

A Guide to Designing a Sheep Handling Unit



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**Author and editor:
Edward Egan, Teagasc, Navan, Co. Meath**

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The purpose of this book

1. How to design an efficient new handling unit.
2. How to improve an existing handling unit.
3. Bring together in one book good handling ideas.
4. Consider different options.

How to use this book

1. This book breaks the handling unit into its main parts.
2. They are ordered as you might approach them in a handling unit.
3. Each section starts with a list of Key Facts.
4. Figures given are for lowland sheep.

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Advantages of a good handling unit

Good v poor handling unit

- **18% less hour's** work/ewe.
- **16 days less** work/100 ewes/year.

1. Reduces labour

A good handling unit reduces the time worked per ewe by 1.28 hours per year (Connolly, 2000). For every 100 ewes that's about 16 less working days per year.

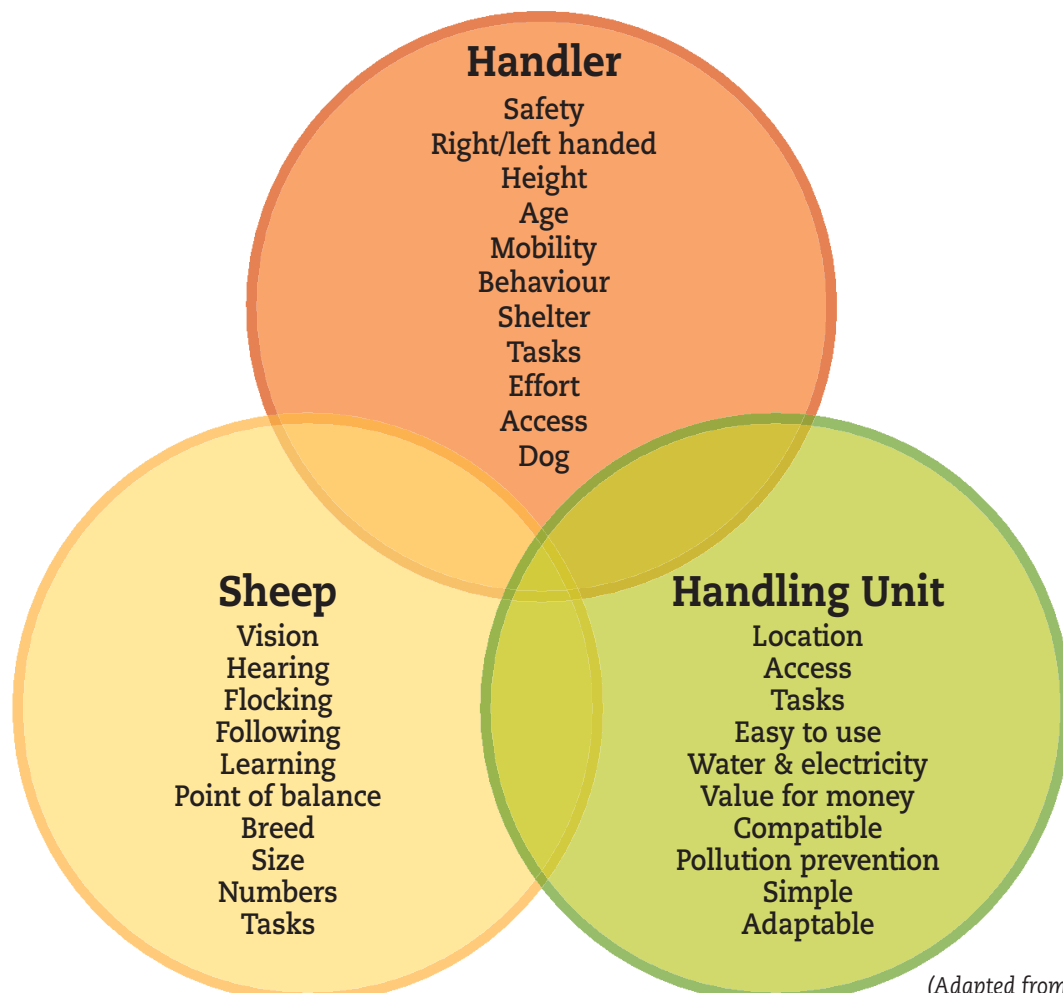
2. Improves safety and welfare for handler and sheep

A well-designed handling unit makes a big difference to safety and animal welfare. Tasks like dipping and foot care can involve intense repetitive handling during which the same muscles are strained. Whether you have 100 or 1,000 ewes you need a well-designed handling unit for the safe, timely and efficient completion of tasks.

3. Encourages preventative practices

Ease of use encourages use. An easy-to-use unit will encourage the timely completion of tasks. Sheep need timely handling for jobs like dosing, foot-care, condition scoring, culling, shearing, dipping etc. People prefer to do more of what they find easy. For this reason a well-designed handling unit is vital for the timely and efficient completion of tasks.

3 key discussion areas for a good design



(Adapted from Parker, 2019)

Value of planning

Key Facts

1. Visit three handling units before building.
2. Think about features that suit you.
3. Put your complete plan down on paper.

A well designed and located handling unit is more likely to be used, which is to the benefit of the handler and the flock. So spend plenty of time planning. A new handling unit is a long-term investment.

3 steps to a good plan

1. See

1. Visit at least 3 handling units when sheep are been handled.
2. Bring a camera, measuring tape, pen and paper.
3. Watch the handler move sheep through the unit.
4. Ask the handler what does and does not work.
5. What would they change, why and how.
6. Note features causing sheep to stop, retreat and break.
7. Note features that cause the handler to labour, stoop, lift, turn, drag, prompt or delay.
8. Are extra people, dogs or time compensating for poor location or design.
9. Record features like location, drainage, pen lengths, pen widths, pen sizes, gate length, race height, race width, race length, tub capacity, tub location, forcing pen width, footbath design, materials, handle design etc.
10. Get the details of good material suppliers and trades people.

2. Think

1. Think how these features will suit your situation.
2. Think about safety, cost, pollution prevention, ease of use, access to piped water, access to electricity, vehicle access, sheep access, handler access, handler age, handler health, farm layout, future expansion, tasks, flock size, breed, size and type of sheep.
3. Where can unsafe, stress, stalling, bent operating positions, back-straining or labouring points be removed.

3. Do

1. List all the jobs that you want to do in your handling unit. Include footbathing, dipping, shearing, crutching, culling, sorting, drenching, injecting, condition scoring, scanning, spraying, weighing, tagging and loading.
2. How and where will these jobs be done in your proposed handling unit.
3. Put your design down on paper first. At the paper stage consider how it will work.
4. Mark out the entire handling unit on site before construction starts.

Use behaviour

Key Facts

1. Calm, consistent and gentle handler.
2. Exploit sheep behaviour for easier handling.
3. What a sheep sees must attract them forward.
4. What a sheep sees must not distract them.
5. Sheep want to flock together.
6. Sheep want to follow sheep.
7. Sheep need a clear escape route ahead of them.
8. Sheep like using similar routes each time.

The handler

The handler's behaviour is important. The handler's actions and voice must be calm, gentle and consistent. Aggressive actions like hitting, shouting and sudden movement will make sheep fearful and harder to handle.



Exploit 5 basic behaviours to make handling easier and safer.

1. Vision

What a sheep sees is key to encouraging them to move freely. The correct location for solid and open sides reduces the visual distraction caused by nearby sheep and handlers. Seeing other sheep moving forward will encourage sheep to move. Avoid sharp corners or dead ends as sheep lose sight of their comrades. The alert response of sheep is triggered by what they see and hear. They are very alert when they see a person or dog. Sheep try to keep sight of them unless they are fleeing. This can be used to direct or hold.

2. Flocking

Sheep have a strong tendency to flock together. It is the most easily used behaviour to move and control sheep. Isolation of an individual causes panic and should be avoided.

3. Following

Sheep are followers. They have a very strong tendency to follow each other. To use this behaviour they should be able to see the sheep moving forward in front of them. Major delays in sheep movements in a handling unit occur because the first animal is stalling. Once the first sheep moves the rest follow.

4. Flight

Making use of the flight behaviour requires a clear escape route. This is why the entrance and exit gates at each end of the race should be see-through. It is also the reason why sharp corners or dead ends are best avoided.

5. Learning

Handlers often find difficulties moving sheep through a new layout on the early attempts. Sheep have the ability to learn a route through a handling unit after 3-5 goes. They are creatures of habit. So, follow a similar basic route through the handling unit to reach different treatment areas. This will reduce the need for prompting each time the handling unit is used.

Safety features

Key Facts

1. Safe for people and sheep.
2. Safe vehicle access.
3. Safe gate latches.
4. Hang gates securely.
5. Enclose counter weights.
6. Avoid different floor levels.
7. Avoid corrugated metal sheets.
8. Childproof and stockproof dip tub covers.
9. Use a registered electrician.
10. Install handler gates to avoid climbing.

A well-designed handling unit makes it safer to handle sheep.

Vehicle access

1. Convenient and safe for vehicle access and turning.
2. If it is near a public road a lorry or jeep and trailer must have space to move completely off the road safely, turn and back into the unit.

Gate latches

1. Avoid latches that are rough, jam or scissors like.
2. Avoid highly spring-loaded latches.
3. Avoid stooping when using.
4. Must be simple and quick to open with one hand.
5. Must not stick out into handlers or sheep's path.

Gates

1. Securely hang all gates with suitable hinges.
2. Minimise spring resistance on gates.
3. Locate gates to avoid climbing or lifting over walls.
4. More gates = less climbing and lifting.
5. Avoid sheeted yard gates. Dangerous when windy.
6. Use smooth lightweight material for pen gates.



Counterweights must be enclosed.

7. Round pipe work is less damaging if the handler is pushed against the railings.
8. Always encase counterweights.

Floors, trips and falls

1. Wear anti-slip footwear.
2. Floors must have a tamped finish for a good grip.
3. Avoid different floor levels, steps or steep ramps.
4. Avoid trip points, obstacles and projections.
5. Keep the floor tidy and free of objects.
6. Do not leave hoses lying on the floor.
7. Install hose storage equipment to make tidy storage the easy option.
8. Do not allow manure or leaves to buildup.
9. Good drainage is essential.
10. Avoid carrying water.

Race and pen walls

1. Do not use corrugated metal sheets. Edges are a risk.
2. Cap all metal post to avoid injury on sharp edges when leaning over or crossing them.
3. Sink screws and nail heads just below the surface.
4. Pack sheep into pens or races to reduce the chances of them running or jumping.



Cap all metal post to avoid injury.

Sheep dipping

1. Locate splash guards to protect handlers.
2. Wear recommended personal protective equipment.
3. Handle, store, use and dispose of chemicals according to manufacture instructions.
4. Do not locate a dip tub in a roofed area.
5. Do not leave hoses on the floor.
6. Never use the same hose pipes for dipping and domestic water supply purposes.
7. Have an action plan in case of contamination or spillages.
8. Those involved in dipping sheep or disposing of dip should consult – Sheep dipping – Advice for farmers and others involved in dipping sheep.

<http://www.hse.gov.uk/pubns/ais41.pdf>

Action plan – dip contamination and spillage

1. Before use read product labels and data sheets for advice on contamination, spillage, symptoms and first aid.
2. If dip gets onto or into your body, any adverse effects depend on formulation, absorption route and exposure.
3. If any dip splashes into your eyes rinse out with plenty of clean, cold water for at least 10 minutes.

4. If anybody gets heavily contaminated, e.g. falling into the dip, treat as an emergency. Remove contaminated clothes, wash all contamination from skin and seek medical advice.
5. If anyone feels unwell during dipping, or within 48 hours of dipping, they should stop work, wash any contamination from their skin or clothing and consult a doctor.
6. Anyone seeking medical advice should take the product label with them.
7. Those advised by doctors not to work with OP compounds should not be involved in the use of OP dips.

Dip tub safety cover

1. Unsupervised tubs must be covered with a locked childproof cover at all times.
2. Galvanised steel covers are a better fit, longer lasting and less slippery when wet compared to timber.
3. The cover must completely cover the tub.
4. Cover must be level with floor.
5. The cover must take the weight of people and sheep.
6. Must be easy to put on and remove.
7. Must not be a trip hazard.



The dip tub cover must take the weight of machinery, people and livestock that may cross it.

Storage tanks

1. All storage tanks and containers must be enclosed or covered to prevent access.

Footbathing – Formaldehyde

1. Handlers must be aware of the hazards from formaldehyde.
2. Have an action plan to deal with hazards.
3. Data sheet deals with managing spillages.
4. Wear recommended personal protective equipment.
5. This will include approved full length gloves and approved safety goggles.
6. Never use formaldehyde in a roofed area. It is carcinogenic.
7. This product is combustible and can form explosive vapour/air mixtures.
8. Tidy hoses away.

Action plan – Formaldehyde

1. Before handling read the safety data sheet for formaldehyde.
2. Inhalation: Remove victim immediately from source of exposure into fresh air. Get medical attention in case of severe exposure or if any discomfort continues.
3. Ingestion: Do not induce vomiting. Immediately rinse mouth and drink plenty of water. Get medical attention immediately.
4. Skin contact: Immediately remove contaminated clothes and wash before re-use. Rinse the skin immediately with lots of water. Unless contact has been slight and no discomfort is felt, obtain medical attention.
5. Eye contact: May cause permanent damage if eye contact. Promptly wash eyes with plenty of water or eye wash solution while lifting the eyelids. If possible, remove any contact lenses and continue to wash. Get medical attention immediately.
6. Anyone seeking medical advice should take the package leaflet with them.

Injecting

1. Have an action plan in case of accidentally injection with a potentially harmful product.
2. Before handling read product label and data sheet. It may indicate user precautions and actions. It may provide advice for the user and doctor.
3. The product user needs to check if any special precautions are required by the person administering the product. Particularly injectable products containing mineral oil.
4. Anyone seeking medical advice should take the package leaflet with them.
5. Place needles in a solid non-puncture container and dispose of correctly.
6. Pack sheep into race to reduce chances of them running or jumping.



Lighting and electrical work

1. Provide good lighting particularly where handling units are roofed.
2. For electrical work always use a registered electrical contractor.
3. When electrical work is complete ask the contractor for an ETCI completion certificate.
4. Install a Residual Current Device (RCD) and test it regularly.
5. Use correct outdoor fittings to the IP (Index of Protection) standard.
6. All switchgear, plugs and sockets used on farm buildings must be of an industrial type.
7. This booklet is not a legal interpretation of Electrical Installation Regulations.
8. For full details contact the relevant Authority.

Straining muscles

1. If possible, avoid lifting sheep.
2. Locate gates to avoid lifting sheep over fences.
3. Use access gates to avoid climbing fences.
4. If you have to lift use your legs not your back.
5. Minimise straining the same muscles repeatedly.
6. Ensure high forces are applied by the largest muscle groups.
7. Ensure the level of work is below the level of the handler's heart.

Standing position

1. Encourage handlers to maintain an upright and forward-facing position.
2. Encourage handlers to adopt a variety of safe postures.
3. Ensure the weight of the body is spread evenly to both feet when working.
4. Ensure the handlers neck, trunk, and upper body limbs are mainly in a neutral and comfortable posture.
5. Avoid bending to far forward.
6. Avoid excessive reaches.
7. Unit must suit left and right handed handlers.
8. Unit must suit handlers of different heights.

Rams

1. Take particular care when handling rams.
2. Keep rams in clear view.
3. Never let your guard down.
4. Protect yourself.
5. Cull aggressive rams.

Personal hygiene

1. Sheep can spread many diseases to humans.
2. Wash and dry hands after handling.
3. Have a clean place with running water, liquid soap and paper towels to wash and dry hands.
4. Cover cuts with water-resistant dressing.
5. Wear recommended personal protective equipment.

Location of unit

Key Facts

1. Convenient location for handler, sheep and vehicles.
2. Convenient access to water and electricity.
3. Central to main housing and grazing area.
4. Consider future expansion.
5. Exploit existing facilities.
6. Locate unit to use existing stanchions if roofing it.
7. More than 1 handling unit maybe needed.
8. Clean dry access and yards.
9. Prevent pollution.
10. Check regulations about planning permission and overhead electricity lines.

Locate the handling unit to:

1. Encourage its use.
2. Prevent pollution.
3. Allow future expansion.
4. Exploit existing infrastructure.
5. Maximise handler welfare and output.

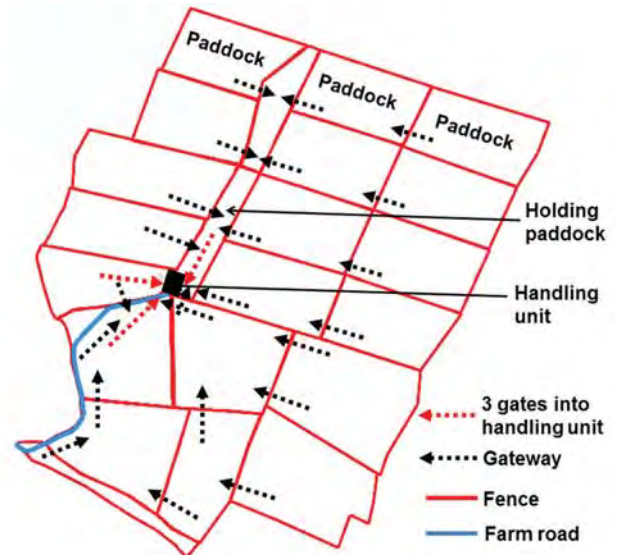
Most convenient location

Locate the handling unit in the most convenient place so one handler with a dog can easily take sheep from the field into the collecting yard and out again. Choose a site with a direct route from the grazing area to the handling unit. The site should be central to the main grazing area. Ideally it should be near housing for the timely completion of tasks like footbathing, vaccination



Handling unit to one side of access road so it's not in the way but easily accessed.

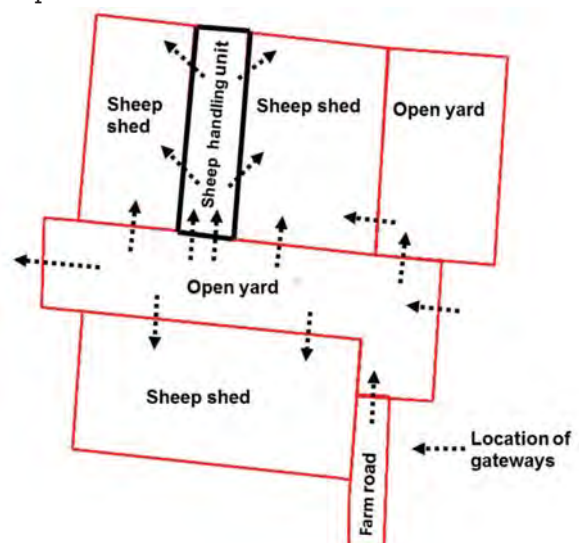
and condition scoring of housed ewes. The site should be level.



Paddock layout designed around a centrally located handling unit. Involved relocating paddock entrances, building new bridges and laying paddocks out for convenient access to the handling unit.

Locate a handling unit in a grazing area so:

1. Most convenient place for the handler.
2. Central to the main grazing area.
3. Distance sheep walk is minimised.
4. Vehicle access by farm road.
5. Main paddocks feed into holding paddock.
6. Holding paddocks feed into the handling unit.
7. Handling unit has entrance gates into 3-4 paddocks.



Handling unit located centrally in a farmyard. Involved making new entrances into the buildings each side of the handling unit.

Locate the handling unit in a farmyard so:

1. Most convenient place for the handler.
2. Next to main sheep sheds.
3. Collecting pen size is minimised.
4. Sheds, yards and roadways act as collecting pens.
5. Sheds, yards and roadways allow sheep to recirculate.
6. It is never in the way.
7. Adjacent roofs must have working gutters.
8. Handling unit can be roofed using existing stanchions.

Convenient to winter housing

Locating the handling unit close to the main sheep housing also has advantages, particularly at housing time for vaccination, body condition scoring and footbathing.

More than one handling unit

It may not be possible to have a handling unit that is central to both the grazing area and the farmyard. For convenience more than one permanent handling unit is required where:

1. Sheep housing is at one end of a large grazing area.
2. Large flocks are on different fragments of a holding.

Use existing facilities

Locate the handling unit to exploit existing small fields, yards, housing and roadways. This will reduce the penning needed for collecting and drafting. Many units involve part of an existing building, yard or wall, usually as a collecting pen or as one side of a pen or race. Using what is already there reduces the cost and work. However, do not compromise on design and access.

Good access

Locate the unit to one side of an access route so that it is convenient to use but never in the way. Sheep should follow a similar route to the handling unit each time it is used.



Easy, direct, clean, dry and well fenced access.

Clean access

The route to the handling unit must have a clean dry hard surface. This is vital to having clean sheep for footbathing, dipping, sale etc. It also makes jobs like checking feet much easier. Collecting yards and entrances with 150mm of hardcore topped with 100mm of 12.5–25mm round stone will help keep feet, footbaths and dip tubs clean and stone free.



Compared to finer gravel 12.5–25mm round stone will keep feet, footbaths and dip tubs cleaner and stone free.

Vehicle access

It must be convenient and safe for vehicle access and turning. If it's near a public road vehicle's must have access and space to move completely off the road safely, turn and back into the unit.

Good fencing

Surrounding fields and routes to the unit must be well fenced. Gates and fences must also be lamb-proof. This allows retreating sheep, particularly lambs to be easily retrieved. It prevents sheep from mixing or escaping from one area to another.

Prevent pollution

Keep as far-away as possible from watercourses, waterbodies, springs, boreholes, wells, flood plains and drainage systems. The site must be free-draining even after prolonged wet weather. Avoid sites with high water tables or where water tends to collect.

Consider future expansion

The expansion, shape and size of a handling unit is often determined and restricted by existing features. Sometimes better to build a less restricted design at a new location and improve access to the site. Locate the unit so future expansion and relocation of materials is possible.

Access to infrastructure

Easy access to waste storage tanks, electricity, piped water, equipment, medication, public and farm roads is important. The ability to setup and clean-up easily encourages the timely completion of tasks. Filling, cleaning and emptying footbaths and dip tubs must be an easy job. A water hose or tap next to a bath saves time when cleaning and filling. A convenient powerful water hose would also be useful for filling and cleaning.

Southern side site

Ideally locate the handling unit on the southern side of a building, hill or trees. This side gets the least frost and the most sun and warmth particularly in the winter.

Sheltered site

Handlers have to work in less than ideal conditions. Shelter from cold winds, driving rain and sun is important for handler welfare and output. Consider the direction of the prevailing wind, the funneling of wind around buildings, hills or along valleys and the position of the sun.

Avoid heavy shading

Avoid areas heavily shaded by trees or buildings. These sites can be cold, dark and slow to dry out. Fallen leaves particularly from some deciduous trees can hamper drainage and create dirty surfaces. Avoid species with large branches or limbs. They can be a danger to handlers, sheep and equipment.

Shelter belt location

Set trees back at least 20m from buildings, yards, concrete tanks, etc. No belts of trees should be planted within 30m of a neighbours dwelling or farm buildings. Consider root damage to structures.

Shelter belt design

A shelter belt should slow rather than block the wind. Extend the shelter belt beyond what it is protecting. Two or three rows of trees are more effective and natural looking than one row. Fast growing conifers can act as shelter belts. But to close to the unit and they will leave it damp and darkened as they overshadow it.

Planting shelter belts

Plant trees when they are dormant. Plant deciduous trees in the autumn. Plant evergreens in March or April. Unless shelter from a strong southern wind is essential, the area directly to the south of handling unit should not be planted to allow in light.



Picture taken 2006. Fast growing conifers can act as shelter.



Picture taken 2016. 10 years later the same unit viewed from the opposite end. Planting close to the unit can lead to overshadowing blocking out light and preventing drying.

Power lines

1. When planning to carry out work in the vicinity of overhead electricity lines contact relevant authority.
2. This booklet is not a legal interpretation of electrical regulations.
3. For full details contact the relevant authority.

Planning permission

1. Contact your Local Planning Authority for full details in regard to planning permission.
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Roofed units

Key Facts

1. Shelters handler, sheep and equipment.
2. Beside sheep shed to use its stanchions.
3. At least 3 sides opened.
4. 4m eave's for machinery.
5. Roof slope at least 15°. 270mm rise per 1m span.
6. 100 lux lighting over the race.
7. 50 lux plus over the remainder. Even lighting.
8. Roof over race & footbath (depending on solution).
9. At least 1m gap between race and stanchions.
10. Stanchions must not be in the way.

Some consider roofing a handling unit a luxury. The growing numbers that do roof it find it has real advantages.

Roof a handling unit to:

1. Allow the timely completion of tasks in poor weather.
2. Allow sheep to be housed while dry so tasks proceed even if it rains e.g. shearing, crutching or paperwork.
3. Improve working conditions.
4. Provide protection from the sun.
5. Reduce the dilution of zinc sulphate or copper sulphate footbaths from rain.
6. Reduce evaporation losses from zinc sulphate or copper sulphate footbaths.
7. Reduce the need to empty footbaths to prevent overflows from rainwater.
8. Reduce the volume of soiled water produced.
9. Protect expensive handling equipment.
10. Leave equipment out but covered.

Never roof dip tubs or formalin footbaths

1. Do not locate the dipping tub under a roofed area.

2. Do not locate formalin footbaths under a roofed area.

Choosing a location

1. Reduce building cost by using existing stanchions.
2. Reduce penning cost by using the existing housing as collection pens.
3. Allow the timely completion of tasks like footbathing, vaccination and condition scoring of winter housed pregnant ewes under one roof.

Reduce roofing cost by:

1. Grafting onto existing stanchions.
2. Only covering essential parts of the unit like the footbath, forcing pen, drafting race and dosing race. This allows the timely completion of certain tasks in poor weather so housed sheep can be footbathed, vaccinated, condition scored and sorted in a timely manner.
3. Setting-up penning in the sheep house to act as collecting pens. So, collecting pens outside do not need to be roofed.

Good ventilation

Good ventilation is very important. For airy conditions leave the roofed handling unit completely opened on at least 3 sides from floor to eaves. Outlet ventilation is achieved by spaced sheeting over the entire roof with a minimum gap of 20mm. However, this allows some rain in.



Roof over drafting race, dosing race and footbath.

Eave height and roof slope

The minimum eave height is 3m. 4m is recommended for machinery access. The roof slope must be given careful consideration as it impacts on ventilation. Roof slope should be at least 15° (equivalent to a 270mm rise per 1m span).

Natural lighting

Good use of daylight is important for safe working conditions. Most roofed handling units are open on at least 3 sides. This allows light in. Where a handling unit is located in the sheep house install clear sheets on the side walls to let in light at animal level. Where the side sheeting is clear the roof should be fitted with non-drip cladding to prevent condensation. Spaced sheeting over the entire roof is another means of letting light in.

Artificial lighting

A lighting level of least 100-lux should be provided over the race and at least 50 lux over the remainder.

Chutes and down pipes

It's very important to have gutters and down pipes in place and working properly.

Using existing stanchion

Stanchion of the existing building must be of sufficient size



Protect down pipes from damage by passing sheep.

for both the existing and new one. The stanchion and base connection at ground level must show signs of minimal corrosion.

Supports for new handling unit roof grafted onto stanchion of neighboring shed.

Location of the race

Where a race and or footbath is sited under a roof, the race and footbath should face towards the light. This will encourage sheep to move forward.

Location of stanchions near the race

Locate the handling unit leaving a gap of at least 1m between the side of the race and the stanchion. This applies to both sides of the race. This allows the handler to work along the length of both sides of the race without been impeded by the stanchion. Stanchions must not hinder sheep or machinery access through collecting pens etc.



Locate stanchions so handler, sheep and machinery move freely.

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Roadways

Key Facts

1. Important for regular vehicle access.
2. 4m wide. €23-25/m for material and installation.
3. Fencing and gates are extra.
4. Ideally remove a thin layer of top soil.
5. Foundation – 200mm of 3" (75mm) down.
6. Surface – 75mm of quarry dust or grit.
7. Road 150mm above field.
8. Cross slope 1:25 if one sided or 1:15 if two sided.
9. 5m wide gateway for machinery.
10. 100mm of 12.5-25mm pebbles at collecting yards.

Sheep farms may only need a short roadway to link the centre of the grazing area to the handling unit or the sheep housing to the handling unit. More roadways maybe needed for wetter land, heavy machinery, cattle or tillage. Where a route is used daily a well-built road is worthwhile. A roadway is a big investment.

Design the roadway so that:

1. You know your cost before starting.
2. It provides quick, direct and easy access.
3. Water runs off it quickly.
4. It does not flood.
5. It suits your livestock and machinery.
6. Livestock do not escape.
7. Livestock and machinery movements are not delayed.

Choosing the route

1. Account for archaeological sites, poles, watercourses, wet areas and slopes.
2. Minimises slopes, bends and wasteful lengths.
3. So freshly dipped sheep returning to grass avoid watercourses, water-bodies, flood plains, drains etc.
4. Straight roads make construction, fencing, paddock design, machinery and livestock flow easier.



4m wide roadway suitable for machinery.

5. Square or rectangular paddocks make's fencing and tractor work easier.
6. Locate roads on the southern side of hedgerows. These locations dry out quickly.
7. Avoid heavy shading by trees. These locations dry out slowly.
8. Do not put drinkers along the roadway.
9. Avoid sharp corners. Use broad gentle curves.
10. At junctions or bends smoothen corners to stop bunching and too ease the flow.

Digging out top soil

1. Do all work in dry weather.
2. Farm roads should be 4m wide.
3. Roads layed on top soil could move under pressure and need more maintance.
4. Remove 150-200mm of top soil.
5. Removing too much top soil increases building-up cost.



1st layer geotextile membrane, 2nd layer foundation stone and 3rd layer quarry dust for binding.

1st layer – Geotextile membrane

1. Is put between the soil and road material.
2. Allows water through for drainage.
3. Prevents soil mixing with the road stone.
4. Provides support and drainage.
5. Is recommended where machinery uses the road.



Geotextile sheet between soil and foundation stone.

2nd layer – Foundation stone

1. Bury 100mm sewage pipes across the road to take electric wiring or water pipes under the road. This avoids digging-up the road.
2. 200-250mm foundation for cars, jeeps and tractors.
3. 300mm foundation for heavy machinery and lorries.
4. Use 804 material. Particle size of 75mm to dust.
5. Roll thoroughly with a vibrating roller.
6. Give it time to settle.
7. The intended slope is formed in this layer.
8. 1:15 from centre to each side or a 1:25 crossfall.



200-300mm layer of foundation stone (75mm to dust).

3rd layer – Surface layer

1. Cover evenly with 50-75mm quarry dust or grit that is 6mm down to dust.
2. Cheaper material available, but not long lasting.
3. 1:25 slope if sloped from one side to the other.
4. 1:15 slope if sloped from centre.
5. Steep slopes results in heavy rain washing off binding material.
6. Lack of slope results in water lying on the road increasing maintenance.
7. Roll thoroughly with a vibrating roller.
8. To keep the road clean and dry it should be at least 150mm above the surrounding field.



75mm layer of quarry dust (6mm down to dust) binds the surface and leaves it smooth.

Fencing the roadway

1. Where the roadway is higher than the field use a 1.8m x 100mm fence post particularly with cattle.
2. The roadway fence should be at the roads edge.
3. Weeds grow under the fence when there is a grass margin between the fence and road.
4. Gradually widen the road and move fences out at T-junctions or bends.
5. Bushes will earth the fence. Leave a space between the fence and hedge for cutting.



Fine surface material.

Gateway design

1. Gateways off the roadway should be at least 4m wide.
2. A 5m wide gap is ideal for livestock and machinery.
3. Cover the lower half of the gate with 50 x 50 x 3mm or 75 x 75 x 4mm mesh to hold lambs.
4. Alternatively use 8 bar lamb proof gates.
5. For clean dry gaps consider stoning.
6. For easier flocking the gate across the gap should span the width of the road.

Gate location

1. Shorten the walk from fields by locating the gate at the side nearest the handling unit or yard.
2. Gates to roadways should avoid wet spots.
3. Set gates back from the roadway.

Clean access

Sheep collecting yards and their entrances should be topped with 100mm of 12.5–25mm round stone. This will keep feet, footbaths and dip tubs clean and stone free. Fine material like quarry dust will be carried into footbaths and dippers.



100mm of 12.5–25mm round stone on entrances and collecting yards cleans clay and grit off sheep's feet.

Maintaining the roadway

1. Carry out maintenance during dry conditions.
2. Early maintenance avoids major work later.
3. Repair and resurface roadways annually.
4. The main requirement should be for filling potholes.

Cost

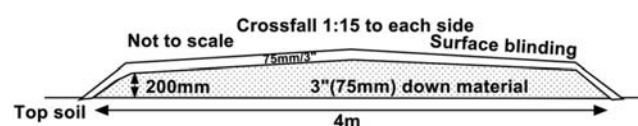
1. Work out your costs before starting.
2. Costs depend on region and amount.
3. Cost reduced if gravel nearby and where the farmer does work.
4. A 25 tonne load of 75mm or 3" down will construct 15.6m length of road by 4m wide by 200mm deep.
5. A 25 tonne load of quarry dust will construct almost 41.7m length of road by 4m wide by 75mm deep.
6. 1m³ of material weighs about 2 tonnes.

Roadway options

There are four different roadway design options shown here. A road that slopes to one side is

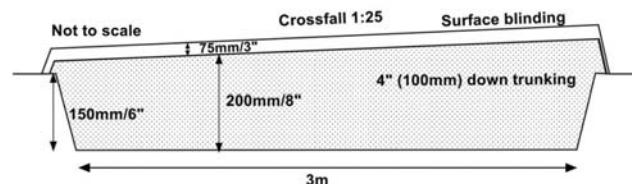
easier to construct and travel on with machinery. However livestock tend to spread out better on a road that slopes from the centre.

Roadway 1 – 4m wide sloped from centre



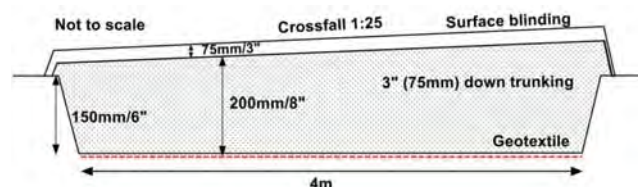
Cost of 4m wide road (excl. VAT)	
	€/m
Installation cost	2.10
Foundation stone – 3" down €9/t 1.6t/m run	14.40
Quarry dust – 75mm €10/t 0.6t/m run	6.00
	22.50
Sheep fence – one side	6.00
1 Gateway per 100m	2.00
Total	30.5

Roadway 3 – 3m wide sloped from one side



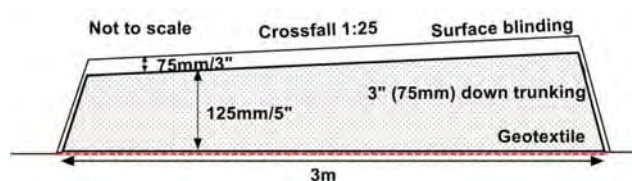
Cost of 3m wide road (excl. VAT)	
	€/m
Installation cost	2.20
Foundation stone – 4" down €9/t 1.2t/m run	10.80
Quarry dust – 75mm €10/t 0.45t/m run	4.50
	17.50
Sheep fence – one side	6.00
1 Gateway per 100m	2.00
Total	25.5

Roadway 2 – 4m wide sloped from one side



Cost of 4m wide road (excl. VAT)	
	€/m
Installation cost	2.80
Geotextile membrane	2.00
Foundation stone – 3" down €9/t 1.6t/m run	14.40
Quarry dust – 75mm €10/t 0.6t/m run	6.00
	25.20
Sheep fence – one side	6.00
1 Gateway per 100m	2.00
Total	33.20

Roadway 4 – 3m wide sloped from one side



Cost of 3m wide road (excl. VAT)	
	€/m
Installation cost	1.80
Geotextile membrane	1.50
Foundation stone – 3" down €9/t 0.75t/m run	6.75
Quarry dust – 75mm €10/t 0.45t/m run	4.50
	14.55
Sheep fence – one side	6.00
1 Gateway per 100m	2.00
Total	22.55

Collecting pens

Key Facts

1. At least capacity for regularly collected groups.
2. 0.5m^2 /lowland ewe without lambs.
3. 0.65m^2 /lowland ewe & lambs.
4. 3.0-4.6m entrance gate. Ideally gate width of pen.
5. 4.6m maximum pen width.
6. 1st layer 150mm of hardcore.
7. 2nd layer 100mm 12.5-25mm round stone/concrete.
8. 0.4-0.8ha holding paddock for largest group.
9. Be inter-connected with gates.
10. Easy access to paddocks, roadways, yards and sheds which could also act as collecting pens for large groups infrequently collected.

Pen access

Access to the collecting pen should be by a simple direct route from field or roadway. Gates should open leading directly into the collecting yard from the road serving the fields, yards or buildings.



Lamb proof gate that opens in and out.

Entrance gate design

Hang the entrance gate so when opened it funnels sheep from the roadway into the collecting pen. All gates should open inwards and outwards. This allows more sheep into the pen. Sheep are less likely to be caught behind a gate which is opened

out of a pen for emptying. Gates should open through a full 180° . It must be possible to secure all gates when opened to avoid accidental closure.

Gate width

The entry gate into the collecting pens should be at least 3.05m wide. Often entrance gates into collecting yards are too narrow. Flocks of 150 ewes or more require entry gates of 4.57m. This makes it easier to get sheep in and out. It also reduces the likelihood of bottlenecks and crushing. Having plenty of gates gives more flexibility and easy access.

Same width of pen and gate

Ideally the entrance gate and exit gates of the collecting pen would be the same width as the collecting pen. This eliminates corners or dead-ends that sheep can run into.

Correctly hinge gates

For easy and quick opening and closing all gates must be hung using proper hinges. Do not hang gates with joining rods. Gates hung with joining rods need to be lifted or dragged.

Collecting pen size

Allow 0.5m^2 /ewe without lambs. Allow 0.65m^2 /ewe and lamb. Ideally the collecting pen should hold the largest group gathered. Alternatively, a collecting pen could be made smaller if used in conjunction with adjoining holding paddock (see next paragraph), sheds or roadways. A lowland farm may contain 600 ewes. However, sometimes only sub-flocks of 100-200 ewes with their lambs will be brought in at any one time. Some find sub-flocks of this size easier to manage. In hill flocks all sheep may be gathered in one group requiring larger collecting pens. 150 lowland ewes and lambs at 0.65m^2 require 100m^2 or 22m long x 4.5m wide.

Holding paddocks

When used in conjunction with a holding paddock the size of the collecting pen may be reduced so it will hold the regularly collected groups. A 0.4-0.8ha (1-2ac) field can act as a

holding paddock for feeding sheep into the collecting pen. Holding paddocks must be very well fenced and free draining. They must also have a level surface that is free of obstacles like machinery, ponds and trees. The holding paddock should be rectangular in shape i.e. long and narrow to make it easier to drive sheep forward.

Collecting pen shape

Existing sites often decide the shape of the collecting pen so they tend to be either rectangular or square. Such shapes are easier to fit into the overall layout. They are also easier to build and to expand. Avoid wide square pens. Rectangular shaped collecting pens are ideal.

Collecting pen width

The ideal collecting pen width is 3m. This makes it easy for one handler to control sheep. The maximum collecting pen width is 4.57m. Often collecting pens are too wide. A long narrow rectangular pen makes it easier for one person to drive sheep forward or into a forcing pen or through an exit. Sheep are less likely to bunch or escape around the handler in long narrow pens. Prevent sheep retreating by placing gates along its length.



3m wide collecting pen makes it easier for one handler to move sheep.

Collecting pen floor

Remove 200mm of topsoil. In the past 150mm of hardcore topped with 100mm of 12.5–25mm round stone was used. Under current regulations the ideal collecting pen floor would have 3 layers;

1. 1st layer 150mm layer of compacted hardcore.
2. 2nd layer a 1000-gauge polythene membrane with a 600mm sealed overlap.
3. 3rd layer 125mm of concrete.

Concrete floors

Where a concrete floor is put down in one operation, joints in bays not exceeding 6m x 4.5m should be cut with a dis-cutter to a depth of 30mm. These joints should be cut to a full 12mm width formed by a double cut in the hardened concrete within 24 hours of placing it. Brush these joints clean. Then fill them when dry with acid resistant mastic sealant. Ensure floors give a good grip with a tamped finish.

Soiled water

Soiled water and other waste must always be collected and stored in accordance with Department of Agriculture Food and the Marine. Pollution must always be prevented.

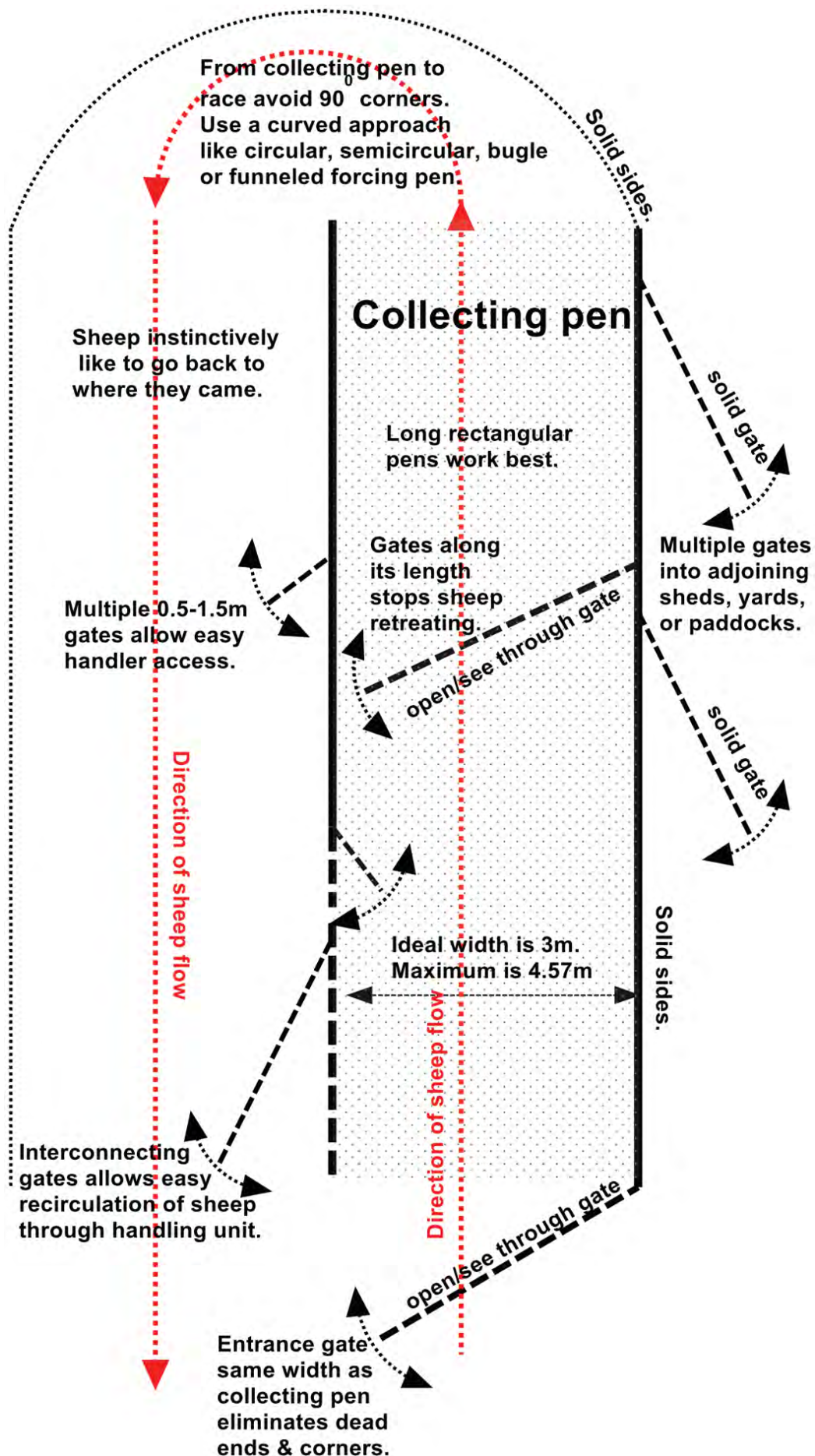
Inter-connecting gates

All pens should be inter-connected. This allows sheep to be returned to the collecting pen with ease for re-circulation. It also allows batches to be moved out of the way while staying within the handling unit.

Existing collecting areas

Existing small fields, buildings, yards, or roadways could act as holding pens or over-flow areas. This may reduce the size of collecting pen needed. Using what is already there reduces the cost and work. However, do not compromise on design and access.

The ideal collecting pen and how it fits into the overall handling unit.



Boundary fences

Key Facts

1. External fences at least 1.2m high for sheep.
2. Internal fences at least 1.0m high for sheep.
3. Boundaries at least 1.4m high if controlling cattle.
4. Handler gates along handler's route.
5. Dog access hole along dog's route through unit.

Boundary fences must:

1. Be at least 1.2m high for external fences.
2. Be at least 1.0m high for internal fences.
3. Be sheep and lamb-proof.
4. Have correctly located open and solid sides.
5. Be cost effective to build.
6. Need little or no maintenance.
7. Include gates for easy handler access.
8. Include easy access for dogs.
9. Avoid injury to handler, dog and sheep.
10. Encourage the easy flow of sheep.

External boundary

Ideally the external boundary of the handling unit should be at least 1.2m high. Ideally the external boundary should have solid sides to avoid sheep seeing out. This avoids them moving towards or stalling at the sight of their comrades. Protecting the handling unit from other livestock like cattle on the farm must also be considered.

Internal boundary

Ideally the internal boundary between pens should be at least 1.0m high. The surface of all internal boundaries should be smooth to avoid wool snagging and injury. Fences must be built to withstand the pressure of a crowded pen. Rails should be on the side of the greatest pressure.

Handler access gates

Locate plenty of handler gates along the handler's route through the unit. These must be simple and quick to open. Otherwise they will not be used.

Aim to cut out handlers having to climb over boundaries or lift sheep over walls. Where a handler does step over a boundary it must be low enough and designed so it is safe and simple to do so.

Location of dog access hole

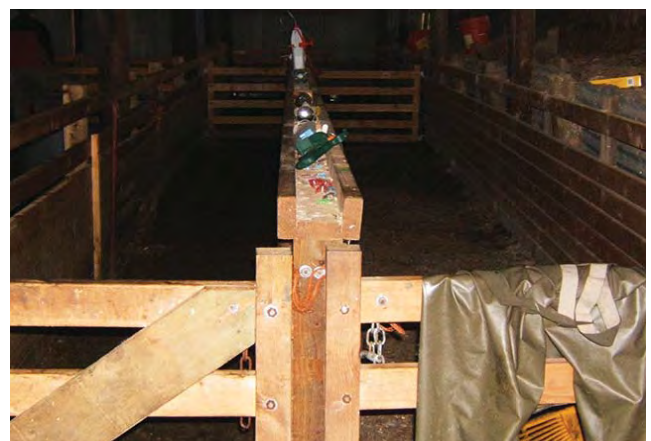
Locate dog access holes along the key routes that dogs follow through the handling unit. This reduces the energy and risk involved in jumping fences. Access holes should have a flap that can be closed when young lambs are present. Where a sheep dog is used the boundary must be safe for it to jump over.

Design of dog access hole

Trim the opening to prevent splinters. Use a rubber car mat to make the flap. Cut the flap so that it is 5mm in from the 2 sides and bottom of the hole. The top of the mat should be 50mm beyond the top of the hole. Cut an aluminum strip to the same width as the access hole. Use it to hold the mat in place. The flap must swing easily both ways so the dog can get in and out.

Timber shelf

A useful shelf can be built between timber pen divisions. Drill drainage holes at regular intervals in the bottom of shelf to let rainwater drain away.



Timber shelf between pens for storage.

Open sides and solid sides

What a sheep can and cannot see is critical in encouraging them to move freely through a unit. The correct location and design for open sides and solid sides is outlined in the following pages.

Open sides

Key Facts

1. Open sided boundary or gates located to encourage sheep forward.
2. Timber post at least 100mm x 100mm.
3. 1.5m between timber post.
4. Typical commercial steel hurdles 0.9-1m high.
5. Internal fences at least 1.0m high.
6. External fences at least 1.2m high.
7. 450mm of timber post below ground.
8. Steel rail and steel mesh are also a good option.

Correctly located open sides (see-through sides) will encourage sheep to focus on where you want them to go. An open sided boundary or gate allows sheep to see an escape or comrades ahead. Sheep will advance to attempt an escape or to join them. Open sided boundaries are generally lighter, cheaper and easier to build than non-see-through sides.

Locate open sides:

1. At each end of a race.
2. At each end of a footbath.
3. In gates between pens that you want them to go to.

Timber post and rail fence

A timber post and rail fence is simple, quick and easy to erect. Timber can also be dismantled and reused. However, it needs more maintenance than steel or concrete.

Timber post size

Use pressure treated timber post that are at least 100mm x 100mm. Boundary post should be at least 1.65m in length. This allows at least 0.45m below ground and 1.05m above ground. Standard length for 100mm x 100mm post is 1.8m. The post should be pressure treated kiln dried larch post treated to IS436. This greatly increases the cost. However, they have a 15-20 year working life when driven directly into the soil.

Timber post spacing

Ideally there should be a distance of 1.5m between each post. 100mm x 35mm-50mm rails come in standard lengths of 4.2m or 4.8m. As a consequence, the post would be 1.4m and 1.6m apart respectively. Locate post on the outside of the pen. Timber post may not suit rocky ground.

Timber rails

Use pressure treated kiln dried larch or douglas fir. They are long lasting and strong. 100mm x 35mm-50mm rails come in standard lengths of 4.2m or 4.8m.

Nails

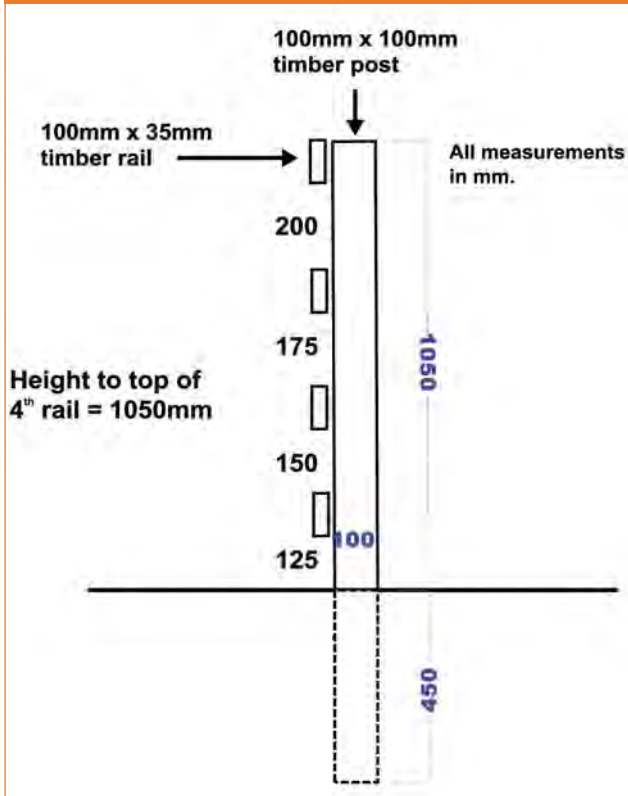
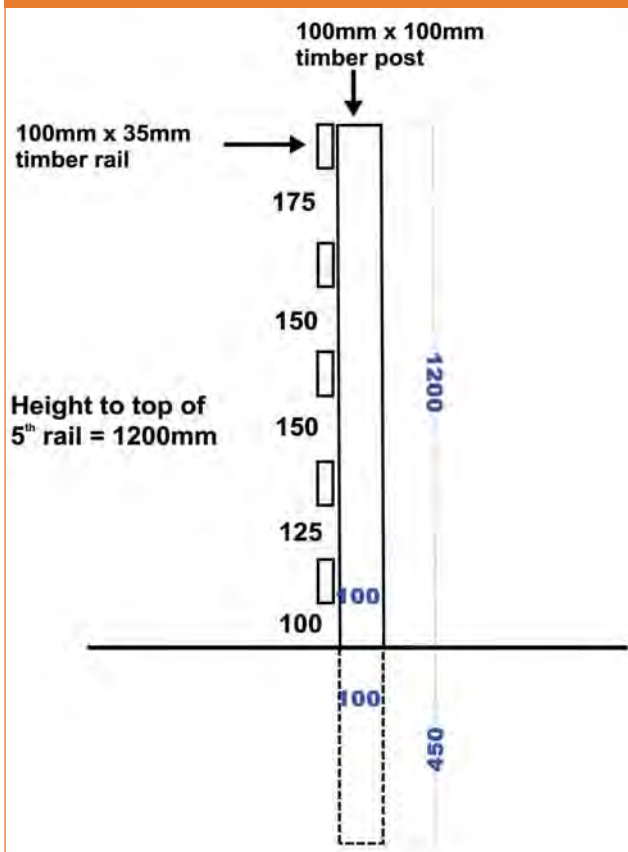
Rails should be nailed to post using 100mm x 4.5mm gauge galvanized nails. Two at each end and two in the middle. Drill holes for nails at the ends to avoid cracking rails.

4-rail timber fence

Leave 125mm from floor to first rail, 150mm between 1st and 2nd rail, 175mm between 2nd and 3rd rail and 200mm from the 3rd and 4th rail. Total height to top of 4th rail is 1050mm.



External 4 rail timber fence. Trees block view out.

4-RAIL TIMBER FENCE USING 100MM X 35MM TIMBER RAILS**5-RAIL TIMBER FENCE USING 100MM X 35MM TIMBER RAILS****5-rail timber fence**

Ideally 5 timber rails each 100mm x 30-50mm should be used. The recommended spacing between each timber rail on a 5-rail fence is shown in the previous figure. Total height from floor to top of 5th rail is 1200mm.



5 rail timber fence using round post.

Steel post and rails

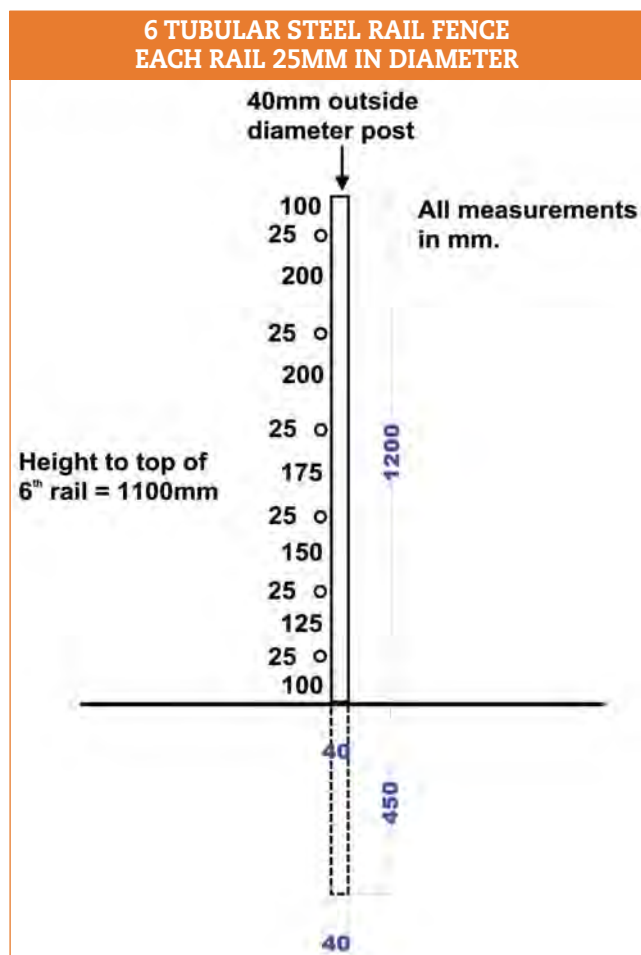
Steel post and rails should be hot dipped galvanised. Galvanised steel is long-lasting, smooth, quick and easy to erect. It's maintenance free, mobile and easily added to in length. Uprights should ideally be bolted to concrete. They can also be set in concrete.

Railed steel fence

Due to lack of time, equipment and expertise's many prefer to buy already made hurdles. There are a wide range of high-quality railed hurdles on the market. They generally have 6 rails and typically range from 0.9 to 1m high.

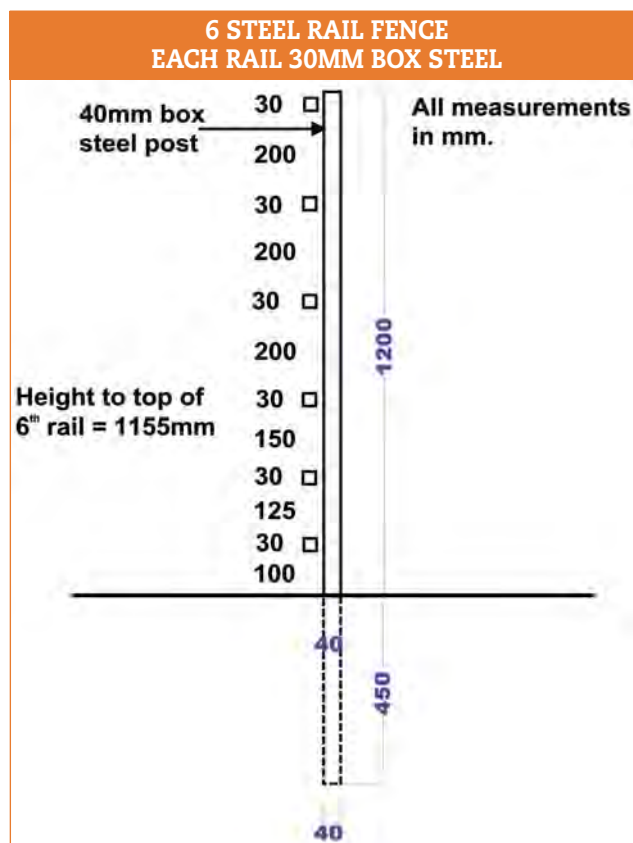
6 tubular steel rails

If making a tubular metal rails fence use 6 galvanised rails each 25mm in diameter. See next figure for recommended spacing. They should be welded or bolted to each other and or to uprights. Fix up-rights in concrete or bolt to the concrete floor. Height to the top of the 6th rail is 1100mm.



6 box steel rails

All rails are 30mm box sections. The recommended spacing between each steel rail is shown in the next figure. Height from floor to top of the 6th rail is 1155mm.



Steel rail and mesh

Steel rails and welded mesh may also be used. The top rail should be 25-30mm diameter tubular piping. The 2 bottom rails and up-rights are 37.5mm x 37.5mm. The 600mm space between the bottom and second rail is filled in with 75mm box weld mesh. It does not suit pens where sheep are packed tightly. Sheep pressed against mesh are harder to move. Dogs and sheep can get their legs caught and broken in mesh. Horns and tags can also get caught.



Metal rail and welded mesh fence.

Solid sides

Key Facts

1. Solid sides keep distractions out of sight.
2. To focus sheep on where you want them to go.
3. Have solid external boundaries, race sides and footbath sides.
4. 50-100mm gap between bottom timber rail and floor.
5. Wall thickness of 150mm if using mass concrete.
6. 100mm solid concrete block, buttress 3m centres.
7. Otherwise use 140mm solid concrete blocks.
8. Top concrete wall with half round concrete cap.
9. Allow for drainage.
10. Sheeted steel and stokboard are also good options.

Solid sides encourage sheep to focus in the direction you want them to go. Locating solid sides in the right places pulls the sheep forward, avoids stalling caused by nearby sheep and handlers coming into view.

Location for solid sides

In general, locate solid sides:

1. On external boundaries.
2. On race sides.
3. Between adjoining pens where sheep are moving in the opposite direction.
4. To block the sight of sheep been handled.
5. To block the sight of stationary sheep in a holding pen that you want to move sheep away from.

Close board timber fence

Timber post sheeted with 150 x 25mm timber rails to make a solid sided boundary. Leave a continuous gap of 50mm between the bottom rail and the floor for drainage and to allow the timber to dry out.



Close board timber boundary blocks out distractions.

Concrete walls

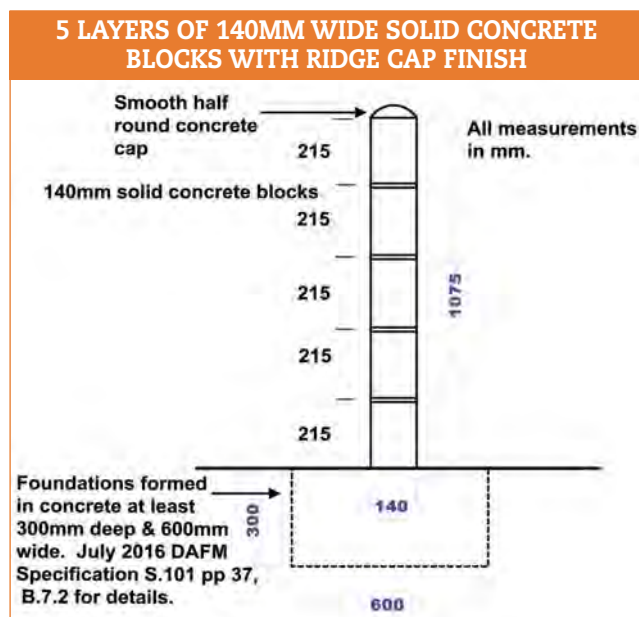
Concrete is long-lasting and maintenance free. However, it's less adaptable. With the exception of precast panels it cannot be reused. So, it's very important to get the design and location right the first time.

Mass concrete walls

Strongly recommended that concrete walls shall be constructed using mass concrete. If using mass concrete, the wall should be 150mm in thickness. Smooth off the top edges of the wall.

Solid concrete block walls

If using concrete blocks use solid blocks. The wall should be 5 blocks high. When using 100mm solid concrete blocks buttress at 3m centres. Otherwise use 140mm/150mm solid concrete blocks. See example of a block wall and foundation in the next drawing.



Concrete cap and shelf

Top the wall off with a smooth half round concrete cap. This removes sharp edges and aids drainage. A groove left in the wall will make a useful shelf.

Drainage joints

Where the handling unit has a concrete floor leave 25mm wide holes at floor level in vertical wall joints at about 1.5m intervals. This will prevent a build-up of water by diverting it to channels.



Drainage joint leading to a collection channel.

Pre-stressed concrete panels

Cost of panels can discourage their use. Pre-stressed concrete panels are long-lasting, smooth, quick and easy to erect. They can be used immediately. A builder, plaster or strip foundation is not required. Panels are clamped into steel columns. They can be moved and reused.

Sizes of pre-stressed concrete panels

Standard thicknesses of panels are 95mm, 100mm, 150mm and 180mm. Standard heights are 1m, 1.2m and 1.5m. Standard lengths are 4.57m, 4.8m, 6.1m to suit bay sizes.

Pre-stressed panels for sheep yards

The 1.2m high x 95 – 100mm thick pre-stressed concrete panels are adequate for sheep. This thickness is non-load bearing. Do not store material against the wall. Panels are more suited to external boundaries. The tongue and groove wall topping makes them uncomfortable to lean on. Check manufacturers specifications for details including loading.

Clamping pre-stressed panels

Pre-stressed concrete panels can be clamped between, inside or outside of the web of the steel column.

Steel sheeted penning

Hot dipped galvanised steel sheeted penning is long-lasting, smooth, quick and easy to erect. It is mobile and easily added to. Panels are easily moved and reused. However, it's expensive. There are a wide range of galvanised sheeted panels on the market. Typically, they range from 0.9-1m high. They are ideal for circular or curved boundaries.

Stokboard

Stokboard is an increasingly popular option particularly in curved areas as it is reasonably flexible. It also reduces noise, is soft on impact, does not become brittle, does not rot, is chew resistant, non-toxic and has no sharp edges. It can be sawn and drilled using typical wood working tools but at a slower speed to avoid heat from friction. Standard sheet sizes are 2.44m x 1.22m sheets with 6, 9 and 12mm depth. 6mm sheets are normally sufficient for cattle and sheep when attached to gates or penning. Sheets do expand slightly as temperatures rise. For every 10 degrees increase in temperature sheets can expand by up to 2.5mm per linear metre. So, leave a slight gap between adjoining sheets. Also, when the stokboard is been fixed, make the holes in the board 2mm larger than the screws. Use round-headed screws or a washer and bolt. Do not use countersunk screws or nails.

Securing uprights

Key Facts

1. Raw bolts or plastic sleeves secure post.
2. This makes fitting, relocating and reuse easier.
3. Plastic sleeves also protect from corrosion.
4. Raised concrete keeps base of timber post dry.
5. Secure uprights to avoid breaking up concrete.

Bolt steel post to concrete

Bolting uprights to concrete makes it much easier to setup, move and reuse them if needed. It may look expensive, but it won't be compared to a jackhammer breaking up concrete.



Bolting to concrete makes fitting and relocation easier.

Steel post in plastic sleeves

The alternative to bolting post to concrete is to place them into plastic sleeves. This makes it easy to move or change the handling unit layout without damaging the concrete floor or the post. Extending the plastic sleeves above ground level protects the steel from moisture.



Plastic sleeves protect the base and allow easy relocation.

Timber post in concrete

Where timber or steel post are set in concrete the floor immediately around the base of the post should be slightly higher than the surrounding floor. This keeps the base of the post dry, prolonging its life.



Raised concrete keeps base of post and bottom timbers dry.

Forcing pen

Key Facts

1. Hold 20% of collected flock.
2. 0.35m²/lowland ewe without lambs.
3. Entry angle to race of 30° for funnel shaped pens.
4. 3.6m diam. circular pen for up to 150 ewe flock.
5. 4.88m diam. circular pen for larger flocks.
6. 2 centrally mounted gates in a circular pen.
7. 3 centrally hung 2.44-3m gates in semi-circular pens.
8. Centre hinging post at least 1.5m long.
9. Forcing pen wall 1.25m high.

The forcing pens job is to provide an even flow of sheep into the race with minimum effort. The main aspects of a forcing pen are its;

1. Access.
2. Size.
3. Shape.
4. Construction material.
5. Quality of construction.

Access gates

Forcing pens typically have at least 3 access gates;

1. Collecting pen to forcing pen.
2. Forcing pen to another drafting pen.
3. Forcing pen to race.

Access to forcing pen

Firstly, an entrance gate for sheep from the collecting pen. Sheep should not have to turn 90° in the collecting pen to enter the forcing pen. Ideally the collecting pen should be in-line with the forcing pen. The next best option is to have the collecting pen at a 60-80° angle to the forcing pen.

Access to drafting pen

The second exit gate should allow the sheep or handler access from the forcing pen into a drafting pen. It should be possible to place a weigh

scales in this exit gate. This allows sheep to go directly from the forcing pen into the scales and then into the drafting pen. This avoids forcing sheep through the race before or after weighing.

Access to race

The third exit should be from the forcing pen into the race.

Vertical roller

A roller that is vertically mounted on the race entrance can stop sheep jamming as they come into the race.

Other access gates

Additional gates maybe needed for a double race, dip tub, handlers work area or for easy handler access through the unit to avoid climbing.

Forcing pen size

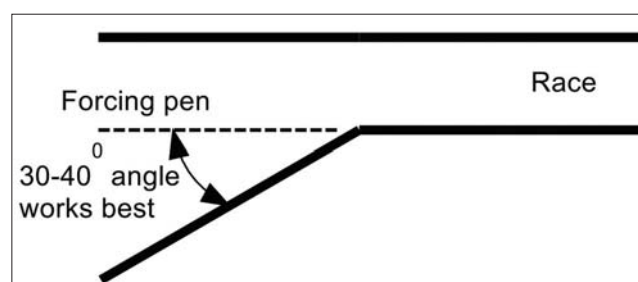
Ideally the forcing pen should hold about 20% of the collected flock. As a guide allow 0.35m² per ewe. It is more labour efficient if the winter housing pen, forcing pen, race and batch footbath hold the same number of sheep.

Forcing pen shape

Forcing pens can be square, rectangular, triangular, funnelled, diamond, bugle, semi-circular and circular. Semi-circle or funnel shaped forcing pens suits flocks of 150 ewes or less. They are cheap and easy to build. Semi-circle forcing pens also suit large flocks.

Funnelled shaped forcing pen

Funnelled shaped pens lack the advantage of an adjustable backing gate. For a funnel shaped pen it is important that the entry angle to the race is 30°. Avoid a sharp angle between the forcing pen entrance and the race entrance.





Funnel shaped pen – entry angle to the race is 30°.

Circular forcing pen size

Typically, circular forcing pens vary in diameter from 3.6m which hold 30 ewes to 4.88m which will hold 50 ewes. A 3.6m diameter forcing pen would be suitable for flocks of up to 150 ewes. Larger flocks need a 4.88m diameter pen. When the diameter exceeds 4.88m moving sheep becomes difficult.



Circular forcing pen with 2 centre gates. Exits into dip tub, drafting race and dosing race.

Semi-circular forcing pen

Semi-circular forcing pens are increasing popular in new handling units for cattle and sheep. A well-planned semi-circular forcing pen has a number of advantages over a circular forcing pen:

1. Cheaper to install as less material is required.
2. Simpler to build.
3. Easier to drive sheep into it. Because the collecting pen is in-line with the semi-circular



Sheep come straight down the collecting pen into semi-circular forcing pen.

forcing pen sheep are pulled from one pen to the other. The collecting pen exit and semi-circular forcing pen entrance are the same width – see previous picture. This gives a seamless movement of sheep from one to the other.

4. A centre mounted gate swings in behind sheep to control them.
5. Sheep come straight down the collecting pen into semi-circular forcing pen.
6. A centre mounted gate swings in behind sheep to control them.
7. It fits better into the overall handling unit. In contrast circular forcing pens tend to be to one side of the handling unit.
8. It's easier to incorporate mobile equipment like a weigh scales as the centre mounted



Easier to include mobile equipment of different sizes.

Semi-circular forcing pen design

6m diameter semi-circular pens work well where they are not over filled, have 3 correctly hung gates on a centre post, good sheep flow and an easy to use latch. The 3 gates are see-through which pulls the next batch forward.



6m diameter semi-circular forcing pen with 3 gates.

Number of centrally mounted gates

Circular forcing pens typically have 2 centrally mounted gates that create 2 pens. However, with a semi-circular forcing pen 3 centrally mounted gates offer the best control. 3 centrally mounted gates in a semi-circular pen will create 2 adjustable pens as shown in previous photo.



Important feature: Gate to right of race is angled to eliminate a dead end/corner where sheep would stall. It is also non see-through to block distractions.

Latching the forcing gate

Been able to secure the gates in a number of positions around the perimeter wall is important. Ideally the latch should ride an angled steel rail and drop down behind a stopper so sheep cannot force it back. Another option is to slide a bolt handle into a hole in the wall.

Self-latching forcing gate

This latch and tooth will make it easy to move the forcing gate in one direction. The sheep cannot force the gate back.



6m diameter semi-circular forcing pen with a latch on the gate that sits on a steel rail attached to the wall. 3 gates each 3m long.



Guide ramp guides the latch onto the steel rail. One guide ramp at each end of the semi-circular steel tail.



Latch and tooth about two-thirds the way up the gate.



Side view of tooth acting as ramp and stopper.



Looking down. Latch to the left of the tooth. Guide ramp to right of tooth.



Latch moving up to the top of the tooth.



Latch dropped in front of tooth which now acts as a stopper.

Distance between latching tooth

On this semi-circular forcing pen there are 6 self-latching teeth located on a steel rail attached to the wall. The first self-latching tooth is 580mm from the start of the steel rail. After that the self-latching teeth are 850mm apart.



Steel rail and tooth attached to forcing pen wall.

Height of latch and tooth

Locating the latch about two-thirds the way up the gate or 670mm above floor level when resting on the metal rail offers 2 advantages. If the latch is at the top of the gate the bottom of weaker gates may bend under pressure. Any lower and the handler must stoop.



Another option is to have the latch and tooth on top of the gate.

An alternative design is to put the rail and stopper on top of the gate as shown in the previous photo. However, the gate needs to be strong enough to withstand pressure.

Sliding bolt

Some units use a sliding bolt. Others use a spring-loaded bolt that goes into holes at various intervals. Spring-loaded bolts have two disadvantages. Firstly, the handler must withdraw the bolt each time. Secondly, a spring-loaded bolt at this height could project into the sheep's path.



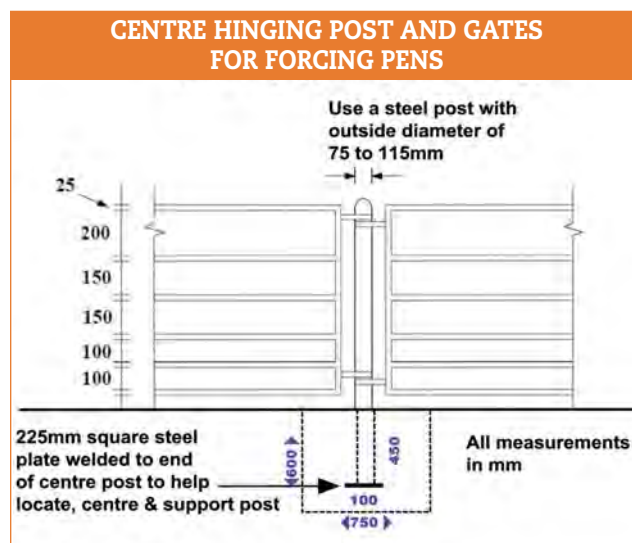
This sliding bolt handle is designed to give a good grip and avoids stooping and catching fingers.



Openings at 0.5m intervals along forcing pen wall.

Centre hinging post

The circular forcing pen centre hinging post is a tubular steel post 115mm outside diameter and 5mm thick. For sheep the centre hinging post must be at least 1.5m long and set 450mm into a mass concrete base 750mm wide and at least 600mm in depth on compacted hardcore. Weld a 225mm square steel plate on the bottom of the centre post to support it.



(Source: Based on an original drawing by Department of Agriculture, Food and Rural Development, 1996)

Centre post specification can vary. The centre post must be strong enough for the weight of the gates and pressure of livestock. Combined cattle and sheep handling units use 139mm outside diameter and 5mm thick steel post.



In this sheep handling unit the hanging post for 3 gates is 1m above ground level, is 115mm diameter and 5mm thick.



In this sheep handling unit the hanging post is 1.02m above ground level and holds 2 gates each 2.5m long.

Correctly hang gates

Gates must hang correctly on the centre post, so they revolve freely. Often gates are incorrectly hung due to loose fitting hinges. This greatly increases the force needed to rotate them. Sometimes a supporting wheel is placed on the end of the gate creating extra drag, increasing fatigue and discouraging use.



3m long gates. Hinges on centre hinging post for 3 gates are fitted tight and lubricated = free movement.

Circular forcing pen wall

The forcing pen wall should be non see-through. Walls should be 1.25m high with a smooth finish inside. A smooth wall reduces wool drag. This makes it easier to force sheep along. Use the concreted in centre hinging post as the centre point to mark out on the ground for the precise location of the forcing pen wall.



1.25m high non see-through wall with a smooth finish.

Galvanised steel circular forcing pen wall

A steel circular forcing pen is easier to construct than a curved concrete wall. Tubular iron with metal sheeting can also be used.

Concrete circular forcing pen wall

Where concrete blocks are used these should be solid blocks at least 140mm thick.

Circular forcing pen floor

The floor should be 125mm of concrete on 150mm compacted hardcore. A ridged finish to the concrete floor will improve grip and water-runoff. To avoid collecting rain water in the dipper slope it away from the dipping tub. A slatted floor in the forcing pen helps to keep it clean.



Floor – 125mm of concrete on 150mm of hardcore.

Drafting race

Key Facts

1. Build a single file race to your needs.
2. 0.35m²/lowland ewe without lambs.
3. 6m x 0.50m race holds 8 unshorn ewes.
4. Straight sided race 450-500mm wide.
5. 'V' shaped race 500mm at top and 280mm at bottom.
6. Race height 825-850mm if working outside.
7. Minimum race length 6.1m.
8. 0.3m/10 ewes over 200 ewes up to a maximum race length of 15.25m.
9. Floor – 125mm of concrete on 150mm of hardcore.
10. Concrete floor 600mm beyond race sides.

The drafting race is central to many jobs. Build a race that suits your needs. The main design aspects of a race include:

1. Width, height and length.
2. Location.
3. Shape.
4. Construction materials.
5. Number of sheep it will hold.
6. How often will it be refilled?
7. Tasks that it will be used for.
8. How easily tasks are completed.
9. Will the handler work from inside or outside?
10. How easy is it to lean over?
11. How easy is it to reach a sheep?
12. Will the handler stand in the correct position?
13. Handler location when using sorting gates.
14. Drafting gate location and design.



Centrally located race allows 3-way drafting and suits both right and left handed handlers.

15. Sorting 2, 3 or 4-ways.

16. Solution used if foot-bathing in race.

Centrally-located drafting race

Carefully plan the location of the race within the handling unit. Ideally locate the race in the centre of handling unit. This allows handling and drafting of sheep on the right and left side of the race. However, most handlers prefer a 2-sided race located slightly to one side of the centre because:

1. This maximises size and use of the collecting pens.
2. Most handling tasks involve treatments rather than dividing flocks into equally sized subgroups.

Drafting race against existing wall

A cheaper option is to use an existing wall as one side of the race. This will greatly limit handling to one side of the race. It may also limit drafting to pens on one side of the race or to the end of the race. Also limits options to recirculate sheep.



Race along a wall limits ability to handle and draft.

When deciding race width consider;

1. Do you want the sheep presented in single file?
2. Is the handler working inside or outside the race?
3. Is the race straight sided or 'V' shaped?

Race capacity

Allow 0.35m²/ewe without lambs. So, a race 6m long and 0.50m wide will hold about 8 unshorn lowland ewes.

Drafting race width

A straight sided single file race should be 450-500mm wide where the handler is working from outside the race. Drafting is easier in a narrow race as ewes must come down the race in single file. Ewes are also unable to turn in a 500mm wide race. Once a race is over 550-650mm wide it's harder to handle ewes and lambs from outside the race. Straight sided races are easy to build and easy to add equipment to. Wider dosing race is covered later.

'V' shaped drafting race width

This race should be 500mm wide at the top and 280mm wide at the base. A 'V' shaped race is only an option where the handler is working from outside the race. 'V' shaped races work well with sheep of varying sizes. Some manufactures provide a 'V' shaped race with an adjustable bottom width to suit different sizes of sheep.

Advantages of 'V' shaped race

This design stops sheep from turning as their feet are close together. The 'V' shaped race also stops smaller sheep passing 2 abreast. This design is useful where a footbath is in the race as it reduces the floor area and thus the solution cost.

Disdvantages of 'V' shaped race

The 'V' shaped race is more difficult to build. It is harder for a handler to walk through this type of a race. It is also more awkward to add equipment to.

Race height

The race height should be 825-850mm when handling sheep from outside the race. If it's greater than 850mm it's harder for the handler outside the race to reach sheep when their heads are down.

Race length

The minimum length of a race should be 6.1m. As a guide allow a 0.3m for every 10 ewes over 200 up to a maximum of 15.25m. Long races cost more to build, but have 2 major advantages;

1. Less time is spent refilling.
2. More "looking time" to identify sheep coming down the race. This extra "looking time" is important when sorting 3-ways.

Race access

The handler should have easy access along both sides and ends of the race. Ideally one side of the race should be sheep free to prevent damage to equipment and materials.

Race floor

The race should have a floor of 125mm of concrete on 150mm compacted hardcore. A ridged finish will improve water runoff and grip. Another option is to have a slatted floor in the race linked to a slatted tank which will keep the handler and sheep clean.



450mm wide race with solid sides and 100mm toe access. Slats keep handler and sheep clean.

650mm concrete walkway

The concrete floor in the race should extent at least 600mm beyond the sides of the race. This provides the handler with a firm, level and clean walkway.



650mm concrete walkway along-side each side of the race for firm, clean, level footing for the handler.

Non see-through race sides

Both sides of the race should have non see-through sides to focus sheep on moving forward. This reduces the likelihood of sheep stalling because of animals or handlers outside the race coming into view.

See-through entrance and exit gates

The entrance and exit gates of the drafting race should be see-through this allows sheep to see an escape route or their comrades ahead. This will encourage them forward.

Race end

There should be at least 3m between the front end of the race and any facing wall, gate or barrier to allow sheep space to exit the race easily.

Race shelf

A useful shelf can be built into the race wall for equipment. If timber is used drill drainage holes in the bottom of the shelf along its length. In the case of concrete a groove makes a useful shelf.

Width of race wall

Where the handler is working from outside the race it is easier to handle sheep where the race has narrow side walls. The building materials used will determine the width of the race wall.

Steel race

Galvanised steel is long-lasting, smooth, quickly and easily erected. It can be erected so that it is mobile. Steel is very adaptable, easily added to in length or adjusted in width. You can make your own or buy from range of suppliers.

Copper sulphate corrodes galvanised steel

Footbaths containing copper sulphate solution should not be located near galvanised steel. It corrodes galvanised steel.



Copper sulphate corroding galvanised steel.

Concrete race

A concrete race is durable and maintenance free. However, concrete is much less adaptable than steel or timber. It is more difficult to add equipment to. So, it's very important to get the design of a concrete race right first time. If using concrete blocks use solid 440mm x 215mm x 140mm concrete blocks.

Smooth concrete sides

Walls should have a smooth finish to reduce wool drag. This makes it easier to force sheep along and reduces injuries to hands.

Smooth concrete top

Where concrete blocks are used top the wall with a smooth half round concrete cap. In the case of mass concrete smooth off the corners on the top of the wall. Removing sharp corners makes it more comfortable and safer for the handler to lean-on the wall.



Rounded wall tops are more comfortable and safer for the handler to lean-on.



Smooth the top corners of a mass concrete wall.

Timber race

Timber sided races tend to be the least harmful to the handler's hands. However, timber requires more maintenance. If using close boarding it should be at least 20mm in thickness. If using plywood use marine plywood that is at least 18mm thick. As per next picture fix a 100mm x 40mm timber horizontally along the top of each side of the timber race. This will strengthen the race. It also provides a comfortable handle and support for leaning on. Maximum distance between uprights should be 1.2m. The uprights in the next picture are 0.83m apart. The uprights should be 100mm x 100mm post.



100mm x 40mm timber rail on top of each side of the race. Uprights 0.83m apart. 100mm x 100mm posts.

Toe gap

A continuous toe-gap of 100mm should be left between the race and floor. This helps drainage, ventilation and cleaning out. In timber races it also allows the timber post and race to dry out. It also prevents timber absorbing moisture from the ground. It allows the handler working from outside the race to get closer to the sheep.



Wood in contact with the ground rots more quickly.

Avoid guillotine gates in the race

Avoid guillotine gates along the length of the race. They prevent the handler from having a clear view of the entire length of the race. They can also be a hazard.



Guillotine gates in the race block the handlers view and are a hazard.

Sort 2, 3 or 4 ways

Key Facts

1. Sheep in single file in the race for sorting.
2. Straight sided race 450-500mm wide.
3. 'V' shaped race top 500mm and bottom 280mm.
4. 3-way sorting is enough for a 1-person unit.
5. Sort 2 ways with 1 or 2 gates and 1-person.
6. Sort 3 ways with 2 gates and 1-person.
7. Sort 4 ways with 3 gates and 2 people.

A drafting race can sort sheep 2, 3, or 4 ways. Many single person units prefer a simple 2-way sorter. Sheep can go through the race again for further sorting. For most single person units, the option to use 3-way sorting is enough. 4-way sorting is more complicated. 2 operators maybe needed.

Consider the following:

1. What's needed.
2. Race width.
3. Race location.
4. Number of pens.
5. Number of operators.
6. Location of operators.
7. Number of gates.
8. Location of gates.
9. Use of pulleys or levers.
10. Stop gate.

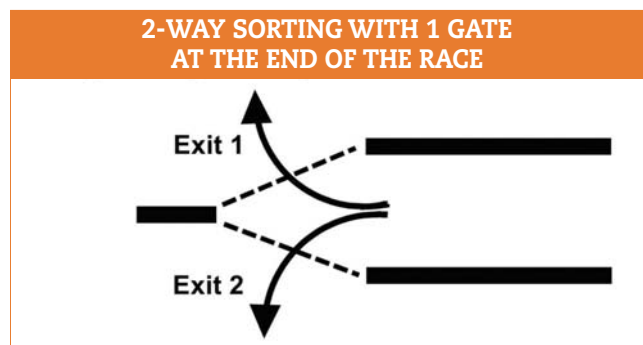
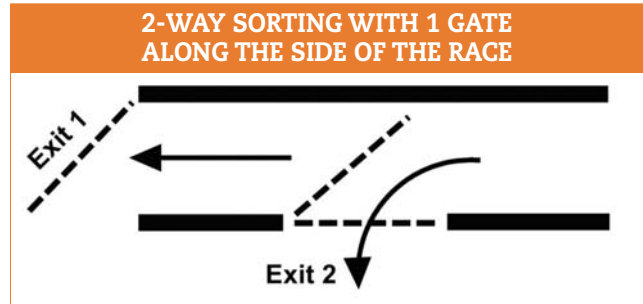
Race width for sorting

For easy sorting sheep should come down the race in single file. To do this a straight sided race should be 450-500mm wide. A 'V' shaped race should be 500mm at the top and 280mm at the bottom.

2-way sorting using 1 or 2 gates

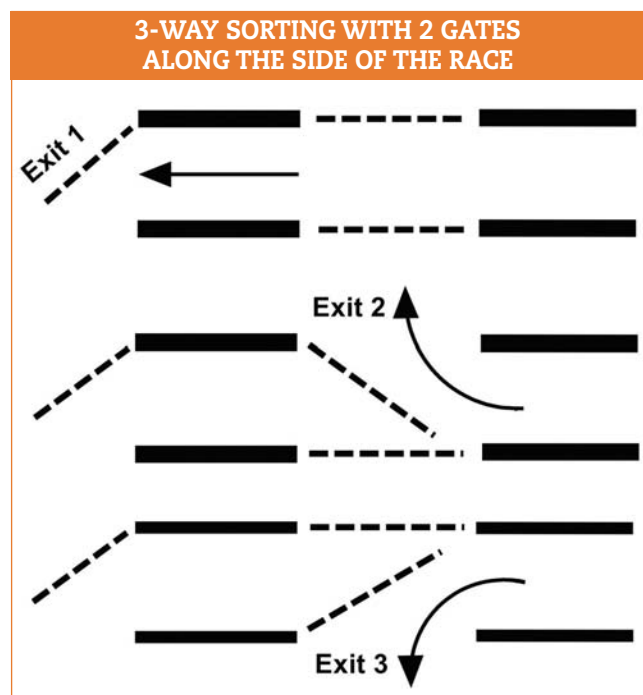
1. 1 sorting gate along the length of the race to divert sheep to one side and a guillotine gate at the end of the race to act as a stop gate at the second exit.

2. 1 dividing gate at the end of the race sorting 2 ways.



3-way sorting with 2 gates

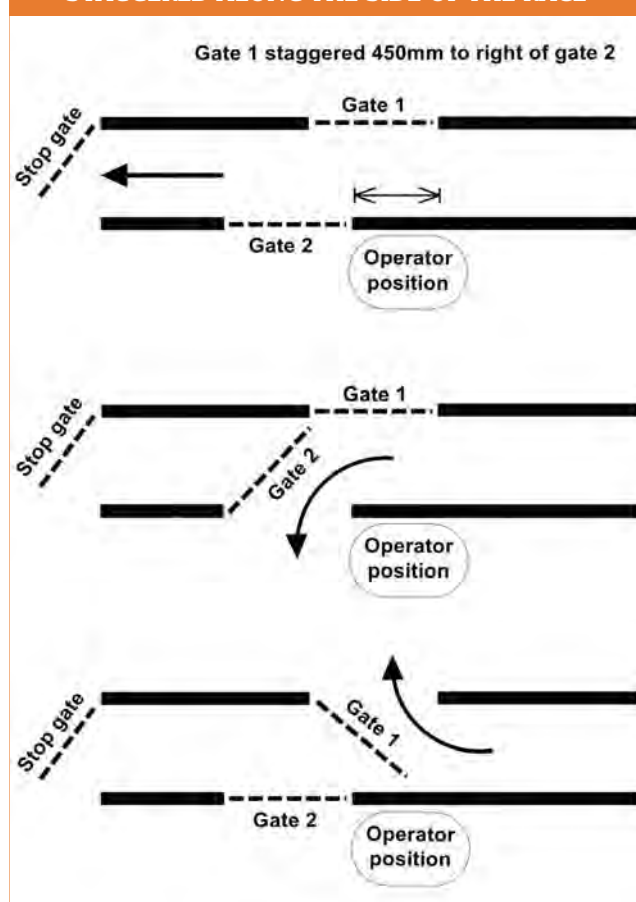
Locating the race toward the centre of the handling unit makes it easier for one handler to sort 3-ways by working 2 gates. The gate into the third sorting pen is kept opened. One handler should be able to work the gate into the third pen using a pulley or lever while standing at the 2 other sorting gates.



3-way sorting with staggered gates

Staggered gates offer the handler a more normal standing position while using 2 sorting gates together. Gate 1 is 450mm to the right of gate 2. The handler stands as shown in the next diagram. Gate 1 is worked using the right hand. Gate 2 is worked with the left hand. Gate 3 into the third sorting pen is kept opened. One handler should be able to work the gate into the third pen using a pulley or lever while standing at sorting gate 2.

3-WAY SORTING WITH 2 GATES STAGGERED ALONG THE SIDE OF THE RACE



2-way sorting in a 3-way set-up

Most centrally located races should be at least set-up to allow for the option of 3-way sorting. While it may be used for 2-way sorting most of the time.

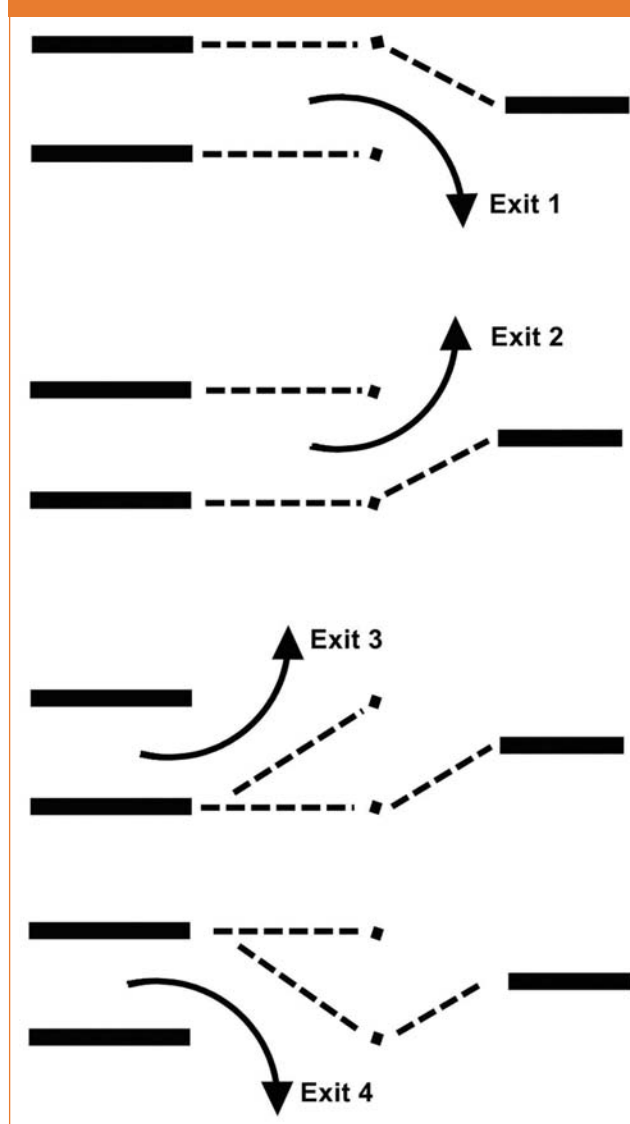
4-way sorting with 3 gates

A small number of handlers use 4-way drafting. 4-way drafting is harder to manage and easier with 2 people. 4-way drafters can be made on farms or purchased ready-made.



4-way sorting with 3 gates.

4-WAY SORTING WITH 3 GATES



Stop gate

If sorting stops a stop gate must be available at the end of the race to hold the sheep remaining in it. This can be a guillotine gate or a sorting gate with a front panel that closes off the race exit.

Sorting gates

Key Facts

1. At least 5m from race entrance to 1st sorting gate.
2. This encourages sheep into the race.
3. Locate sorting gates near the end of the race.
4. This maximises looking time to identify sheep.
5. Sorting gates along race side 1.2m long.
6. Sorting gate handle at least 120mm long.
7. Handles 150mm from front of gate.
8. Handle at elbow height.
9. See-through gate at end of the race.
10. This encourages sheep forward.

The main aspects of a sorting gate are:

1. Location in the race.
2. Number in the race.
3. Design of the gate.
4. Handle design, height and location.
5. Latch design.
6. Design of the end gate.

Sorting gate location in the race

Sorting gates should be near the end of the race. This maximises the time available to identify approaching sheep. Where this is not possible the minimum distance between the race entrance and the first sorting gate(s) should be 5m. This allows time to identify approaching sheep. If sorting gates are closer to the race entrance sheep may not enter. When sheep are been drafted into a pen have enough room in front of the sorting gate exit to avoid hesitation at this gate.



Locate sorting gates near the end of the race. Non see-through 1.2m drafting gate.

Sorting gate design

Avoid using materials that make noise. Avoid metal striking metal by leaving a thin gap, using rubber strips or wood against metal. Sorting gates should close tightly so that they are a continuation of the race. Sorting gates on the sides of the race should have solid sides to avoid stalling. Having solid sides also reduces the chances of catching horns or legs.

Sorting gate width

Sorting gates along the length of the race should be 1.2m long so sheep can exit the race easily and at a gentle angle. Shorter gates cause pregnant ewes or large sheep to jam risking injury and slowing the flow. A wide gate also encourages sheep into the drafting pen because they can see into it and sheep in it.

Handler position when sorting

Ideally it should be possible to use sorting gates so the handler stands towards the back of sheep. This allows a clearer view of raddle markings, daggy sheep etc.

Location of mobile sorting gate unit

Some handlers have a mobile sorting gate unit. This gives the option of moving the drafting gates too immediately beside the collecting pen exit or further down the race. Connecting the sorting gate unit to the collecting pen exit avoids running sheep down the race before drafting. This can work well where sheep are coming into the sorting gate unit from a collecting pen as there is a continuous flow from a large group of sheep. Sheep can be drafted quickly at this location, but they must be kept pushed-up.

Guillotine Gate

Guillotine gates make a better stop gate than a sorting gate. A sorting gate along the side of the race or at end of the race that moves side-to-side is much easier and quicker to use.

Handle location

Setting the handle back 150mm from the front of the gate may avoid injury to hands as gates meet or as it closes against a wall.

Handle design

Handle design is very important. Handles must be big. A handle must be big enough to give a full strong hand grip. That's at least 120mm long. It must also be very easy to grip. Covering metal handles with plastic piping will improve grip, reduce vibration and avoid having direct contact with metal during cold weather. Handles must have a smooth surface.

Handle height

Handle height is very important. Position handles to prevent stooping and injuries. Use elbow height as reference to working height. Handles, hinges and latches must not stick out into the path of the handler or sheep.



Robust smooth 120mm long handles should be located 150mm back from the front of gate to avoid hand injury and at elbow height to avoid bending.

Latch design

Latches must be secure. They must be easily used without jamming, stooping or injury. See section on gate latches.

Spring loaded gates

Spring loaded gates can be useful. However, minimise spring resistance on gates to reduce the risk of injury.



Note the angle plate that helps to close the spring.

End gate design

The exit gates at the end of the race should be see-through. This encourages sheep to move forward as they see an escape or other sheep. It is



See-through end gate that goes up and down and is also hinged to open in and out (pulley rope missing).

very useful if the guillotine gate and drafting gate at the end of the race can be controlled from the race entrance. Avoid guillotine gates along the length of the race.



Guillotine gate and a non see-through swing gate that discourages sheep from stalling at the corner.

Non-return gate

Key Facts

1. Stop the first sheep reversing down the race.
2. Non-return gates in races over 6m long.
3. Non-return gate within 2-3m of exit gate.
4. Non-return ramp 1100mm long, 40mm at low and 200mm at high end.

Races longer than 6m should have a non-return gate within 2-3m of the exit gate. Spring-loaded self-closing gates are the most common non-return mechanism used. It stops the first few sheep from reversing back down the race. This makes it easier to fill the race.



A non-return gate stops sheep reversing in the race.

Non-return ramp, block or bar

Instead of a non-return gate a wooden ramp, concrete block or bar maybe located across the race. It may cause some sheep to stall. Non-return gates help fill long races.

Non-return ramp

Instead of a non-return gate some farmers have used a moveable wooden ramp with success. Once sheep have crossed over it, they are not inclined to go backwards.

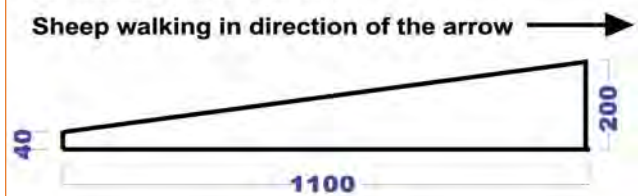


Non-return ramp discourages reversing in the race. Sheep walks up the ramp as she comes down the race.

NON-RETURN RAMP LOCATED IN RACE

All measurements in mm

Sheep walking in direction of the arrow



Dosing race

Key Facts

1. Dosing race speeds up dosing.
2. 0.35m²/lowland ewe without lambs.
3. 750-800mm wide where handler works alone in it.
4. A 6m x 800mm wide race holds 16 ewes.
5. Locate at least 1 side gate at back of dosing race.
6. Often side by side with drafting race.

Some handling units have 2 races. A narrow drafting race of 450-500mm wide for sorting. A second wider dosing race about 750-800mm wide for treating sheep. This wider race is also handy for checking ewe's udders.

Dosing not drafting

A dosing race is not for drafting. Because of its width a dosing race performs badly as a drafting race. It's hard to draft sheep in a wide race as they can come down 2 or 3 abreast. Sheep in an 800mm wide race can turn themselves around, helpful when dosing, a problem when drafting.

Dosing race width

The dosing race should be 750-800mm wide where a handler works alone inside the race. If it is wider than 750-800mm it is hard for a handler to hold sheep, particularly young lambs in front.



Dosing race and drafting race access from forcing pen.

Reduces filling time

The wider dosing race reduces the time spent filling compared to the typical drafting race. A 6m x 800mm wide race holds about 16 ewes. A 6m x 500mm wide race holds about 9 ewes.

Filling wide races

As a handler moves through the dosing race sheep can push and charge the handlers legs. Sheep could also rear-up, striking the handlers upper body or head. Within reason pack sheep into the race tightly enough to reduce the chances of sheep running or rearing-up.

Side gate for emptying dosing races

It is useful to locate a side gate at the back of the dosing race. When sheep are treated, they can exit. They do not stay behind the handler.



750-800mm dosing race on left alongside a drafting race/footbath on the right. Also note the side gate.

Dosing race location

When deciding the location of the dosing race relative to the drafting race there are 2 options:

1. Side by side with one wall common to both races as shown in the last photo. This reduces cost. However, sorting is limited to one side of the drafting race and the end of the race.
2. Completely separate from each other. The drafting race can be located centrally in the handling unit. The dosing race can be located along a boundary wall. This keeps cost to a minimum and while allowing sorting on both sides of the drafting race.

Footbath

Key Facts

1. Put clean feet into it.
2. Collecting pen – round stone/concrete surface.
3. Easy to fill – tap
4. Easy to drain – 100mm diameter bung.
5. Easy to clean – powerful hose.
6. Size based on treatment product pack size.
7. 0.4m²/ewe without lambs.
8. Holds at least the same as race/housing pen.
9. Bath holds 12.5-20% of gathered flock.
10. Standalone permanent concrete footbath ideal.
11. Flat bottomed bath.
12. 100mm retaining walls.
13. Bath sides at least 200mm deep.
14. 3-4cm to ewe's foot hairline.
15. Solution at least 5cm deep.
16. Some prefer a starting depth of 7-8cm.
17. Know bath volume.
18. Sheep exit onto clean hard surface.
19. Prevent pollution.

A well-designed footbath is key to lameness control. Many flocks are a single person operation. Ease of use encourages regular use. The main aspects of a footbath:

1. Safe for handler, sheep and environment.
2. Minimise labour.
3. User friendly.
4. Access and location.
5. Size and depth.
6. Construction material.
7. Pre-wash footbath.
8. After treatment standing area.
9. Solution used.
10. Cost of filling it.

User friendly footbath means:

1. Easy to set-up.
2. Easy to fill.
3. Easy to use.
4. Easy to drain.
5. Easy to clean.

Easy to set-up

Setting up and filling the bath must be quick and easy. It should take less than 10 minutes. Permanent footbaths that do not involve setting up temporary penning will be used more often. A water hose or tap beside the bath saves time when filling. Alternatively store rainwater from nearby roofs and use this. To make setting-up easier the size of footbath should be based on using 25kg bags of zinc sulphate or copper sulphate e.g. in 250 litre increments.

Easy to fill with sheep

Locate the standalone footbath after the end of the race so sheep can easily be drafted into it. To encourage sheep into the footbath the exit gate into the standing area should be see-through. This could slow down sheep exiting the race. This in turn could require the handler to move up and down the race more often to empty it. The footbath should hold at least the same number of sheep as the race. This avoids splitting groups. It will be easier to fill the footbath with sheep if it is designed to hold 10-20% more sheep than its intended for.

Easy to drain

Handlers prefer a drain with a stopper. These can be purchased from a hardware store. Bunged drains make emptying and cleaning quicker and easier. Bunged drains can also be hosed clean more effectively. Drains less than 100mm in diameter will block. When removing the bung wear gloves to avoid chemicals. Locate the bung in the footbath wall or floor. Drain it into a nearby dip tub or slatted tank for proper collection before disposal.

Easy to clean

Footbaths must be easy to clean without risk of pollution or injury. Cleaning out should take less than 10 minutes. Gently sloping ramps at the footbath entrance or exit makes cleaning out with a brush or scrapper easier. A convenient powerful hose will help with cleaning. A bunged drain is a big help for easy and proper cleaning.

Clean surfaces

Yard entrances and collecting pens with hardcore topped with 100mm of 12.5–25mm round stone will keep feet, yards and footbaths clean and stone free. Smaller material will be carried into the footbath.



Compared to finer material 12.5–25mm round stone will keep feet and footbaths cleaner and stone free.

Wash footbath

Opinions vary on the usefulness of having a wash footbath. It should lengthen the life of the medicated solution by washing feet. It can be filled with medicated solution for extra treatment where feet come in clean. Where possible fit it with a 100mm diameter bunged drain. An extra bath has to be built and managed. The wash bath has 2 main problems:

1. Water transferred into the treatment bath has a dilution effect.
2. Extra soiled water for disposal.

Permanent concrete or mobile plastic/metal

Consider the pros and cons of a permanent concrete footbath versus a mobile plastic/metal footbath.

Permanent concrete footbaths

Consider the pros and cons of a permanent concrete footbath versus a mobile plastic/metal footbath.

1. Are easier to fill, drain and clean.
2. Avoids setting up temporary penning.
3. Can be built to meet a particular flock's needs.
4. A bunged drain can be installed at a suitable location.
5. Offer better sheep flow as less noise and more stable footing.
6. Are not damaged by chemicals.
7. Need less maintenance.
8. Cannot be moved or adjusted once installed.
9. Are more difficult to correct for faults like leaks or incorrect levels.

Mobile plastic/metal footbaths

1. Reduce the labour of moving sheep particularly young lambs.
2. Are easily installed and moved.
3. Can be moved into or out of a race or pen.
4. May cause sheep to stall due change in surface, noise and movement.

Disadvantages of a mobile footbath in a field

1. Job of moving and setting-up at each location.
2. Expensive as solution less likely to be reused.
3. Effectiveness is reduced as feet are less likely to be clean pre and post footbathing.
4. Little or no hard standing.
5. Increased risk of pollution.
6. Not always easy to find a level surface in a field.
7. Access to water and electricity is an issue.
8. Cleaning the bath right is difficult.
9. Draining the bath is difficult as a drainage bung may not be built in.

Race or standalone footbath

Consider the pros and cons of locating a footbath in the race versus a standalone unit.

Advantages of the footbath in the race

A footbath in the race permits the regular treatment for lameness, as other tasks progress. Footbaths in races tend to be longer than standalone baths so sheep take more steps. They can use less solution because they are narrow.

Disadvantages of the footbath in the race

Can be harder to get sheep into it as a single sheep can block the entrance. A permanent uncovered footbath in a race will collect a mixture of rainwater, urine and dung. They are harder to drain and clean. Regular cleaning is needed to keep the footbath, handler and sheep clean even when footbathing is not the intended task. A removable footbath or a cover avoids this. Having the footbath in the race may delay the completion of other tasks if sheep are to get the required stand-in-time. As a result, the stand in times may not be long enough to be effective.



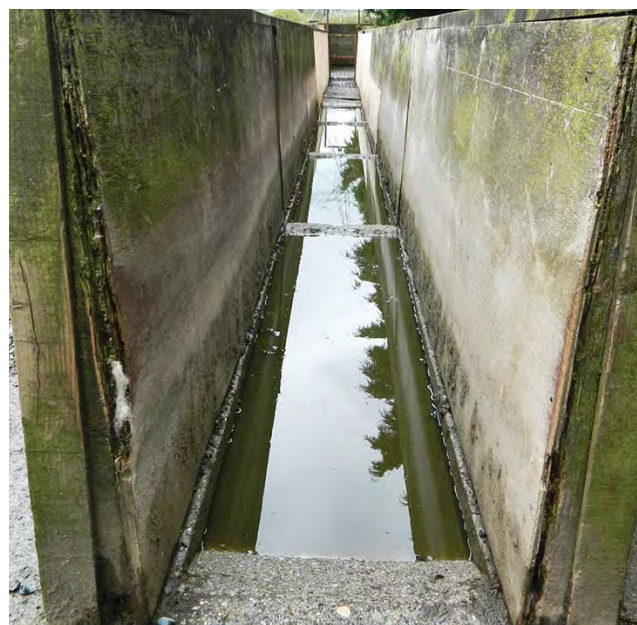
Permanent footbaths in the race cannot be bypassed, are harder to keep clean and harder to drain. They can fill with manure creating baths of bacteria.

Design of permanent footbath in the race

There are different possible designs.

1. To encourage sheep into the race at least the first 1.5m of the race should not contain a footbath.
2. Then a 3m wash footbath of clean water. Minimise splash into the medicated solution.
3. A 1m concrete floor between the wash and medicated footbath would shed off some water prior to foot-bathing. This could cause stalling.
4. Next should be the medicated footbath at least 3m long for a walk-through treatment.
5. Follow this with gently sloping 1m concrete floor draining back to the medicated footbath. This would retain some medicated solution that would have been lost.

6. To ensure sheep do not slip or fall in solution or splash the handler the last 1.6m of the race should not contain a footbath.
7. Baths should have a retaining wall every 2.44-3m.
8. Often races are running up a slight slope. To account for this the footbath will need to be stepped in sections no greater than 2.44-3m.
9. See-through gate at end of race to pull sheep forward.



15.88m race containing an 8.8m concrete footbath in 4 sections each 2.2m long and stepped due to sloping ground. Final 1.35m of race has a concrete floor.

Advantages of a standalone footbath

A standalone footbath allows longer stand-in-times. While at the same time the race can be used for other tasks. Standalone footbaths can also be used as a collecting pen. They can be designed to suit larger flocks or larger groups. They can be easier to get sheep into. Larger baths take more sheep and reduce hours worked.



Commercially available 3m x 1m standalone galvanised steel mobile footbath.

Disadvantages of a standalone footbath

Larger so cost more to fill initially. Particularly if using the more expensive treatment solutions. Split larger baths into compartments. Standalone baths take up more space. They could create more solution for disposal. However, roofing a standalone footbath can reduce the frequency of filling. This could reduce solution cost and the amount that has to be disposed of.

Standalone footbath – near the race

Locating the standalone footbath close to the drafting race is one option.

1. Locate it near the end of the race but off-set to one side. Having 2.44m-3m from the race exit to footbath entrance allows sheep to be easily drafted into it while not interfering with drafting. Having it this close to the race reduces the distance the handler has to move. It also makes it easier to supervise from the race.
2. It must be possible to put sheep into the footbath without going through the race. Footbathing maybe the only task you want to do.
3. It must be possible to bypass the footbath, so sheep do not walk through it each time they use the handling unit. This avoids having to walk through a bath of solution or manure.



Standalone footbath 2.44m away from race (on left of picture) for easy drafting into it.



2.44m from race exit to footbath entrance. Sheep exit the drafting race (right). Diverted into the footbath using the drafting gate.

Advantages of having a standalone footbath away from the race

1. Less problems with sheep flow when drafting.
2. Easier to bypass when not footbathing.
3. Allows more options in regard to size and shape.
4. Allows more options in regard to location i.e. locate in an existing building or close to winter housing.
5. May allow drainage into dip tub or slatted tank.
6. May allow better use to be made of a shed or yard.

Requirements of a standalone footbath away from the race

1. Hose nearby for cleaning and filling.
2. Must be easy for one person to put sheep into it i.e. beside the handling unit or in enclosed area.
3. No sharp turns or funneling at entry or exit.
4. Under the roofed (unless using formalin) section of the handling unit.
5. Treated sheep exit bath onto clean hard surface.
6. It must always be available.



Sheep exit the race (near left). A stand-alone footbath (far right) allows the race to be used for other tasks. Sheep are drawn into the footbath by sheep they see in the drying pen beyond it.

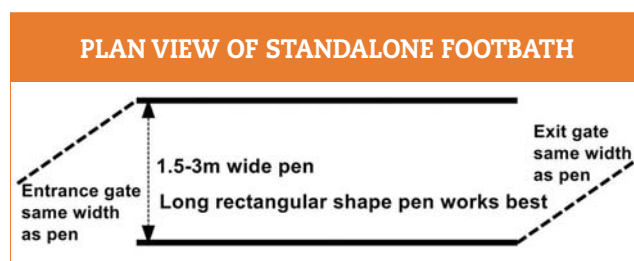
Design of a standalone footbath

There are many possible design features. Key features include:

1. Concrete is preferred for reasons already given.
2. To make sheep flow easier the entrance and exit gate should be the same width as the footbath.
3. The floor of the bath should be at the same level as the floor level at entry and exit.
4. The bath floor should be flat not ridged.
5. See-through gate at end of race to pull sheep forward.
6. As in the last photo sheep that have just been foot-bathed should be clearly visible in the drying pen to help draw other sheep into the footbath.
7. Have a solid wall on both sides of the footbath to reduce spillage and reduce stalling from distractions.

Shape of standalone footbath

Long rectangular baths 1.5-3m wide with entrance and exit gate of the same width are easiest for one person to fill and empty with sheep. One sheep cannot block the entrance or exit. They can also be used as walk through bath.



Size of standalone baths

Allow 0.4m²/ewe. A bath that holds 10 (3m x 1.4m) to 50 (7m x 3m) ewes is generally sufficient. When deciding on the size of the footbath consider:

1. **Treatment product pack size:** Zinc sulphate and copper sulphate usually come in 25kg bags. At a mixing rate of 10% each 25kg bag does a 250 litre footbath. Most handlers want to simplify setting-up. For many using these products the size of footbath is based on using 25kg bags.
2. **Your gathered group size:** For decent throughput the bath should hold at least 12.5% and maybe as much as 20% of the flock typically gathered. A 200 ewe flock needs a bath that holds 25 ewes. So, $25 \times 0.4\text{m}^2 = 10\text{m}^2$. 4m x 2.5m. Large flocks with ewes in batches of 200 plus might go for a bath that holds 37 or 50 ewes.
3. **Labour:** Big flocks need big baths. Larger footbaths cost more to build and fill with solution, but they reduce the hours worked.
4. **Race and pen size:** It's easier to fill the footbath if it holds at least the same number as your race and maybe even the same number as your winter housing pens. However, the reality is that few flocks have a race that will hold 25 ewes or more.

5. **Ease of filling:** A bath that holds 10-20% more sheep than the race/housing pens is easier to fill.

Guide to footbath sizes based on flock size

Flock size (ewes)	Pen size m ²	Group size (ewes)	Bath size (litres)
100	5	12	250
200	10	25	500
500	15	37	750
750+	20	50	1000

Assumed: Footbath filled to 5cm.

Stand-in time

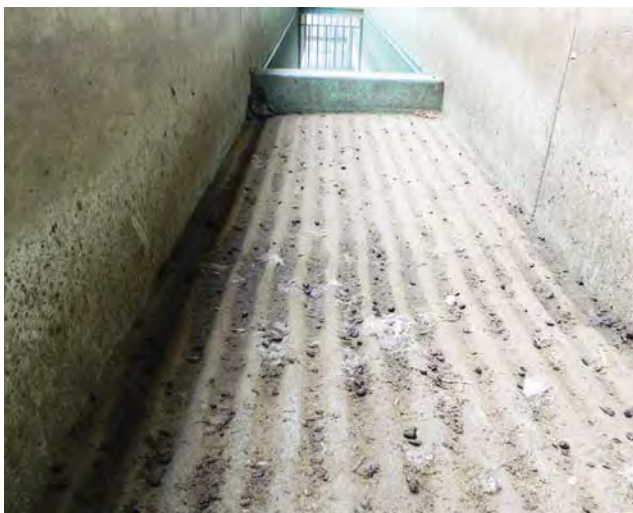
Scald tends to be a superficial lameness so a walk-through bath could be sufficient when using formalin. However, for the effective treatment of foot rot and to get maximum value from the medicated solution sheep should be allowed 10 minutes stand-in time.

Footbath with ramps or walls or sunk

Ramps: Ramps are more difficult to build. However, they can be easier to clean out with just a brush or scraper. Ramps also allow more of the solution to drain back.

Walls: It's easy to build retaining walls at each end especially where you have an existing level concrete floor. The footbath floor level should be the same as the entry and exit floor level. This should give good sheep flow.

Sunk: Many sheep handlers like the step down in and a step up out footbath. Where there is already a step down the step down in and step up maybe easy to build. This design can maintain the same floor level at the entrance and exit. Steps can be easy to build.

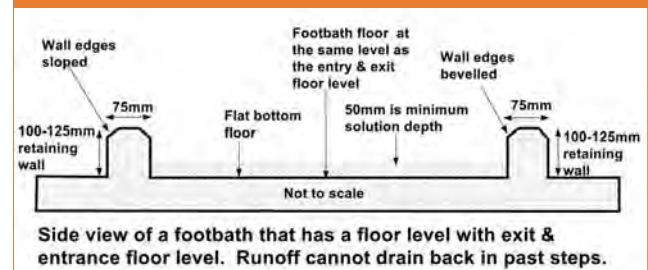


Walled footbath.

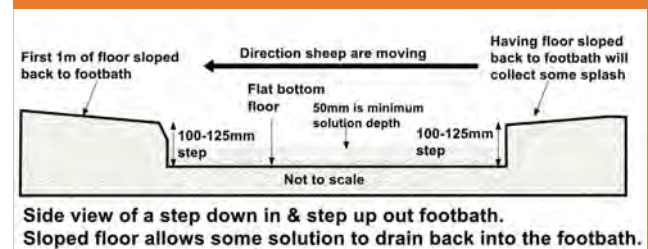


Sunken footbath. Step down in, step up out. Solid sides. Gate setback into bath.

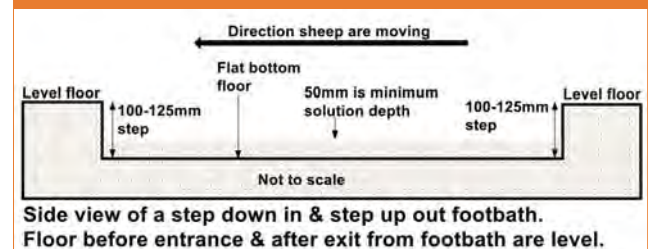
WALLED FOOTBATH



SUNKEN FOOTBATH – SLOPED AT ENTRANCE AND EXIT



SUNKEN FOOTBATH – LEVEL AT ENTRANCE AND EXIT



Footbath retaining wall edges

The top corners of the retaining walls or steps of the footbath should be bevelled/sloped to reduce foot injuries.

Site to prevent pollution

1. Site the bath and post-bathing standing area as far as possible from watercourses, waterbodies, springs, boreholes, wells, flood plains and drainage systems.
2. Some handlers use slatted floors in sheep sheds as the dry-standing area after footbathing.
3. Site must not be waterlogged after heavy rain.
4. Avoid high water tables or where water collects.
5. Locate the footbath to prevent overflow problems.
6. Avoid slopes where spillage could flow to a watercourse or roadway.
7. Water from roofs, yards and fields must not enter it.
8. Compared to ramps and step down into baths retaining walls can be better at preventing overground flows getting into the footbath.
9. Have an action plan in case of splashes or spillages. See section on safety.
10. Locate the footbath under a roof to stop rain getting into it. Not an option if using formalin.

Construction material

Where concrete is used place 125mm of concrete on 150mm of compacted hardcore foundation. Alternatively, the footbath maybe made of metal, fiberglass or plastic. Timber uprights and plywood side sheeting are an option particularly if copper sulphate is used. Copper sulphate corrodes galvanised steel.



Copper sulphate corrodes galvanised steel. Ledges offer sheep a chance to keep feet out of the footbath.

Flat floor better than ridged floor

The floor of the footbath should have a flat bottom. This is easier to build. It is also more comfortable for sheep to walk on and gives better sheep flow. A flat floor reduces the amount of solution needed. Toes not spreading is not an issue. The footbath floor must have a good grip.

Footbath floor

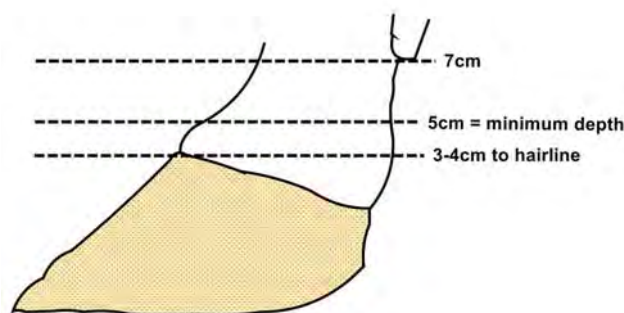
The footbath must have a level floor along its length. A stepped approach may be needed in races on sloping ground.

Footbath sides

The side walls, entrance and exit gates must be flush with the footbath sides. This leaves sheep with no place to rest their foot except in the bath. Footbath sides should be non see-through. Entrance and exit gates should be see-through to pull sheep forward. Side walls of the footbath should be at least 200mm high. Retaining walls or steps at the entrance and exit to the footbath are typically about 100-125mm high or ramped.

Correct footbath solution depth = 5cm+

A common mistake is not to make the footbath deep enough. The footbath solution must be deep enough to reach above the hairline of the feet. For a mature lowland ewe, the hairline can be 3-4cm above floor level. Thus, the minimum solution starting depth is going to be 5cm. The correct depth is as important for the last as for the first sheep. Lamé sheep often come through last. Some farmers start with a solution depth of about 7.5cm.





3cm deep – not enough to reach hairline.



5cm deep – minimum needed to go above hairline.



7cm deep – well above hairline/coronary band.

Roofed footbath

Using a zinc sulphate or copper sulphate under a roofed area could reduce the cost of solution used. This is because dilution from rainwater is avoided. The solution could remain effective for months depending on how clean it's kept and numbers footbathed. Good lighting and ventilation are important. Never use formalin in a roofed area.

After treatment standing area

Sheep must exit the footbath onto a clean relatively dry surface. A concrete floor is ideal as it is easily kept clean. A slatted floor would also work very well. However, avoid galvanized mesh floors when using copper sulphate. The longer sheep are left standing the more the solution will soak in and work. Ideally stand for 30 minutes. Draining or collecting pens could perform this role.



Slatted floor as after treatment standing area. Floor stays clean. Waste collected underneath. Avoid galvanized mesh floors with copper sulphate baths.

Size of after treatment standing area

The drying pen should hold at least 4-5 times the number of sheep that the footbath holds.

Cost of filling

The size of the footbath is a compromise between cost of filling it with solution, hours spent footbathing and stand in-times. Bigger footbaths cost more to fill but reduce hours worked. Larger footbaths can also allow longer stand in-times.

Impact on humans, environment and animals

Carefully consider the human health, environmental hazards and animal welfare issues of treatment solutions. Aim to maximise foot health while minimising the use of these chemicals. Read the data sheet. Wear recommended personal protective equipment. Never allow children access to these chemicals. Store and dispose of them correctly.

Formaldehyde: May cause cancer. Can cause severe skin burns and eye damage. Can cause respiratory irritation. Suspected of causing genetic defects. Very painful for lame sheep. A hazard to have it on a farm.

Copper sulphate: Does not have the same human health risk as formaldehyde. However there are concerns about its disposal. High levels of soil copper are toxic to plants and animals. Copper also has an impact on the microorganism in the soil. It's toxic if drunk.

Zinc sulphate: A heavy metal and very toxic to aquatic life. It is also toxic to plants. Can be toxic if drunk. Causes serious eye damage.

Chemical dilution rate per 100litres of water		
Chemical	% added	Amount per 100 litres (L)
Formalin (40% formaldehyde)	3%	3L per 100L
Zinc sulphate (hexahydrate)	10%	10kg per 100L
Zinc sulphate (monohydrate)	6.5%	6.5kg per 100L
Copper sulphate	10%	10kg per 100L

Make the most use of each fill

Getting more out of each fill reduces cost, handling and the amount of solution for disposal. Make the most of each fill by:

1. Putting only clean feet into the bath.
2. Equipped to properly hose and drain a dirty bath.
3. Fasting sheep just before bathing.
4. Allowing sheep 10 minutes in the bath.

5. Sheep exit bath onto a clean dry hard surface for a 30-minute soak in.
6. Reusing suitable solutions through an intensive footbathing programme i.e. 3 sessions 5 days apart.
7. Roofing copper or zinc sulphate footbaths.

How many ewes do you want it to hold?

Decide size of footbath required before building it. Know the number of sheep a footbath holds.

Calculating the ewe holding capacity

In metres length x width = $m^2 \div 0.4m^2$ per ewe = number of ewes.

Example: length = 8m. width = 2.5m.

$8 \times 2.5 = 20m^2 \div 0.4m = 50$ ewes.

Length of footbath required assuming 2.44m wide

Group size (ewes)	Pen size m^2	Length m	Litres (5cm deep)	Litres (7.5cm deep)
12	5	2.05	250	375
25	10	4.10	500	750
37	15	6.10	750	1125
50	20	8.20	1000	1500

Assumed: Footbath 2.44m wide.

How many litres does it hold

Once you know the size of footbath you can work out how many litres it contains. It's important to know the number of litres a footbath holds. Otherwise the solution will be too weak or strong. Calculate footbath volume in litres. For an existing footbath with ramps workout how many litres it will hold by pouring a known volume of water into the footbath filling it to the required depth.

Calculating the footbath volume

In metres multiply length x width x dept = m^3
 $m^3 \times 1,000$ = capacity in litres.

Example: length = 8m. width = 2.5m. depth of solution = 50mm or 5cm or 0.05m.

Volume = $8 \times 2.5 \times 0.05 = 1m^3 \times 1,000 = 1,000$ litres.

Dip tub design

Key Facts

1. Site to prevent pollution.
2. Dip tub increases pollution risk.
3. Covered with a locked cover.
4. Floor around bath sloped 1:30.
5. Fill & empty tub in less than 15 minutes.
6. Lifting into tub suits flocks below 100 ewes.
7. 1 handler but ideally 2 for this method.
8. Side entry with a 1.1m long slide at 30° angle.
9. Gate 1.5m in front of slide holds decoy sheep.
10. 2 handlers for this method.

If including a dipping tub, consider:

1. Child and handler safety.
2. Potential health impact from dipping.
3. Pollution prevention is essential.
4. Ease of use.
5. Frequency of dipping.
6. Numbers to be dipped.
7. Tub location and size.
8. Method of getting sheep into tub.
9. Tractor access.
10. Building and filling cost.
11. Draining pens.

Planning permission

A fixed sheep handling unit with a dip tank requires planning permission.

Why have a dip tub;

1. Very effective treatment for lice and scab.
2. Option of dipping.
3. Mobile dipping contractors are increasing rare.

Safety cover

Unsupervised tubs must be covered with a locked childproof cover at all times.



Safety cover must:

1. Completely cover the dip tub with no gaps.
2. Be level with the floor around it to prevent trips.
3. Take the weight of machinery, people and livestock on it.
4. Not be possible to force it opened.
5. Be easy and safe to put on and remove.
6. Use galvanised steel as it is longer lasting and less slippery when wet compared to timber.



A dip tub securely covered with a steel chequer plate sheet which is moved with a loader. Cover is flush with the floor to prevent trips. Non-slip chequer plate floor prevents animals slipping and is rust resistant.

Safe dip use

1. All chemicals must be stored, handled, used and disposed of as per manufactures instructions.
2. Do not locate a dipper under a roofed area.
3. Locate splash guards where handlers could be splashed.
4. Wear recommended personal protective equipment.
5. Have eye wash and clean water to wash off splashes.
6. Hand and eye washing facilities must be provided.
7. Have an action plan in case of splashes or spillages. See section on safety.

Site to prevent pollution

1. Having a dip tub increases the pollution risk.
2. Site the dipping unit as far as possible from watercourses, waterbodies, springs, boreholes, wells, flood plains and drainage systems.
3. Site must not be waterlogged even after heavy rain.
4. Avoid high water tables or where water collects.
5. Locate the dip tub to prevent overflow problems.
6. Avoid slopes where spillage could flow to a watercourse or roadway.
7. Clean water from roofs, yards and fields must not run into the dip tub or draining pens.
8. Have an action plan in case of splashes or spillages.
9. Plastic tubs should be UV resistant.

Route to prevent water pollution

1. Return sheep to the field when their fleece is dry.
2. The return route for freshly dipped sheep to grazing should avoid watercourses, ponds, rivers, springs, wells, boreholes, poached ground etc.
3. Return sheep to grazing that does not have watercourses, ponds, rivers, springs, wells, boreholes, poached ground etc.

Before construction check ground water level

1. Dig a trial hole at the proposed site.
2. Cover holes so they are not a safety risk.
3. Check the trial hole over a period of days to see if ground water is a problem.
4. If water seeps between the plastic tub wall and the surrounding material the bath sides maybe forced in.
5. Observe soil profile for signs of a high-water table.

Installing a plastic dip tub

The walls of a plastic tub pushing in can be an issue.

1. Follow manufactures instructions.
2. Dig a hole deep enough for a 100mm concrete floor to support the bottom of the tub.
3. The hole surrounding the tub should be big enough for at least 150mm backfill around it.
4. Place the tub on the concrete floor.
5. Check the tub is level.
6. Support the tub inside with struts or add water into the tub as concrete is added to backfill.
7. This equalises the pressure.
8. Important to backfill with concrete where a highwater table is a concern.
9. Backfill the tub to within 150mm of the top.
10. Allow 10-14 days for backfill to settle.
11. Place a concrete surround around the top of the bath covering the top ledge of the anti-splash rim.
12. Usual concrete curing time is 28 days.
13. The concrete surround must be at least 150mm deep to firmly hold the tubs ground fixing ledge i.e. anti-splash rim.
14. For extra stability rawbolt the anti-splash rim to the concrete surrounds.
15. Some suppliers advise filling the tub with clean water when not in use to avoid damage from water table changes.
16. Unsupervised tubs must be covered with a locked childproof cover at all times.
17. Some manufactures may have different instructions to the above.
18. Seek and follow your manufactures instructions.

Design to prevent dip tub leakages

1. The dip tub must not have a drainage hole.
2. The dip tub must be watertight.
3. Better to buy a manufactured one-piece tub.
4. Building a watertight tub is a very specialised job.

Before use check dip tub for leakages

1. Before use and while empty always check the tub, dipping pen, draining pens and silt trap for cracking, wear or damage.
2. Fill the dip tub with clean water and leave overnight, ensuring it has a locked childproof cover and that rain cannot get into it.
3. Check the water level during the following day.
4. If it has not changed dip concentrate can be added.

Floors to prevent leakages

The floors of the collecting pens, forcing pens and race must fall away from the dip tub. The dip area and draining pens must have leakproof concrete floors with watertight sealed joints.

Prevent back-siphoning

Piped water is an easy way of topping up, decontamination and rinsing. Direct pollution of a water supply can occur by back-siphoning of dip during filling.

1. Have a double check valve or a backflow prevention device to stop back siphoning of dip.
2. To prevent back-siphoning avoid water sources with a direct connection to the water mains.
3. Never submerge the water hose in the dip bath.
4. Direct the hose over the draining pens.
5. Never use the same hose for dipping and domestic water supply purposes.

Floor around dip tub pen

The floor of the penned area around the bath should be non-slip concrete floor sloped 1:30, tapered in from the sides to return all the dip to the tub.

Dip disposal

Remove spend dip immediately after use to avoid overflow problems. Dispose of used dip according

to manufactures instructions.

Easy to set-up

A tub that avoids setting up temporary penning is more likely to be used. Filling and emptying the tub must be a quick and easy job. A water hose beside the dipper makes filling easier. Stored roof water can also be used. Fit water storage tanks with an on-off valve and a large bore hose. Tanks must be safe. Allow access for a tractor and vacuum tank as the tub maybe filled or emptied using it. Leave space beside the dipper to get in and store a large mobile water tank. It must be next to the dip tub for direct filling but not in the way when dipping.



Leave access and space for tanks of water next to tub.



Locate a powerful hose beside the dipper for easy cleaning and filling. A neatly stored hose prevents trips.

Easy to empty and clean

Emptying and cleaning the tub must be an easy job. Locate the tub so it can be easily accessed with a vacuum tanker for sucking out. The tub must not have a drainage hole. A convenient powerful hose will help with washing down. All washings must go into the tub. Allow access for a tractor p.t.o. driven high pressure hose for cleaning and vacuum tank for sucking out dip and delivering water.



Tractors must have easy access to the dip tub.

Easy to use – tub location

A dip tub setup that is easy to use i.e. easy to get sheep into is important if sheep are to be dipped regularly i.e. annually or more often. Dip tub location will dictate labour needs and speed of dipping. 4 methods of getting sheep into the dip tub include:

1. Manual lifting into tub.
2. Side entry from a race with a slide.
3. Side entry from a race with a nudge gate.
4. Walk-in ramp.

Method 1 – Manual lifting into tub

Manual lifting into dip tubs is common with flocks of less than 100 ewes or where dipping is infrequent or where there is a single operator. It is simple and cheap to install and use. However, it makes dipping labour intensive. Ideally two people are needed as there is a lot of catching, dragging, lifting and lowering each sheep into the bath. One person forces sheep into the dipper, the other does the dipping. It's important to locate the dipper right on the edge of the forcing pen. A circular forcing pen keeps sheep closer to the tub. This method increases the risk of handlers been splashed with dip.



Dip tub located right on the edge of the forcing pen. Cover when not supervised.



Tub beside circular forcing pen to reduce dragging distance.

Method 2 – Side entry from race with a slide

Side entry dip tubs are popular with larger flocks and with flocks that dip regularly. Many handlers find locating the tub along-side the race is the easiest way to dip sheep.

1. At least the first 1.5m of the race should have a concrete floor to encourage sheep into the race.



The first 3.6m of this race has a concrete floor.

2. Follow this with a slide at least 1.1m long at a 30° angle.
3. The slide must have a smooth finish i.e. stainless steel sheet.



Slide covered with a 2.14m long steel chequer plate sheet when not in use. Angle iron along the top of the swing gate on the left gives it extra strength. Non-slip chequer plate floor prevents animals slipping and is resistant to rust.



Steel chequer plate sheet removed, exposing the stainless steel slide.



1.14m long, stainless steel dip slide uncovered. Removable angle iron (2.14m long x 40mm x 40mm x 5mm) which is still on the floor on the left holds the steel chequer plate cover in place when dipper not in use. Bottom of stainless slide is at liquid level.

4. Locate the slide so sheep do not step down onto it.
5. The bottom of the slide should be at liquid level.
6. Hang a swing gate or canvas along the length of the slide to block the sheep's view into the tub.



Swing gate in the race is 1.45m wide, 0.89m high. An off-set hinge is located 0.33m from top of this gate. When not in use 2 spring loaded sliding bolts at ground level lock it in place.



Another option is to use a rubber curtain to block the sheep's view of the dipper. Shown here stored in a shed when not in use. The advantage of the curtain is that it can be removed when not in use.

7. Watch that sheep do not pile into the dipper and drown particularly when dipping ewes with lambs. Count them in and out.
8. Place a gate 1.5m in front of the slide to hold a decoy sheep. This decoy draws the next sheep into the race and onto the slide.
9. It does not always work and sheep may have to be forced onto the slide.
10. When the slide is not in use it is securely covered with a 2.14m long steel checker plate sheet.
11. With this method of dipping the handler is less likely to be splashed with dip.

Method 3 – Side entry from race with gates

Locate 2 half gates alongside the race which can be used to gently push sheep from the race into the bath. These 2 half gates can be used in a setup similar to that described in the side entry from the race with a slide. However, the slide is often left out. 3 people may be needed to operate this system, i.e. first person forces sheep into race, second person to work the gates and a third does the dipping.



Swing gate hides site of dipper from oncoming sheep (covered as not in use).



2 half gates used to draft sheep into dipper (dip tub covered as not in use). When not in use 2 spring loaded sliding bolts at ground level lock it in place.

Method 4 – Walk-in ramp

The theory is that sheep walk down a ramp into the bath. This design suits long dip tubs that can include an entry ramp.

Dip tub size

Key Facts

1. Dip tub size should be related to flock size.
2. 1,050-1,250 litre – flocks of 100-250 ewes.
3. 1,250 litre tub holds 1 or 2 sheep at a time.
4. 1,818-2,000 litre - flocks of 250-500 ewes.
5. 2,000 litre tub holds 3-4 ewes or 5-6 lambs.

Opinions vary widely on what is a suitable dip tub size. There is no perfect size as large flocks are often divided into subflocks of 100-200 ewes. In practice 1,050-1,818 litres suits a wide range of flock sizes.

Size of dip tub is a compromise between:

1. Flock size.
2. Frequency of dipping.
3. Labour available.
4. Speed of dipping.
5. Cost of the dipping tub.
6. Cost of filling the dipper.

General guide to manufactured dip tubs

Litres (Gallons)	Shape
818 (180)	Rectangle
1136 (250)	Rectangle
1250 (275)	Round
1544 (340)	Rectangle
1818 (400)	Round
This is not a complete list.	



Cover the dip tub when not supervised.

Intermediate dip tub – 1,050 to 1,250 litres

This is a popular size of dipper. In general, 1,050-1,250 litre tubs suit flocks of about 100-250 ewes. They are cost effective to install and fill. However, they are labour intensive and slow. Typically, they hold 1 or 2 sheep at a time. It is likely that sheep will be manually lifted into it. Locate a guillotine gate at the bottom step of the exit ramp to keep sheep in. Typically, rectangular or round in shape. Available in concrete, plastic or mild steel.

Large dip tub 1,818-2,000 litres

This size is more expensive to install and fill with dip than smaller tubs. However, many flocks of 250-500 ewes find 1,818-2,000 litre tubs give a convenient size and throughput. Many larger flocks are divided into sub-flocks. They allow higher output per hour, better control and accurate immersion. A 2,000 litre tub will hold 3-4 ewes or 5-6 lambs. They must be held in the bath. Typically, round in shape. Watch that sheep do not pile in and drown particularly when dipping ewes with lambs using a slide.



1,800 litre tub. When down stop gate holds sheep in dipper. Pulley operated allowing the handler avoid walking and splash. Cover tub when not supervised.

Long dip tubs

Long dip tubs are 7.6-12.5m long. Very expensive to build and fill. To justify their cost an output of 500 ewes per hour is required. In theory the sheep walk down the ramp. While making their way through the bath they are dipped. The long swim bath allows continuous dipping and reduces handling. The large volumes of used dip for disposal. Long dip tubs also require a level site.

Calculate dip tub volume

The dip tubs capacity to its filled working level and to its topping-up level must be known. Otherwise the solution will be too weak or strong.

Use a container of a known volume of water to fill the tub. Mark the filled working level and topping-up level in litres on the inside wall of the tub with 2 permanent lines. Alternatively use a plastic pole or dip-stick with measurements written permanently on it. This avoids confusion when dipping. Due to their shape length x width x height of the dip tubs will not give you their actual volume.

Cost of filling

Bigger baths cost more to fill with solution. However bigger baths allow sheep to be dipped more quickly. The size of the dip tub should be related to flock size.

Draining pens

Key Facts

1. Draining pens hold & drain all dip back to the tub.
2. Ideally 2 side by side draining pens.
3. 0.5m²/ewe.
4. 15m² draining pen for a 100 ewe flock.
5. 15m² holds 30 ewes.
6. 20m² draining pen for a 200 ewe flock.
7. 20m² holds 40 ewes.
8. Concrete floor sloped 1:30.
9. 25-40mm kerb or ramp at gateways.
10. Pulley operated exit gate keeps handler away from wet sheep.

Draining pen size

Allow 0.5m²/ewe. Ideally have 2 side by side draining pens large enough to hold each group for at least 10 minutes after dipping. A 100 ewe flock requires pens that will hold 30 ewes. While a 200 ewe flock requires pens for about 40 ewes. Ideally draining pens should hold similar numbers of sheep as the forcing pen.

Draining pen floor

The floor should be 125mm of concrete on 150mm compacted hardcore. The floor should be non-slip concrete floor sloped 1:30. DAFM S136 January 2016 requires 1:60. The floor should be tapered in from the sides to return all the dip to the tub through a filter.

Kerbs to prevent leakages

A 25-40mm kerb at doorways and gateways would prevent the escape of dip from the draining pen area.

Walls to prevent leakages

Draining pen walls must be solid and high enough to contain all splashes. The walls must also be water-tight particularly at the base. They should also be smooth. Pollution must always be prevented.

Pulley operated exit gate

Ideally sheep should leave the draining pen through a pulley operated guillotine or swing gate. By using a pulley operated gate the handler avoids having to go near recently dipped sheep that will be shaking off dip. The gate in the next picture is 2.1m long. It is too heavy to be operated as a guillotine gate. It rotates on hinges on each side. Key operating and design features are shown in Pulleys and Levers section.



Pulley operated swing gate allows the handler to open the exit gate without going near the wet sheep. See section on pulleys and levers. Instead of using kerbs the floor directly under the exit gate is ramped to retain all the dip runoff and to exclude soiled water from neighboring pens. Dipping is not in progress above.

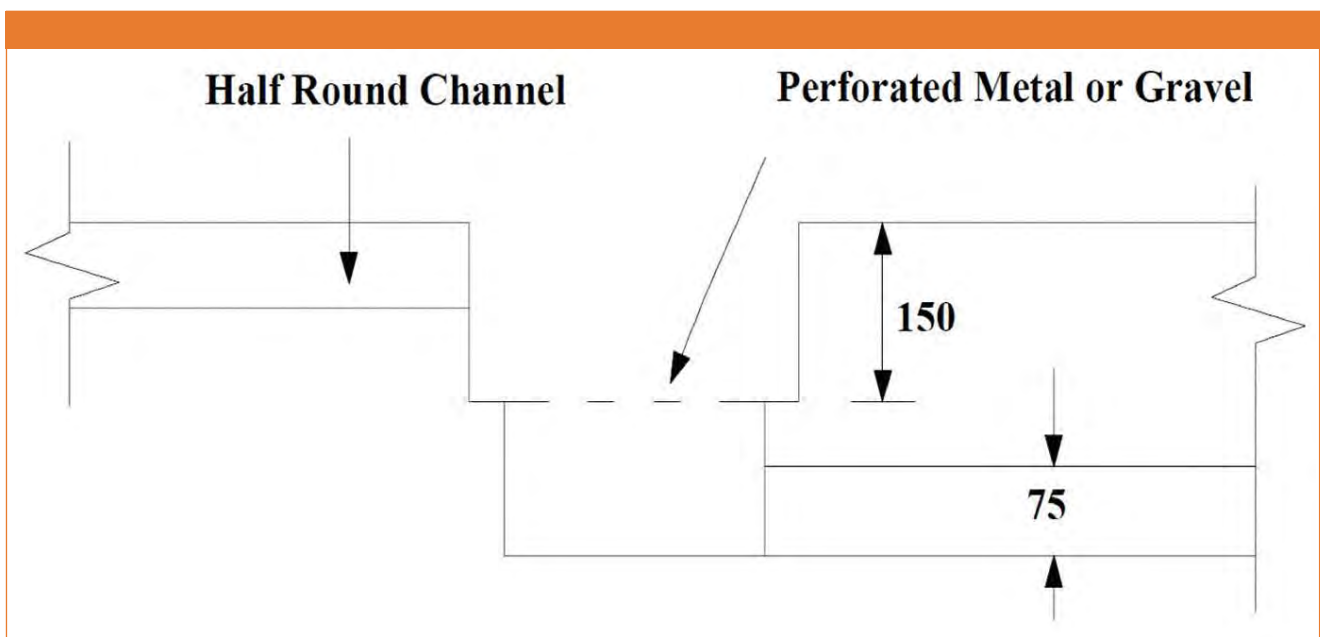
Dip channel and filter

Key Facts

1. Filter holds back wool, dung and waste.
2. Half round channel 225mm wide and 75mm deep diverts dip into a filter.
3. Concrete sump 300mm x 300mm and 250mm deep.
4. Perforated metal sheet or 5mm mesh to filter dip.
5. 75mm pipe diverts dip back to tub.
6. Must be leakproof.
7. Pollution must always be prevented.

Dip filter

Use a shallow half round channel 225mm wide and 75mm deep to divert dip into a filter. The filter should consist of a concrete sump 300mm x 300mm and 250mm deep. The filter contains a perforated metal sheet or 5mm mesh to remove dung, wool and solids. Use a 75mm pipe to divert dip from the bottom of the filter back to the tub. Locate the filter so that it is easily brushed clean. The dip filter and its channel must be leak-proof and only drain to the dip bath.



A side view of a channel 225mm wide and 75mm deep to divert dip into a filter.

(Source: Department of Agriculture, Food and Rural Development, 1996)

Handler gates

Key Facts

1. Handler gates avoid climbing and lifting.
2. 500-550mm wide.
3. 6 or less handler gates around unit.
4. Usually non see-through.

Handler access gates are an important safety feature. They avoid climbing and lifting. The handler can move more easily and quickly through the unit.

Handler gates help to;

1. Avoid climbing over penning.
2. Avoid opening gates on a regular basis.
3. Avoid lifting sheep or materials over penning.

Location of handler gates

A handling unit may need 6 or less handler gates. Possible locations include:

1. Where you expect to climb over a boundary.
2. On each side where the forcing pen meets the race. The handler can fill the race. Then use the handler gate to walk from the forcing pen to the working area on either side of the race.
3. From the working area along-side the race into the collecting pen that feeds into the forcing pen. This allows the handler to walk directly from the working area into the collecting pen to refill the forcing pen.
4. From the forcing pen into the handlers working area around the dip tub.
5. From the forcing pen into the handlers working area around the batch footbath.
6. In the working area around the footbath so that the handler does not have to walk through the bath to open sheep entry or exit gates.
7. Working area around the dip tub so that the handler avoids just dipped sheep.



Handler gate gives access along the length of the race.

Design of handler gate

1. The handler gate should be 500-550mm wide.
2. Use proper latches not pins to keep gates closed.
3. Locate the latch to avoid stooping.
4. Hinge gates correctly for easy movement.
5. Remember more gates = less climbing.
6. They should be non see-through to avoid stalling.
7. They should not be in direct path of animal flow.



530mm wide handler gates to access both sides of race. View from inside forcing pen.



Handler access gate should be 500-550mm wide.

Dosing line

Key Facts

1. Makes dosing quicker and easier.
2. Handler free of pack and gun.
3. Less pipe catching.
4. Line carries the pack and gun.
5. 1.85m high dosing line.
6. Line runs length of race.
7. 2 holders on 1 line.

A handler must be able to quickly and correctly dose sheep with minimum effort. With the dosing line the handler avoids carrying the dosing container and gun.

Many handlers find carrying the dosing container and gun:

1. Restricts movement.
2. Causes delays as packs are taken on and off.
3. Risks product loss or spillage onto the handler.
4. Risks catching it on equipment or sheep.

On the dosing line the dosing equipment must:

1. Move freely.
2. Be out of the sheep's reach.
3. Be out of handler's way so other tasks can be completed.
4. Located along the race.
5. Dose line 1.85m above floor level.



Two handlers dosing along the race using a dosing line. Two hollow steel pipes move freely along the tensioned steel wire that stretches the length of the race.



Hallow steel pipe has a chain to hold the dosing container and ring to hold dosing gun when not in use.



The dosing gun slotted into its holder when not in use.



Dosing equipment is safely out of the reach of sheep.



The dosing equipment is out of the handler's way so other task can be completed after dosing.

Pulleys and Levers

Key Facts

1. Reduces walking, lifting, climbing and stalling.
2. Counter weights ease lifting & decent.
3. Keeps handlers away from dipped sheep.
4. Pulley rope typically 1.9m high.
5. Counter weights enclosed for safety.
6. Guillotine gate see-through and lightweight.
7. Pen swing gate up to 2.1m wide.
8. Height to top of swing gate at least 0.9m.
9. Swing gate hinge rotates 0.67m above floor level.
10. 2.06m high frame supports swing gate pulley.

A single handler must efficiently control the flow of sheep. Using pulleys avoids walking up and down races, footbaths and holdings pens to open and close gates. It may also avoid climbing over penning and sheep to let stock out. It will also avoid having to go near recently dipped sheep that are wet. Using pulleys can exploit sheep behaviour in 3 ways.

1. The handler stays behind the sheep offering a clear escape route.
2. The handler behind the sheep encourages them forward.
3. Sheep are more likely to enter when they see comrades moving ahead or moving forward to escape.

Operate gates using:

1. Ropes.
2. Gravity.
3. Springs.
4. Off-set hinges.
5. Extended handles.
6. Counter weights.

Ropes

To minimise walking have ropes at a location and height that they can be used from anywhere along



Guillotine gates work well as stop gates.

the race, footbath or holding pen. It should also be possible to easily hook up the rope to keep the gate opened. Where a rope goes around a corner run it through a pulley to reduce friction and prolong the ropes life.

Gravity

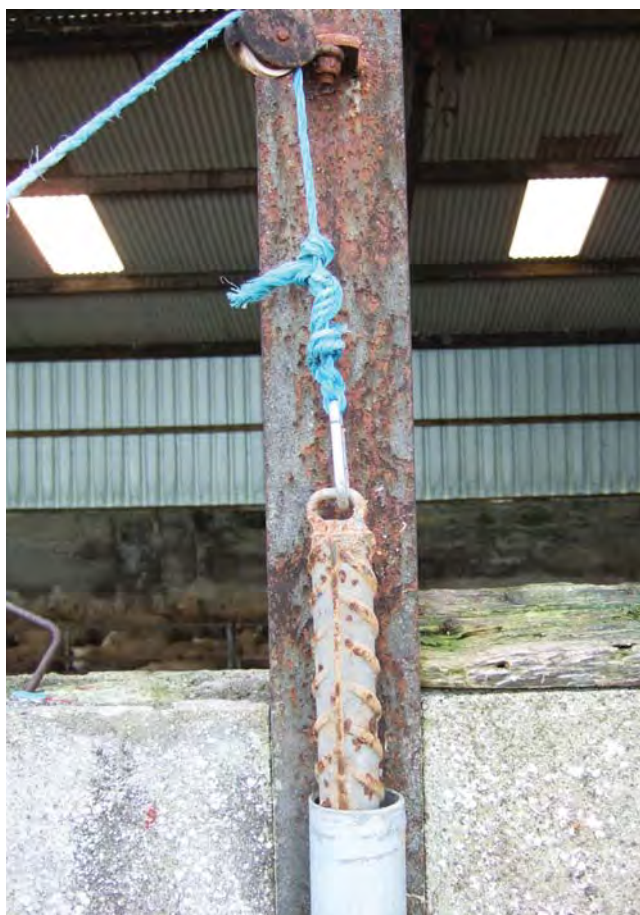
The handler pulls a rope to lift a guillotine or swing gate. When the rope is released gravity returns the gate to its original position. This design works well with stop gates. However, a drafting gate that moves side-to-side with the help of a handle or rope perhaps combined with an off-set hinge or a spring is easier and quicker to use.

Off-set gate hinge

An off-set hinge works well on a sorting gate located at the end of a race. The off-set hinge causes the released gate to swing to one side leaving the opposite side opened. A rope attached to the gate is pulled to move the gate back, diverting sheep into a different pen.



Counter weight inside a pipe for safety.



Note the shape of the counter weight inside a pipe.

Spring pressure

A gate can be spring loaded to return it to one position. A rope is pulled to force the gate to a different position. Haybob or combine tines can be used as springs. Minimise spring resistance on gates for ease of use & safety.

Counter weights

Counter weights must be encased for safety. A partially filled container could be used as its weight can easily be adjusted. Counter weights can be used to;

1. Ease lifting.
2. Ease the decent of a guillotine gate.
3. Ensure that the gate stays fully opened or closed.
4. Pull the gate back into position as a spring or off-set hinge would do.

Combined guillotine and sorting gate

A guillotine gate that uses gravity and a sorting gate that uses a spring or an off-set hinge is a popular combination as shown in the next picture. The guillotine gate is lifted using a rope. A second rope is used to pull the sorting gate to one side. The rope attached to the sorting gate can then be tied to retain this side opened despite pressure from a spring or off-set hinge. Once the rope is released the spring or off-set hinge returns the sorting gate back to its resting position.



Drafting gate operated using a rope and an off-set hinge. Guillotine gate operated by pulling a rope.

Guillotine gate design

Guillotine gates should be see-through to give a clear view ahead for both handler and sheep. Guillotine gates should be made from lightweight material for easier lifting. Heavy gates are dangerous when dropping. Use light weight material like tubular framed gates with 50 x 50 x 3mm or 75 x 75 x 4mm weld mesh or galvanised mesh. Legs or horns can get caught in mesh. Using vertical rails instead of mesh reduces this risk. Tubular framed gates have less impact injury than box or angle iron.

Guillotine gate location

Locate guillotine gates at both ends of a race, footbath and holding pen.

Pulley operated swing gate

The pulley operated swing gate shown in the next picture is particularly suitable for use in draining pens as it avoids having to go near recently dipped sheep. It is also suitable for exit gates for batch footbaths and smaller drafting pens. The gate shown is 2.1m long and would be too heavy to be operated as a guillotine gate. Key operating and design features are shown in the next 5 pictures.



2.1m wide swing gate in closed position. To open pull the rope while the handler stands at the race or dipper.



Gate tilted opened by pulling the rope which rotates the gate on its hinges. Release the rope to close.



Height to top of swing gate is 0.9m. Hinge it rotates on is 0.67m above floor level. This allows the gate to rotate when the rope is pulled. But forces the gate to closed position when released. Sliding bolt at the top of the gate keeps it closed when not in use.



Side view: Swing gate. 2.06m high steel frame supports the pulley.



Left hand is pointing to pulley above the gate. This pulley is set back 0.26m behind the gate. Right hand is pointing to where rope is tied to the bottom of gate which lifts the bottom of the hinged gate when pulled.

Gate latches

Key Facts

1. Safe and easy to use.
2. Avoid pinch points.
3. Open from both sides with one hand.
4. Open from both sides without stooping.
5. Must be strong.
6. Locate half to two-thirds the way up the gate.
7. Work even if gate drops.
8. Must not stick into path of handler or sheep.
9. Have a smooth finish.
10. Avoid drop bolts.

Often gate latch height and design are neglected in sheep handling units. The ability of a handler to efficiently, easily, quickly and safely use a handling unit is affected, by the height and design of gate latches. Features and common designs are mentioned here.

Latch height

Gate latches must be located on the gate;

1. To avoid injury to the handler and sheep.
2. To avoid handlers having to stoop.
3. For easy use from both sides of the gate.
4. For easy reach and use when sheep are against the gate.
5. To hold the gate in the right place.
6. So that it will open in and out.
7. To stop the gate bending. Locate latches half to two-thirds the way up the gate. Where handles are too low the handler must stoop. Where handles are too high the gate may bend. For long gates and those under pressure latches should typically be halfway up the gate. Timber gates are more likely to bend than metal gates.

Latch safety

Gate latches must be located on the gate;

1. To avoid injury to the handler and sheep.
2. Avoid latches that are rough, jam or cross like a scissors.

3. So, the handler can operate the handle without ever putting his/her hand between moving parts.
4. To be securely withdrawn to stop them sticking out into the path of handlers and sheep when opened.

Easy to use latch

Gate latches must be designed;

1. To work properly even if the gate drops.
2. To be operated and the gate opened in one motion.
3. So, handlers can operate it easily and quickly with one hand while holding a sheep with the other.
4. To be maintenance free. Use non-rust materials. Galvanise steel latches and springs to prevent rust.
5. To hold the gate in the right place.
6. Strong enough – take rough treatment and pressure.
7. With an engineered smooth surface.
8. So that handled parts are big enough for both a full strong hand grip and are very easy to grip.
9. To be easily seen, reached and used from both sides of the gate.



Handle is too small for a full hand grip. The bolt is too weak, and the spring is not rust resistant.

Sliding bolt

This is simple and effective to make, use and maintain. The bolt can be withdrawn, and the gate opened in one motion. A long opening in the receiving post allows for a drop-in gate height.



Long opening in receiver allows for drop in gate height.

A slight disadvantage with the sliding bolt is that it must line up with the receiver. Not always easy to do when restraining a sheep. The bolt must be strong enough for the gate. It must slide freely. Have a safety stop so the bolt does not accidentally open or close. The bolt handle should be large enough to give a full hand grip. The handler must be able to use the handle without ever putting the operator's hand between any moving parts.



Large smooth handle attached to a sliding bolt for good grip and safe use.

Inclined sliding bolt

The inclined sliding bolt has 2 main advantages. It is easy to close. Gravity pulls the released bolt down. Secondly, the downward pull on the bolt prevents accidental opening. It's important that when the gate is opened that the bolt can be secured away completely with a safety stop. This prevents the bolt from sticking out beyond the end of the gate into the path of the handler or sheep.



Spring loaded sliding bolt

A sliding bolt can be spring loaded. Rust, rough handling or too much pressure can damage springs. The bolt and spring must be strong enough to withstand the rough handling and pressure applied. The bolt must slide freely. Spring resistance is a balance between positively closing the bolt and compressing the spring with easy. The angled striking plate allows the gate to be closed by pushing the gate without touching the sliding bolt. Avoid spring loaded bolts on sorting gates. They could catch an ewe's face or side. If using spring-loaded bolts, it's safer to locate them well above sheep level.



Striking plate allows the gate to be closed by pushing the gate without touching the sliding bolt.

Chain and slot latch

This design is easy to make and needs little maintenance. There are many versions of the chain and slot latch. A chain link locks against a metal plate when the chain is dropped into the slot. When restraining a sheep this design may not be as easy to use as a sliding bolt. Undoing this latch and opening the gate might not be done in one motion. The gate does not have to be closed to a precise location to latch it securely. This design works even if the gate drops. This design will secure double gates together without having to line them up closely. There are no protruding parts like a bolt latch. If not closed tightly a gap can be left.

Throwover latch

A latch attached to one gate clamps over the joining gate or post. Tends to be used on double gates but can be used to latch an individual gate to a post. Having the throwover at the top of the gate may make the gate susceptible to bending. Gates must line up for the throw over to work well. This may require maintenance to correct some drop in the height of the gate. Very heavy throwovers risk slamming down and injury.



Throwover on an individual gate.



Throwover on a double gate.

Chain and hook latch

This design is easy to install, low maintenance and adjustable if the gate drops. A chain on the gate has a hook that attaches to a ring on the receiving post. The gap between the gate and receiving post is dictated by the chain's length. Get the chain length right to avoid a big gap. Not as easy to use as a sliding bolt. The latch and receiving ring are located on one side of the gate. So, the handler may have to reach over the gate to use the hook. Not easy to do when holding a sheep. Undoing this latch and opening the gate cannot be done in one motion. The hook on the chain could catch the wrong things.



Chain and hook latch.

Drop bolts or garage bolts

Drop bolts tend not to suit sheep handling units. Drop bolts are located on one side of the gate. The handler may have to lean over the gate to reach the bolt handle. Not easy to do when holding a sheep. Lifting this latch and opening the gate cannot be done in one motion. If sheep are against the drop bolt, they can be hard to reach and use. To close a drop bolt, it needs to be lined up with the receiving hole.



Drop bolts best avoided in sheep units.

Other latch designs

Spring-loaded self-locking gate latch with a striker could be used on short light gates that will not come under pressure from sheep.

Extend handles on low latches

If a low to mid-height latch is already in place avoid stooping by extending the handle beyond the top of gate. This makes it easier to use.

Joining rods

Joining rods are good at securing penning. However they do not make good latches. They are not easy or quick to use. To line the holes up the operator has to be looking straight down at them. It also requires 2 hands. Not that easy to do when holding a sheep.

Combined sheep and cattle handling units

Key Facts

1. Combining cattle & sheep units can reduce cost.
2. Boundaries at least 1.4m high for cattle.
3. Uprights every 2.4m centres.
4. Non-sheeted gates should be 8 bars for sheep.
5. Combining units must not limit usefulness.

A small number of farmers have a combined sheep and cattle handling unit.

Combined units can be divided into 2 groups.

1. The basic type. A cattle handling unit crudely adjusted to handle sheep. Typically sheep penning is temporarily added to the cattle crush using ropes or hooks. This allows limited sheep handling for lamb selection, dosing and footbathing. It is awkward to reach or draft sheep through a cattle race. Units that are awkward or involve setting up temporary penning are also less likely to be used.
2. The sophisticated type. A combined handling unit which includes a separate sheep forcing pen and sheep race. This design is rare. There is a useful design in Teagasc, Kildalton Agricultural and Horticultural College, Piltown, Co Kilkenny.



Entrance to cattle crush on the left and sheep race on the right.



Exit to sheep race on the left and cattle crush on the right.



Having side by side races limits handlers to working on one side of the race and limits drafting options.



Sheep race closed off. Cattle crush entrance opened.



Entrance to sheep race been opened.



Sheep race entrance opened. Cattle crush closed off. Concrete surface where livestock turn to enter race.

Compromised handling

Combined units involve some compromise in the ability to handle sheep in particular. They are generally designed around handling cattle with sheep as an add-on. The degree of compromise ranges from severe to mild depending on planning, finance and execution. Dip tubs, fixed standalone footbaths and complete circular forcing pens tend not to be included. Drafting ability also tends to be limited.

Reduces cost

The main advantage of a combined unit is that the penning and floor cost involved in holding pens are minimised.

Suited to out-farms

Combined units have a role as secondary handling units on out-farms where the cost of a second complete sheep handling unit can be hard to justify. They avoid moving sheep long distances to the main handling unit. However there must still be a primary sheep handling unit located centrally on the main holding where all task can be completed.

Suited to mobile units

Combined units with sheep proof permanent penning can be useful where a mobile sheep handling unit is used. The combined unit can provide the majority of the penning in a permanent form which the mobile unit can be anchored to. This avoids having to set-up temporary penning. Such units will be used more regularly. The combined unit also provides a clean hard surface for sheep before and after footbathing.

Key considerations:

1. Must be easy to complete routine sheep task like weighing, dosing, footbathing and drafting.
2. A sheep handling unit that avoids setting up temporary penning will be used more regularly.
3. Ideally the sheep race should be completely separate to the cattle crush. They should not share a common boundary wall between them. This allows more drafting options and handling from both sides of the race.

4. All boundaries including walls, gates, fences and penning in the handling areas cattle have access to must be at least 1.4m high and must be strong enough to withstand the pressures applied.
5. Uprights at least every 2.4m centres.
6. All boundaries including walls, gates, fences and penning in the area sheep have access to must be sheep and lamb proof.
7. Non-sheeted gates should be at least 7 bars but ideally 8 bars to control both cattle and lambs safely.



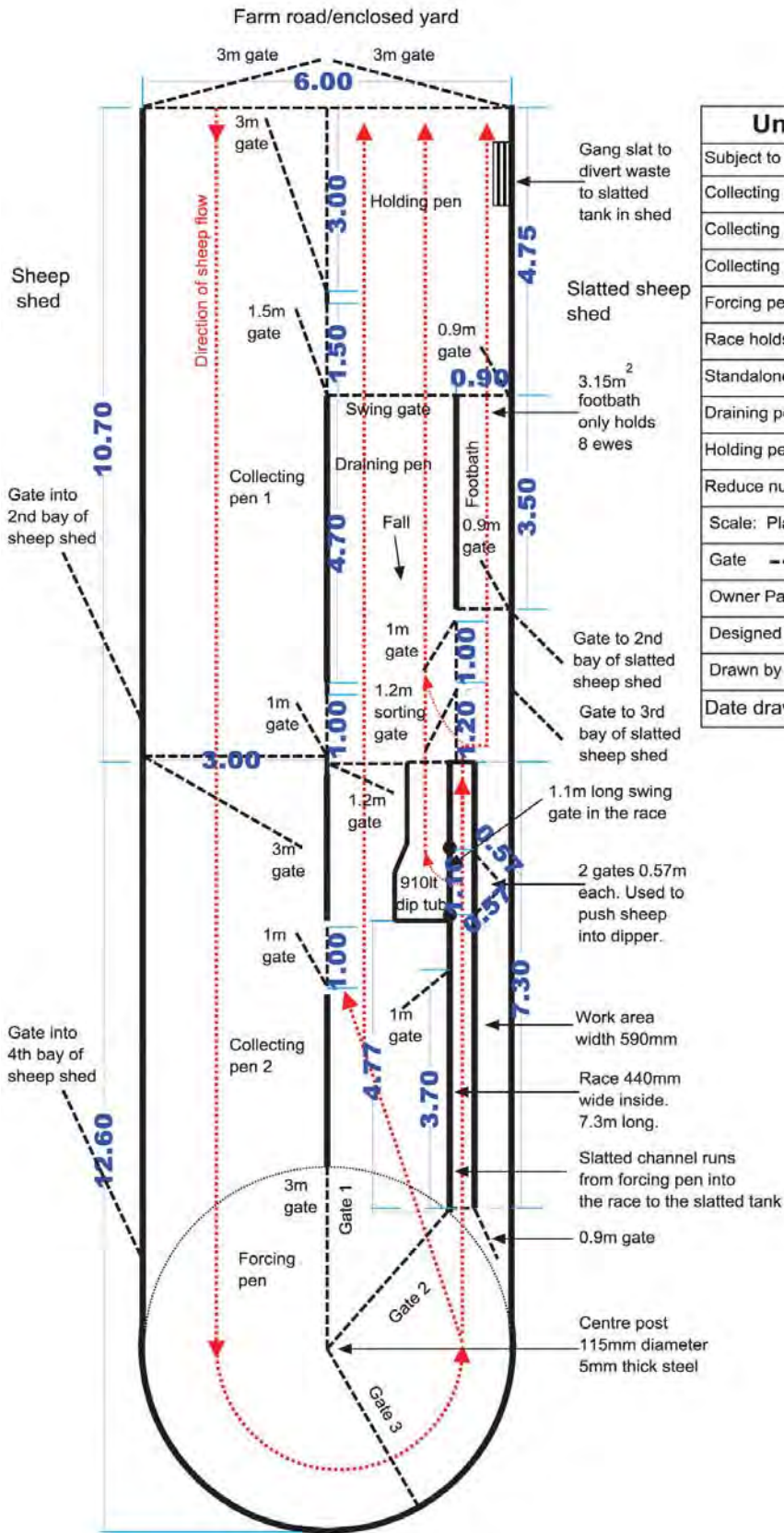
Penning must be at least 1.4m high to control cattle. At least 7 bars but ideally 8 bars to control lambs. The bottom 5 bars are close together to retain sheep.



Boundary of sheep unit must be cattle proof.

Plan of a handling unit for 120 ewes without lambs





Unit for 120 ewes without lambs

Subject to collecting pens 1 & 2 combined

Collecting pen 1 holds 65 ewes without lambs

Collecting pen 2 holds 55 ewes without lambs

Collecting pens 1 & 2 combined holds 120 ewes without lambs

Forcing pen holds 50 ewes

Race holds 8 ewes

Standalone footbath holds 8 ewes

Draining pens holds 22 ewes

Holding pen holds 28 ewes

Reduce numbers by 33% where ewes with lambs at foot

Scale: Plan not to scale

Gate

Owner Paul Maguire

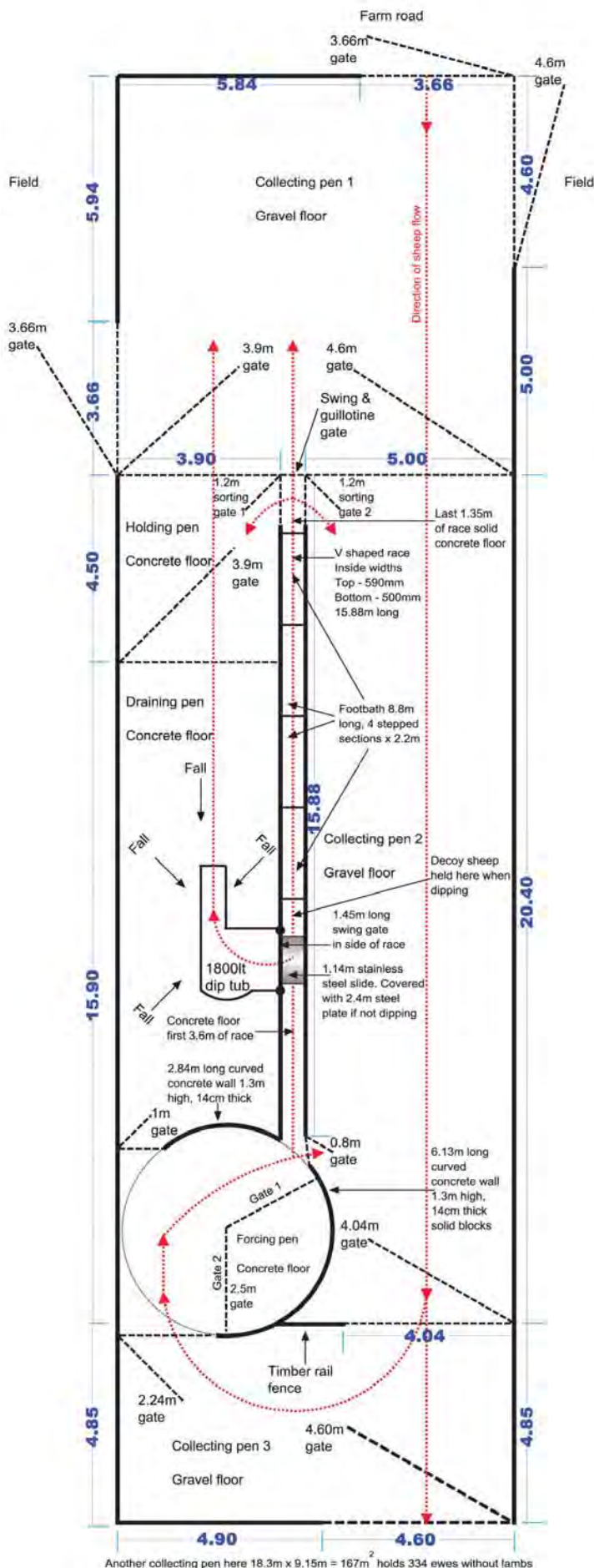
Designed by Paul Maguire

Drawn by Edward Egan

Date drawn: 22/04/2016

Plan of a handling unit for 380 ewes without lambs





Unit for 380 ewes without lambs

Subject to collecting pens 1 & 2 combined
Collecting pen 1 holds 180 ewes without lambs
Collecting pen 2 holds 200 ewes without lambs
Collecting pen 3 holds 90 ewes without lambs
Pens 1, 2 & 3 combined hold 400-450 ewes
Forcing pen holds 40-50 ewes without lambs
Race/footbath holds 20-25 ewes without lambs
Draining pen holds 65 ewes without lambs
Holding pen holds 35 ewes without lambs
Reduce numbers by 23% where ewes with lambs at foot
Scale: Plan not to scale
Gate -----
Owner Ken Mathews
Originally designed by Ken Mathews, Killeigh, Co. Offaly & John O'Hanlon, Teagasc, Co. Offaly.
Redrawn by Edward Egan
Date redrawn: 22/04/2016

Another collecting pen here 18.3m x 9.15m = 167m² holds 334 ewes without lambs

CONVERSION TABLE METRIC – IMPERIAL			
Volume/Fluid			
Millilitres (ml)	→ x	0.0352	÷ ← Fluid ozs
Millilitres (ml)	→ x	0.0018	÷ ← Pints
Litres (L)	→ x	0.22	÷ ← Gallons
Cubic metres (m ³)	→ x	1.308	÷ ← Cubic yards
Area			
Square metres (m ²)	→ x	10.764	÷ ← Square feet
Square metres (m ²)	→ x	1.196	÷ ← Square yards
Hectares (ha)	→ x	2.471	÷ ← Acres
Linear			
Centimetres (cm)	→ x	0.3937	÷ ← Inches (ins)
Metres (m)	→ x	3.2808	÷ ← Feet (ft)
Metres (m)	→ x	1.094	÷ ← Yards (yd)
Kilometres (km)	→ x	0.621	÷ ← Miles
Weight			
Grammes (g)	→ x	0.0352	÷ ← Ounces (oz)
Kilogrammes (kg)	→ x	2.2046	÷ ← Pounds (lbs)
Kilogrammes (kg)	→ x	0.01968	÷ ← Cwts
Kilogrammes (kg)	→ x	0.000984	÷ ← Tons

(Source: Stephen Alexander, 2017)

USEFUL
1 litre of water weighs 1kg.
1 cubic metre =1,000 litres.
1 hectare = 10,000 sq. meters.
Radius is the distance from the center of a circle outwards.
Diameter goes straight across the circle, through the centre.
Circumference is the distance once around the circle.

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Contact Details:

Teagasc,
Head Office,
Oak Park, Carlow.
Tel: 059 9170200 | Email: info@teagasc.ie
www.teagasc.ie

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