Department of
Primary Industries and
Regional Development

GOVERNMENT OF
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Best Practice for the Design, Construction and Operation of Sheep Feedlots

Purpose

This factsheet outlines best practice for the design, construction and operation of sheep feedlots (outdoor and covered). It includes considerations for environmental protection, community amenity and animal welfare.

Scope

This factsheet applies to sheep feedlots with fit-for-purpose infrastructure that can be used for year-round feeding, where sheep exit for slaughter. It is not designed for application to confinement and containment feeding facilities (such as drought feeding).

If you are unsure if fit-for-purpose infrastructure is required, refer to the Sheep Finishing Decision Tree and Sheep Finishing Calculator.

Approvals

Planning Approval

Planning and building approvals may be required to construct a sheep feedlot. Early contact with the relevant Local Government is recommended to establish what is required.

Environmental Approvals

Prescribed Premises

Sheep feedlots that exceed certain thresholds are classified as ‘prescribed premises’ under the *Environmental Protection Act 1986*.

Sheep feedlots meet the description of Category 55 in Schedule 1 of the Act’s corresponding *Environmental Protection Regulations 1987.* That is, livestock saleyard or holding pen: premises on which live animals are held pending their sale, shipment or slaughter’, and with a throughput of 10,000 animals or more per year are considered ‘prescribed’ and require a works approval to construct, and a licence to operate from the Department of Water and Environmental Regulation (DWER). Issues to be considered include solid and liquid waste disposal, permeability of the infrastructure and odour from the site.

More information about licenses and works for prescribed premises can be found here.

Native Vegetation

If native vegetation is proposed to be cleared to enable the establishment of the feedlot, it may be necessary to apply for a permit from DWER.

More information on native vegetation clearing permits can be found here.

Groundwater and Surface Water

Access to groundwater and surface water resources may require a licence and/or permit from DWER. Construction of bores may also require a licence.

More information on water licencing can be found here.

Sheep Feedlot Layouts

Outdoor Sheep Feedlots

Layout and Design

Key considerations for outdoor sheep feedlot pens are:

- Pens are sloped between 2% and 6% to encourage runoff, with runoff directed to waste containment infrastructure.
- Feed troughs should be placed on the high side of the pen and separate from water troughs to minimise contamination.
- Pens should be on a stable, smooth compacted area to:
    - prevent infiltration of water and nutrients to groundwater.
    - divert clean stormwater from surrounding areas.
    - prevent breakdown of the pen floor.
    - facilitate drainage.
    - facilitate manure collection and removal.
    - enhance animal welfare.

Shelter and Shade

Shade or shelter can be incorporated into outdoor pens, either retrospectively or at the point of construction. The recommended allowance for shade is a minimum of 0.4m^2 per sheep and should be provided in a way that:

- maximises shade throughout the day (usually western side of pen).
- encourages ventilation.
- minimises cleaning interruptions (i.e. needs to be high enough for access by cleaning machinery).
- does not impede drying of the pen surface.

The supply of shade or shelter in sheep feedlots is currently not mandatory.

Consider obtaining engineering advice for the design and placement of shade and shelter to ensure matters such as structural load, wind loading and air circulation are addressed.

Stocking Density

The current recommended stocking density for outdoor feedlots is 3-5m^2 per head (MLA, 2020).

Covered Sheep Feedlots

Layout and Design

Covered sheep feeding systems have many of the same requirements as outdoor feedlots. However, additional elements that need to be considered when designing a covered sheep feedlot include:

- Flooring: if shed floors are elevated, options include wooden slats, steel grating or woven wire mesh. If wire mesh is chosen, a 5mm diameter wire with 18mm aperture is considered appropriate.
- Adequate ventilation must be provided (natural or mechanical).
- If shed floors are elevated, the safe operation of people and machinery below must be provided.
- Covered feedlots need appropriately designed loading facilities to safely move sheep into and out of pens.
- At least 9 hours of lighting (natural or artificial) needs to be provided per day.

Stocking Density

The Australian Animal Welfare Standards and Guidelines for Sheep (2016) provides a guide for the minimum space provision per sheep in a covered feedlot as demonstrated in Table 1.

Table 1: Minimum space allowance

of sheep in intensive sheds

No. of Sheep	Area/sheep (m^2)
< 8 sheep	0.9
8-15 sheep	0.8
16-30 sheep	0.6
> 31 sheep	0.5

Separation Distances

Sheep feedlots must be sufficiently separated from sensitive receptors to minimise the potential for off-site impacts, such as nuisance odour, noise and dust, and to ensure the protection of groundwater and surface water resources. There are fixed separation distances all feedlots must abide by (Table 2), and variable separation distances specific to each feedlot

Table 2: Fixed separation distances (MLA, 2020).

Feature	Distance
Public road - except as below	200 m
Public road - unsealed with less than 50 vehicles per day excluding feedlot traffic	50 m
Major watercourse	200 m
Other watercourse	100 m
Property boundary	20 m

Variable separation distances are based on odour dispersion from the site, with calculations designed for traditional outdoor feedlots needing to be applied to covered feedlots. However, their use will typically give conservative results. Refer to Appendix A for further information and detail on variable separation distance calculations.

Waste Management

A Controlled Drainage Area (CDA) is required to contain runoff so that nutrient-rich wastes do not enter the surrounding environment. The principles below apply to the CDA of a sheep feedlot:

- Bunding or drains are typically required around the perimeter of the feedlot to prevent ingress of clean stormwater into the CDA.
- Bunding or drains are typically required within the feedlot (including manure storage and/or compost pads) to direct runoff to purpose-built containment infrastructure.
- Adequately sized and constructed ponds are typically required to contain nutrient-rich runoff for evaporation or irrigation.
- All waste-containing infrastructure (including pads and ponds) within the CDA should be lined to ensure waste is contained. This is typically achieved via a clay

liner, with two 150mm layers compacted to form a permeability of $<1x10^{-9}$ m/s. If this cannot be achieved using in-situ soils, suitable soils can be brought onto the site, or synthetic liners can be utilised.

- A depth of 2m between the base of all waste containment infrastructure and the seasonal high groundwater level is recommended.

Waste storage and utilisation sites need to ensure they maintain appropriate separation distances from sensitive receptors. Refer to Appendix B for further information.

Depth to groundwater and permeability testing of soils should be the first considerations when siting a sheep feedlot.

Wastewater Ponds

Ponds for wastewater containment need to be appropriately sized, designed and constructed. When sizing wastewater evaporation or holding ponds, the following factors need to be considered (in addition to the key principles for waste management listed above):

- The quantity of wastewater to be contained
- A spill frequency of not more than once every 20 years for evaporation ponds, and once every 10 years for holding ponds
- A safety factor to prevent overtopping during high winds (typically 0.1 - 0.5 m)
- Separation to seasonal high groundwater level from the base of the pond (typically 2.0 m)

The following DPIRD factsheets provide further information on wastewater ponds:

- **ABD Factsheet – Evaporation Pond Design**
- **ABD Factsheet – Pond Freeboard**

Treatment pond sizing and types (i.e. anaerobic, facultative or aerobic) will need to consider the volumes of raw wastewater generated and the desired quality of treated effluent. Specialist advice is recommended.

Manure Storage

Stockpile pads can be used for storing manure when it is unable to be spread to land. A stockpile pad must be engineered to promote runoff into a drainage system or wastewater pond. It must also be sized to ensure it can store the manure produced, considering the variation in numbers on feed throughout the year.

Manure can be stored (to produce aged manure) or actively turned (to produce processed manure or compost). Mortalities can also be composted within the stockpile area.

Carcass Disposal

Carcasses can be disposed of via composting (see Manure Storage section above), taken off site to a facility that is licenced to accept that type of waste (such as a licenced rendering facility, composting or organics recycling facility, or solid waste landfill), or via burial (least preferred).

If burial pits are utilised, they need to be constructed with appropriate lining to prevent leakage into the surrounding environment.

Waste Utilisation Areas

Waste utilisation areas need to be sized based on the principle that nutrients applied are assimilated by the receiving pasture or crop. The following DPIRD guidelines should be referred to for further advice:

- **ABD Guideline: Land Application of Solid Animal By-Products**
- **ABD Guideline: Preparing a Solid Waste Management Plan**

Feed and Water

Feed and water should be easily accessible for all sheep. Feed and water infrastructure should be designed to minimise spillage and accumulation of waste beneath them.

Feed trough length is dependent on the feeding style. If feeding ad libitum, only 3cm/head is required as a minimum. If restricted feeding practices are used, 15cm/head is required. Water trough length should be a minimum of 30cm plus 1cm/head (MLA, 2020a).

It is imperative that access to adequate and continual water supply is established early in the design process for sheep feedlots. Sheep require up to 6.5 litres of water per day in hot weather, with an average of 3-4 litres per day per sheep over 12 months. Water can also be required for cleaning, and dust and fire control. The MLA National procedures and guidelines for intensive sheep and lamb feeding systems (2020) recommend 3 days of drinking water be stored on site in case of emergencies. The guidelines also suggest keeping drinking water cool, especially over warmer months, as water temperature can affect sheep intake.

Both feed and water troughs should have concrete aprons (minimum of 2m wide) to accommodate the high traffic zone.

References

Animal Health Australia (2014) **Australian Animal Welfare Standards and Guidelines for Sheep**, accessed [16 June 2025]

MLA (Meat & Livestock Australia Limited) (2020) National procedures and guidelines for intensive sheep and lamb feeding systems.

MLA (Meat & Livestock Australia Limited) (2020a) Production feeding for lamb growth – A guide for producers.

Need Further Support?

DPIRD's Agribusiness Development team can offer support to proponents that are interested in establishing a feedlot in WA.

Get in touch with the team at **agribusiness@dpird.wa.gov.au**

Appendix A: Separation Distances

The calculations for separation distance are provided in the National procedures and guidelines for intensive sheep and lamb feeding systems (MLA, 2020).

> The maximum number of standard sheep units for a site from a sensitive receptor at a given distance:
>
> $$N = (D \div S)^2 \times 7.3$$
>
> The minimum distance for a specified number of standard sheep units from a sensitive receptor:
>
> $$D = \sqrt{N7.3} \times S$$

N = the maximum number of standard sheep units at any one time (1 SSU is approximately 60kg live weight)

D = separation distances in metres between the closest points of the feedlot to the most sensitive receptor or impact location.

S = Composite Site Factor (= S1 × S2 × S3 × S4).

The composite site factor relates to stocking density, receptor type, terrain and vegetation.

Table A1: Standard sheep units conversion table

Sheep liveweight (kg)	Standard Sheep Unit (SSU)
≤25	0.519
26-30	0.595
31-35	0.667
36-4	0.738
41 45	0.806
46-50	0.868
51-55	0.937
56-60	1.000
61-65	1.062
66-70	1.123
71-75	1.182
>75	1.241

Composite Site Factor

The composite site factor is calculated from a range of factors.

> S = S1 × S2 × S3 × S4

S1 = Stocking Density Factor

Determine the class of the feedlot (using Table A6) and then use the stocking density to determine S1 in Table A2.

Table A2: Site factor S1

Stocking density (m2/SSU)	S1 factor		
	Class 1	Class 2	Class 3 & 4
1.0	49.5	67.9	83.8
1.5	46.5	63.3	78.1
2.0	43.5	58.7	72.4
2.5	40.5	54.1	66.7
3.0	37.6	49.5	60.9
3.5	32.1	42.6	52.4
4.0 and over	26.6	35.7	44.0

S2 = Receptor factor

The receptor factor will vary depending on the receptor type and can be determined using Table A3. For more details about what constitutes each factor type, refer to the MLA Guidelines.

Table A3: Site factor S2

Receptor Type	Value
Large towns (>2000)	1.6
Towns (100 - 2000)	1.2
Small towns (20 - 99)	1.0
Intensive rural residential developments	1.0
Extensive rural residential developments	0.7
Rural farm residence or rural school	0.3
Rural church/community centre	0.2
Public area	0.05

S3 = Terrain factor

The terrain factor will vary depending on topography and relates to air drainage flow paths at nighttime, or the impact of low-level nighttime temperature inversions.

Table A4: Site factor S3

Topography	Value
Flat	1.0
High relief >10%	0.7
Low relief >2%	1.2
Valley drainage	2.0

High relief is up-slope terrain or a hill that projects above the 10% rising grade line from the feedlot (the receptor will be uphill from the feedlot).

Low relief is regarded as terrain which is generally below the 2% falling grade line from the feedlot (the receptor will be downhill from the feedlot).

A **valley drainage** zone is low relief terrain with significant confining side walls.

S4 = Vegetation and surface roughness factor

The vegetation and surface roughness factor will vary according to the vegetation density and topography between the feedlot and the receptor. The factors in Table A5 assume the selected factor is continuous between the feeding system and the receptor, and therefore if vegetation changes throughout the life of the feedlot, stocking density may need to be revisited.

Table A5: Site factor S4

Intermediate Landscape	Value
Few trees, long grass	1.0
Pasture, crops, no trees	1.0
Undulating landscape	0.93
Level wooded landscape	0.85
Heavy forest	0.77
Heavy timber	0.77
Hills and valleys	0.68

Intensive feeding system classes

Table A6: Description of intensive feeding system classes

Class	Permitted stock numbers	Design standard	Construction standard	Operation standard	Pen floor construction	Operating season
1	Limited by separation distances and environmental impacts	High May be close to impact locations Buffer zones and separation distance must be within the property boundary	High	High	Graded and compacted hard pen floor	All year
2	Limited by separation distances and environmental impacts	High Removed from impact locations	High	Less stringent than class 1	Graded and compacted hard pen floor	All year
3	Up to 5,000 standard sheep units depending on separation distances and environmental impacts	Basic Well removed from impact locations	Basic	Basic	Graded pen floor on clay soils having low, intermediate and high plasticity, clayey sands and clayey gravels. ***Note:*** sandy soils are not suitable as a class 3 pen floor. For year-round operation on sandy soils refer to class 1 or 2.	All year
4	Up to 5,000 standard sheep units depending on separation distances and environmental impacts	Basic Well removed from impact locations	Basic	Basic	No special preparation Non compacted sandy soils	Dry season operation only

NOTE: Supplementary feeding for production in a paddock is classed as a Class 4 system when the paddock is unable to sustain more than 50% of the feed required from pastures or crops which have a yield which is reasonable or commonly accepted for the district.

Appendix B: Separation Distances for Waste Storage and Utilisation Sites

Separation distances for waste storage and utilisation sites should follow the separations distances as below (taken from MLA National procedures and guidelines for intensive sheep and lamb feeding systems, 2020).

Table B1: Separation distances surrounding waste disposal areas

	Distance in metres			
Disposal method	**A**	**B**	**C**	**D**
Large towns >2000 persons	500	1000	1500	2000
Towns >100 persons	500	500	1000	1500
Small towns >20 persons	200	400	500	1000
Rural farm residence not owned by feedlot	100	300	400	500
Public area (minimum value)	50	100	150	200
Public road - except as below	50	100	150	200
Public road – unsealed with less than 50 vehicles per day excluding feedlot traffic	50	50	50	50
Major watercourse	100	200	200	200
Other watercourses	50	100	100	100
Property boundary	20	20	20	20

Waste Disposal Method A

- discharge by injection directly into the topsoil at a rate not exceeding either the hydraulic or nutrient and salinity limits determined for the soil type.

Waste Disposal Method B

- solids that have been completely composted
- effluent having a solids content of not more than 1%.

Waste Disposal Method C

- mechanical spreaders in combination with “ploughing-in” type equipment
- downward effluent discharge nozzles
- discharged material is not projected to a height of more than 2m above ground level.

Waste Disposal Method D

- all effluents that are discharged or projected to a height more than 2m above ground level
- liquid effluent in which water remains visible on the soil surface for periods more than one hour
- separated solids of sludge (except fully composted solids) that remain on the soil surface for more than 24 hours (i.e. are not immediately ploughed in).

Appendix C: Glossary of Terms

Term	Definition
Ad libitum	A term which refers to sheep being able to access feed or water without restriction.
Aerobic pond	A wastewater-holding pond in which aerobic conditions prevail.
Anaerobic pond	A pond that uses anaerobic microorganisms to treat the effluent. These are micro-organisms that do not need free oxygen from the air to function (APL, 2025).
Containment or confinement feeding	A containment or confinement area is used for the purpose of providing feed and water for production or maintenance of sheep on a regular, semi regular or annual basis. A containment or confinement area may assist with short term land and sheep management when minimal pasture or forage is available due to seasonal variation. Reference: National procedures and guidelines for intensive sheep and lamb feeding systems (MLA, 2020).
Controlled Drainage Area	An area that collects contaminated stormwater runoff or effluent and excludes clean rainfall runoff (APL, 2025).
Downward effluent discharge nozzles	Irrigation equipment used for the purpose of discharge nozzle spreading effluent which projects liquid towards the earth.
Facultative pond	A pond or lagoon that uses facultative microorganisms to treat the effluent stream. These are microorganisms that can function in the presences or absence of oxygen from the air (APL, 2025).
Permeability	Permeability is the ability of a material to allow a fluid to flow through it. An impermeable material will not permit any fluid to pass through (very few materials are totally impermeable) (MLA, 2012).
Separation distance	The separation distance is the distance between a likely source of an emission and a receptor likely to be sensitive to that emission (MLA, 2012).

APL (Australian Pork Limited) (2025) National Environmental Guideline for Indoor Piggeries (NEGIP) Siting and Design.

MLA (Meat & Livestock Australia Limited) (2012) National Guidelines for Beef Cattle Feedlots in Australia.

Important disclaimer