FEEDLOT DESIGN AND CONSTRUCTION

# 15. Fences, gates and lanes

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# Introduction

Cattle housing and handling systems in a feedlot need well-designed fences, gates and lanes to ensure optimum animal performance, good animal welfare and to provide a safe environment for feedlot workers.

# Design objectives

The design objectives for feedlot fences, gates and lanes are to

- keep cattle securely contained in production pens or laneways during movement around the feedlot
- allow safe and efficient movement of cattle
- minimise stress and injury to cattle
- not hinder pen and drain cleaning
- not hinder the movement of feed trucks and pen cleaning equipment
- minimise ongoing maintenance costs
- provide a safe working environment for pen riders and other feedlot personnel.

*Steel pipe is probably the most common material for fence line posts. Concrete 'post pots' reduce corrosion and also damage by pen cleaning equipment.*

# Mandatory requirements

There are no specific mandatory requirements associated with the design of fencing, gates and lanes.

# Design choices

## Fencing

Cattle are strong and inquisitive animals and will play with any loose fittings that they can reach. To remove their winter coats and to relieve itching, cattle will rub on anything that is available and this is usually the fencing.

The construction materials and the fence design selected will depend on the frequency of yard use, with commercial feedlots requiring more robust fencing than opportunity feedlots. Fences must be economical to build and maintain; they must contain stock but not hinder pen drainage or cleaning.

*Secondhand or surplus materials from other industries are commonly used e.g. railway line and bore casing.*

## Overall design

Figure 1 shows the various aspects of fence design. Fencing for a commercial feedlot often has the following features

- posts
- cables
- top rail
- belly rail
- post 'flower' pot (concrete fence post base for corrosion protection and water shedding)

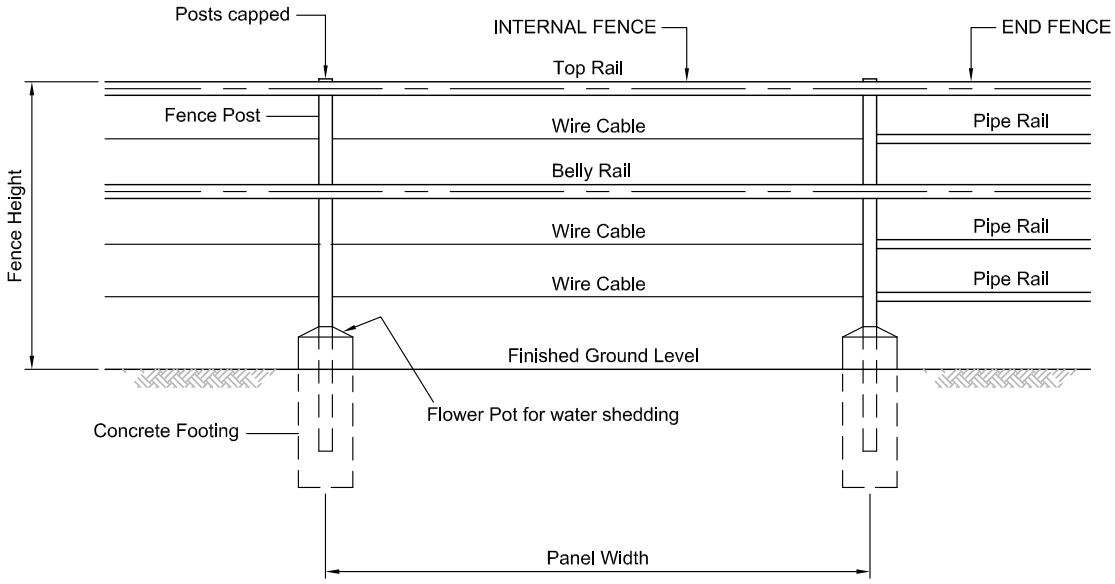


*Figure 1. Typical fence design for commercial feedlot*

## Fence posts

Fence posts are generally made from either steel or timber. Wooden posts should be at least 250 mm in diameter with corner and gate posts 300–350 mm in diameter. All wooden posts should be set at least 900 mm into the ground. If timber posts are to be concreted into position, the post should protrude below the bottom of the concrete to allow water to drain out and prevent the post from rotting. Steel posts need to be set in concrete 900 mm below ground level with the concrete finishing about 200 mm above ground level in a 'flower pot' or post pot, to reduce corrosion at ground level. Hollow steel posts should be capped to prevent rainwater entry and subsequent corrosion.

*Good quality timber is becoming difficult to source. A steel capping rail will prevent posts without concrete footings from leaning under pressure from cattle.*

## Fence height

Feedlot pen fences are usually about 1.5 m high, but may need to be higher (1.6–1.8 m) for cattle not accustomed to handling. For handling yards, fences should be at least 1.7 m high and up to 2.0 m high for cattle not accustomed to handling.

## Panel width

The distance between fence posts, or panel width, influences the cost of fencing. Wider panel spacing is more economical to construct and more efficient to clean under. As a 3.2 m panel takes about the same time to clean as a 2.4 m panel, about 25% more fence will be cleaned under in a similar time. Panel widths should not exceed 3.2 m as these would reduce the strength of the fencing. Strainer panels or end assemblies are required at the end of each length of fencing.

*Steel top and belly rails with cables*

## Cables

There are many different types of cables. The more elastic 'curly' type is preferred as it does not require a turnbuckle or similar device for tensioning, whereas straight wire cable does need turnbuckles to be installed on strainer posts to allow periodic re-tensioning.

*External eyelets hold cables running past steel posts. Hollow posts are capped to exclude water.*

Cables should be kept reasonably tight although some 'give' is allowed for contraction in cool weather; turnbuckles should be loosened a little during the winter to reduce the strain on the posts.

Ideally, fences will include five rows of cables and rails to allow under-fence cleaning while preventing cattle escaping by rolling under the cable.

Cables should be attached to, or directed through, fence posts so that no sharp edge can deteriorate the cable as it moves constantly back and forth under pressure from the cattle. Cables can be run through holes in wooden posts; steel posts require hollow sleeves or external eyelets. Cable wear, corrosion and ongoing maintenance are important considerations in deciding the most practical applications.

## Top rails and belly rails

Top rails and belly rails add strength to a fence. Top rails stabilise fences from leaning over and provide a baulk for cattle when cattle continually rub and push the fence. Belly rails help to prevent cattle from escaping from pens where the cables have stretched or become loosened, and allow cattle to rub on solid infrastructure.

*Cables passing through steel fence posts need a steel sleeve to reduce fraying. Sleeves prevent water entering the hollow post but can accumulate moisture which accelerates corrosion of the cable. This is an expensive fabrication technique.*

*The height of the bottom cable must allow under-fence cleaning, Some flexibility in the strain reduces damage. Here, curly cable is used only in the lowest cable.*

*Cable tension control using a wedge-lock system that was developed in the construction of pre-stressed concrete.*

*Cable tension is achieved and maintained by locking the cable in the railway line using chain links.*

*Cable clamps are often used to retain cable tension.*

Top rails and belly rails and posts can be either wood or steel. Wooden rails should be at least 150 mm in diameter and steel rails at least 100 mm in diameter. Steel used for top rails and belly rails needs to be strong, ideally round pipe or heavy walled RHS.

## Gates

The size and location of gates are important; they must provide good, safe access to the pens for both pen cleaning equipment and stock. Any unnecessary gates, particularly across access points, should be eliminated as they add to the capital cost of the feedlot and can cause delays for machinery and cattle movement throughout the feedlot.

## Gate location

Most feedlots require a gate at the rear of pens for movement of stock and pen cleaning equipment, and another across the feed bunk apron for easy cleaning of aprons and movement of pen riders between pens (see pen layout figure in *Section 9*).

Stock movement gates are usually located at the bottom of the pens near the drains or cattle lane. Figure 2 shows a gate that requires cattle and pen cleaning equipment to make a tight 90 degree turn into a pen.

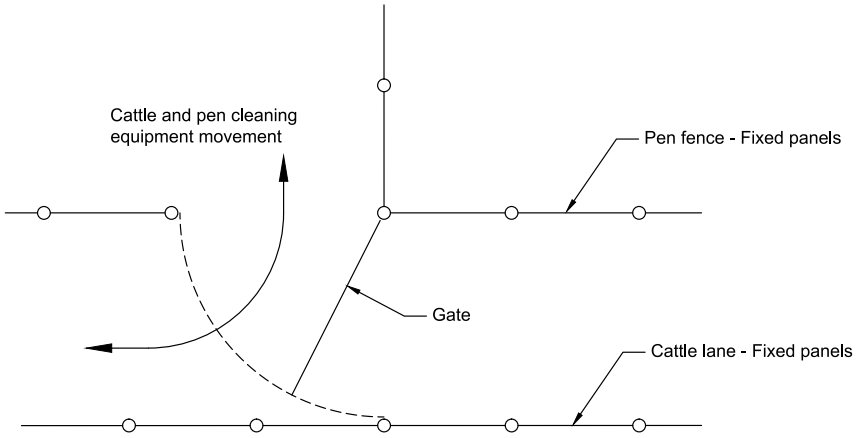


*Figure 2. Pen entrance gate without the herringbone tapering*

Figure 3 shows a herringbone configuration for gates that provides good access for pen cleaning equipment and promotes good, safe stock flow.

Herringbone gates facilitate entry of pen cleaning machinery into the pen and work well when the flow of cattle movement is in one direction. However, cattle in the lane have to enter the pen at an acute angle if they approach the gate from the wrong side. If cattle are required to approach from either direction, gates should be installed on each side of the herringbone pen. In most good layouts, cattle approach pens from one direction only and therefore only one gate is required and a fixed panel can face the gate.

Gates for stock and machinery movement should ideally be the same width as the stock lane. When the pen entrance gate is swung across the lane, the cattle can flow well into or out of the pen. A wide cattle lane will need a double gate arrangement to close off the lane.

*Cables can pass through wooden posts minimising corrosion and cable fraying. This fence line has no top or belly rail.*

*Strainer panels or end assemblies are required at the end of each length of fencing.*

*Strainer assemblies across gate openings provide structural stability for both the gateway and cable tension.*

*Welded-on round barrel hinges are simple and effective. The swing angle can be limited by the way the hinges are mounted to one side of the post.*


*The circular grip on this telescopic pipe latch minimises the risk of pen riders getting snagged. Half circle gate stops prevent cattle damaging the latch when rubbing and allow the gate to be opened in one direction only.*

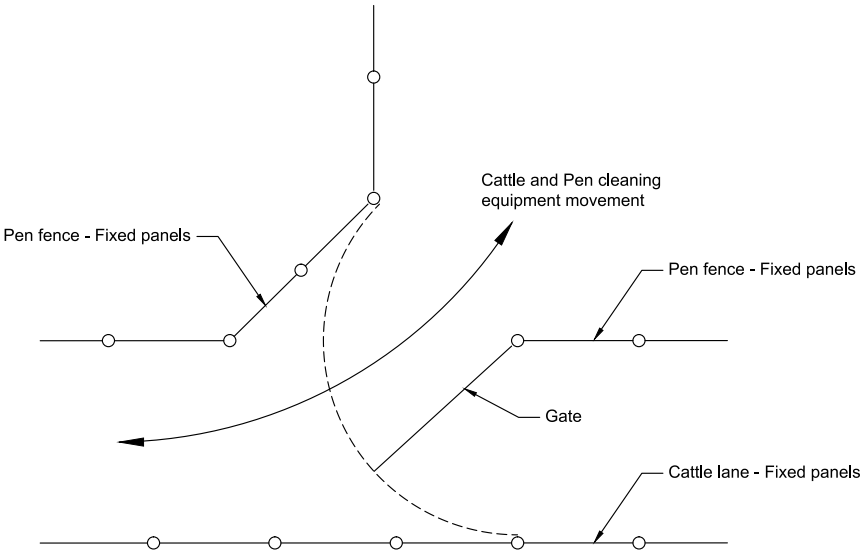


*Figure 3. Pen entrance gate in a herringbone arrangement*

A gate across the feed bunk apron at the top of each dividing fence between pens allows the full length of the feed apron to be cleaned in a single pass.

Feed bunk gates should be wider than the concrete apron and be able to swing fully open to rest against the subdivision fence line. These gates also provide pen rider access between pens.

## Gate latches

Gate latches should be designed so that pen riders can safely open the gate without dismounting from their horses, and should prevent curious cattle from working out how to open the gate. There are many designs for gate latches.

*There are many designs for gate latches*

*Wide lanes require wide gates. Double gates are preferable when lane width exceeds about 4.5m.*

## Gate construction

Gates should be lightweight but strong. Strength can come from a wide, ribbed solid panel of steel at the mid-height of the gate. This also tends to baulk the cattle and they do not knock the gate around so much. Gates should not have any sharp protrusions such as badly positioned hinges and latches that cattle can bump into and be bruised by as they move in and out of the pen. Ideally all gates should lay flat against the fence line when open.

## Lanes

A good lane system will promote efficient movement of cattle, pen cleaning equipment and pen riders throughout the feedlot facility with a minimum number of gates and lanes crossing roadways and drains.

Lane width is important. Lanes that are too narrow (less than 4 m wide) can choke cattle movement while lanes that are too wide (greater than 6 m) allow cattle to turn around easily and come back on themselves and pen riders. All tight corners and unnecessary gates should be eliminated.

Feedlot designs can have either separate cattle movement lanes and drains or combined lanes and drains. Separate cattle lanes and drains should have a total width of 5–7 m to allow for easier drain cleaning (see Section 10).

Layouts with a combined cattle lane and drain are usually about 4.5 m wide as gates for stock movement limit the width. This design may be preferred since cattle movement along the drains scuffs up the manure, promoting more rapid drying. However, cattle may also 'bog-up' the drain, impeding water flow.

*Typical double herringbone gate arrangement provides good access for pen cleaning machinery and cattle, but from one direction only.*

*A gate in the pen fence line across the feed bunk apron allows easy access by pen cleaning and maintenance equipment, and by pen riders. Gates require a strainer assembly for support.*

*Cattle lanes behind angled pens that are not parallel. Angled gate openings allow easy access for pen cleaning machinery and cattle but only from one direction.*

*A wide cattle lane allows plenty of room for under-fence cleaning and manure removal...*

*...but an unfenced wide lane usually requires more than one stockman to move cattle.*

## Quick tips

- Fences must contain stock and should be economical to build and maintain.
- Fence posts are generally made from either steel or timber.
- Wooden posts should be at least 250 mm in diameter with corner and gate posts 300-350 mm in diameter.
- If timber posts are to be concreted into position, the post should protrude below the bottom of the concrete to allow water to drain out and prevent the post from rotting.
- Steel posts should be set in concrete with the concrete finishing about 200 mm above ground level in a 'flower pot' or post pot to reduce corrosion at ground level.
- Cap hollow steel posts to prevent rainwater entry and subsequent corrosion.
- Strainer panels or end assemblies are required at the end of each length of fencing.
- If straight wire cable is used, turnbuckles (or similar) must be installed on strainer posts to allow periodic re-tensioning of cables.
- Wire turnbuckles together to prevent cattle unwinding them.
- Cables should be kept reasonably tight although a small amount of 'give' should be allowed for contraction of cable in cool weather.
- The lowest fence cable should be high enough to allow under-fence cleaning but low enough to prevent cattle escaping by rolling under the cable.
- Gates will be required at the rear of pens for movement of stock and pen cleaning equipment.
- Gates across the feed bunk apron at the top of each dividing fence between pens facilitate cleaning of aprons and movement of pen riders between pens.
- Design gate latches so that pen riders can safely open the gates without dismounting and so that curious cattle cannot work out how to open the gate.
- Gates should not have any sharp protrusions, i.e. hinges, latches.
- Position hinges so that gates lay flat against the fence line when open.

## Further reading

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