DESIGN OF FACILITIES AT LIVESTOCK MARKETS

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This compendium arose from a DEFRA-sponsored study on livestock welfare at 24 markets in the UK. It describes some simple features that make sheep and cattle handling easier. We hope it will be useful for operators upgrading their markets or planning a market at a new site.





1. GENERAL LAYOUT OF MARKET FACILITIES

Good markets are well designed, well maintained and have conscientious and considerate staff. The attitude of the staff and the standards they show when handling stock are particularly important in establishing the image of the market. Staff attitude often reflects the attitudes amongst senior and middle management. High standards originate and flow from the top of the firm. Most staff working at markets are highly skilled and have many years experience with stock handling. Their experience is valuable and they should be consulted when trying to resolve stock handling problems and improving market design. This set of guidelines aims at giving you and your staff some ideas on alternative designs for the facilities at livestock markets. The purpose is to help you think through some options and allow you to come to the best choice for your particular situation.

Some key points worth considering when designing a new market are

• how big should the holding facilities be ? What will be the throughput in the future? This depends on whether other markets in the area will be closing down, whether local farmers send more fatstock directly to abattoirs, and whether the local livestock industry increases or declines. Sometimes a town authority is bound by a Charter to provide a livestock market, and the prospect of those markets closing is remote. Whereas, markets are being acquired as development sites in regions where there is urban expansion.

The disadvantage with building an overcapacity market is that stock have to be moved longer distances within the market. This makes handling slower.

- provide plenty of parking space for farm vehicles. In recent years there has been a trend towards farmers delivering their own stock instead of hiring a haulier. This has resulted in vehicle congestion and overspill from the parking area at several markets. Overspill can restrict the turning area for vehicles trying to dock at unloading bays, and at one market, long vehicles with trailers carrying calves are obliged to park at an angle to the stepped unloading ramps because of parked vehicles that are in the way. This means that calves have to negotiate several steps up and down, and this increases the opportunity for falls in very young calves.
- plan the movement of stock throughout the course of a sale day. The flow of livestock can be complicated if they cross each other at the same time. This is a problem at one market with stock that arrive late, after selling has begun (Fig. 1). The late arrivals have to cross the corridor used for putting other stock up to the ring.
- the docking area should be level not sloping. At some markets, the docking area slopes downwards towards the loading bay. This has benefits as well as weaknesses (Fig. 2). Downward-sloping docking areas allow easy unloading, as the stock have a clear view of the yards and other animals in the yards. They run off the vehicles quickly. More importantly, loading sheep is difficult, as they have to be pushed up into the vehicle. The slope results in the sheep crowding at the back of the pens in the vehicle, making it more difficult to close the vehicle-pen gates and achieve a full load. If the sheep stay pressed together at the rear of each pen, there can be a risk of smothering. At one market where this has been a problem.

Fig. 1. Cross-flow in stock movement at a market

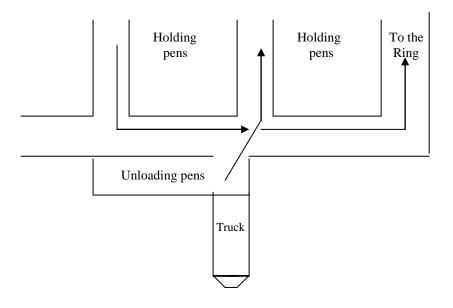
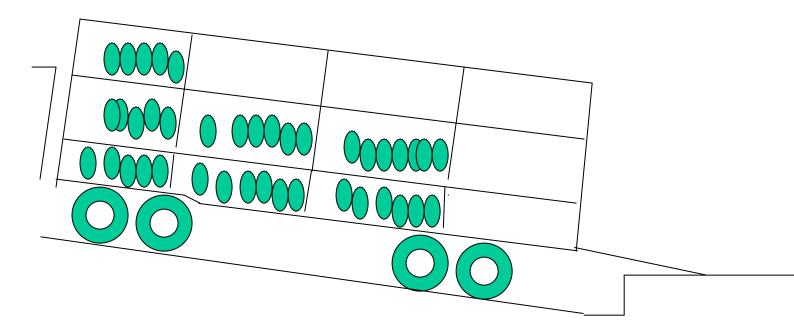
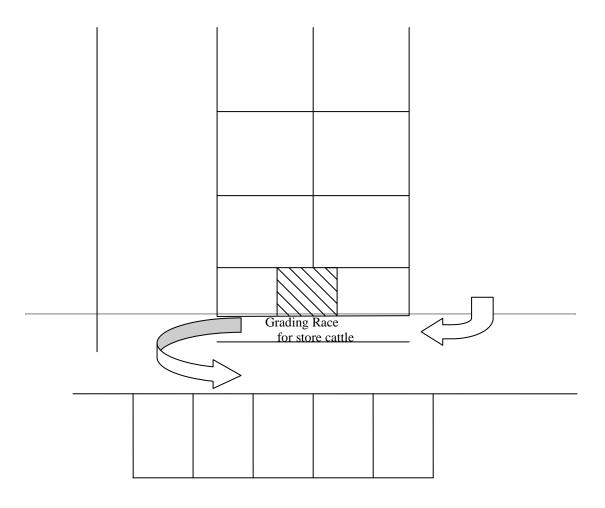


Fig. 2. Vehicle sloping downwards at the docking bay



- each facility has to be in the right location. A problem at several markets is poor location of the store cattle grading race. It has often been placed some distance from the sale ring, and more importantly the animals have to turn through 180° at the end of the race (Fig. 3). This poses a risk for falls at the turn.
- when designing the grading system, it can help to put cattle through the same corridors during grading as those used later when they are put up to the sale ring. The cattle become familiar with the set-up, and they are less likely to be excited when passing through the facilities a second time.
- in some markets cattle are lot numbered in their holding pens. They are not put through a grading race when organising their lot number. This has benefits for the cattle, as they are less stressed.

Fig. 3. Common location of the grading race for store cattle



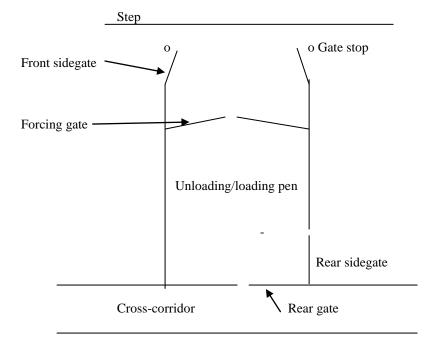
Docking Bay

• when a new market is planned, make sure drain inspection covers are not in the middle of corridors or in unloading pens.

2. UNLOADING AND LOADING BAYS

The terms used to describe different features in the unloading and loading pens are shown in Fig. 4. The vehicle reverses to the step, lowers its tailboard and unloads. The front gates that hold stock in the pen may be either the front sidegates or the forcing gates. If they are the front sidegates they will be long enough to meet at the centre. If the forcing gates serve as the front gates, the front sidegates do not need to be the full width of the pen. The rear sidegates near the cross-corridor allow movement of stock between adjacent pens when loading.

Fig. 4. Terms used for various features in unloading/loading pens

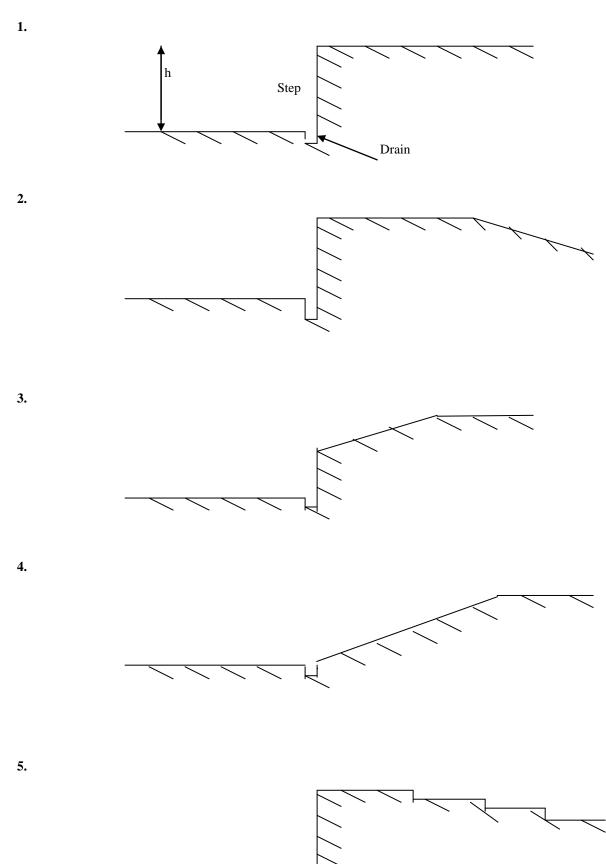


2.1. ALTERNATIVE SYSTEMS

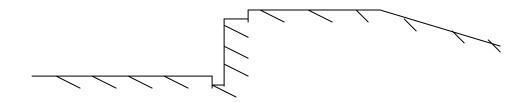
Stepped unloading platforms are an advantage with high vehicles. They reduce the slope of the tailboard. However, they are not always suitable for farm trailers so it is helpful to have at least one unloading bay level with the docking area.

There are six types of stepped platforms (Fig. 5). Types 1 to 4 are common and type 3 is often used in modern markets. The aim with type 3 is to use a horizontal tailboard, but with steep platform slopes this depends on how far the vehicles reverse into the slope.

Fig. 5. Six types of unloading/loading bays



6



A suitable angle for the slope in design number 3 is 6 $^{\circ}$. If the slope is greater than this there is a risk that smallstock can duck under the front sidegates during loading, and cattle may refuse to load onto small trailers.

The height of the step (h) is very important for ease of loading. If it is too high the animals have a clear view of the inside of small trailers below them, and they quickly realise that it is a trap. This can make them obstinate and difficult to load.

The forcing gates in the loading pens are the most important handling aid used by drivers.

Loading pens must have forcing gates. Some markets do not have forcing gates. This makes it very difficult for drivers when trying to get sheep onto the trucks.

The location of the forcing gates in the loading pen is critical. On multideck vehicles, usually between 22 and 38 sheep are loaded onto a vehicle at a time. This is the number of sheep that fill a pen inside the vehicle. Ideally, the front forcing pen in the loading bay should hold about 40 closely stocked sheep. If the forcing gates in the loading pen are set too far away from the tailboard, the driver cannot crowd the sheep and this makes it more difficult to exert pressure to move them onto the tailboard and into the vehicle. For example, one market has a forcing pen that is 7 m long and 3 m wide, which is too big. It creates a lot of difficulty when loading sheep, and there are similar problems at another market where the size of the forcing pen is 5 m long by 4 m wide. The forcing pen needs to be about half this size.

There can be more than one set of forcing gates (Fig. 6). This is helpful in pens designed for holding both sheep and cattle. The position of the front forcing gates is suitable for sheep. The forcing gates in the middle are well positioned for loading cattle or for drafting the next batch of sheep to the front forcing pen. The 2 m pen sidegate allows drafting from an adjacent pen into the loading pen where the truck is docked.

Some loading bays have water available in troughs near the front of the pen in a Y-shaped recess (Fig. 7). This recess also acts as a funnel for stock during loading.

Fig. 6. Example of an unloading/loading pen with double forcing gates and access to adjacent pens

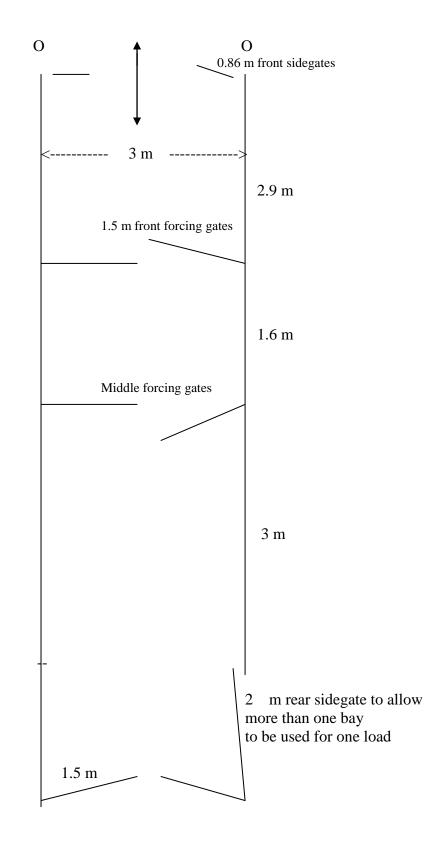
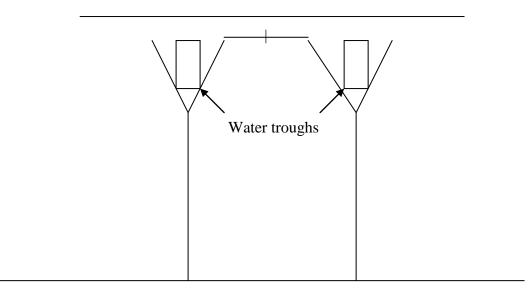
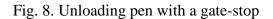


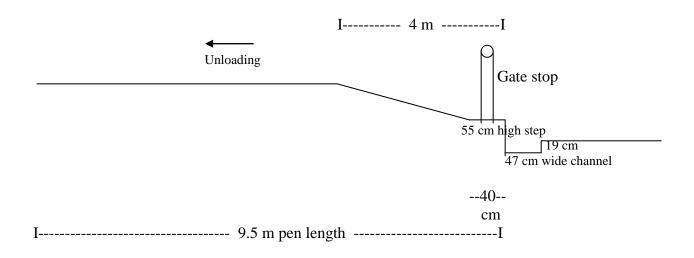
Fig. 7. Loading pen fitted with Y-funnels and access to water



Cross-corridor

Some markets have gate-stops at the unloading/loading pens (Fig. 8). These give farmers and drivers something to focus on when reversing, and they help control swinging front sidegates.





Dual unloading pens are helpful where vehicles make large deliveries of sheep (Fig. 9). They allow large deliveries to be offloaded without the need for stopping to empty an unloading pen. Large vehicles can vacate the unloading area quicker.

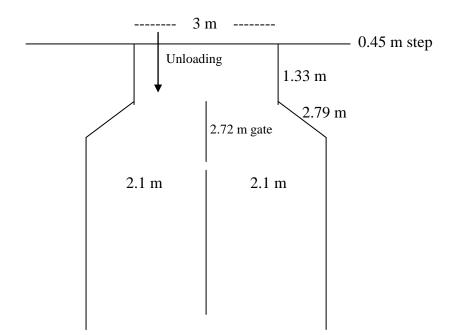


Fig. 9. A docking point with dual unloading pens

Staff working in the cross-corridor at the ends of the unloading pens sometimes cause stock to move back towards the vehicles during unloading. This causes congestion at the front of the pen, which can hinder unloading. Animals sometimes re-enter the vehicle, which can be frustrating for the farmer.

Usually there is only one cross-corridor at the ends of the unloading pens. Double cross-corridors are used at some markets (Fig. 10). If the partition between the two cross-corridors is panelled, staff can use cross-corridor 1 without causing stock to balk and turn back during unloading. The double cross-corridor can also be helpful during loading. The partition between the two corridors is gated allowing stock to pass independently along both cross-corridors, to different loading pens.

An alternative is to have a system where the holding pens nearest the unloading bay can be converted to a second corridor by opening some gates, as and when needed (Fig. 11).

Fig. 10. Unloading/loading bay system with double cross-corridors.

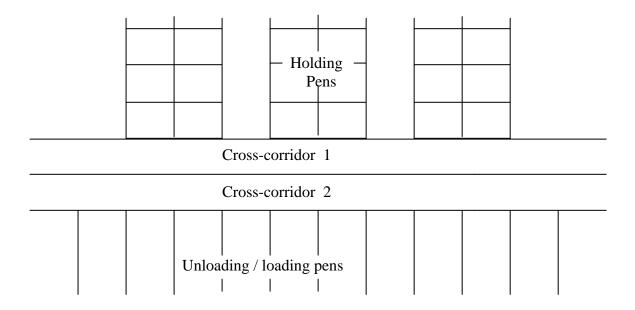
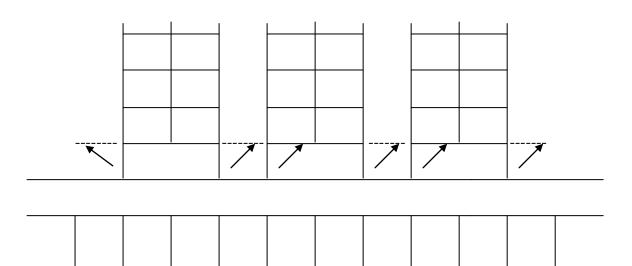


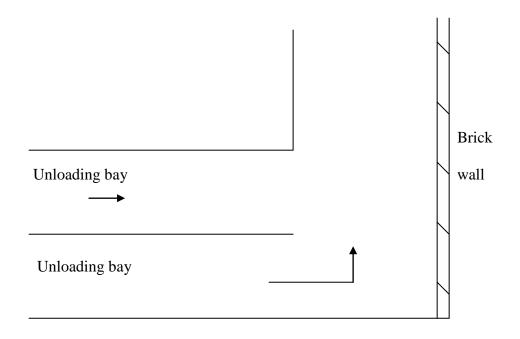
Fig. 11. Single cross-corridor system that can be easily converted to a double cross-corridor system when needed.



2.2. COMMON PROBLEMS WITH UNLOADING AND LOADING

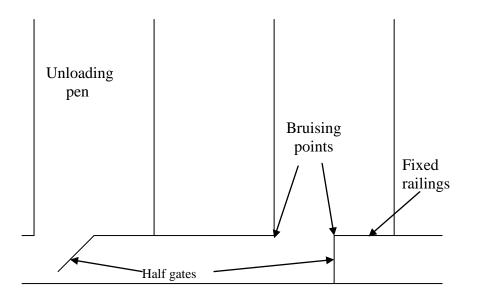
• it helps if animals that are expected to come off vehicles can see other animals in the yards ahead of them. Some unloading bays have a brick wall facing the sheep as they unload (Fig. 12). This obscures the view of other sheep in the market, and so there is poor **visual draw** for the sheep coming off the vehicles.

Fig. 12. Example of a market where sheep unloading bays face a brick wall, and this makes unloading more difficult

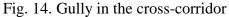


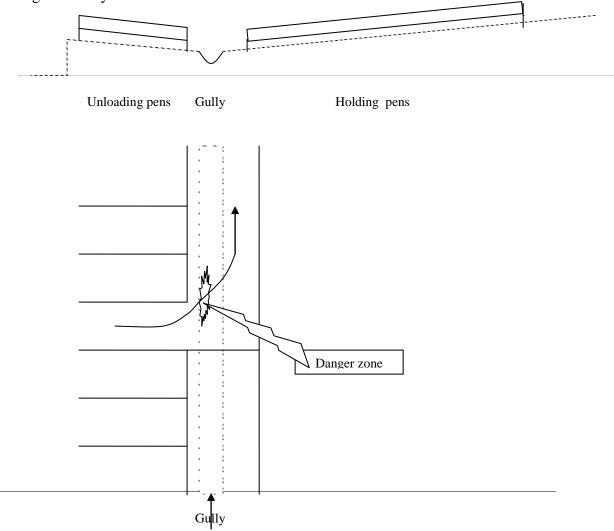
- During unloading, if the forcing gates are not secured to the side railings of the pen, they can swing into the pen. Sheep are prone to impact injuries if the gates are left unsecured, and individual animals get trapped on the wrong side of the gate.
- Avoid using **loose gates** or hurdles in the unloading pens or anywhere else in the market. Smallstock can get injured when the hurdles fall over, and legs can get trapped between the bars. The only exception is self-standing hurdles, which are sufficiently robust not to be pushed over.
- Some trailers have broken or missing tailboard sidegates. This can create an escape risk and the market will share responsibility for any escapes. It is worth bringing this point to the attention of farmers who have broken tailboard sidegates.
- Placing straw on a dry concrete floor can make it slippery for stock that run quickly off the vehicles.
- Unloading pens should have full-width rear gates. Some unloading pens have **narrow gateways**, which are only half-gates (Fig. 13). The centre post of the half gate and the corner post are bruising points for cattle.

Fig. 13. Bruising points created by narrow rear gates



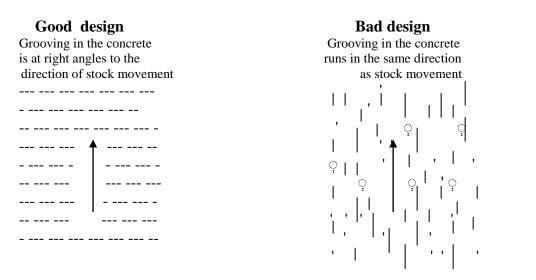
- Gate and gate post maintenance is critical. One of the main complaints one hears from farmers and drivers about markets are ill-fitting gates and this is often because they have been damaged and not repaired. One case was quite serious. The gatepost that supported two gates at an unloading bay had become loose in the concrete floor. As a result when one gate was opened, the movement caused the gatepost to lean into that gate. This resulted in the pin securing the other gate being drawn out of its hole and so the second gate spontaneously swung open, allowing animals to wander off. Since this was at the unloading area, it meant that a large number of animals could escape at one time.
- Another common complaint is with delays in getting unloaded because of long **vehicle queues**. This problem is often worse at cattle markets that have few unloading pens and rely on rapid grading to allow continuous removal of stock from the unloading area. It is also a problem at markets that sell large numbers of calves. This is partly because farmers are encouraged to minimise the time calves are at the market, and because markets are often limited to one effective unloading bay for calves. There may be more than one unloading point for calves, but they are often too close together and one vehicle that is unloading hinders access to the other point. Where queuing is a problem, several markets have introduced a ticketing system, which establishes a vehicles' position in a queue. This does not solve the problem, but it helps avoid unpleasantness.
- The way surface water is managed can cause problems. For example:-
 - Gully in a corridor leading to cattle falls. At one market, surface water from the unloading and holding pens drains into the cross-corridor (Fig. 14). The floor of the cross-corridor has been profiled as a gully to get the water away. When cattle run out of the unloading pens and turn in the cross corridor, their nearside hindleg slides down the gully, and they are prone to falling.





2. Surface grooving in the concrete running in the same direction as the stock leading to slips (Fig. 15). The surface grooving that is formed when concrete is laid serves two purposes. It directs the flow of water and when well designed this reduces surface ponding. It also provides foot grip when stock run across the grooves. At some markets the need to get water away has taken precedence over grip, and the direction of the grooves is the same as the direction the animals move. This results in slips and falls when stock run quickly and make a turn.

Fig. 15. Surface grooving in concrete



- The unloading pens and corridors get dirty as the day progresses, and so the floors become slippery. One market manages this by turning on sprinklers in the loading pens whilst the sheep are being sold. The pens are then clean and less slippery when selling is finished and stock are ready for loading.
- Cleaning the corridors and pens before loading has an additional advantage. Sheep that go down are less likely to get dirty and so they are more acceptable at the abattoir as 'clean stock'.
- Surface ponding in the pens and corridors creates splash when animals run through dirty water. This makes the belly and legs dirty, and may add to hygiene problems experienced at the abattoir. Ponding also causes balking.
- Staff who clean down cattle yards after the sale need to be mindful of stock movement. Leaving a wheelbarrow in the corridor or a hose trailing across a corridor can cause balking and interfere with loading.
- At some small sheep markets the weighbridge and grading station are directly in-line with the unloading bay (Fig 16). This works well when unloading, but the sheep have to run over the weighbridge when loading after the sale. By this time the weighbridge is wet with manure, and the weigh platform is slippery. This leads to slips and falls.

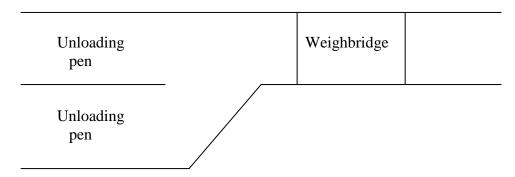


Fig. 16. Weighbridge in-line with the unloading pens

• Avoid **sheep traps**. If the front sidegates of a loading bay pen are too close to the edge of the bay or if the pen is wide relative to the tailboard, there can be a trap for sheep and calves between the tailboard sidegates and the front sidegates of the pen (Fig. 17). Offset the front sidegates from the step, or use Y-funnels (Fig. 6).

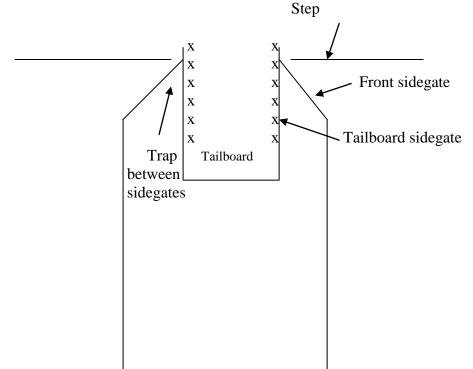
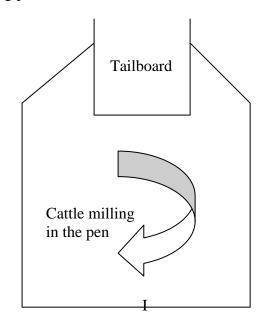


Fig. 17. Sheep trap in a loading pen

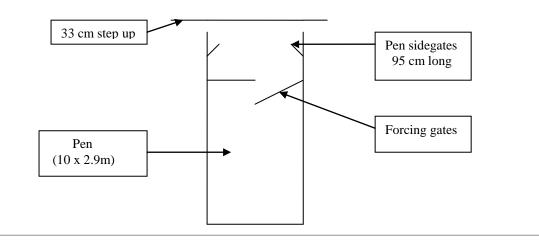
- Sheep tend to balk when there is a strong draft blowing in the face. Drivers usually recognise this, and close the side hatches in the vehicle to reduce the draft at **windy** sites. Shelterbelts can help.
- **Glare** on a new alloy tailboard can make sheep balk. Tailboards can be painted to stop glare. The paint can make the tailboard more difficult to clean, but it does not last long, and by the time it comes off, the tailboard has a tarnished surface that is less prone to producing glare.
- Light contrast between the inside of a vehicle and the outside is sometimes a problem on sunny days. Opening the side hatches in the vehicle can help provided it does not cause streaks of sun light on the floor.
- Sheep are sometimes reluctant to enter vehicles that **smell** of pigs, and it is said that cattle may refuse to enter vehicles that smell of disinfectant. One driver manages the smell of pigs by sprinkling vinegar on the tailboard and lower deck of the vehicle, but we are not in a position to confirm that this approach works.
- Loading pens should not be too wide. If they are too wide, cattle can mill around the pen instead of walking onto the vehicle (Fig. 18). **Milling** (circling) is a problem where the pens are 4 or more metres wide.

Fig. 18. Loading pen that is too wide



• Cattle loading pens that are 2.9 m wide should work well, but call for careful reversing when lining-up wide trucks (2.7 m wide). The plan for a suitable sheep loading/unloading pen is shown in Fig. 19.

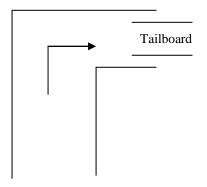
Fig. 19. Unloading/loading pen (14 m long x 2.9 m wide)



- Loading cattle can be difficult even for experienced drivers. It helps if drivers assist one another in getting cattle on-board, and if market staff stay-on after the sale to give a hand. Unfortunately, mutual **assistance with loading** is not that common in certain parts of the country.
- When difficulty is experienced in loading cattle, a useful strategy is to cover the tailboard with **straw**. Cattle will then be more inclined to step onto the tailboard. One market has a straw store at the loading bay specifically for this need.

• Limousin cattle can be difficult especially when they try to escape. They are prone to charging and jumping railings or gates. They may also refuse to enter vehicles. One farmer commented that Limousins are alright when they are loaded at the farm, but they are completely different by the time they are unloaded at the market. At the farm they load-on easily. One farm loading system that is said to work well is shown in Fig. 20.

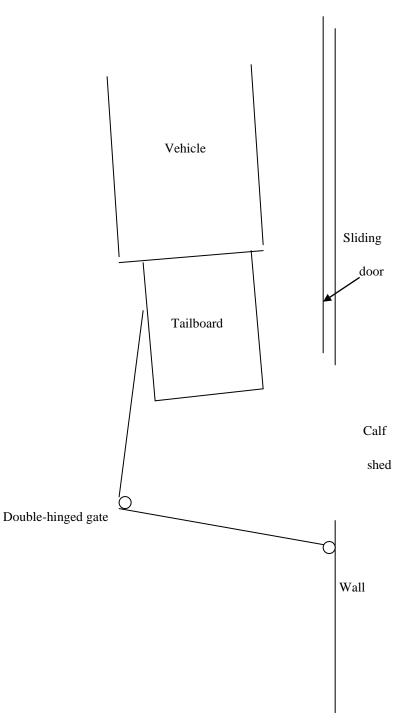
Fig. 20. Loading system suitable for shy or unpredictable cattle



A turn just before the tailboard sometimes works better than a straight entry.

- Occasionally an animal escapes between the tailboard and loading pen sidegates. The front sidegates of the loading pen must be fitted with **chains** that can be secured to the tailboard sidegates.
- Some drivers avoid back bruising in cattle by loading smaller animals in the pen above the front wheelbase in multideck trucks. In old truck models, this pen has a lower **headroom** (e.g. 1.49 m compared to 1.68 m in main compartment), and it is usually the first pen to be loaded. Loading according to stock size requires planning, as the sequence in which the separate lots are brought up to the truck needs to be worked out. The only alternative is to make use of spare pens at the unloading area, to hold larger cattle back. Truck models now in production have 1.64 m headroom above the front wheelbase compared to 1.82 m in the main compartment, and so this feature is becoming less of a problem.
- **hosing down cattle** before a sale, to clean them up, needs to be done in a considerate way. Cattle usually react alright to being hosed, but if they start getting excited whilst trying to avoid the water, it is best to leave them alone.
- At many markets the **calf unloading** area is little more than a double hinged gate situated alongside a sliding door to the calf shed (Fig. 21). The gate can be folded away, against the calf shed wall, when not in use.

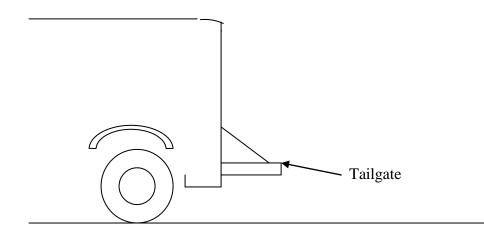
Fig. 21. Example of an unloading area for calves



Light-weight treble-hinged gates are less common, but work well.

This system operates as a drive-through docking area, and the main advantage is that it is simple with few steps that can cause falls. It has two weaknesses. Firstly, there is a step at the tailboard. During loading calves often fail to lift their feet adequately onto the tailboard, their legs fold and they go down onto their knees. Secondly, at busy markets there are often long queues of vehicles waiting to unload. On average, farm trailers deliver 4 calves at a time. If a market sells 350 calves, there will be 90 vehicles unloading at the docking area. It would be unrealistic to unload that many vehicles within two hours when using only one doorway. Some markets try to manage this by having two doors to the calf shed. The doors need to be well away from each other, otherwise one vehicle blocks both doorways.

- Some markets receive a lot of vehicles that have tailgates instead of tailboards (Fig. 22). These include pick-ups and Landrovers, and sometimes vans are used which have neither a tailgate nor a tailboard. Vehicles with tailgates are used mainly for calves and individual rams, and unloading and loading can be challenging. Lively animals are apt to slip under the tailboard and escape during loading, especially on loading bays with a sloping floor and high sidegates. Where there is a high drop between the tailgate and the ground, a straw bale placed at the edge of the tailgate can act as a convenient resting platform.
- Fig. 22. Vehicle with a tailgate instead of tailboard

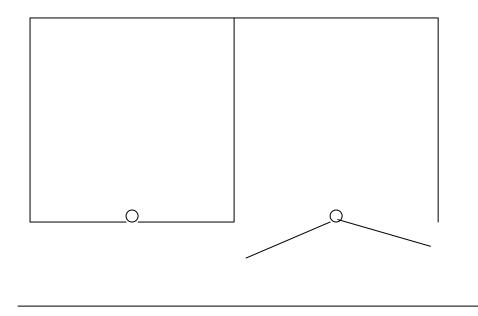


3. USEFUL DESIGN FEATURES FOR PENS, STALLS, RINGS, GATES AND RAILINGS

3.1. HOLDING PENS

• Many markets use two-way gates for the holding pens (Fig. 23). These have obvious advantages where space is limited and stock need to be put in and out of a pen in either direction along the corridor. If the entrance is too narrow, the corner and gate posts can be bruising points.

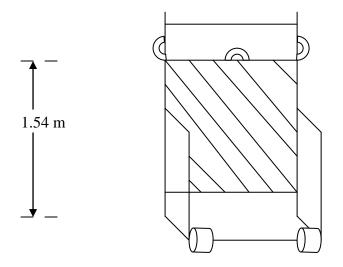
Fig. 23. Pens with two-way gates.



- Bulls are held individually in stalls. This raises some special considerations.
 - (1) extra staff are needed to drive each bull into a stall
 - (2) a bull may balk when it realises that it is being driven into a blind-ending stall. If it turns to face the person driving it forwards, that person can be in a dangerous situation. Similarly, the person in front of the bull (headman) diverting it into the stall is also at risk. One market manages the headman's risk with a mobile panelled bull board (Fig. 24).
 - (3) once the bull enters a stall it has to be secured quickly with a chain stretched behind its rump and latched onto a pin. If the bull pushes back at the wrong moment, whilst the chain is held in a hand, it can pinch and remove skin from the palm of the hand. This is best avoided by wearing gloves.
 - (4) forward exiting stalls allow easier bull management than single entry-exit stalls. They allow bulls to pass through the stalls and there needs to be a corridor at both the rear and the front of each stall.

(5) there needs to be adequate space. One market was limited for space when it introduced bull stalls. The stalls were set at an angle to the corridor in the usual herringbone pattern, but there was no front exit corridor and the corridor at the rear was very narrow. When a bull was facing the wrong way it had to be reversed along the length of that rear corridor to get it to a suitable point where it could turn around. This manoeuvre was common at that market, and lead to confusion.

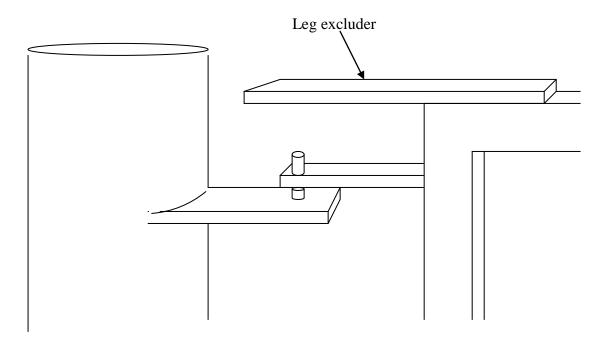
Fig. 24. Mobile bullboard



A walking screen on 2 wheels, which is positioned in the corridor to stop a bull and turn it into a stall.

- A slaughter weight lamb can get its head stuck between horizontal railings if the gap is 16 cm. 14 or 15 cm spacing is preferred.
- Usually sheep pens have six or seven bars with 12 cm gaps between the railings at lower levels, and 15 cm gaps above. Staff need to step over gates and railings, so they are usually no more than 90 cm high.
- In areas where cattle are prone to making escape attempts, pens can be made from 5bar 5 cm (od) galvanized tubular steel with 28 cm spacing between each rail. This produces a pen wall that is a little over 1.6 m high. In busy areas, bar metal can be welded vertically across the tubular steel rails at 1 m intervals to provide a visual contrast and reduce escape attempts.
- The gap between an upright post and a gate can act as a leg trap for cattle that try to jump over a gate. This risk can be reduced by welding a leg excluder over the hinge-space at the top of the gate (Fig. 25)
- It is good if cattle holding pens can be enlarged or reduced in size by opening or closing gates within the pen. This is particularly helpful on busy days when there are a large number of sale lots, and when horned cattle need to be separated from hornless cattle.

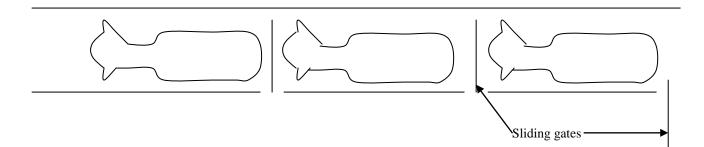
Fig. 25. Leg excluder at a gate post



3.2. GRADING RACES

- Grading can be stressful for cattle, as can any crush or raceway work. The cattle are prone to shunting up and down the race, riding each other and burrowing under other animals ahead of them in the race. If some are horned, they can damage each other. Sometimes an animal that has been mounting the animal in front gets stuck when a leg goes over the side of the race.
- Some of the stress associated with races can be controlled by separating the animals into individual stalls within the race, using sliding gates (Fig 26). This stops them shunting, but the gates need to be used in a considerate way, without inflicting bruises. In general, sliding gates are preferred to forward opening gates within the race, but they need to be fitted with rubber padding at the edge to minimise noise and bruising. It is advisable to use the gates even when the race is occupied by only one animal.
- Where store cattle are put up the same race as fat cattle, the stores are prone to crowding alongside each other and getting wedged. This is difficult to manage, but the sectioned race can reduce this risk (Fig. 26).

Fig. 26. Series of sliding gates that allow separation of individual cattle in a race



- If an animal goes down in a race there is a risk that a leg will go outwards under the bottom side rail of the race. The leg can become trapped and the animal cannot stand up. This can be prevented by making sure the gap below the side rail or panel is too small to allow a leg to pass underneath.
- It helps if the grading race is panelled. This encourages cattle to raise their heads, which makes ear tag reading easier. The benefit from panelled races is particularly noticeable with twin races.
- Races should be fitted with side unloading gates. These can be used when there is a downer animal, store cattle become jammed, an animal refuses to move or when one animal needs to be drafted out.

3.3. WEIGHBRIDGE AND RINGS

- Dual races can lead to confusion if the railings between the two races are not panelled. Stock moving in one direction can create confusion for stock that are supposed to be moving in the opposite direction in the adjacent race. This is sometimes a problem at sheep markets.
- Weighbridge floors made of durbar mild steel are slippery, especially when they become wet. Slips and falls can be reduced by coating the weighbridge with resin screeds containing grit. These are available commercially and have been used successfully at several markets for both weighbridges and slippery concrete corners. At one market the resin plus grit screed was laid on a concrete floor at corners over 8 years ago, and it has lasted well.
- Weighbridges often wobble and this can put animals off. They refuse to move. When renewing the weighbridge consider installing a load cell platform. These are wobble-free, but they may need to be custom-built for the site where they will be installed.
- Single animal weigh platforms are more difficult to load than multiple animal platforms, but they are easier to unload. At one cattle market, loading had been improved by fitting a curved vertical bar upper half to the front gate (Fig. 27). This gave the animals more head space and encouraged them to move nearer the front. It reduced the need to prompt the animal's protruding hindquarters onto the platform.
- Buckets of grit or sand sharps can be placed near slippery concrete floors, for staff and farmers to use as and when they are needed.

• In general, returning rings are better than straight-through rings (Fig. 28). This is because stock that are uncertain are more inclined to go back to where they came from, rather than head towards the unknown. Straight-through rings are used more for sheep.

Fig. 27. Curved front half gate for a single animal weighbridge

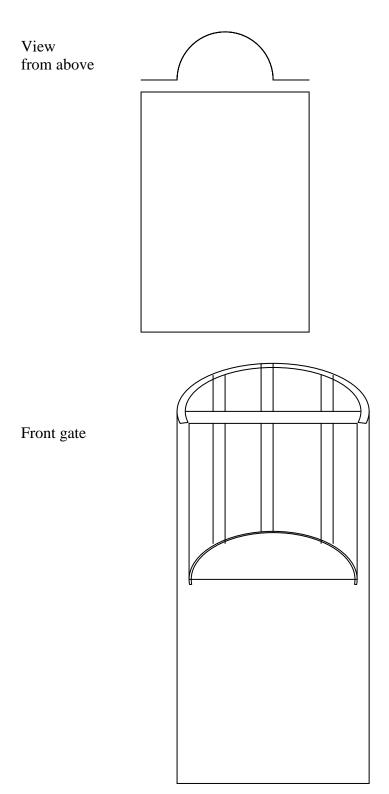
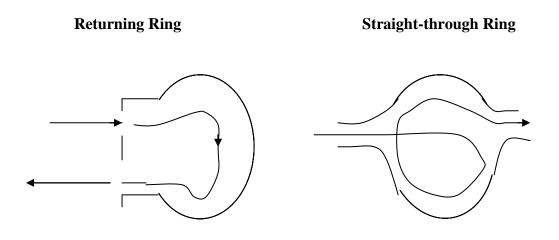


Fig. 28. Returning and straight-through sale rings



• Tubular steel posts are less likely than box steel or I-girders to cause bruising.

4. SOURCES OF ADVICE

Videos and publications giving general advice on handling methods can be obtained from the Humane Slaughter Association.

It is helpful when changing the design or planning a new market, to visit other sites to get ideas. Handling systems need to be tailored according to specific needs of each livestock market, and if you require advice, you may like to consult the following

Humane Slaughter Association The Old School Brewhouse Hill Wheathampstead Hertfordshire AL4 8AN Ph. 01582 831818

Royal Veterinary College Hawkshead Lane Hatfield Hertfordshire AL9 7TA Ph. 01707 666333

Meat and Livestock Commission PO Box 44 Winterhill House Snowdon Drive Milton Keynes MK6 1AX Ph. 01908 677577