system is effective when bird pressure is "Light" to "Heavy." It is easy to install and long lasting. It is considered to be the most cost effective and permanent solution for preventing birds from landing.
Bird Wire	Installation of nylon coated wire tensioned between stainless steel posts will create an unstable landing area, deterring pigeons, seagulls and larger species. This system is effective when bird pressure is "Light" to "Medium." It is long lasting but takes longer to install than bird spikes. It is a relatively low cost system with a low profile.

Bird Slope	Installation of a PVC triangular shaped strip to ledges turns them into "slippery slopes" and prevents birds from roosting or nesting thereon. This device is effective against all species and when bird pressure is "Light" to "Heavy."
Repeller	These basic devices consist of a cylindrical platform with stainless steel rods protruding from the centre of the unit in a circular array. The rods wave in the wind making the surface unattractive for birds to land. They are only suitable for large birds such as pigeons and seagulls. It can be applied to areas such as tops of street lights, air conditioning units, water tanks and boats. There is also a solar powered unit available. These systems are relatively easy to install. They are effective when bird pressure is "Light" to "Medium."
Optical Bird Scarer	An optical bird scarer that harmlessly deters birds from unwanted areas by making use of light beams reflected from direct sunlight or artificial light. The reflective pyramid rotates via an electric motor, sending the beams around in a menacing pattern. The light spectrum reflected back by the product disorients birds in flight by limiting their vision significantly. This causes the bird to deviate in flight and fly to another destination. It has been effectively used in a wide range of situations for the control of an extensive variety of pest birds.
Electrified Shock Systems	A range of such systems are available all depending upon the principle that birds are rapidly deterred from landing by experiencing an electric shock. Power to these units is supplied by mains electricity or solar panels. The system is low profile and relatively quickly installed. It is effective against all bird species and all bird pressures.
Scare Eyes/Owl or Falcon Bird Scarers	These durable plastic devices are balloons with large eyes or models of owls and falcons. They deter birds from entering an area in which they are displayed. Their efficacy is limited as the birds become habituated to their appearance. They are more effective when moved to various locations and when augmented by other deterrents. They should only be used in "Light" pressure situations.
Distress Calls	Distress calls are made when birds are under duress and serve to frighten birds of the same species from the area. Recordings of distress calls can be played back through cassette players or more sophisticated audio systems. They are mainly effective against species which are good communicators e.g. starlings, seagulls, cockatoos. They are not effective against poor communicators e.g. pigeons, sparrows or swallows. Birds will become tolerant of distress calls after a period of time unless they are supplemented by other measures such as "Scatterbird" or shooting. As the distress calls are repeated *ad infinitum*, workers and residents may object to the noise.

12.6.5 Enclosed Areas

Management Tool	Rationale
Bird Netting	Bird nets are available in a variety of sizes and colours and can be used effectively in areas such as warehouse awnings, loading docks and other covered areas which provide nesting opportunities. Courtyards can also be netted to prevent birds from entering the area. Installation is a lengthy process and can be quite expensive. On the positive side, bird nets should last for 10 years or more. All pest species can be prevented using netting and it is effective with any bird pressure.
Vinyl Strip Curtains/Doors	Vinyl strip curtains or doors are used in passageways of personnel or material handling equipment and are primarily designed to minimise noise or dust and maintain a constant interior temperature but also serves to prevent the entry of birds. These devices are effective against all bird species when fitted and used correctly.

12.6.6 Bird Removal/Reduction

Management Tool	Rationale
Alphachloralose	Alphachloralose is a "soporific" i.e. an agent which lowers the metabolism of warm blooded animals and can cause them to fall asleep. In cool temperatures, the animals can lose so much heat to the environment that they die. Alphachloralose can be mixed with a suitable food medium e.g. wheat or millet, and placed for consumption by target species such as pigeons and sparrows. Native birds which eat the bait will survive if kept warm. Baiting is carried out in the early morning when premises are empty and when no bystanders are in the area. Permits from state authorities are required to use this product. Special permission must be sought when using it against native species. In NZ this product is approved and must be used according to the label. Permits required in some states.
Amino pyridine ("Scatterbird")	"Scatterbird" is a toxic compound which induces distress symptoms in birds consuming it. The birds which eat the bait will die but scare other birds from the area whilst succumbing. Species which are good communicators e.g. seagulls, crows, starlings, are most readily affected. Permits for the use of this product must be obtained from the state authorities. Special permission must be sought when using it against native species. In NZ this product is not registered for use. Permits required in some States. Treatments are carried out in the early morning when premises are empty and when no bystanders are in the area.
Contact Avicides	For the control of pigeons, starlings, Indian Myna and sparrows on roosting sites. This product can only to be supplied and used by a licenced Pest Manager. This material is applied to ledges etc. by a paint roller and kills birds which contact it. Staff/bystanders may object to its use. Therefore, it should only be used under circumstances where non-essential personnel are not in the vicinity or when the premises are vacant.

Trapping	Various sized traps are available depending on the pest species. All traps should be checked daily and sufficient food, water and shelter must always be available. Birds must be humanely disposed of after trapping according to the Animal Welfare Acts. No permit is required to trap feral species. More details may be available on the state authorities' websites.
Shooting	Shooting is carried out using a high powered air rifle and local police must be notified before proceeding. Two people are normally in attendance during the process. The designated shooter must have a Shooter's Licence. Pigeons are the usual target but, sometimes, sparrows and Indian Mynas are shot, especially if they have taken up residence inside premises. Shooting should take place after hours when no unauthorised personnel are in attendance.
Mist Nets/Cannon Nets	These methods are not permitted by law to be used for management programs. In NZ these may be applied with the permission of the Department of Conservation.

12.7 Larger Vertebrate Pests: Cats, Foxes, Wild Dogs, Possums

Cats, foxes, possums and wild dogs are known carriers of disease and bacteria. They should not be present within food production or storage areas.

Exclusion with suitable fencing and for possums, proofing, are the first steps in preventing access. Discouraging feeding of Pest animals by site personnel is also important, as is minimising access to available food sources and harbourage. If the larger vertebrate Pests cannot be built out or driven away the Pest Managers will need to implement a trapping regime.

A trapping regime will use a non-injury causing trap. Pest animals shall be handed over to an appropriate animal welfare shelter.

Note: In Australia possums are a protected native species and it is an offence to relocate them to another area as these animals are often territorial and newcomers not accepted. In these instances exclusion and deterrence is the only option.

In NZ possums are not a protected species and are not subject to any specific protection other than Animal Welfare Act.

12.8 Termites

Termites are commonly, but incorrectly, called white ants. They are social insects that live in a colony like ants or bees. Their sole diet is cellulose so they seek wood, cardboard and paper. They are present throughout Australasia.

The most frequent, and expensive, damage is to structural timbers. In food manufacturing and storage they may also attack packaging material. Alates (winged termites) may cause contamination of food.

Typically, termites that are found will be worker termites seeking food. Killing these will not affect the termite nest nor reduce the risk of ongoing damage. Identification of the termite species is important in the eradication decisions.

If a Food Business discovers termites they should:

- Leave the infested area alone and undamaged; this includes the mud tunnels termites will build over materials like brick and concrete through which they cannot tunnel.
- Barricade the area of infestation to prevent entry.
- Immediately contact a Pest Manager to attend the site – Note: ensure they are experienced in termites, as not all do termite work.
- Understand the implications and agree with the Pest Manager on the termite management program to be implemented.

Several options can be used to manage termites including baiting and application of Termiticides. Eradication without the use of chemicals is not possible although there are options (such as baiting) where the chemical is applied in a well controlled and selected manner. The installation of non-chemical physical barriers is only possible during construction of the building and not an option in existing structures.

13. Selecting a Pesticide

If a Pesticide is required for control of a Pest, the Pest Manager will need to select a pesticide formulation that will not make an impact on the Food Businesses workplace environment or impact on the safety or suitability of their product. The active that kills the pest (the "pesticide") can be formulated in various ways; for example; a dust, liquid spray, solid, gel or liquid bait. It is common the same active will be formulated in several ways and the one selected will depend on the pest and the situation.

Australia and New Zealand each have national regulatory authorities that are responsible for approving registration of pesticides, the formulations and their use. These are:

- Australia – the Australian Pesticides and Veterinary Medicines Authority (APVMA)
- New Zealand – the Environmental Protection Authority (EPA) as of 1/7/2011. (Formerly called the Environmental Risk Management Authority.)

Both bodies, referenced above approve all pesticide formulations and the application including usage rates and the Pest. In some instances the situation, eg. inside or outside, when the pesticide formulation may be used is also approved. These details are noted on the product label. The approved use on the label is legally binding and so-called "off-label" use can only be allowed with a permit. Permits can be obtained from either the national or state authority, depending on the circumstances. Copies of labels can be accessed via the web either on the national regulator site or the individual manufacturers' sites. It should be noted labels can be specific on the region of use as well as other details of use.

As well as the Pest and the application situation, the following need to be considered when choosing a pesticide formulation:

- A **minimum requirement** is that it is approved for that application by the national authority.
- In some instances, other regulatory bodies may also have jurisdiction, for example; AQIS in Australia and NZFSA in New Zealand.
- End user or the Food Business standards.
- If there a need to change the pesticide to avoid resistance developing in the pest population.

A documented risk assessment should be prepared before a pesticide is applied. Sources of information on the pesticide are the manufacturers label and the MSDS or SDS (NZ). It is a legal requirement that these assessments are prepared for all products and are carried by those who carry the products. It needs to be recognised the MSDS/SDS is prepared for the product as supplied by the manufacturer and the risks will change, usually they are reduced, when the product is prepared for use.

Formulations such as dusts and pelletised or liquid baits should not be used in food production and processing areas because of the potential transference to food product. Pesticides should be applied in a precise manner to avoid contamination of food or accidental coverage of non-targeted areas. Many pesticides are formulated so that this risk is negligible, for example; cockroach gels.

Rodenticides must be used in a bait block formulation. Bait blocks must be placed in tamper-resistant bait stations that are anchored except when used for baiting in secure or locked areas, inaccessible voids, or sewer lines; outdoor bait stations must be weather-proof.

14. Pest Management Stations

Pest Management Stations may target rodents, flies, cockroaches, stored product and other pests.

Where any risk of food contamination or other adverse consequences may exist, all Pest Management Stations must be durable, tamper resistant, secured firmly and the bait fully contained.

Stations should be uniquely recorded by location and number on a Pest Management Station site map.

(See also Sub-Section 12.1.9 - *Placement of Rodent Bait Stations*).

15. Organic Food Business Sites

A Pest Manager completing works at an Organic Food Business site should apply this CoP criterion and also provide further non chemical approaches to Pest Management on an Organic Food Business site.

Some of the non-chemical approach may include:

- Mechanical and physical controls
- Horticulture controls

(Additional options for the various Pests can be found in Chapter 12.)

15.1 Philosophy

It is recognised that organic products provide an alternative for those consumers seeking food with little or no chemical residues.

Biodynamic and organic farming methods have evolved over many years through particular philosophical approaches to farming. These reasons generally include a concern about the environmental sustainability of farming and a desire to work with natural processes. Organic farming relies primarily on biological processes, rather than the purchase of chemical inputs, to maintain soil fertility and plant and animal health. It is recognised that these systems of farming can contribute to the outcomes listed above and have therefore developed a Pest prevention or management strategy in support of organic farming.

The Pest Manager providing the Organic Pest Management Program will use or encourage the following measures in order of priority:

- Preventative methods to discourage and exclude Pests, such as sanitation,

  elimination of Pest habitat and denial of access to buildings.
- Approved mechanical, physical and biological methods.
- Permitted substances and treatments.

There shall never be direct or indirect contact between organic products and prohibited pesticides.

15.2 Certifying Organisation

The Organic Food Business needs to be explicit about the certifying standards they are following. The Pest Manager can then modify their efforts to follow the state and country standards and programs recognized by the certification body or authority for the Organic Food Business. The USDA National Organic Program (NOP) is a reference point that may be used. While all organic agents follow the same guideline, there may be different procedures in order to comply with the National Organic Program (NOP), Australian Organic Standard (AOS) 6.1.19 or the New Zealand Organic Standard of the New Zealand Food Safety Authority (NZFSA).

15.3 Location Maps

A Location Map of each facility should be created, showing all pest management devices, and kept in the Service Register. The Location Map will document location and number of bait stations, interior traps, pheromone monitors and Insect Light Traps (ILT). The diagram needs to be updated annually or whenever the location or the amount of the pest management devices change.

15.4 External Rodent Program

The Pest Manager will place and maintain exterior approved bait stations as specified by the scope of work. All bait stations will be locked and secured, serviced as specified by the scope of work, and will be dated when checked. A log will be established in which to note conditions found in the bait stations at the time of service. Accurate record keeping is important for future review of actions taken or recommended. All stations will be recorded on the Location Map. If rodenticide is to be used it must comply with the certification standard. If necessary, permission should be obtained from the certifying agent before using rodenticide.

15.5 Internal Rodent Program

The Pest Manager will place and maintain interior traps as specified by the scope of work. All traps will be dated when checked. Conditions found in the traps at the time of service will be noted on log sheets. If rodent activity increases, then the number of stations may be increased to resolve the problem. Changes will be noted on a revised Location Map which must be dated. If the problem is brought under control and a decision is made to reduce the number of stations, a new Location Map should be created. An inspection should be completed to identify why the problem occurred and findings and recommendations documented in a report.

15.6 Insect Control

Pest Management in an Organic Food Business shall preferably be obtained by non-pesticide means such as:

- Removal of Pest habitat, food sources and harbourage sites.
- Prevent Pests from entering the building (exclusion).
- Make recommendations to modify environmental factors such as lighting, humidity, temperature and air pressure to reduce activity.

(Refer to Chapter 12 for specific actions for the different types of Pests.)

<u>If the above do not achieve the required result pesticides may have to be used. Before they are used the Pest Manager in consultation with the Food Business should obtain approval from the certifying agent.</u>

15.7 External and Internal Treatments

The Pest Manager will conduct a thorough inspection each visit and look for conditions that are conducive to an infestation. All recommendations should be documented on a service report. Pesticides will not be used until other options have been tried. If Pesticides are to be used, only those on the approved list of the certifying organisation shall be used. Pesticides must not come in contact with food, packages, or food contact surfaces.

15.8 Fly Program

Most of the flying insect management tools listed in Section 12.2 are appropriate for use in Organic Food Businesses. However management tools involving insecticides may not be used except under extreme circumstances and then only after consultation with the Organic Food Business and with their written permission.

Fly management tools will be specified in the scope of works and where appropriate, their positions, indicated on the location map. For Insect Light Traps (ILT), dates of light tube and adhesive board replacement will be recorded on the trap when replaced and the ILT log sheets will record insects caught in the traps at the time of service.

15.9 Stored Products

The Pest Manager will utilize Stored Pest Product (SPP) Monitors as specified by the scope of work. The Pest Manager will recommend corrective actions based on SSP activity found during the service of pheromone monitors. All non-pesticide solutions to eliminate infestations must be initiated first. The certifying agent must approve Pesticides to be used.

15.10 Service Register

The following information must be kept in the service register for review:

- State certification/licence
- Company insurance
- Scope of Work (SOW)
- Frequency of servicing - if not specified in the SOW
- Pest sighting register
- Equipment log sheets

- Location Map
- MSDS (or SDS) and labels (electronic or hard copies as appropriate)
- Service Reports clearly indicating the target pest, site application, application method, products used and amounts and all recommendations.
- Summary of Actions and Recommendations worksheet (see below),
- Request to use a product not on the National List, or as required.
- List of Approved Products

The Summary of Actions and Recommendations should be prepared in a way for the certifying organisation to easily see the success or failure of non-pesticide treatments, and if there is a failure the clear reasons to allow the use of approved pesticides.

This would normally contain;

- The specific action item(s)
- Identify whether the Food. Business or Pest Manager is to carry out the actions.
- The dates the action was completed.
- Result of the action – (see Trend Analysis in Chapter 10 for more information).
- Special comments

15.11 Steps if Pesticide Use is Requested

If non-pesticide methods have been tried and the pest problem persists the use of a pesticide may be justified. Good documentation as outlined above will be necessary if this decision is taken.

- If the problem persists, you may use a product on the NOP approved list taking care not to contaminate any organic product or contact surface. You do not need permission to use a product on the NOP approved list. However, you must first document that your attempts at control were unsuccessful utilizing non-pesticide procedures. Check if an approved pesticide can be used without permission.
- A Summary of Actions and Recommendations should be prepared after using the pesticide.
- If the approved pesticide does not achieve the desired result it will be necessary to use a non approved substance.
- An application for use of a non approved substance should be prepared and submitted by the Food Business to the certifying organisation. An outline of previous actions and results should accompany this application.

Information required in this application:

- Pest name.
- Pesticide name, Chemical Class, EPA Reg. #, Concentration.
- Quantity of product to be used.
- Area measurement to be treated.
- Description of steps already taken to this point.
- Description of the area to be treated and a diagram.

Once permission to use a non approved pesticide has been received, the following should be done;

- All food and containers are removed from the area.
- Doors and entry points into the treatment area are closed.
- Use plastic sheeting where necessary to prevent drift.
- Treat and release the area back to the facility.
- Document the service and place the service report in the service register.
- Clean all areas that may have come into contact with the Pesticide spray or drift.
- Return the food items to the area.

16. Key Performance Indicators (KPI's)

Due to the ongoing and challenging problem of controlling Pest activity, to verify the complete effectiveness of a Pest Management Program is very difficult.

Success of a Pest Management Program can be measured by ongoing continuous improvement identified in time frames and by applying the following KPI's:

1) A measureable reduction of Pest activity. The means of measuring to be agreed by the Pest Manager and Food Business.

2) Pest Management Technicians are appropriately licenced and a copy of licence is available in records of service documents.

3) Service is completed in accordance with service frequency.

4) All products used have accompanying current MSDS/SDS.

5) All products used are approved for purpose.

6) All physical equipment complies (eg. Shatterproof UV light tubes, lockable bait stations).

7) Non-conformances by the Pest Manager company are addressed within pre-determined time period.

8) Non-conformances by the Food Business are addressed within pre-determined time period.

9) A detailed service report for each site visit or service is produced and a copy is available in record of service document (eg. Service Register).

10) Pests covered on the Scope of Works (SOW) are either inspected for, or treated and reported on, for each service in accordance with SOW

11) SOW and service requirements are reviewed at least annually to ensure the program is meeting the pest management needs of the facility.

12) A valid contract exists between the pest management service provider and the Food Business outlining the SOW, service frequency, response times to non-conformance, reactive or emergency response times and any other relevant information.

17. Training & Accreditation of Pest Managers

Professional Pest Managers serving the food industry in Australia and New Zealand are commonly referred to as 'Urban' or 'Urban and Commercial Pest Managers' and their licensing and regulation is the responsibility of:

- In Australia – a mix of state governments departments that are responsible for legislation relating to health, chemical usage or OHS.
- In New Zealand – The Environmental Protection Authority (Formerly the Environmental Risk Management Authority) that also has responsibilities similar to the APVMA.

In Australia, in the late 1990's, the state regulation bodies agreed on uniform national competency-based training standards for Urban Pest Managers. The level required is the minimum necessary to obtain a Pest Manager licence and no further on going training is mandated.

In New Zealand, Urban Pest Managers are required to hold a drivers licence. In addition, if they use, store, transport or sell 'Hazardous Substances or New Organisms', which includes most insecticides and certain biological toxins, they will require an 'Approved Handler Test Certificate' which covers only safe handling of toxins. No pest management training or registration is mandated by the government though most larger pest management companies require that employees hold (or are proceeding towards) a 'National Certificate in Urban Pest Management' which is an entry level pest management qualification.

In both countries, training and assessment in Urban Pest Management is provided by government and/or private training providers that are regulated by a national training framework. The training that allows an individual to work as a Pest Manager is geared to facilitating entry into the industry and assumes that further skills and experience will be acquired on the job or added as an optional additional qualification later. As a result the skill levels of Pest Managers varies widely and current training for entry to the industry cannot be expected to equip all Pest Managers to provide the quality of services defined in this Code.

Many pest management companies provide training that goes beyond the basic entry level. Recently the AEPMA introduced into Australia a service quality accreditation scheme, "PestCert", which has as a component, a continuing professional development scheme. The PMANZ has also developed a continuing development scheme that is linked to maintaining the Approved Handlers certificate.

It is the intention of the Working Party, which developed this Code, to define a curriculum of Core Training Elements. These will be based on the Code when it has achieved industry acceptance. This will allow inclusion into the training frameworks that exist in both countries and to establish a mechanism for 'accreditation' of persons who complete the training. It is expected this would be part of continuing professional development program and in this way a pathway will be created for Pest Managers to specialise in servicing the food industry. Food businesses will then be able to identify Pest Managers who have been trained in food pest management at an enhanced level by reference to their accreditation certificate.

Until the anticipated training courses and accreditation processes are in place, food businesses should require that Pest Managers providing services to their organisation are familiar with this Code and can demonstrate previous efforts to comply with Best Practice as defined in the Code.

Training for Food Businesses

This Code continually stresses the need for Food Business staff and associates (eg. consultants, contractors, auditors, etc.) to understand the Code and to work co-operatively with Pest Managers in its implementation. Training required of Food Business staff will cover many of the same core areas as that of Pest Managers but from a different perspective and at a lower level. Part of the process of defining the core elements will be to concurrently define those required for Food Business staff. It is expected that these will be delivered as continuing professional development courses both externally and in-house.

18. Appendixes

18.1 Australian New Zealand Food Standard – What Applies to the Pest Management

Pest Managers need to follow the guidance of the following standards and practices outlined in the following Food Standards Australia New Zealand Act.

Standard 3.2.2 Food Safety Practices and General Requirements
Standard 3.2.3 Food Premises and Equipment

Division 6 — Miscellaneous

24. Animals and Pests

(1) A Food Business must:

(a) Subject to paragraph (b), not permit live animals in areas in which food is handled, other than seafood or other fish or shellfish;
(b) Permit an assistance animal only in dining and drinking areas and other areas used by customers;
(c) Take all practicable measures to prevent Pests entering the food premises; and
(d) Take all practicable measures to eradicate and prevent the harbourage of Pests on the food premises and those parts of vehicles that are used to transport food.

(2) In sub clause (1), 'assistance animal' means an animal referred to in section 9 of the *Disability Discrimination Act 1992* of the Commonwealth.

Editorial note:
Section 9(2) of the *Disability Discrimination Act 1992* refers to an *assistance animal* as a dog or other animal;

(a) Accredited under a law of a State or Territory that provides for the accreditation of animals trained to assist a person with a disability to alleviate the effect of the disability; or
(b) Accredited by an animal training organisation prescribed by the regulation for the purpose of this paragraph; or
(c) Trained:
    (i) to assist a person with a disability to alleviate the effect of the disability; and
    (ii) to meet standards of hygiene and behaviour that are appropriate for an animal in a public place.