



Grass Challenge

for dairy farmers

Challenge Note 2B - Grazing Systems

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1. Advantages and Disadvantages of Various Grazing Systems

Buffer grazing system

The principal is to shut off an area of grass, and use it as part of the grazing area if there is a grass shortage on the main grazing area. If it is not required then it can be used to graze other stock or be cut for silage. This system is used mainly when the grass growth rates are variable, for example, spring and late summer. The benefit of this system is to give the farmer greater flexibility.

Zero grazing

With this system stock do not graze at all but rather the grass is harvested, carted and fed fresh to the stock, which are indoors. This is usually done on a daily basis to minimise wastage. The advantage of this system is the higher efficiency of grass growth and utilisation per hectare as there is less waste and no infield rejection of grass due to faecal contamination. However, this benefit is usually more than offset by the capital and running cost of the machinery employed, including the labour required to operate the system. The other disadvantage is the cost of applying the extra slurry throughout the grazing season. This system does have a role where cows cannot access or walk to a buffer grazing area or part of the main grazing area. It may also have a role when ground conditions are wet and there is the risk of severe poaching, or in periods of severe grass shortage where distant silage areas have to be harvested and fed.



Advantages and disadvantages of various grazing systems continued

Table 1: *Continuous stocking*

Advantages	Disadvantages
<ul style="list-style-type: none"> • Encourages dense swards which are more resistant to poaching, drought and weed infestation. • Requires less capital cost on infrastructure for example, fences, roadways. • Requires little labour to manage. • Larger areas to manoeuvre machinery. • Ensures less variation in seasonal distribution of grass. • Suited to extensive production systems such as organic. 	<ul style="list-style-type: none"> • Grass production and utilisation is lower than a well managed rotational system. • Difficult to achieve correct grazing intensity. • Difficult to gather large herds. • Not suited to certain types of grasses or legumes which lack persistence under persistent grazing. • System not suited to farms with small and scattered fields.

Table 2: *Rotational grazing*

Advantages	Disadvantages
<ul style="list-style-type: none"> • Grass production and utilisation potentially greater compared to continuous stocking. • Easy and quick to gather herd. • Easier to identify periods of grass surplus and shortage than in continuous stocking situation. • Easier to measure grass growth and herd grass intake. • Greater discipline when sowing fertiliser. 	<ul style="list-style-type: none"> • Requires more capital cost on infrastructure for example, fences, roadways and water points. • Requires more labour to manage. • Swards are more open and less dense compared to continuous stocking. • Seasonal distribution of grass growth is more variable in rotational grazed systems compared to continuous stocking. • Costly with a low stocking density.



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Advantages and disadvantages of various grazing systems continued

Table 3: *Paddock grazing*

Advantages	Disadvantages
<ul style="list-style-type: none"> • Less labour requirement compared to strip grazing as less movement of fences. • Simple management system. • Regrowth of swards is maximised due to "graze and rest" policy. • Imposes discipline into the grazing system. 	<ul style="list-style-type: none"> • In periods of variable grass growth rate, there is potential for over or under grazing resulting in a lower output per hectare or per cow in comparison to strip-grazing. • More fences, posts etc required therefore higher infrastructure cost in comparison to strip grazing. • Adjustments to make to paddock size if herd size increases or decreases.

Table 4: *Strip grazing*

Advantages	Disadvantages
<ul style="list-style-type: none"> • Flexible: Stock's daily grass demand can be closely matched to grass supply resulting in a higher output per cow and per hectare. • Less fences & posts required therefore lower infrastructure cost in comparison to paddock grazing. • Less adjustments to make if herd size increases or decrease. • Greater area available to manoeuvre machinery due to no rigid fences. 	<ul style="list-style-type: none"> • More labour required due to more movement of fences. • Slower regrowth of previous days' grazing area if a back fence is not used. • In wet conditions more poaching will occur on previous day's grazing area if back fence is not used.



2. Cow Roadways and Tracks



Benefits of good roadways and tracks

- Cows walk faster to and from grazing;
- Cows spoil less grass;
- Cows are cleaner coming into milking;
- Less poaching when grazing under difficult ground conditions;
- Can reduce lameness in cows;
- Good control over stock / less labour needed.

Ideal roadways and tracks

- Are smooth;
- Have a fine surface;
- Have no protruding stones;
- Are the correct width;
- Have no sharp bends;
- Allow water to run off onto the pasture.

Planning roadways and tracks

- In planning roadways avoid sharp bends or blind corners.
- Roadways should only be placed where cows and/or machinery need frequent access to grazing fields to justify cost.
- Provide maximum access to fields and paddocks from a roadway. Temporary fencing allows for greater flexibility with access points.

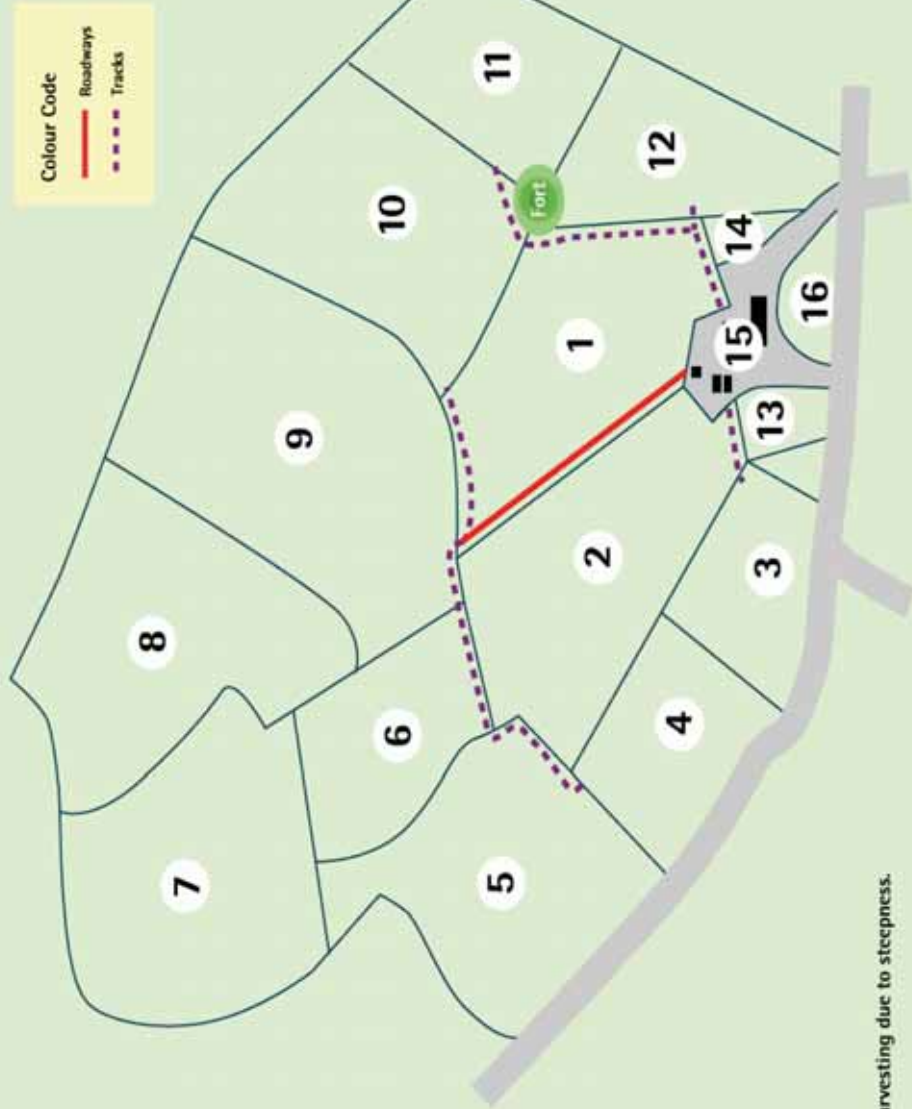
- If the roadway is also required to carry machinery, extra care must be taken in constructing the foundations.
- Road widths of three, four and five metres are satisfactory for small, medium and large herds respectively.
- On wet and intensively stocked farms a road system that leaves all land within approximately 200 metres of a roadway is needed.
- Tracks of only one metre wide can be used that will allow cows to walk in single file. In this situation extra space is needed at the start and finish of the track to allow cows to filter off one behind the other.
- All new roadways and tracks should comply with all relevant parts of the 'SAFFO' regulations.
- Roads/tracks are cheaper to construct if the site is firm, dry and free draining.
- Roads should be positioned at the top of a field rather than at the bottom.

The accompanying farm maps show an example of how roadways and tracks can be improved for a grazing system.



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Current Roadways & Tracks



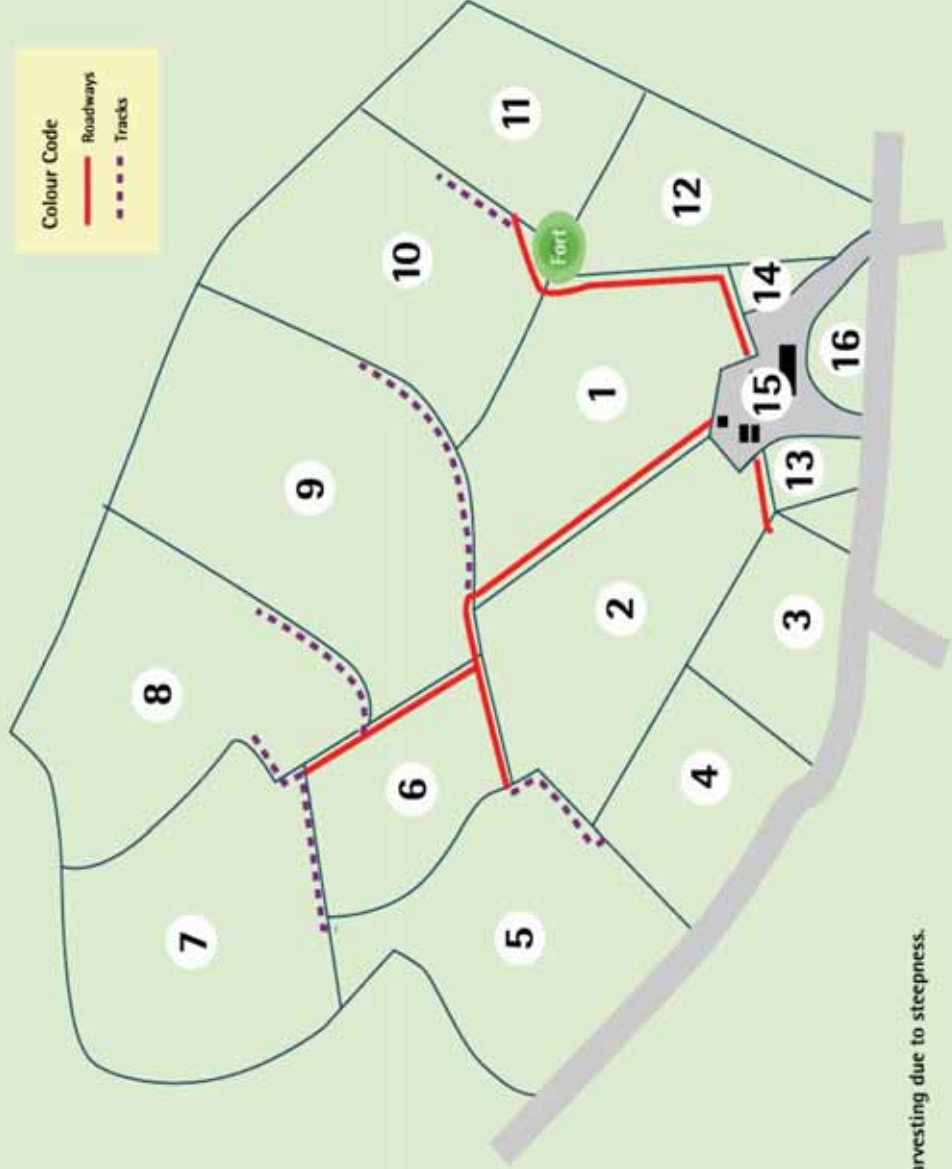
Name: Farmer Brown
 Address: Glen Farm, Ballyanywhere
 Farm Survey No.: 3/61/43
 Grid Reference No.: 3H518649

Field Number	Field Area (ha)
1	2.27
2	1.70
3	1.00
4	0.99
5	2.95
6	1.86
7	2.59
8	3.26
9	3.23
10	2.15
11	2.12
12	1.52
13	0.21
14	0.28
15	0.47
16	0.35
TOTAL	26.95

Note:
 Fields 11 & 12 are unsuitable for silage harvesting due to steepness.



New Roadways & Tracks



Name: Farmer Brown
 Address: Glen Farm, Ballyanywhere
 Farm Survey No.: 3/61/43
 Grid Reference No.: 3H518649

Field Number	Field Area (ha)
1	2.27
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3. Constructing Roadways and Tracks

- Hardcore for roadways should be installed to a depth of 200 to 250mm, with the biggest stones being no bigger than one third of the thickness of the layer.
- The roadway should be compacted with about 50 to 75mm of a fine material for example, quarry blinding (Figure 1). This surface layer needs to be laid evenly and compacted with a vibrating roller preferably in damp conditions allowing improved binding of materials.

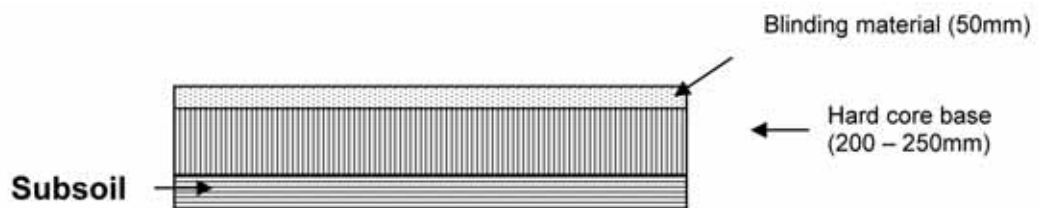


Figure 1: *Hardcore roadway / track*

- As loose stones are a major cause of lameness in cows it is important that the surface material should have a low proportion of pebbles and a lot of fine material into which the small pebbles can be embedded.
- Can be laid directly onto the topsoil, but removing topsoil does work better although it costs more. Where the roadway is being laid onto weak topsoil, a geotextile membrane should be laid under the road materials (See Figure 2).

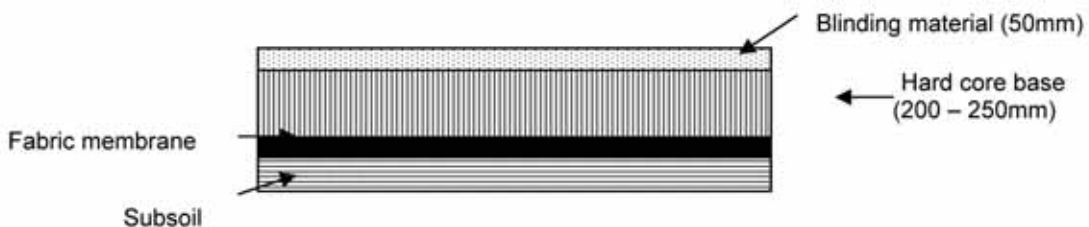


Figure 2: *Membrane roadway / track*

- Farm roadways should slope to one or both sides with a crossfall of 1 in 20-30 for example, for a 4m wide roadway, with a fall to one side, this amounts to a height difference of 130-200mm. If the fall were to both sides, the centre would need to be 70-100mm higher than the sides.
- If the roadway is to be constructed alongside an open waterway it is important to ensure the fall is away from the open waterway.
- The fence along the roadway should be positioned no more than 450mm from the edge of the roadway to prevent cows from walking along the grass margin.
- It is also important to avoid bottlenecks in the road system. Always make gateways wider than the roadways.



Concrete roadways



- Concrete roadways are initially expensive, but will be maintenance free for many years. However, it must be remembered that new concrete is very abrasive and can cause severe lameness to cows.
- Normally 100mm of concrete is sufficient, although if the roadway is to be used by heavy machinery a depth of 150mm of concrete is required (See Figure 3).

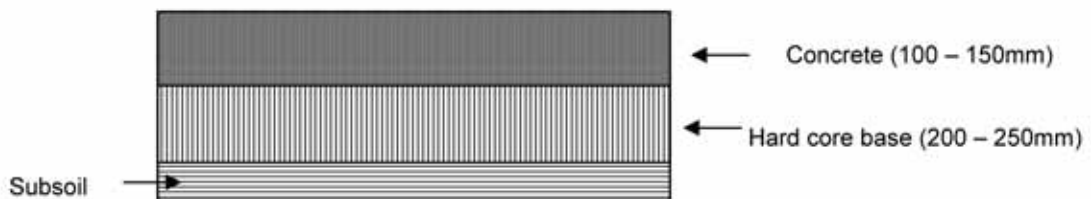


Figure 3: Concrete roadway / track

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Construction of tracks

Cow tracks are usually narrower than traditional roadways and can be used at the end of a roadway to achieve greater access to grazing areas.



- On drier farms infrequently grazed areas could be accessed by fencing narrow walkways along hedgerow areas, without the need for any track construction.
- Where topsoil has been removed down to a firm base only 50mm of hardcore may be required. Where hardcore is being placed on top of the soil it should be at least 220mm in depth.
- When making a track the aggregate sub base should be made of crushed stone chippings combining a mix of angular and small particles to allow drainage and also to ensure a stable surface is formed when compacted.
- To facilitate drainage off the track, the track can be sloped to one side to encourage run-off. This is particularly important for tracks with a quarry dust surface layer.
- Tracks should have a double layer of tough, porous, geotextile, which is used to prevent the hardcore from mixing with the soil and to prevent the surface layer from mixing with the hardcore. These membranes prevent mud working its way to the surface of the track.
- Problems have been experienced using wood chip / shavings as toppings for tracks as they hold moisture in wet weather resulting in the surface layer becoming churned up. However, wood peelings tend to interlock, forming a mat that binds together while also allowing relatively free drainage.
- Tracks constructed using porous membranes and covered with wood by-products are not suited to farm machinery. If these materials are used at gateways separate access for tractors into fields must be provided.
- If the track is to be constructed alongside an open waterway it is important to ensure the fall is away from the open waterway.

4. Maintaining Roadways and Tracks

- Roadways should be repaired as necessary, with particular attention being given to drainage outlets, surface diversions, potholes and rough areas.
- Where the road is lower than the field it should be raised using 40-50mm of granular fill material laid to the fall of the field. A suitable surface material should then be laid and compacted to finish off.
- Tracks with a wood by-product surface layer may require the occasional raking to maintain an even surface layer and a topping up with new material annually or biannually depending on usage.
- Tracks with a quarry dust surface layer will also require some topping up. For tracks alongside hedgerows it is important that hedges are not allowed to become overgrown. As a hedge grows out, it pushes cows off the track. Hedges must be trimmed and weeds kept down at the side of tracks.

Table 5: *Summary of various roadway types*

	Advantages	Disadvantages	Cost (£ / m) assuming a 1.4m wide track
Hardcore + concrete	<ul style="list-style-type: none"> • Ideal road surface for both machinery & livestock. • Maintenance free. • Free from stones, uneven surface etc. 	<ul style="list-style-type: none"> • Expensive. • New concrete is abrasive and can cause lameness. 	15 to 25
Hardcore + quarry dust	<ul style="list-style-type: none"> • Cheaper than concrete. • Suitable for both machinery & livestock. 	<ul style="list-style-type: none"> • Needs maintenance. • Loose stones can cause lameness. 	5 to 10
Hardcore + porous membrane + wood by-product	<ul style="list-style-type: none"> • Cheaper than concrete. • Free from loose stones. 	<ul style="list-style-type: none"> • Wood by-products can hold water leading to churning up. • Needs maintenance up to £2 m. 	8 to 15
Geotextile + wood by-product	<ul style="list-style-type: none"> • Cheaper than concrete. • Free from loose stones. • Cheap and easy to lay. 	<ul style="list-style-type: none"> • Geotextile is expensive. • Not suited to machinery traffic. • Needs maintenance up to £2 per m. 	15 to 20

Note: Construction guidelines and costs are for high spec roads. Costs can be reduced depending on what the road is to be used for.



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5. Fencing of the Grazing System

Good fencing is an essential component of the infrastructure of a rotational grazing system. Temporary electric fencing is the cheapest to set up, however it requires a lot of management time to move wires and power units. Permanent electric fencing is more expensive to set up however once in place there is a low labour requirement.

Table 6: *Costs of fences*

Types Of Fencing	Cost (£/100m)
Permanent conventional fencing (barbed and netting wire)	350 to 450
Permanent electric fencing	200 to 280
Temporary electric fencing	50 to 100

6. Water Supply for the Grazing System

Table 7: *Costs of water*

Water Source	Cost per 1000litres
Mains	74p
Deep well (submersible pump)	5p
Deep well (above ground pump)	25p
Shallow well (above ground pump)	5p



Importance of water to the dairy cow

- 60% – 70% of a cow's bodyweight is water.
- Over 80% of a cow's intake per day is water.
- Milk is 85% water.
- Cows require four litres of water per litre of milk produced.
- A high yielding cow on a low dry matter diet in hot summer conditions can consume 200 litres (44 gallons) of water per day.
- Drinkers should be situated in the collecting yard so that cows have access to water after milking. This will help to ease the pressure on the drinkers in the paddocks.

Guidance Notes

- Drinkers should be large enough to hold sufficient water (10% of the herd should be able to drink at any one time).
- Drinkers should be situated so that cows do not have to walk long distances (ideally two water troughs per paddock).
- Drinkers should have a supply capable of meeting peak demand. If not, then a reservoir may be required.
- Water systems should use at least a 25mm pipe on the main line and a 20mm pipe on branches that feed outlet points. If the pipe is buried, it should be at a depth of 450mm (1.5') to avoid mechanical damage.