Local Government Air Quality Toolkit

Beef cattle feedlots guidance note

Information on good design and management practices to reduce air emissions from feedlots

Acknowledgement of Country

Department of Climate Change, Energy, the Environment and Water acknowledges the Traditional Custodians of the lands where we work and live.

We pay our respects to Elders past, present and emerging.

This resource may contain images or names of deceased persons in photographs or historical content.

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Cover photo: Cattle on a feedlot. BeyondImages/iStock

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Contents

List of figures

1. Introduction

1.1 Industry overview

This guidance note provides general information on good design and management practices to reduce air emissions from feedlots. It does not cover nutrient management, cattle health, work health and safety, cattle productivity or greenhouse gas emissions.

A beef cattle feedlot is a confined yard area with watering and feeding facilities where cattle are hand or mechanically fed for beef production.

Feedlots that have the capacity to accommodate more than 1,000 head of cattle for rearing or fattening them (wholly or substantially) on prepared or manufactured feed (excluding facilities for drought or similar emergencies), are scheduled activities under the *Protection of the Environment Operations Act 1997* (the POEO Act), being 'livestock intensive activities'. Scheduled activities require an environment protection licence (EPL) and the NSW Environment Protection Authority (EPA) is the appropriate regulatory authority (ARA) for the purposes of the POEO Act.

Local government is the ARA for feedlots housing fewer than 1,000 head of cattle.

Local councils can influence the initial siting of all intensive agricultural industries through land-use planning and the development approval process. This is usually the most important decision on air quality management.

The environmental management and resolution of any air pollution-based nuisance or off-site impacts caused by odour and dust from beef cattle feedlots are the responsibility of the site operator.

Figure 1 **Cattle in a feedlot**

Source: SlavkoSereda/iStock

There are approximately 400 accredited feedlots in Australia as of 2023, the majority of which are in Queensland (about 60%) and New South Wales (about 30%).

Cattle arrive at the feedlot and receive veterinary treatments (vaccination, tagging, etc.) and are slowly introduced to a grain diet. This prevents acidosis occurring (grain poisoning).

The cattle arrive with liveweight ranging from 300–450 kg, and are slaughtered when they weigh 600–750 kg. These final liveweights depend on the market for which the cattle are being produced.

While they are in the feedlot, cattle are fed grain-based rations designed to promote high weight gain. Depending on the feedlot system, in Australia this weight gain can range from 1–1.8 kg per day (FutureBeef 2022).

The intensive raising of cattle has resulted in environmental and other challenges, especially when feedlots are located near rural residential areas.

1.2 Facility structure and design

The basic components of a feedlot include:

- pens where the cattle are accommodated – these are usually outdoors but can be covered
- a feed storage and processing area
- effluent holding ponds (including a sedimentation basin)
- a solid by-product storage and treatment area.

Where feedlots are sited on large properties with co-located cropping areas, treated by-products can be reused on these crops.

Other features of a feedlot, although less significant from an air quality perspective, can include:

- roads and infrastructure (including a weighbridge)
- veterinary services areas
- administration and accommodation buildings.

The raw materials of feed (grain, hay, silage, etc.) are delivered to the feedlot and stored, ready for processing.

Feed rations are mixed and prepared on demand using methods such as steam flaking or milling and are loaded onto trucks to be distributed into feed bunks (concrete troughs alongside each pen) throughout the feedlot.

Odour and dust emissions can be significant and are considered in Chapters 2 and 3 below.

At smaller-scale feedlots, feed processing may not be carried out on site and self-feeders may be used. These require filling only once or twice a week and are easily transportable. However, without regular cleaning, they accumulate manure and spilt feed underneath, increasing the potential for odour generation.

Both solid and liquid excrement accumulates on the feedlot pad (the pen surface) and under fences, and needs to be cleaned regularly. This can be done using box scrapers, bobcats or front-end loaders. The manure can be removed to the solid by-product treatment area or stored within the pen – a process called mounding. The manure in the mound is then removed when quantities become excessive.

The *National Guidelines for Beef Cattle Feedlots in Australia* (MLA 2012a) note that regular pen cleaning should maintain manure depths on the pen surface at 50 mm or less. Historical practices, like those used in the United States, allowed long periods between cleaning, leading to manure depths of up to 300 mm. Under this system the pen surface can take a long time to dry out after rain, increasing odour emissions.

Figure 2 Feed bunk at a feedlot

Source: ribeirorocha/iStock

Figure 3 Cleaning manure under fences

Source: Tucker et al. 2015

Figure 4 Truck delivering feed in a large feedlot

Source: Nordroden/iStock

Figure 5 Manure mounding using a box scraper

Source: Tucker et al. 2015

Rainfall and run-off

As the pen surface is exposed to rainfall, and is relatively impermeable, considerable run-off occurs during a rainfall event. Modern management including maintaining shallow depths of manure on the surface of the pen (discussed above) limits the moisture storage capacity of the surface. Hence run-off may occur after 10–15 mm of rain.

Well-designed feedlots drain completely into drains that discharge to a sedimentation basin, leaving no ponding on the pen surface. In the sedimentation basin the effluent velocity is reduced, causing solids to fall out of suspension, reducing the treatment requirements for the holding ponds. From the sedimentation basin, the effluent typically overflows through a weir into the holding ponds, where anaerobic bacteria (those that thrive in the absence of oxygen) break down the organic matter remaining in the effluent. The treated effluent is usually irrigated to land.

All run-off from the feedlot should be diverted to the sedimentation basin and holding ponds. Clean run-off from outside should be prevented from entering the feedlot complex to reduce the required capacity of the effluent holding ponds.

Solid by-products

Solid by-products are typically stockpiled or composted before application to land. Most large feedlots also sell manure off site for application to cropping land as a fertiliser.

2. Potential emissions to air

2.1 Overview

All air pollutants should be considered during the planning process and addressed within consent conditions, where relevant. The site operator is responsible for compliance with all consent conditions. The main air emissions that can arise from cattle feedlots are odour and dust. The various potential sources are noted below.

Figure 6 represents the process through a typical feedlot system. It shows air quality issues relating to each stage of the production process, in this case odour and dust.

The dominant issues concern the management of effluent, including clearing, storage and disposal. These management practices are discussed in more detail in Section 3.2.

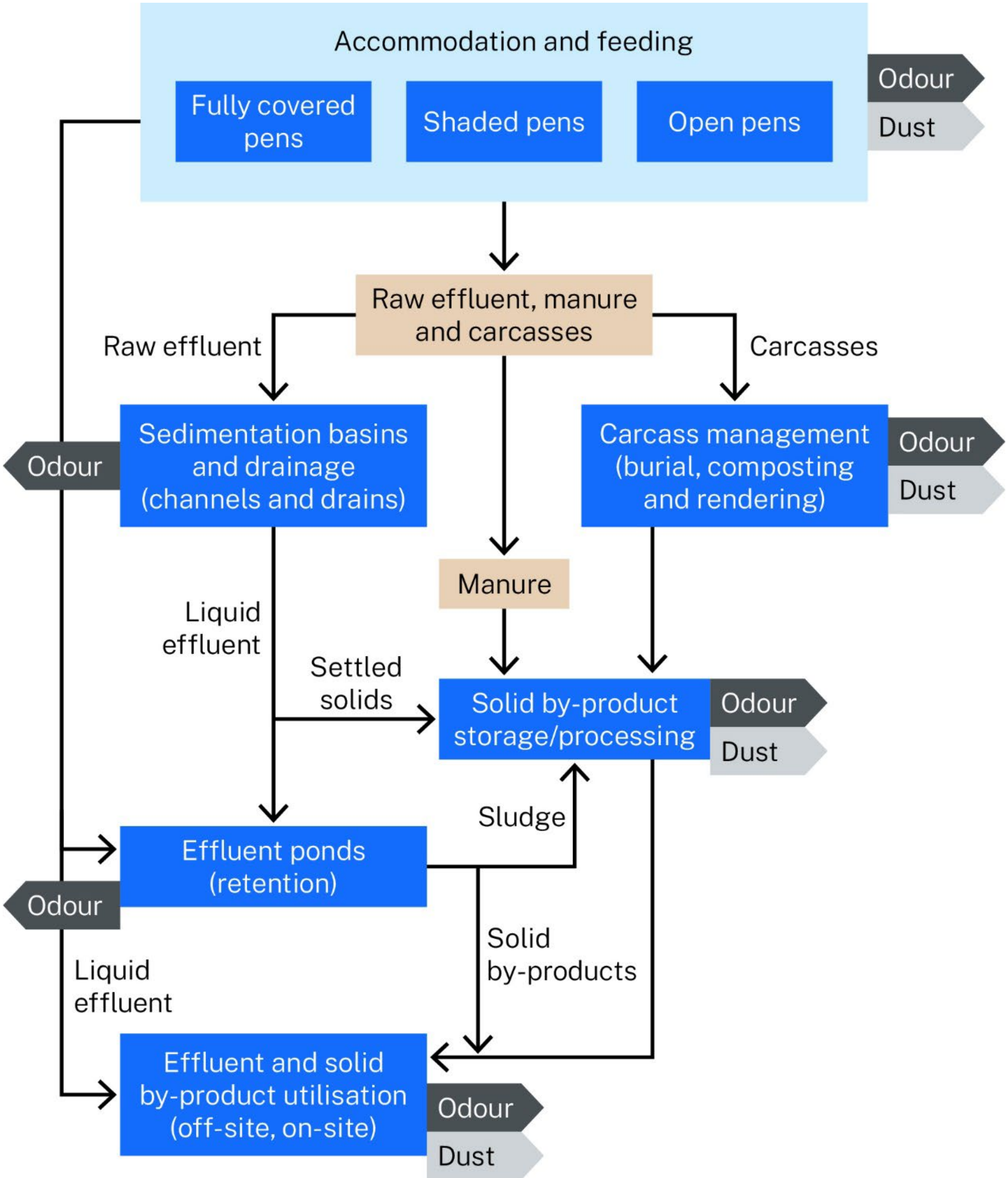

Figure 6 **Feedlot process diagram showing air quality issues for each step**

2.2 Odour

Odours at cattle feedlots arise from:

- the surface of holding pens
- feed storage and spillage
- run-off / effluent collection and treatment (ponds)
- storage and processing of solids
- land application of effluent and solids
- disposal of carcasses.

The biggest source of odours at cattle feedlots is the surface of the pens where the cattle are raised, fattened and held. As such, this is likely to be where odour management efforts should be focused.

2.3 Dust

Dust from cattle feedlots arises from:

- movement of cattle within the pens, particularly when conditions are dry
- storage and processing of solids
- land application of effluent and solids
- disposal of carcasses
- grain / feed handling
- wheel generated dust on dry and unsealed road surfaces.

3. Managing air pollution

Control mechanisms that feedlot operators can use to minimise air pollution are limited where:

- anaerobic processes are necessarily involved (the processes by which bacteria break down organic matter in the absence of oxygen, usually when material is moist or wet)
- large odorous areas are exposed (e.g. holding areas, collection ponds, solids storage).

Management that promotes aerobic breakdown or complete anaerobic breakdown of manure results in less odour.

The following sections outline a range of mitigation methods and best practice measures that operators can employ to reduce their air emissions and environmental impact.

3.1 Location of feedlots

As noted in Chapter 1, local councils can influence the initial siting of a feedlot through the development approval process. Siting the operation well by considering its proximity to sensitive neighbours is critical, because dispersion is the main method of managing off-site impacts of both odours and dust.[1]

Newer, larger feedlots have mainly been established in areas relatively remote from rural towns and urban settlement. Some smaller feedlots, which are likely to be regulated by local government, are located where they have potential to give rise to air quality complaints.

The use of appropriate separation or buffer distances is a widely recognised method of mitigating off-site odour impacts. The fundamental principle is that fugitive odour and dust emissions tend to radiate out from a source and are diluted along the way.[2]

Controlling such air emissions with pollution control equipment is not feasible for the large areas / air volumes involved, so separation distance is the most practical means of dispersion. Thorough assessment at the approval stage is therefore very important.

Further information about the planning process can be found in the Air quality toolkit – *Land-use planning guidance note*.

[1] The fundamentals of dispersion and how this affects air quality are discussed in the Local Government Air Quality Toolkit – Module 3, *Air pollution control techniques*.

[2] Fugitive emissions are uncontrolled emissions that do not arise from controlled point sources, such as vents, stacks, ducts and exhausts. They typically arise from evaporation, windblown or mechanical disturbances. It is usually impractical or impossible to capture or contain such emissions – hence they are termed ‘fugitive’.

The *Technical Framework: Assessment and management of odour from stationary sources in NSW* (DEC 2006a) and the accompanying *Technical Notes: Assessment and management of odour from stationary sources in NSW* (DEC 2006b) outline the Level 1, or screening, assessment procedure for large diffuse sources such as feedlots. This is to determine whether a facility is likely to cause odour impacts, primarily based on a calculation of optimum separation distance for the number of cattle at that facility.

The same equation and accompanying methodology is also presented in Appendix B of the *National Guidelines for Beef Cattle Feedlots in Australia* (MLA 2012a).

The *Technical Notes* show the equation for calculating this separation distance (D) as follows:

$D = \sqrt{N} \times S$

N = Number of standard cattle units (SCU)

S = Composite site factor (S1 x S2 x S3 x S4 x S5). Site factors S1, S2, S3, S4 and S5 are determined according to site-specific information relating to stocking density, feedlot class, receptor, terrain, vegetation and wind factor.

The total SCU is calculated using the conversion factors in Table 7.1 of the *Technical Notes* for the different types of cattle at the facility and their approximately liveweight.

SCU = (Number of type A cattle **x** conversion factor for the liveweight of type A cattle) **+**

(Number of type B cattle **x** conversion factor for the liveweight of type B cattle)

Standard cattle units

Cattle feedlots may have a range of cattle types, with an animal weight range from 350–750 kg. For a cattle feedlot, the number of SCU can be calculated by using the data included in Table 7.1 of the *Technical Notes*. It allows the manure and odour potential of different weight cattle to be derived from SCU.

The composite site factors (S1, S2, S3, S4 and S5) are determined according to site-specific information and each is described in detail in the *Technical Notes*.

Worked example

Scenario: A new Class 2 cattle feedlot proposes to rear 800 head, comprising 300 trade cattle and 500 Jap Ox cattle. The cattle feedlot is in an area with annual rainfall less than 750 mm, has a stocking density of 15 m^2 per beast, is near a rural residence, on a flat site with few trees and normal winds.

Calculation of SCU

Trade cattle have an average liveweight of 400 kg and Jap Ox have an average liveweight of 550 kg. Using the liveweight factors in Table 7.1 of the *Technical Notes*, the total number of SCU is therefore calculated as follows:

N = (300 x 0.74) + (500 x 0.94) = 692 SCU

The remaining site factors are determined using the information presented in Section 7.4 of the *Technical Notes*.

Site data

S factor	Value	Feature	Reference in Technical Notes
S1	78	–	Table 7.2a
S2	0.3	Rural farm residence	Table 7.3
S3	1.0	Flat topography	Table 7.4
S4	0.9	Few trees	Table 7.5
S5	1.0	Normal wind frequency	Table 7.6

Equations

S = S1 x S2 x S3 x S4 x S5

D = √N x S

Calculations

The minimum distance from a rural residence is:

D = √692 x 78 x 0.3 x 1.0 x 0.9 x 1.0 = 554 m

Two feedlots considered as one feedlot

For calculating the separation distance to a receptor, the 2 feedlots can be considered as one single feedlot if they are closer than half the shortest separation distance from each feedlot to the receptor.

For example, if 2 feedlots have individual separation distances of 400 m and 600 m from a receptor, they will be assumed to be one feedlot for the purpose of calculating separation distances if they are closer than 200 m from one another. If the feedlots are further apart than 200 m, they will be treated as separate feedlots.

Two feedlots considered separately

Where the 2 feedlots are considered as separate entities, a 20% increase in separation distance applies to the proposed second feedlot.

For each feedlot:

- add 20% to the required separation distance (as calculated above)
- consider this distance as the radius of a ‘separation zone’
- determine whether the 2 zones overlap.

If the zones overlap, the added 20% applies to the separation distance of the second feedlot. If the zones don’t overlap, the ‘normal’ separation distance applies and the separation distance of the existing feedlot is not affected for its current level of operation.

Figure 7 is a visual representation of this method.

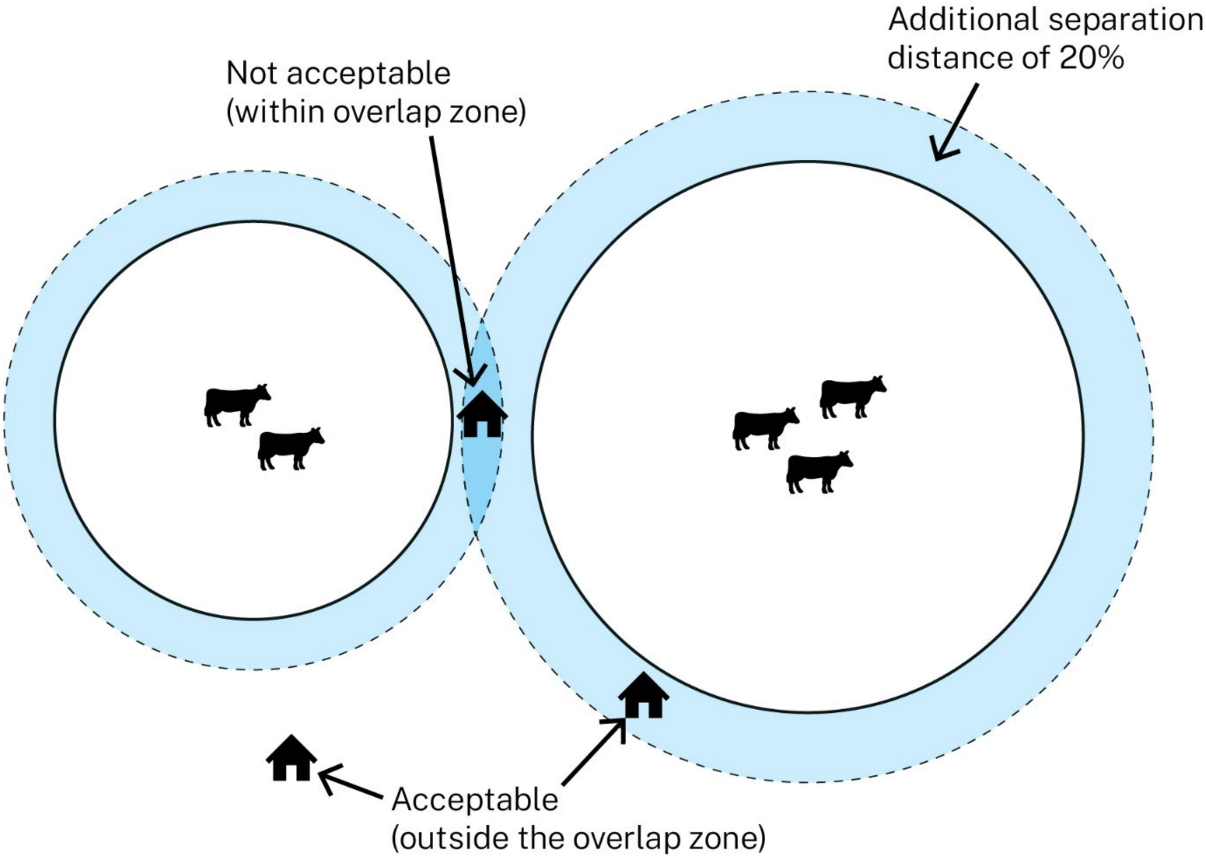

Figure 7 **Separation distance when 2 feedlots are considered separately**
Source: adapted from DEC 2006b

As noted previously, this is a screening method to understand if impacts on local receptors may occur. The screening assessment should present all the information used to calculate the separation distances as well as justification for all inputs.

The screening methodology is by nature conservative. Therefore, where sensitive receptors are sufficiently removed so as to fall outside the calculated separation distance, the likelihood of impacts is low and no further odour assessment is required.

However, when the calculation yields a separation distance that does not satisfy the existing environment and receptors fall within this zone, dispersion modelling may be completed to refine the assessment further. For requirements and considerations for modelling, see Section 4.3 of this guidance note.

Each assessment should be site-specific and determined on a case-by-case basis whether it is appropriate to use a separate distance calculation and/or air modelling.

3.2 Managing odour

The pen surface is one of the largest sources of odour in a feedlot. Good pen design is therefore very important and feedlots must have a system that controls run-off well and has good drainage.

Some good design objectives for pens can be found in chapter 17 of *Beef cattle feedlots: design and construction* (the Feedlot Design Manual) (Watts et al. 2016), and include measures that can be adopted to maintain stable surfaces and minimise odour emissions.

Some of the measures that can be adopted to minimise odour emissions, and that may be adopted within consent conditions at the site development planning and approval stage, are detailed below.

Controlling moisture content

Moisture content is influenced by:

- pen design
  - pen slope should be in the range 2–5%, typically 3%
  - pen surface type (best practice is a quick drying surface that does not erode during run-off)
  - direction of pen run-off (avoid pen-to-pen drainage)
  - design of feed bunks and water troughs
  - design and construction of any shade structures – these influence pad moisture content in shaded areas
- pen stocking density
- pad cleaning frequency
- pen and water trough maintenance.

Figure 8 and Figure 9 show examples of poor drainage, allowing moisture to accumulate within the pens. This may be because there is insufficient slope to allow drainage, or from adopting pen-to-pen drainage where run-off has to flow through each pen to reach the holding pond.

Figure 8 Drainage slope too flat to allow effective run-off

Source: Watts et al. 2016

Figure 9 Poor design with pen-to-pen drainage

Source: Watts et al. 2016

Controlling temperature

Controlling the temperature of the pen surface by using shading structures helps minimise odours (Figure 10).

Figure 10 **Shading structures in place at a feedlot**
Source: Thurtell/iStock

Managing feed storage

Measures that can be adopted to minimise odour emissions from feed storage facilities include:

- controlling moisture content
- aeration
- controlling temperature.

Chapter 30 of the Feedlot Design Manual (Watts et al. 2016) notes that standard grain grades with moisture contents of 13–18% do not usually cause problems, flowing freely through storage silos, but high moisture content grain can lead to material flow issues. Moisture content of the grain can change with the environment in which it is stored and this should be monitored to help ensure the overall condition of the grain.

Temperature is also important in conjunction with moisture content. As the temperature rises, the safe level of moisture in the grain must be reduced for good quality storage. Keeping these 2 in balance helps feed flow remain consistent, reducing clogging and the build-up of odour. Watts et al. (2016) provide more advice on optimising these aspects.

Silage pits can generate nuisance odours and need to be sufficiently separated from receptors.[3]

The key issue for odour emissions from feed distribution is feed wastage. To help avoid this, feed supply needs to be matched to cattle requirements.

[3] Silage is a type of fodder made from green foliage crops that have been preserved by fermentation to the point of acidification.

Handling and treating run-off

While handling and treating run-off is predominantly a water quality management activity, there are significant implications for odour generation associated with this activity. For this reason, good practice measures are discussed below.

Feedlot effluent is predominantly composed of run-off, which picks up and transports some manure into the effluent holding ponds. Some effluent may also come from feed processing operations. Run-off can be exacerbated after a storm event.

Feedlot drains collect run-off from areas within a feedlot (predominantly pen surfaces and roads) and transport it to the effluent treatment system. The lengths of drains and the catchment area serviced by each drain vary with feedlot layout.

The effluent treatment system at most feedlots comprises a sediment trap (basin) and holding ponds. Sediment traps capture solids before the effluent is discharged to the holding ponds. Holding ponds are used to treat effluent before it is used for irrigation or as flushing water in the holding yard.

Measures to manage odours from run-off treatment and handling are outlined below.

Drain design and management

- Adequate slope is required (generally 0.5%).
- Appropriate surface for self-cleaning drains (to prevent scouring).
- Drains should be kept free of manure. Figure 11 shows a clean drain, while Figure 12 shows a poorly maintained drain with built-up vegetation and manure.

Figure 11 Well constructed and maintained concrete drain

Source: Watts et al. 2016

Figure 12 Poorly maintained drain

Source: Watts et al. 2016

Sediment trap design

Important factors to consider:

- weir design
- trap volume
- vehicle access for solids removal
- use of parallel sediment traps, allowing one to dry out while using another.

Sediment trap operation

Important factors to consider:

- weir maintenance
- regular removal of solids to avoid blockage of flow.

Holding pond design

Important factors to consider:

- volume – adequate capacity to treat incoming effluent
- volume changes after an inflow event
- using parallel ponds, to alternate de-sludging and treatment.

Holding pond management

An ongoing maintenance program is important for assessing potential problems and enabling them to be rectified before they eventuate. Important factors to consider:

- retaining some effluent at all times, providing there is sufficient capacity to prevent overtopping during inflow events
- de-sludging of ponds with sufficient frequency to ensure pond capacity for liquid storage is not reduced
- where pond capacity is inadequate, the following options are available to increase the pond treatment volume:
  - increase frequency of de-sludging
  - improve solids separation before discharge to the effluent treatment pond
  - install a second treatment pond in parallel, requiring diversion of some of the untreated effluent into the new pond.

Sludge removal using a vacuum tanker

Important factors to consider when using a vacuum tanker to remove sludge:

- ensure this causes minimal disturbance of the pond
- the activity requires having sufficient land close to the pond for immediate spreading
- this involves safety hazards for workers due to the extreme toxicity of the hydrogen sulfide gas that can be released when handling sludge; appropriate health and safety precautions must be followed. Refer to the SafeWork NSW *Exposure of workers to hydrogen sulphide gas safety alert* (SafeWork NSW 2018) and Safe Work Australia confined spaces code of practice (Safe Work Australia 2011).

Sludge removal using an excavator

When using an excavator for this process it is important to consider:

- this method completely empties the pond and may disturb the pond lining
- the sludge is likely to be an odour source when wet and may take time to dry
- de-sludging should be done in dry weather only.

Sludge removal by agitating and pumping

- Agitating the sludge and pumping it out also causes a large disturbance to the pond volume.
- Sufficient land must be available close to the pond for applying the sludge mix.

Land application of effluent

Feedlot effluent (waste solids) is usually reused through irrigation to land as fertiliser. Effluent irrigation is encouraged when it is safe and practical to do so and where it provides the best environmental outcome (DEC 2004). In most instances, the effluent is applied to each area in small quantities. Prior to reuse via application to land, the current orders and exemptions should be reviewed to ensure conditions are met (see EPA 2014a, 2014b).

When effluent is applied to land, the key management factors influencing odour emissions are:

- quantity of material remaining on the soil surface after application
- odour potential of the material being applied
- avoiding application onto wet soil
- prevailing and forecast weather conditions and the location of the land application relative to receptors – avoid spreading in calm conditions (early morning, late afternoon) when dispersion is likely to be poorer, and make sure receptors are upwind
- avoiding weekend application if local odour impacts are likely
- level of treatment achieved – effluents should be aerobic if applied by spray
- quantity of air emissions formed during application.

> The potential for air emissions to impact on receptors depends largely on the proximity of receptors to the application area and the dispersion conditions at the time of application.

Odour emissions are influenced by the method of application and how the application is managed.

Effluent application methods include:

- spray irrigators – low pressure systems produce less airborne contaminants than high pressure systems
- surface drip or trickle (surface or subsurface) irrigation – produces less air emissions than spray irrigation but is often not a practical alternative
- tanker spreading – distributes effluent evenly and produces less air pollution
- travelling drip irrigators – distribute effluent evenly and produce less air pollution
- direct (deep) injection – minimises odour
- open pipe – is a poor option; while spreading effluent directly from the pipe produces fewer airborne contaminants it spreads effluent very unevenly, which can result in pooling
- irrigation with droppers.

Solid waste handling and land application

- Odour emissions can be minimised by maintaining a dry surface and preventing water-logging of materials.
- Solid by-products should be formed into piles where possible.
- Piles should be established on a low-permeability, slightly sloping surface.
- Operations disturbing stockpiled material should be undertaken away from neighbouring receptors and during the middle of the day as much as possible, when weather conditions are most likely to disperse any odours.
- Solid wastes (manure, settled solids from sedimentation and treatment ponds, carcasses, spilt feed and grain dust) should be treated as soon as possible after collection.

Downwind odour

The timing of operations that disturb stockpiled materials (e.g. shifting piles or spreading material) influences downwind odour concentrations.

Anaerobic activity in solid waste

Anaerobic activity (processes by which bacteria break down organic matter in the absence of oxygen) in solid wastes can be avoided by composting the material, but this requires extra management and access to appropriate equipment.

Important factors to consider:

- moisture levels, degree of aeration and other factors influence the odour emissions
- for effective results, composting requires expert design and close management
- a delay between collection and treatment of solid by-products influences odour emissions.

Composting Animal Manures: A guide to the process and management of animal manure compost (Keena 2022) provides general information on this process.

Treatment of carcasses

Common treatments for carcasses include composting, rendering or burial. Information on best-practice procedures for different treatment options can be found in the *Animal carcass disposal* fact sheet (DPI 2021).

Composting

Carcasses are readily composted, but the volume of material used to cover the carcass is important for controlling odour emissions. Composting must be managed correctly to achieve adequate carcass disposal and can be a time-consuming practice. Refer to the *Animal carcass disposal* fact sheet (DPI 2021).

Regarding composting, the size of the operation and type of waste will determine whether the scheduled activity of 'composting' under the POEO Act is being carried out at the facility or whether a non-scheduled activity is being carried out, and therefore who the ARA is. This is detailed in Chapter 4 of this guidance note.

Rendering

Rendering carcasses is a suitable disposal method for producers located near a rendering plant.

Burial

For carcasses that are buried, odour emissions are influenced by the amount of soil cover over the carcasses. Information on burial pit depths and soil cover is in the *Animal carcass disposal* fact sheet (DPI 2021).

Incineration and burning

Incineration is rarely feasible on a farm and burning is not advisable as it releases smoke, odour and potentially biohazardous material into the air. Burning may only be permissible in response to a disease outbreak or a mass mortality incident.

Treating odour emissions

Solid by-products should be treated as soon as possible after collection to minimise odours.

Where by-products are stored, temperature and exposure to wind and water should be minimised as much as possible.

A good depth of soil or compost substrate should cover carcasses (2 m minimum) and surface water run-off should not be able to enter the area.

3.3 Managing dust

Dust emissions from beef cattle feedlots are unlikely to cause impacts unless receptors are close to operations, or conditions are exceptionally dry. Consent conditions will most likely relate to odour rather than dust as dust can generally be controlled with good management practices for heavy vehicle movement, windblown dust from large exposed dry areas, feed storage, processing and handling, and spreading of manure.

Issues to be aware of regarding dust management:

- Separation distances that are adequate to mitigate odour impacts at closest sensitive receptors will usually also be adequate to mitigate dust impacts at these locations.
- Moisture content and particle size of materials can be important. Manure, grain dust and composted material contain fine particles that contribute to dust emissions when these materials are dry, and can be blown over large distances when they become airborne, particularly on windy days.
- Dust within feedlot accommodation areas is influenced by pen stocking density.
- Dust can arise from the feedstuffs and feed infrastructure such as on-farm milling facilities used. Attention should be paid to
  - design and management of storage and feed processing areas and enclosing them if necessary
  - siting feed processing areas away from sensitive receptors
  - reducing drop heights from silos to delivery equipment.
- Dust can be generated from cattle movements over extremely dry ground. Over time the ground may become dusty and cause a problem.
- Constructing roads with low silt-content materials (such as gravel) can reduce wheel generated dust.
- The quantity of dust carried off site can be reduced by installing windbreaks, such as vegetative screens or hessian walls, or by wetting dusty material.
- Water sprays can settle dust and consolidate dusty surfaces but will not be feasible in many feedlot situations as they introduce more water to the site, requiring efficient drainage.
- Timing and management of any operations involving the movement of dusty materials is critical. For example, moving dusty material during periods of high winds is not desirable.

4. Considerations for local councils

4.1 Scheduled or non-scheduled activity

As discussed previously, an activity carried out at a facility is designated as scheduled or non-scheduled in the POEO Act depending on its size and the processes being undertaken at the site.

If scheduled activities are carried out at the facility, the EPA is the ARA for the purposes of the POEO Act. Schedule 1, Part 1 of the POEO Act provides a definition of the scheduled activity of *Livestock intensive activities* and specifically *cattle, sheep or horse accommodation*.

Clause 22 Livestock intensive activities

1. This clause applies to the following activities—

   cattle, sheep or horse accommodation, meaning the accommodation of cattle, sheep or horses in a confinement area for rearing or fattening (wholly or substantially) on prepared or manufactured feed (excluding facilities for drought or similar emergency relief)

2. Each activity referred to in Column 1 of the Table to this clause is declared to be a scheduled activity if it meets the criteria set out in Column 2 of that Table.

Column 1 Activity	Column 2 Criteria
cattle, sheep or horse accommodation	capacity to accommodate more than 1,000 head of cattle, 4,000 sheep or 400 horses at any time

If the activity carried out at the facility is non-scheduled, the local council is the ARA for the purposes of the POEO Act and can direct the operators to ensure that the activity is carried on in an environmentally satisfactory manner and in accordance with best practice.

Existing problems can be addressed using 2 sets of regulatory tools:

- orders requiring compliance with consent conditions under Division 9.3 and Schedule 5 of the *Environmental Planning and Assessment Act 1979* (the EP&A Act)
- environment protection notices under Chapter 4 of the POEO Act (see the Local Government Air Quality Toolkit – Module 2 and Module 4), including:
  - a prevention notice (Part 4.3) or series of notices, where the ARA suspects the activity is being carried out in an environmentally unsatisfactory manner
  - a clean-up notice (Part 4.2), where there is a pollution incident within the meaning of the POEO Act
  - both a prevention notice and a clean-up notice.

If issues are identified, the following tools are available in the Local Government Air Quality Toolkit – *Resource pack*:

- Chapter 3 – checklists for investigating odour, fallout (dust deposition) or other complaints
- Chapter 6 – checklists for reviewing air quality assessments and dispersion modelling.

Under the POEO Act notice provisions, local councils are empowered to direct a recipient to take clean-up action or preventative action, for example, requiring studies to be carried out by the operation's management. Time spent making sure the brief for any investigation is thorough and covers all the relevant aspects raised in this guideline, is time well spent – for the management, for the local council and for the neighbours and wider community.

Composting and the POEO Act Schedule 1

Composting on site is permitted, providing there is development consent for this activity and relevant guidelines, protocols and legislation are complied with. For example, responsibilities under biosecurity legislation are met and composting ensures adequate pasteurisation to manage pathogen and weed risks.

Compost generated exclusively from on-site organics does not trigger the licensing thresholds for the scheduled activity of 'composting' under clause 12 of Schedule 1 of the POEO Act. This includes disposal of carcasses generated exclusively on site via alternative methods not captured under Schedule 1, such as pit burial.

Receipt of carcasses from off site for burial, composting or similar that are above prescribed thresholds would trigger licensing requirements.

Licensing requirements for composting are only triggered when the organic materials are received from off site and are above the thresholds set out in Schedule 1 of the POEO Act.

The composting thresholds may vary depending on the location of the receiving site and whether the organics received are classified as putrescible or non-putrescible. For further details please refer to clause 12 of Schedule 1 of the POEO Act (excerpt below) and clause 50 of Schedule 1 of the POEO Act for definitions of the terms 'organics' (including 'putrescible organics' and 'non-putrescible organics') and 'regulated area'.

Schedule 1, Part 1, clause 12 – Composting

1. This clause applies to composting, meaning the aerobic or anaerobic biological conversion of organics into humus-like products —
   a. by methods such as bioconversion, biodigestion or vermiculture, or
   b. by size reduction of organics by shredding, chipping, mulching or grinding.
2. The activity to which this clause applies is declared to be a scheduled activity if –
   a. where it takes place inside the regulated area, or takes place outside the regulated area but receives organics from inside the regulated area (whether or not it also receives organics from outside the regulated area) —
      i. it has on site at any time more than 200 tonnes of organics received from off site, or
      ii. it receives from off site more than 5,000 tonnes per year of non-putrescible organics or more than 200 tonnes per year of putrescible organics, or
   b. where it takes place outside the regulated area and does not receive organics from inside the regulated area —
      i. it has on site at any time more than 2,000 tonnes of organics received from off site, or
      ii. it receives from off site more than 5,000 tonnes per year of non-putrescible organics or more than 200 tonnes per year of putrescible organics.

3. For the purposes of this clause, 1 cubic metre of organics is taken to weigh 0.5 tonnes.

Consideration should be given to existing non-scheduled activities that may be approaching the production limits outlined above.

Composts containing animal carcasses cannot be supplied for use off site (i.e. outside the premises where the compost was generated) unless a site has obtained a specific resource recovery order and resource recovery exemption from the EPA that covers that particular waste type. The EPA's order for compost (the compost order; EPA 2016) defines compost as any combination of mulch, garden organics, food waste, manure and paunch that has undergone composting. It was not developed for composting carcasses and does not apply to composting dead stock or animal parts.

'Paunch' is defined in the compost order as the undigested food contained in the stomach of ruminant animals. This is generally considered to include partially digested grass, hay and other feed products such as grain.

Any person proposing to produce/supply compost should give careful consideration to the intended use and all relevant regulatory requirements before determining whether to include animal parts or carcasses in the process.

While carcasses are not an allowed input under the existing compost order, a specific order and exemption can be sought by making a submission to the EPA under the Resource Recovery Framework. Supporting evidence is needed to show that the final compost generated is beneficial or fit for purpose and poses minimal risk of harm to the environment and human health. Information on applying for a specific exemption is available on the EPA's *Apply for an order and exemption* webpage (EPA 2018).

4.2 Compliance testing

The need for compliance testing should be considered in each situation, balancing potential expense incurred by the operator against likely sensitivity and the extent of likely impact.

Typical compliance testing conditions are included in Chapter 7 of the Local Government Air Quality Toolkit – *Resource pack*.

4.3 Assessment and dispersion modelling

There are a few important aspects for local government to consider when reviewing external consultants' air quality assessment and dispersion modelling studies, to make sure the best outcome is achieved. These are included in Chapter 6 of the Local Government Air Quality Toolkit – *Resource pack*.

It should also be noted that dispersion modelling only applies to projects during the development and approvals stage. Once a facility is operational, odour surveys can be a more useful tool for evaluating odour impacts. The methodology for conducting an odour survey is provided in Chapter 3 of the Local Government Air Quality Toolkit – *Resource pack*.

4.4 Operational and control recommendations

If the local council is the ARA for the purposes of the POEO Act, consideration should be given to appropriate operational procedures to control and limit air emissions. Chapter 7 of the Local Government Air Quality Toolkit – *Resource pack* lists several operational measures that are helpful in reducing emissions and impacts from beef cattle feedlots.

Sections 3.2 and 3.3 of this guidance note indicate a number of odour and dust mitigation considerations that could be included in consent conditions. In addition, where odour is considered to be a significant air quality issue, an Odour Management Plan may be required as a consent condition to ensure the operator is aware of the odour sources and what measures they should have in place to mitigate these.

The local council may need to conduct a site inspection to investigate current management practices. Chapter 2 of the Local Government Air Quality Toolkit – *Resource pack* provides helpful information for council officers prior to these inspections, including a checklist.

Before going on site for an inspection, council officers should be aware of whether scheduled or non-scheduled activities are carried out at the facility and should review any previous reports (including diagrams, photographs and maps).

5. References and other resources

All documents and webpages that are part of the Local Government Air Quality Toolkit are available from the EPA website.

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