CHAPTER 9
Managing Facilities

Overview

Well-designed facilities prevent contaminants moving from early to later process steps and minimises the risk of produce contamination. Facilities should also be designed for ease of cleaning, maintenance and to avoid accumulation of water and debris.

9.1 Introduction

Facilities vary according to the type of business. The facility may be a simple farm building used to store empty picking containers and hold produce ready for dispatch. At the other end of the scale, it can be a building with capacity to pre-cool, treat, grade, pack, ripen and store produce. Facilities include:

- growing sites (e.g. glasshouse, tunnel, net house)
- produce storage areas
- structures used to store packaging materials and other inputs
- buildings used for cooling, grading, washing, treating and packing
- cold rooms, ripening or conditioning rooms
- disinfestation or quarantine structures (e.g. fumigation chambers)
- distribution centres
- market stands.

Other chapters that should be considered with this chapter include:

- Chapter 10: Managing Tools and Equipment
- Chapter 11: Managing Containers and Packaging
- Chapter 12: Managing Vehicles
- Chapter 13: Managing Animals

9.2 The outside environment

Movement from outside areas into the facility increases risk of produce contamination from external sources (Table C9:1). Wind, water runoff and mud can transfer microbes and chemicals into the facility. Additionally, pests (including rodents, birds, insects and spiders) may inhabit surrounding areas, particularly if perimeter weeds are not properly controlled. Contaminants may also be carried on or be spread by vehicles, machinery, equipment and containers or team members.

Image C9:1 | Good practice example of a tidy and clean area outside a facility.

Image C9:2 | Unacceptable practice example with external areas that are not adequately maintained, creating conditions that may harbour pests and increase risk of contamination.

Table C9:1 | Potential external sources of contamination of facilities.

Source	Potential type of contamination
Water source and storage conditions	Facility water source is non-potable and potentially contaminated by animal faeces or dead animals.
Drainage area	Microorganisms (e.g. *Listeria*) from puddles and poorly drained areas enter the facility directly by runoff or carried in on machinery, equipment and team members. Water pooling encourages insect infestations to occur.
Roads and paths	Soil and dust enter the facility on the wind, equipment and team members.
Farm machinery and vehicles	Soil and pests enter the facility on tractors and forklift wheels.
Equipment and containers	Transfer of soil and plant debris into the facility on equipment and containers used during growing and harvesting.
Livestock and pests	Entry of birds, rodents, insects and other animals into the facility. Human pathogens from manure enter the facility directly on dust and in runoff or carried in, on machinery, equipment and team members.
Storage areas for fertiliser, manure or chemicals	Microorganisms and chemicals enter the facility directly by wind and runoff or carried in on machinery, equipment and team members (storage not well separated from the facility).
Facility surrounds	Weeds and plant waste near the facility harbour pests.
Toilets and team member meal areas	Sewage and wash water seep into the facility water source or runoff directly into the facility. Failure to wash and sanitise hands properly (transfer of human pathogens or allergens from team members' hands).

9.3 Inside the facility

It is important to eliminate design features and materials that enable harbourage and cross-contamination of hazards to produce during storage, processing and packaging. Table C9:2 provides a summary of potential contaminants and their sources inside facilities.

Image C9:3| Good practice example of a well-maintained internal environment that helps minimise contamination risks and supports compliance with hygiene standards.

Image C9:4 | Unacceptable practice example with untidy or inadequately maintained internal areas that may harbour pathogens and attract pests.

Table C9:2 | Potential sources and types of contamination inside packing and storage facilities.

Source	Potential type of contamination
Structures (e.g. walls, ceilings, posts, bearers, mezzanine floors, walkways, stairs)	Paint flakes, rust and dirt on structures fall into open containers or packed product. Faeces of birds, rodents and other animals accumulate on structures and drop onto produce, equipment, containers and packaging. Water drips or splashes from structures during cleaning, due to condensation or from leaks during heavy rain. Electric insect killers attract and kill flying insects which then drop into grading equipment or onto produce.
Cool rooms, ripening rooms	Condensation, dripping of water from dirty ceilings, walls and cooling units into open containers. Discharge from defrost and condensate lines. Splashing of water onto produce during cleaning.
Drains	Pathogens such as *Listeria* and *Salmonella* can survive in drains and contaminate product and equipment through splashback and overflow.
Dirty food contact surfaces	Microbiological contaminants such as *E. coli* and *Listeria* can survive on dirty surfaces and in biofilms, potentially leading to repeated contamination of produce.
Lights	Glass from broken lights falling onto produce, equipment, containers or packaging materials.
Storage of equipment, materials and product	Faeces of birds, rodents and other animals accumulating in storage areas. Broken glass, hard or brittle plastic, ceramic or similar material fragments falling onto produce, equipment, containers and packaging.
Chemical storage	Spillage or leakage of chemicals into areas where produce is handled and/or packaging is stored. This includes all agrichemicals, maintenance chemicals, fuel, oil and grease.
Fertiliser storage	Spillage or leakage of fertilisers into areas where produce is handled and/or packaging is stored [refer Chapter 6].
Workshop	Metal shavings and other foreign objects from a workshop located close to areas where produce is handled and/or packaging is stored.
Team members	Jewellery, hair, adhesive plasters/bandages and/or disposable Personal Protective Equipment (PPE).

To minimise risk, key considerations include:

9.3.1 Improved facility design

Contamination potential may be higher at entry to the facility than at the exit. Facility layout should prevent contaminants from earlier steps transferring to later steps in the process. To achieve effective control, consideration should be given to the following elements of facility design:

- process flow
- air flow
- traffic (vehicle) flow
- people movement
- flooring (materials, slope and maintenance)
- water drainage (so that water flows from areas of high hygiene control to areas with lower hygiene control)
- infrastructure to prevent condensation
- storage of unused equipment
- location of repair and maintenance activities.

Ideally, the facility will be described in zones, whereby the level of sanitary control is determined by the type of activities in the zone and the feasibility of implementing controls.

Specific attention should be given to the site, design and maintenance of drainage systems which are high risk for potential product contamination. Critical considerations for drainage include:

- construct using food safe, corrosion resistant materials
- the number and capacity of drains should prevent water accumulation
- ensure waste flows from high-risk to low-risk areas
- prevent backflow
- keep clean and free of blockages with a documented and monitored cleaning schedule
- prevent pest entry using grates or mesh.

For further information refer to the Food Standards Code Standard 3.2.3 Food premises and equipment.

9.3.2 Separation of materials

Areas used for handling and storage of produce should be separated from areas used to store equipment, packaging, chemicals, fuel, oil, grease, fertilisers and other materials. Crates, bins and other containers should be identified for in-field use or facility use (e.g. colour coding). If, in small facilities, clear separation is not feasible then prevention of cross-contamination should be achieved through separation of activities by time, team training and control of workflow. Contamination risks vary depending on the type of produce being produced/packed. The inherent level of risk from the volume and type of produce and the processes used should be considered.

9.3.3 Operate a risk-based cleaning and sanitising programme

The frequency of cleaning, sanitising and maintenance activities depends on the risk of contamination. For example, cleaning and maintenance may be required daily during peak periods of operation, weekly during infrequent operation or annually prior to seasonal operation. A cleaning and maintenance plan should be prepared, detailing the structure or area to be cleaned or maintained and the type and frequency of the activity. A record should be kept of all cleaning and maintenance activities to confirm they have been completed correctly and as scheduled.

The required frequency of cleaning and sanitising can be determined, for example, from the results of environmental monitoring, which also verifies the effectiveness of cleaning and sanitising performed. Guidance on environmental monitoring programmes is available in the FSANZ Compendium of Microbiological Criteria for Food (2025) and UFPA Guidance on Environmental Monitoring for *Listeria* Control in the Fresh Produce Industry, 2nd Edition (2018). As an example, production zones in the facility will determine cleaning regimes as outlined in Table C9:3.

Table C9:3 | Facility zones and cleaning frequencies.

Zone	Cleaning regime
A	Clean and sanitise daily, with possible mid-production sanitation.
B	Clean and sanitise daily.
C	Generally, clean and sanitise daily, but less frequent cleaning of some areas may be appropriate.
D	As appropriate for maintenance of facility hygiene.

This zoning is also used to plan the monitoring programme as shown in **Figure C9:5**.

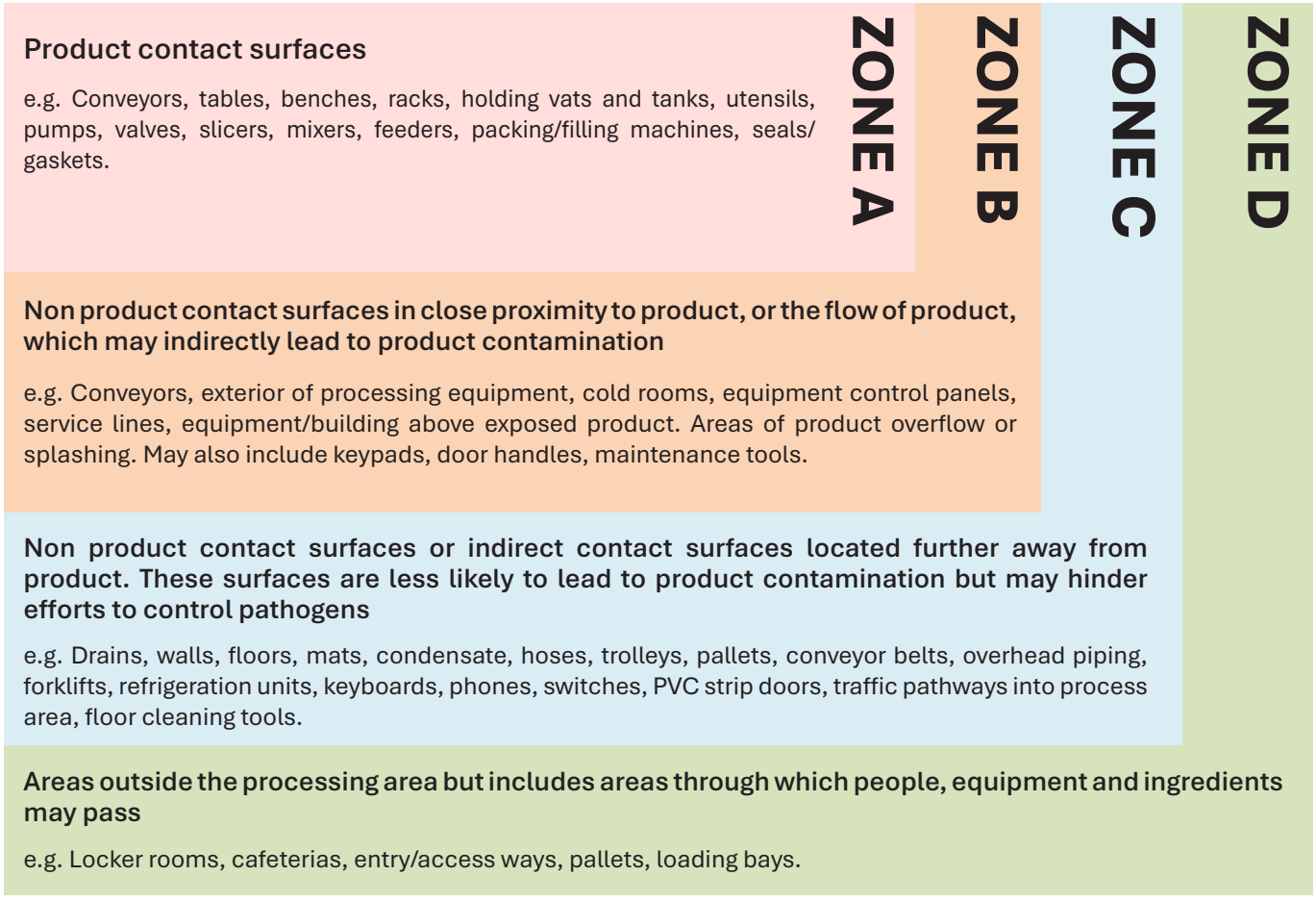

Figure C9:1 | Example environmental monitoring zones and sites (Adapted from FSANZ Compendium of microbiological criteria for food 2025).

Environmental monitoring programmes need to be business specific based on contamination risks (i.e. a risk-based plan should be established) [refer Chapter 18].

The formation of microbial biofilms on food contact surfaces (Figure C9:2) can pose a significant hazard to food safety (food contamination with human pathogens) and food quality (food contamination with spoilage microorganisms).

Biofilms are a community of microorganisms and associated extracellular products (polysaccharides, eDNA, proteins, lipids) growing on a surface. The extracellular matrix (slime layer) enhances the survival of the microbes in hostile environments and increases their resistance to sanitisers and other stressors (UV, heat, drying).

To minimise or potentially prevent biofilm formation, the food facility should have developed an efficient cleaning and sanitising programme, noting that these programmes can fail due to the development of microbial dormancy among biofilm-associated cells. To prevent this, cleaning and sanitising programmes should be limited to sanitisers that have a growth-independent mode of action (i.e. the sanitiser will kill or damage microbes whether or not they are in an active growth phase).

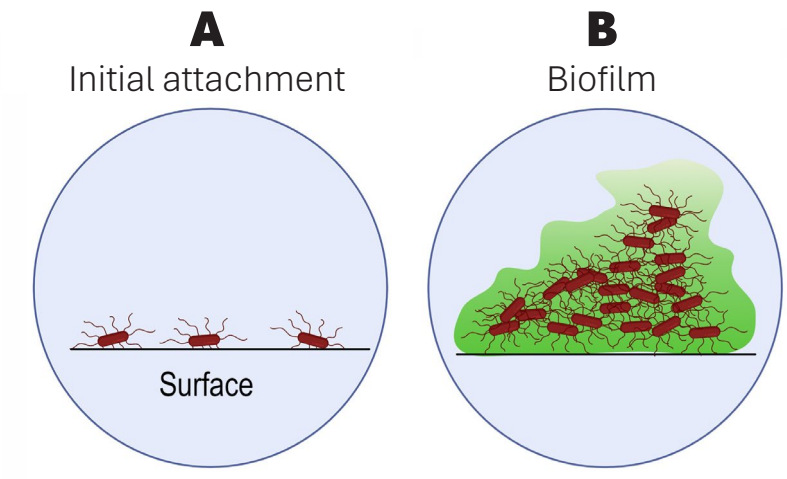

Figure C9:2 | Diagram of a microbial biofilm. Biofilms may form on equipment surfaces resulting from ineffective cleaning and sanitising if inappropriate processes and chemicals are applied (Adapted from Vidovic et. al, 2024).

9.4 Good practice for facility management

Table C9:4 | Summary of good practices for facility management.

Management are	Good practices
Design	Hygienic design principles should be considered at the design stage of any new facility to be constructed.
Exclusion	Entry of soil, dust, water and other potential contaminants from the outside should be minimised or managed. A pest control program outside and inside the facility should be implemented and monitored (refer Image C9:5).
Structure	Facility structures should be kept clean, free of vermin and well maintained.
Separation	Produce should be separated from storage areas for chemicals, fuel, fertilisers or other potential contaminants. Containers and equipment used in the field should not be used or located in finished product areas.
Layout	The layout of the facility should prevent contaminants from earlier steps in the process (e.g. arrival and pre-wash), transferring to later steps in the process (e.g. packing and storage).

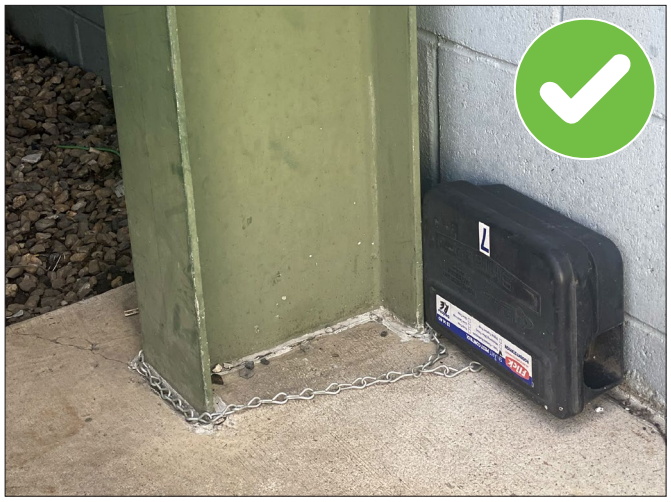

Image C9:5 | Good practice example of a numbered bait station, secured in place to prevent movement and maintain effective pest control.

Image C9:6 | Good practice example of under-building mesh, providing protection from pests.

Image C9:7 | Good practice example of a meshed window, providing protection from flying insects.

Image C9:8 | Good practice example of ultraviolet light used to attract flying insects, which are then captured on glue boards instead of being electrocuted. These are widely used in packing sheds and protected cropping environments due to their low risk of insect fragmentation (unlike electric zappers).

Resources

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Schmidt, R.H. and Erickson, D.J., (2005). ***Sanitary design and construction of food equipment***. FSHN0409. Gainesville, FL: IFAS Extension, University of Florida.

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