

Infrastructure for Adaptive Grazing Systems

Version 1.0

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Image: Balbirnie Home Farm Farm (Angus D. Birditt, Our Isles)



Image: Essebeare Farm (Olly Walker)

This Grazing Infrastructure Guide is designed to help you make decisions for your grazing system.

Infrastructure is often key in adaptive grazing systems that aim to achieve regenerative outcomes. Context is key and there is no 'one-size-fits-all'. You are the expert on your farm, so use some of these ideas as a guide and see what works best for you.

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1 It’s all about Context

The question is not does it work,
but ***how*** does it work for you on your farm?

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Where are you starting from?

Image: Cotswold Beef

Before diving into making infrastructure changes, know your start point.

Use the prompts on the following pages as a guide.

You can't track the impact of changes if you haven't defined where you're starting from. Getting this down on paper will help you to plan, measure and adapt more effectively and design a system that helps unlock the potential of your farm business.

Physical parameters are important when it comes to infrastructure planning - such as topography, habitats, water courses, and existing infrastructure. However, your Social and Economic context can be just as influential on choosing the options that best fit your goals.

A defined farm context grants us greater ability to look at the farm system holistically, which will ultimately help us achieve our whole-system objectives. The main factors that influence our decision making when planning any changes or investment are: Environmental, Social, and Economic.

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Environment

What landscape are we working with?
Think about:

- Geology
- Soil type & soil function
- Plant species
- Geography & ecoregion
- Climate & precipitation
- Topography
- Habitats
- Ecological history
- Agricultural history
- Public access & restrictions
- Existing infrastructure - water, fencing, buildings, access/tracks
- SFI & other obligations



Image: Fife Landscape (Angus D. Birditt, Our Isles)

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Mapping your Environment

A detailed farm map showing topography, water infrastructure, fencing and habitats is a key tool in effective planning. Being able to visualise environmental features will help you plan infrastructure more effectively. For example, topography will often determine how you design water and fencing infrastructure and what equipment would work best in your system.

Some digital tools for mapping and farm planning are:

- Land App
- Field Margin
- Agriwebb
- Breedr
- PastureMap
- Google Earth Pro
- Google My Maps

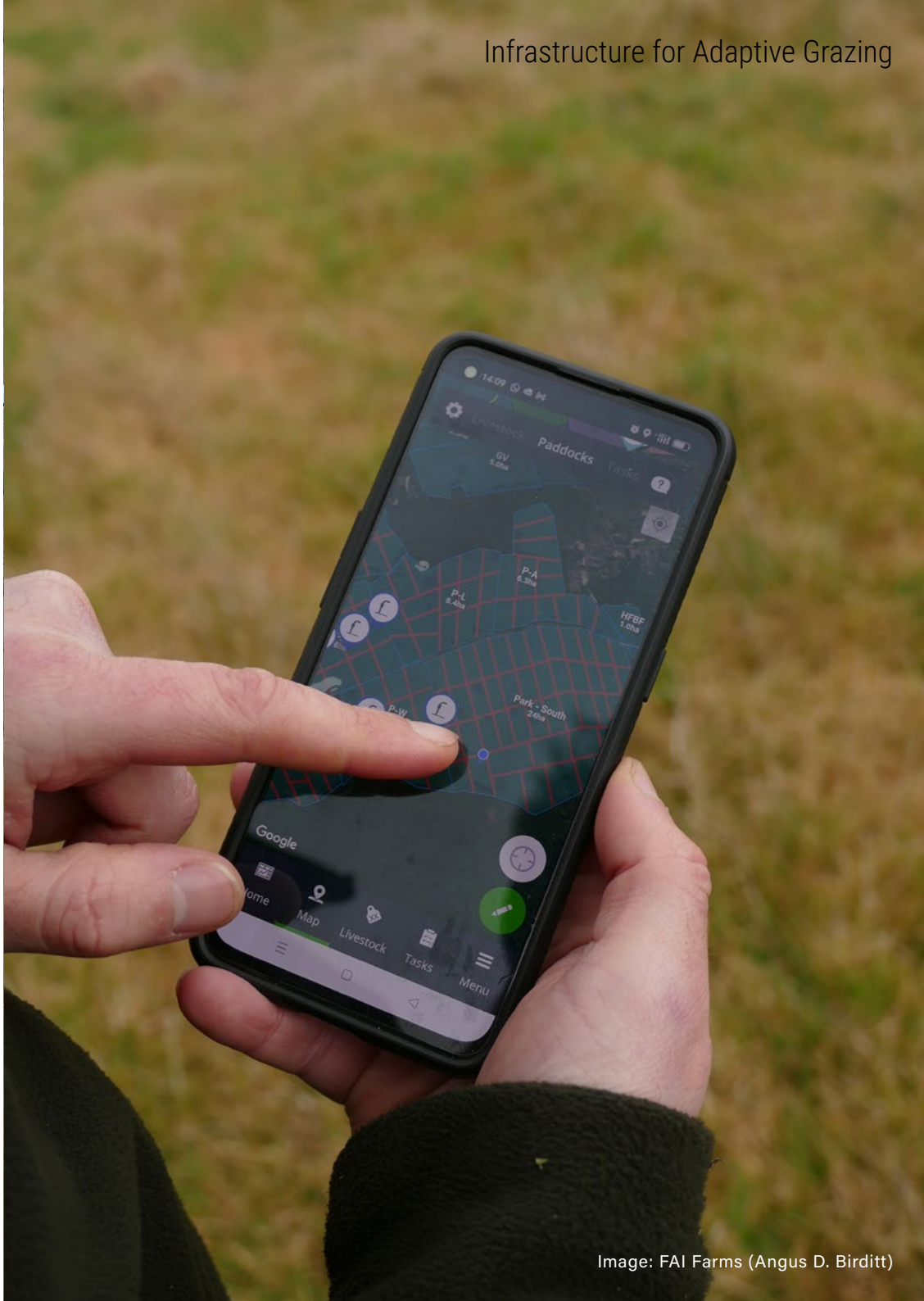


Image: FAI Farms (Angus D. Birditt)

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Social Context

Who are we working with?
Think about:

- The people / community on the farm:
  Who are they, what are their roles, what are their skills, experience & passions?
- Family & employee dynamics
- Knowledge & background
- Time commitments
- Existing future plans & succession
- Customers & supply chain
- Designing your work-life balance

Economic Context

What resources and outgoings are we currently working with?
Think about this as financial picture of the business, current and opportunities:

- Enterprises
- Current production levels
- Current revenue / margins / profit
- Capacity to take risks
- Ability to invest
- Grants & SFI
- Livestock type, class & numbers - how do they behave/function e.g. grazers, browsers
- Existing grazing or management plans
- Cash reserves
- What options do we have to generate or borrow capital?

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Image: Megs Farm [Film] (Angus D. Birditt)



What are you trying to create?

Image: Cotswold Beef (Ian Boyd)

Before setting out to make changes, it helps to set objectives: broader goals that provide direction, inspiration, and purpose behind smaller actions you implement. **Use the following pages as guide to start thinking about your objectives.**

When establishing your objectives, think about both the short and long term. The key to setting effective objectives is specific, measurable outcomes with the ability to track progress. This doesn't have to mean "data" in its most technical sense - don't forget that photos are your friend and even keeping a simple visual record of the changes in your landscape will track the impact of what you are doing. You can also run rudimentary DIY practical tests to help track progress towards your goals following investment in infrastructure and tweaks to management. For example monitoring infiltration rates in your soil can be a good indicator of changes to soil health. Have a look at the SoilMentor app for further guidance about on-farm monitoring.

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Environmental Objectives

What landscape are we trying to *create*?
Think about:

- Soil health
- Biodiversity
- Above ground nutrition quality and quantity
- Habitats & corridors
- Public access & restrictions
- Evolving Infrastructure - water, fencing, buildings, access/tracks
- SFIs you might be aiming for

To help visualise the potential of your soil - try this

If you are not sure where to start or what might be achievable for your land, look to your verges and margins. Dig a hole in the middle of one of your pastures and assess soil structure, colour, moisture content, aggregation, root depth etc (take photos too). Then, do the same in an adjacent verge or hedgerow that has had no livestock or vehicle access. You will often remark a noticeable difference between the two soil samples. This is what could be achieved with improvements to grazing management underpinned by effective infrastructure.

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Image: Gartur Farm, Stirlingshire (Soilmentor)

Social Objectives

What do we want our farming life/community to look like? Think about:

- The people / community on the farm: How can we utilise skills, knowledge, experience, and motivations within our farm business to design a system that really works for the people in it?
- What networks can you access for increased knowledge exchange, brainstorming ideas and learning from peers?
- Would it be beneficial to get planning support from a professional, and if so who?
- Family & employee dynamics
- Desired lifestyle
- Future plans & goals (both farming and non-farming)
- If not already established; succession planning - what farming system does the next generation want to work in?

Economic Objectives

What do we want our (realistic but optimistic) economic picture to look like? Think about:

- Enterprises
- Production goals & objectives
- Target revenue / margins / profit
- Possible investments and their risks
- What grants or programs are you eligible to apply for?
- Livestock objectives (e.g. diversification into other enterprises, change in stocking rates, performance and health objectives)
- Changes to grazing and management that improves the economic performance of the business

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Image: Treway Farm (Treway Farm)

2 Impact of Infrastructure

Why invest in infrastructure for grazing systems?

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Image: Balcaskie Farms (Angus D. Birditt, Our Isles)

What can infrastructure help you unlock?

Well designed infrastructure and grazing management can facilitate improving and optimising: soil health, biodiversity, livestock performance, time management, efficiency, systems and processes, health and safety, farm access, costs, revenue, margins, habitats, climate resilience, management options and flexibility.

Well planned infrastructure grants us a greater capacity to influence how our livestock interact with our environment to achieve desired outcomes. The main tools we have in a livestock enterprise to achieve these outcomes that can be enhanced by infrastructure are: Grazing, Animal Impact, and Time.

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Grazing

We can influence the quality of our pastures by using grazing as a tool to achieve certain outcomes. When an animal grazes a plant, it induces a response from the plant. That response could be chemical signals sent into the soil that stimulates biology or plant growth. Some grazing events encourage desired outcomes such as plant tillering, taller/denser plants, promote root growth, shorten recovery periods or increase plant nutrition. Other grazing events could incur undesirable outcomes such as reduced plant performance, longer plant recovery, stress responses such as early seeding or shedding roots.

We can have both overgrazing and undergrazing on a farm. Overgrazing is a factor of time, achieved by staying the same place too long, or coming back around before plants have recovered. Undergrazing is achieved through selective grazing and plants being missed by the grazer. We can influence how our livestock graze and increase the chances of desirable outcomes by using infrastructure and time as a tool to change livestock behaviours.

Grazing behaviours change when you increase or decrease competition. The higher the competition the less selectively animals will graze. We can increase competition by increasing stocking density, increasing grazing interval (time in a paddock or cell) or by setting up longer narrower cells with our mobile electric fencing. Less selective grazing reduces undergrazing and increases the grazing of less desirable species. However, the outcomes we are aiming for will likely change throughout the year - how we graze in different seasons or different pastures will vary depending on what we are trying to achieve.

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Image: Durie Farms (Angus D. Birditt, Our Isles)

Animal Impact

Animal impact is another tool we can manipulate to get desired outcomes. For example, we may want to increase the amount of trampling of more mature plants into the soil to feed soil microbes, address our C:N (carbon-to-nitrogen) ratio and build organic matter. We could do this by increasing stock density, adjusting our grazing cell shape, adjusting the grazing interval or by placing our water trough or mineral feeder in a specific location to encourage more traffic.

When placing water in an area be aware of the herd dynamics related to the distance. If the water is placed 300m or more from the herd, they will likely all go to drink together. This can put some water systems under immense pressure or result in cows fighting for the water. The shorter the maximum distance the more likely they will drink individually, putting less pressure on the system. This is particularly important if your water flow rates and water trough holding capacity cannot deal with a high demand in a short period.



Image: Animal Impact (Silas Hedley-Lawrence)

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Time

How long are livestock in an area for? And how long until they come back again? There can be a fine line between staying in a single area for the right amount of time to get the grazing and impact outcomes you would like, and staying there too long.

Overgrazing is a factor of time, staying somewhere too long so that a plant is re-grazed a second time when it is trying to recover, or coming back again in your rotation too quickly before the plants in the pasture have fully recovered. Staying somewhere too long can also result in too much animal impact and cause compaction, particularly in wet weather and under high stock densities.

You can influence time intervals by:

Changing stock density either by reducing or increasing the area per day or per move. Or, by changing the total number of livestock units in the group. This will have a knock-on effect on grazing utilisation rates and animal impact, if the time interval is kept the same.

Changing stock move frequency within the same grazing area. By increasing or reducing the time livestock spend in a set area, you can slow down or speed up a rotation. This will have a knock on effect on grazing utilisation rates and animal impact.

Changing the rotation length by reducing or increasing the total available area allocated to that livestock group. This will change the rotation length, or grazing utilisation rates.

Combinations of the above.
Getting time factors optimised will depend on growing conditions, time of the year, pasture diversity, soil health, how it was left at the previous grazing and your desired outcomes for those pastures.

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Image: Romshed Farm, The South East (Angus D. Birditt)



Water

Water infrastructure is often the key factor for success in adaptive grazing systems



Image: Sheep Drinking (Linda Dufurrena)

Be aware of Regulations.
Check with your supplier or a consultant that the system and material you buy meet regulations.
Some regulations to be aware of are using different types and colour of pipe to depending if it is being installed above (black) or below (blue) ground.
There must be an air gap when livestock troughs are connected to the mains water supply, so dirty water cannot back-flow into the mains system. There are other regulations on installing, extracting and storing water.
For more details check with your local authority.

Water Infrastructure

Create a water system that allows you to have flexibility in your management, within your context and your objectives.

Clean water is essential for animal welfare and performance. Work *with* your farm's unique context - features such as where water is located and topography are key when designing your water system. Think abut how you can use gravity to allow infrastructure to work with minimal effort and cost.

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Mains

Pros: Clean & reliable.

Cons: Can be expensive.



Image: Knepp Regen Farming (Russ Carrington)

Bore Hole

Pros: Clean (test it is safe for livestock consumption, high nitrates), a cheap source.

Cons: Source could dry up, so back up could be needed. Investment in infrastructure to extract could be expensive.



Image: Borehole (https://www.dailynationzambia.com/2024/03/china-unwep-partner-in-drilling-boreholes-in-drought-prone-areas-2/)

Pasture Pump

Pump / extraction from water course.

Pros: Flexible & cheap.

Cons: Water can become contaminated, high risk for health issues such as lepto, dirty water can impact animal health and performance. Environmental impact of water disruption.



Image: Birdby Pasture Pump (https://www.restorerivers.eu/wiki/index.php?title=File:Birdby_pasture_pump_Mar2013_4.JPG)

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Storage & Pumps

It is often useful to have a stored water capacity that will cover you if you lose water for a day or more. The need for stored water and the capacity will depend on your context, your numbers of livestock and where your water is coming from. To move that stored water around your system you will need to either use gravity, or a pump system.

Pump systems work on Flow Rate and Bar (pressure). Generally, the more topography your water system has to navigate the more bar your pump should be specced for. A general rule is 1 bar of pressure is required for every 10m of elevation. So, if the highest point you need to get your water is 100m higher in elevation than your pump, you will need a pump that rises to at least 10 bar. A higher flow rate pump would likely be better for farms with a more consistent topography. Speak to your local pump supplier to find the right pump for your system.



Image: Rainwater Harvesting (JRH Water Management)



https://static1.industrybuying.com/products/agriculture-garden-landscaping/water-pump-sets/engine/AGR.ENG.826410166_1718863009977.webp



Image: Melrose Farm (JRH Water Management)



Image: IBC (Pablo Rasero)

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Water Troughs

The larger your herd the more water you need to have available at any given moment. Water availability is determined by the flow rate and water holding capacity of the water trough. If you have a high flow rate compared to your herd requirements you are more able to use smaller more mobile troughs. If you have a poor flow rate compared to your herd requirements you will need to use large troughs with a high holding capacity. Remember, the larger the trough the slower it is to move it.

Your flow rate and trough type will affect your fencing infrastructure and grazing plan.



Image: Kiwitech Drag Trough
(Irish Farmers Journal)



Image: IBC Trough Trailer
(https://duokitchenware.com/wp-content/uploads/2022/12/Portable-Water-1.jpg)



Image: Cows drinking at Trough
(Reid K. Dalland)



Image: Choosing the Right Trough
(StowAg)

What do I do when it freezes?

If freezing temperatures are something you may deal with in winter months then consider the following:

Mole plough your water system at least 500-600mm in depth to avoid it freezing

For above ground pipe that is used with a mobile trough, keep spare lengths that are defrosted when changed. This allows you to always have an unfrozen pipe to change in the morning.

Install a high volume back up! When it is really frozen, livestock have very little impact on the pasture. So, I find it useful to install a large volume trough near a water point that is easy to defrost and allow your livestock to walk back to it from their allotted area (drop the back fences).

Tap into natural sources. On some farms you may be able to place water troughs (or even old baths) underneath a running water source such as a spring. These rarely freeze due to the continuous flow.

Set up your trough to be continuous flow. You could do this by drilling a hole in the trough, adjusting the level or opening the ballcock. Flowing water rarely freezes in the UK. If you do this, make sure the trough is set somewhere that will not pool the water where livestock are standing. The water should flow away somewhere away from livestock.



Image: Frozen Pipes (Silas Hedley-Lawrence)



Image: Natural Source Backup (Silas Hedley-Lawrence)

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Understanding Water Requirement

Calculating Flow Rate Requirement

Calculating water flow rate requirement assuming a daily demand of 100 litres per cow in hot weather, almost 50% of which is consumed in a three-hour period soon after evening milking, means that an hourly flow rate of 17 litres per cow per hour is required (i.e., 100 x 50%/ 3 = 17 litres/cow/hour). Therefore, for a herd of 100 cows the flow rate needs to be about:

100 cows x 17 litres/hour = 1700 litres/hour or 28 litres per minute

To calculate your flow rate, get a container, trough or bucket of a known quantity e.g. 50L and allow the water from your ballcock or pipe to flow into it for 60 seconds. Your flow rate could vary across your farm due to different water sources, distances from source, topography, size of pipes used etc.

General Livestock Requirement

Lactating Suckler Cow: generally allow 10-15kg of water per 100kg of bodyweight per day. Lactating cows can drink from a range of 10L per day on a cold day, up to 250L on a hot day. Make sure you have sufficient flow and storage capacity for your entire herd on hot day.
A Yearling R1: 24 to 36L per day
An R2: 36 to 50L
Ewe with Lamb: 9 to 11L per day
Dry Ewe / Ram: 4 to 7L per day

RECOMMENDED FLOW RATE TO MEET PEAK DEMAND (LITRES PER MINUTE)

	Dairy Cow (550kg)		Suckler Cow (675kg)		Yearling Cattle (400kg)	Ewe (75kg)		Weaned Lambs (35kg)
No. of Animals	Lactating	Dry	Lactating	Dry		Lactating	Dry	
10	2.0	1.6	2.4	2.4	1.1	0.3	0.2	0.1
20	3.9	3.1	4.8	4.8	2.3	0.5	0.4	0.2
30	5.9	4.7	7.2	7.2	3.4	0.8	0.6	0.3
40	7.9	6.3	9.6	9.6	4.6	1.1	0.9	0.4
50	9.8	7.9	12.1	12.1	5.7	1.3	1.1	0.5
60	11.8	9.4	14.5	14.5	6.9	1.6	1.3	0.6
70	13.8	11.0	16.9	16.9	8.0	1.9	1.5	0.7
80	15.7	12.6	19.3	19.3	9.1	2.1	1.7	0.8
90	17.7	14.1	21.7	21.7	10.3	2.4	1.9	0.9
100	19.6	15.7	24.1	24.1	11.4	2.7	2.1	1.0
150						4.0	3.2	1.5
200						5.4	4.3	2.0
250						6.7	5.4	2.5
300							6.4	3.0
350							7.5	3.5
400							8.6	4.0

Data: Reference figures from Progressive Farming Company

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Understanding Water Requirement

Materials & Fittings

Friction from the pipe onto the water will slow down your flow rate over distance. So, it is generally better to install larger pipe and fittings for longer distance infrastructure and reduce down to the required size for your trough or above ground mobile pipe that attaches to a mobile trough.

I personally like to use 32mm - 50mm pipe as the main ring main and reduce down to 25mm for overground pipe or fixed trough installations. The larger the herd and the longer the water system the bigger the spec should be. A small farm may be fine with 25mm pipe as the main ring main, but remember it is best to over spec and do it once than to find out you need to adjust it in the future!

PRESSURE LOSS PER 100 METERS AT VARIOUS FLOW RATES

	Flow Rate				
Pipe Bore	17 litres/ minute	33 litres/ minute	50 litres/ minute	67 litres/ minute	83 litres/ minute
20mm	-0.98 bar/ 100meters				
25mm	-0.23 bar/ 100meters	-0.79 bar/ 100meters			
32mm	-0.04 bar/ 100meters	-0.16 bar/ 100meters	-0.33 bar/ 100meters	-0.52 bar/ 100meters	-0.80 bar/ 100meters
38mm	-0.02 bar/ 100meters	-0.08 bar/ 100meters	-0.17 bar/ 100meters	-0.28 bar/ 100meters	-0.43 bar/ 100meters
50mm	-0.01 bar/ 100meters	-0.03 bar/ 100meters	-0.06 bar/ 100meters	-0.09 bar/ 100meters	-0.14 bar/ 100meters

Data: Reference figures from Teagasc 2009

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Image: Pipe Fittings (Silas Hedley-Lawrence)

4 Fencing

Create fencing infrastructure that works **for** your objectives and **with** your context



Fencing Infrastructure

Image: CB Farms (Angus D. Birditt)

Using topography, natural features, farm tracks, access and buildings to plan your fencing is essential. Keep your objectives in mind while planning.

Livestock favour gentle topography when navigating a field or a field move. They also prefer soft angles when entering or exiting a paddock, barn or handling system. Our design should aim to incorporate these as much as possible.

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Permanent Fencing

High Tensile Electric:

Pros: Quicker and cheaper to put up compared to barb & netting. Easy to repair. Can reduce requirement for mobile electric units. Can run off of the mains electric which is reliable and high power.
Cons: Higher regular maintenance to keep fence clear of vegetation.

Barbedwire & Netting

Pros: a physical barrier, not just psychological. More effective with sheep and calves. Vegetation does not impede its efficacy (unless a tree falls on it!)
Cons: Often more expensive per meter. Takes longer to erect and repair. Requires more fence posts over the same distance.

Types of Posts

Natural Cleft
Pros: when from sustainable source likely to be better for the environment. Cons: expensive and less durable

Treated Wood
Pros: Readily available and versatile.
Cons: Chemical treatment used could have environmental impact. Can rot quickly in wet environments.

Steel
Pros: should last longer particularly in wet environments. Smaller & quicker to install. No requirement for fence staples as wire is clipped into the post.
Cons: can bend with pressure, may eventually rust.

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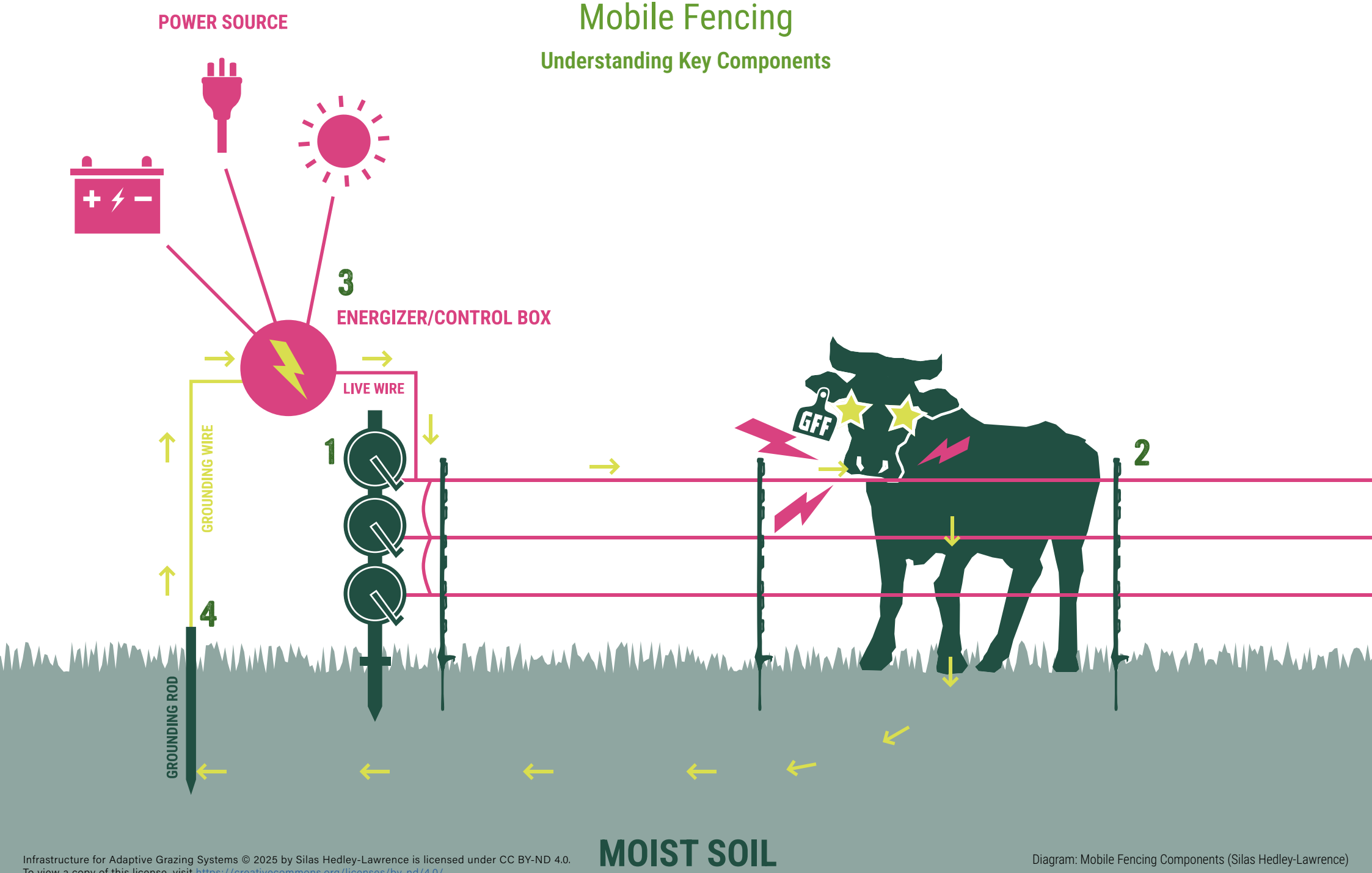

Image: High Tensile Fencing (Kencove Farm Fence Supplies)


Image: Clipex Steel Posts (tornadowire.com)


Image: Megs Farm [film] (Angus D. Birditt)

Mobile Fencing

Understanding Key Components



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Diagram: Mobile Fencing Components (Silas Hedley-Lawrence)

1. Wire & Reels

Reels

Use geared reels!

A geared reel of e.g. 3:1 rotates 3x for every 1x you turn the handle. So it saves time and effort reeling them in, look after them and they are worth the investment.

There are many brands, I have my favourite based on what I grew up with. But, generally aim for something robust and flexible. Think of the little details such as how does it lock shut or open and how does it latch onto a fence or hang off of an anchor point...securely...and if it falls off of the quad bike is it likely to break.

Polywire & Braid

This is the fence line that goes onto your reel. It is generally strands of plastic and wire interwoven so it can carry an electrical current.

Polywire is thinner, lighter, generally cheaper per meter but slightly less robust. Braid is more robust, heavier and generally more expensive per meter. So a reel with polywire on will likely have more distance and be lighter, braid will be heavier and shorter distance. The option you choose will depend on personal preference and possibly how naughty your livestock are...a better electric system should solve that one...

Bare in mind the colour of your polywire or braid. Generally polywire and braid is white in colour, but this can become hard to see for livestock when it snows. You can buy options that are orange or a mix of colours so they are more visible in variable weather conditions.

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Image: Electric Fencing Reel (vaforages.org)

2. Posts & Anchor Points

You will need light weight posts to put up your electric fence. You can buy plastic, steel or fibreglass posts. Fibreglass posts are generally more expensive but more durable and flexible. The posts you choose will likely come down to personal preference.

I like to use a mix. Plastic posts do just fine as straight line posts and fibreglass posts are often better used when there is a change of direction in your fence or when being used as an anchor point for your reel or handle.

Changes in Direction

Whenever you have a substantial change of direction in your fence I have two golden rules:

1. Increase the amount of resistance at the corner by using multiple posts.

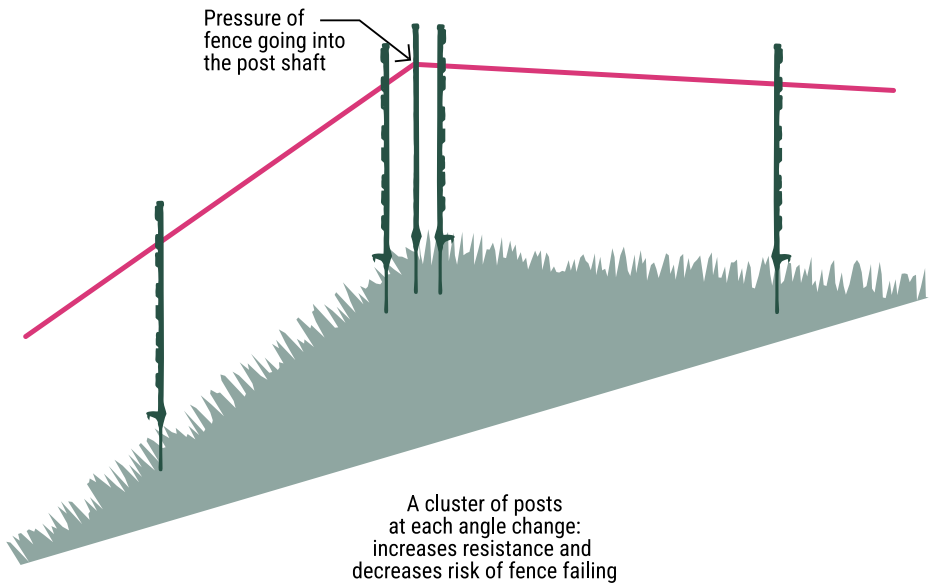
2. Whenever there is a change in angle of your fence line, put the wire on the outside of the post so all of the pressure is pushing into the vertical stem of the post and not out and away of the clip that the wire has been clipped in to.

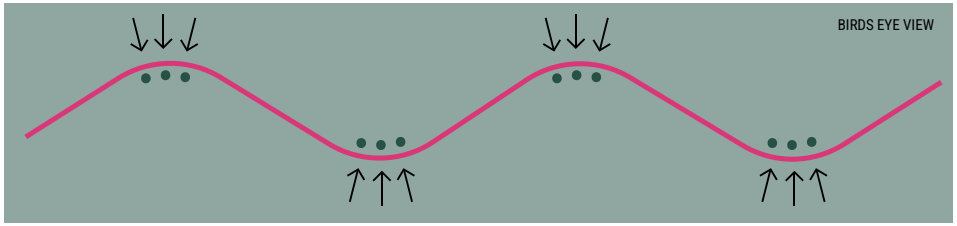
With standard posts, I would place 3x posts next to each other to increase resistance. Fibreglass posts can often be clipped onto each other to create sturdy tripod type structures (see next page - Kiwitech make these) in place of post clustering.

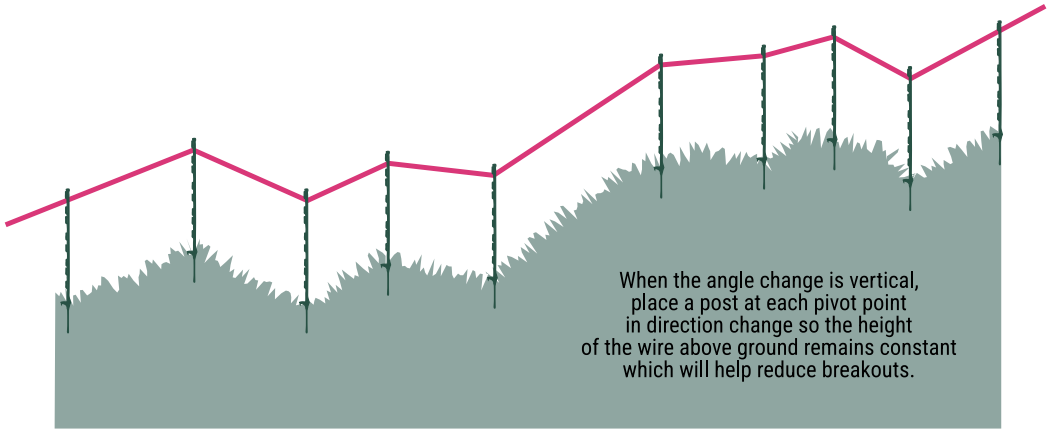
For undulating ground or sudden changes in topography I stake a post at the highest and lowest point, in a W shape.

Tip:

Always check fences on uneven ground once up. Look for the fence sitting low or high (a gap) that might tempt livestock to go over or under the wire, use fence posts to bring the fence line back to the desired height above ground.







Diagrams: Electric Fencepost Placement (Silas Hedley-Lawrence)

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2. Posts & Anchor Points

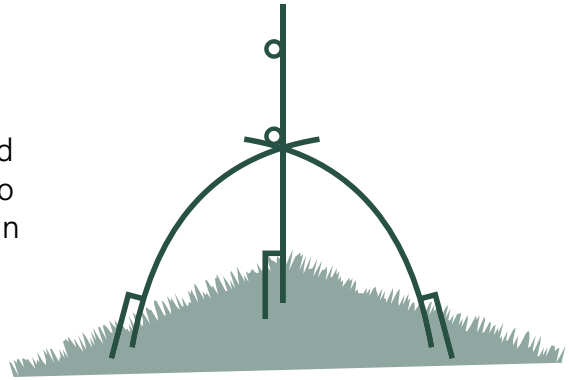
Anchor Points

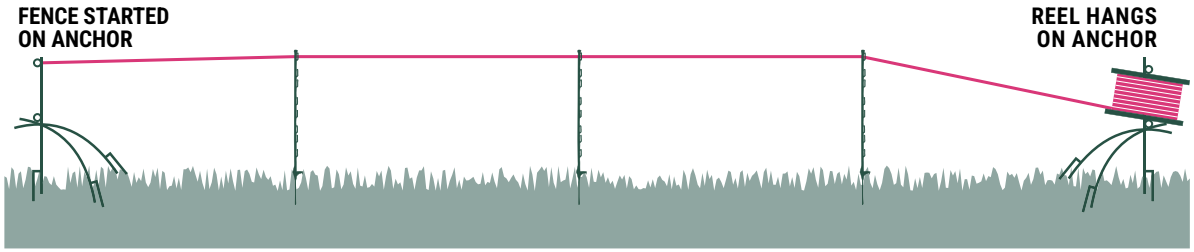
Where you start and end your reel can be the difference between an effective fence and an ineffective fence. Anchor points need to be sturdy and each end of the reel needs to be secure. If they are not secure they can be popped off the anchor by a curious cow or from pressure being exerted on the wire. Thinking about where you start and finish your fence is also important when factoring in how you plan to move livestock through the field and where they are naturally going to want to go. Generally, livestock flow goes to the place of least resistance, so soft angles and consistency are your friend.

Anchor points for the start or end of your fence can either be on something fixed, such as a permanent fence or tree, or you can make one using a cluster of multiple mobile fence posts. Make sure the anchor points are not going to short out your electrical current (i.e. polywire touching anything other than the plastic part of the reel, or a plastic / fibreglass mobile post). When anchoring to something fixed (i.e. not part of the mobile fencing system), I often use baler twine when anchoring to make sure the polywire is not touching any unwanted conductor.

Fibreglass Anchors

Create a tripod with 3x posts clipped together. Secure the two leg posts to the upright with a spare clip. Position so the legs are inside the corner, i.e. taking the strain





Diagrams: Fibreglass Post Usage (Silas Hedley-Lawrence)

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Image: Kiwitech Anchor Setup (Silas Hedley-Lawrence)

3. Fence Energizers - make it hot!

Mains

Pros: Powerful and reliable. Very little maintenance.

Cons: Only effective where there is suitable infrastructure across the farm e.g. high tensile permanent fence.
High set-up cost.



Image: High Tensile Fencing (Kencove Farm Fence Supplies)

Battery powered

Pros: Mobile, low set-up cost.

Cons: Ongoing costs of battery maintenance and replacement. Cold weather can reduce battery life quickly. Due to portability, easily steal-able!



Image: Battery Setup (Gallagher Animal Management)

Solar

Pros: Mobile, cheap green energy.

Cons: Higher cost than battery units.
Weather dependent, efficacy reduces in winter due to shorter hours and less sunshine.



Image: Solar Setup (Gallagher Animal Management)

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3. Understanding Power Requirement

1. Calculate your fence length in meters: Add up the total length of your fence. This is the ground distance covered, not the number of wires on the fence.

2. Adjust for wire type and vegetation: The type of wire and the amount of vegetation around your fence affect how much power is needed. Multiply your fence length by:
- x2 for high tensile wire with no vegetation
- x3 for high tensile wire with vegetation
- x10 for polywire, which has higher resistance.

3. Convert to kilometres: Once you've adjusted for wire type and vegetation, convert your total fence length to kilometres (1000m = 1km)

4. Calculate joules: Divide the total adjusted figure by 10. The result is the minimum number of joules your energiser needs to deliver. For example if your fence length (after adjustment for wire and vegetation) is 7km, you would need at least 0.7 output joules.

5. Consider wire resistance: The more wires on a fence, the lower the resistance, which can improve the fence's efficiency. However, additional wires often increase the chance of contact with vegetation, which can counteract the benefits of lower resistance. To make the most of multi-wire fences, join the wires at both ends for optimal conductivity. You can buy line-to-line connectors specifically designed for this, or you can just use spare wire.

It is a good idea to size up your energiser to accommodate potential future expansions or higher challenges, such as heavy vegetation or untrained livestock. Opting for a larger unit now could save you time and money in the long run.

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4. Grounding

The number of grounding rods you need for your electric fence depends on several factors, including:
Energizer strength (joules): More powerful energizers require more grounding rods.
Soil conditions: Dry, sandy, or rocky soils require more grounding rods than moist, clay-rich soils.
Fence length: Longer fences may need additional grounding rods.

Here are some general guidelines:
Energizers up to 15 joules: Minimum of 3 grounding rods.
Energizers up to 25 joules: Minimum of 5 grounding rods.
Energizers up to 35 joules: Minimum of 7 grounding rods.

For a mobile electric fence running at lower joules, still aim for at least 3 ground rods, or as a rule of thumb you can calculate the number based on the energizer's stored joules rating divided by 5 (e.g., a 5-joule energizer would require at least 5/5 = 1 ground rod, but it's better to use 3 or more).

Important considerations:

Ground rod depth: For most mobile units powering a few km of fence, in moist soil, depth of 50-100cm should be sufficient (always double check with your fencing kit supplier if you are unsure). For large-scale, fixed grounding systems, each rod should be driven at least 6 feet into the ground, and deeper if possible, to reach moist soil.

Spacing: Ground rods should be spaced at least 10 feet apart to minimize resistance and maximize effectiveness.

Connection: Connect the grounding rods to each other and to the energizer's ground terminal using a ground rod clamp and insulated wire.

Additional tips for effective grounding:

Use galvanized steel or copper ground rods. Avoid using rebar, as it rusts quickly and provides poor grounding.
Water the ground around the rods to improve conductivity, especially in dry conditions.
Consider adding more ground rods if you have long fence runs, dry soil, or a powerful energizer.
Don't connect your fence ground to any other grounding systems (e.g., house or barn grounding).
Periodically check your grounding system to ensure it's in good condition and providing adequate grounding.

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5 Mobile in Practice

How can I move mobile infrastructure around the farm and set it up effectively?

Context is key! What works for you on your scale, with your topography, with your budget, with your skillset and how you like to balance time management with observations and initial/ongoing investment.

On Foot

A chance to be more present, observe and to reduce vehicle compaction. But it could take more time and reduce capacity of carrying required kit. Think what fence system and brand would work best for you, Kiwitech and Rappa have lightweight set ups designed for being on foot.


Image: Kiwitech PAC (Progressive Farming Company)


Image: RAPPA Barrow (rappa.co.uk)

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Quad Bike

My personal favourite. A quad is versatile and can carry a lot of equipment.

I tend to build a custom rig to allow for the most efficient use of space and quick setting up of fencing and water infrastructure. Building custom boxes, reel anchor allows you to create something that really suits your preferences.

Another modification is adding a hoop to the front of the bike with pipe / rebar that guides the braid / polywire underneath the bike and out the back to its original position when you drive over a mobile fence at a right angle. This saves a lot of time navigating over mobile fences across a week, a month, a year.

You also have great visibility on a quad bike, allowing for 360 observations. Other brands also offer quad specific equipment.

Always wear a helmet...I like helmets with a retractable visor for insects and dust in the summer - it keeps your face warm in the winter too! I like the added extra of heated handlebars for the winter.



Image: RAPPA Winder (rappa.co.uk)



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UTV

Often more expensive than a quad bike, with an enclosed cab and options for luxury extras such cab heaters and radio.

Good for a high carrying capacity but less nimble and time effective than a quad bike due to being in a cab with your equipment behind you.

Perhaps this is the option for you if you score comfort and being out of the elements highly. UTV's are often suited to Rappa fencing systems that come with a rear mount.



Image: RTV Winder (rappa.co.uk)

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Tips & Tricks

Keep a waterproof tool box in your vehicle with:

Spare water fittings
Pipe cutters
Pipe C grips / Wrench
Bungee cords
First Aid Kit
Fencing pliers
A bag of fencing staples
Hammer
Knife
Fence voltmeter
Cattle awareness signs for footpaths
I like to tie 30cm lengths of baler twine to the frame of the quad bike above the front wheel arches. I use this baler twine to anchor reels at each end to a permanent fence or tree.

Moving overground pipe with your mobile water trough

Use baler twine/rope/chain to wrap around the pipe fitting and secure to the vehicle to move it.
Attach a chain to the water trough that goes over the tow bar to move the trough.
Never move pipe that is still attached to the water point.
Avoid moving overly large lengths around corners. Break it down at the fittings into short lengths of 50m or so.
Avoid sharp changes in direction when towing pipe to avoid the pipe wrapping around a wheel.

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Image: NFU Mutual Signage (Farm Safety Foundation)



Image: Electric Fence Signage (Petersham Meadow)


Image: Drag trough (Kiwitech)

What next?



Image: Wildlife and Cattle (Cotswold Beef)

There is no one size fits all, and we learn by doing - so just start!

You can lean on peers, seek support from a professional, and make use of organisations with resources designed to help you in order to build confidence in your journey - but the only way to start is to start. You will learn by doing, observing, and adapting.
If you want to boost any part of your journey with professional support, then check out grassfedfarmer.co.uk and the services and resources available through pastureforlife.org.

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