first4milk

Regenerating the earth every day

First4Milk Regenerative Farming Programme

REGENERATIVE FARMING – PROMOTING GRASS-BASED DAIRY FARMING AS A CLIMATE SOLUTION

When we launched the First4Milk pledge in 2020 we opened by saying "The world we live in is changing". Little did we know there was a pandemic on its way and climate change would be seen as requiring emergency action universally across the globe.

The response to the Pledge has been fantastic, with 93% of our members signing it and showing their commitment to sustainable dairy farming. We also have data showing First Milk members are inherently more sustainable than most other dairy farmers both in the UK and the rest of the world.

Building on this we have committed as a business to be net zero by 2040; a bold target but one which can be achieved by us working together. Given over 90% of our supply chain's CO_2e emissions are at farm level, this needs to be an area of focus if we are to achieve our goal.

Through extensive research and data analysis, we believe regenerative agriculture presents the best opportunity to meet our climate and biodiversity obligations in a way which complements how most of our members farm. So, what is regenerative agriculture?

Put simply, regenerative agriculture/farming is where food production is also improving the environment. Regenerative farmers typically disturb the soil as little as possible and do not leave it bare, encourage plant diversity, always maintain a living root and incorporate livestock.

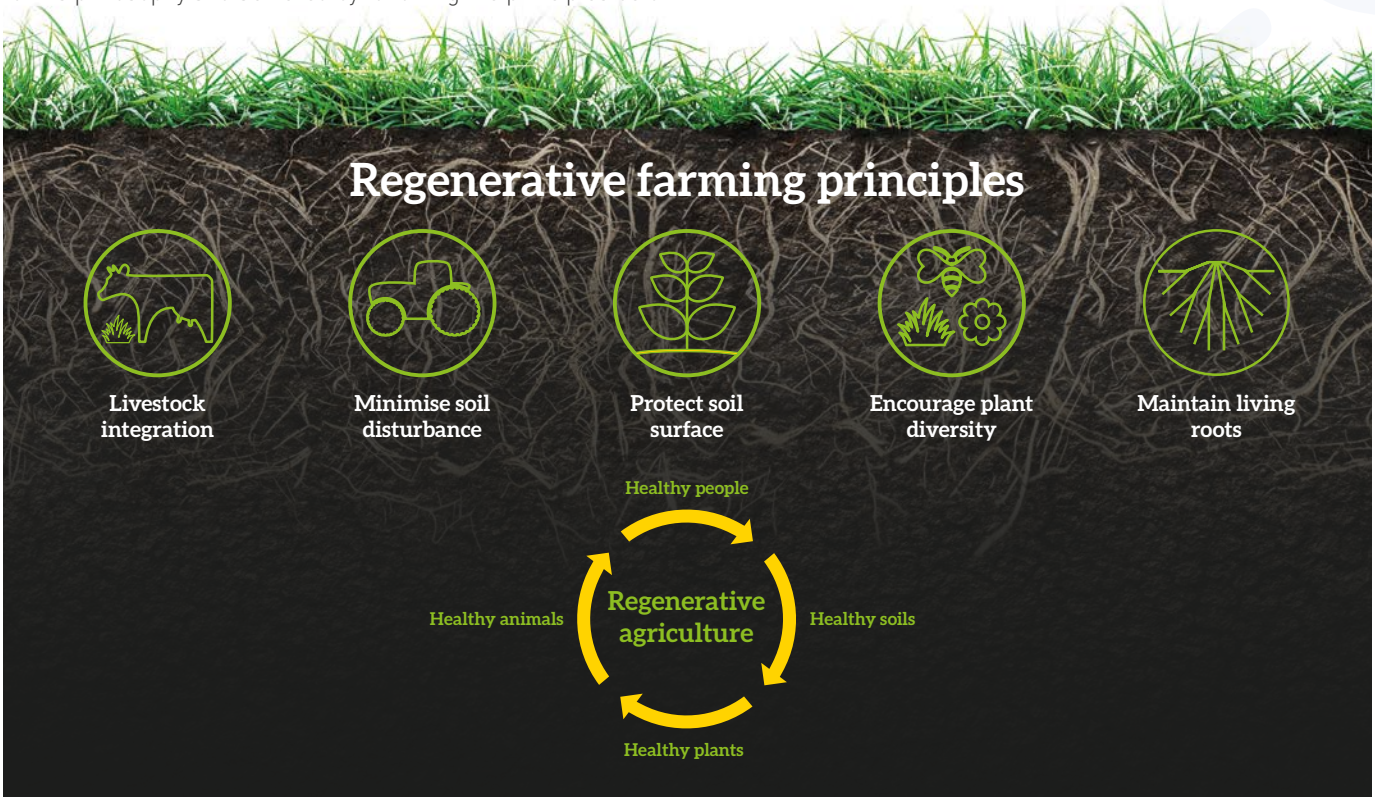
Many of you will say "we already do all of that" and we agree. Most First Milk members already farm at least some of their land in a way that could be called regenerative. What we need to do is capture the good work already being done as well as encourage the adoption of regenerative principles more widely.

We talk about principles and not rules because you will each choose how best to implement new ideas to suit your farm. This document explains the base principles of regenerative agriculture and how they can be delivered. We hope you can relate them to your own farm either to reinforce what you are already doing or provide ideas of other practices you could adopt. What is certain is by farming regeneratively you can be seen as being part of the climate change solution, while making your business more resilient for the future.

Mark Brooking
Sustainability Director

Regenerative Farming

Regenerative farming is where food production complements the local and global environment. A healthy and vibrant soil is central to this philosophy and achieved by following the principles below:



Healthy soils

Why is a healthy soil important?

Healthy soils recycle more nutrients, store more water and require fewer inputs to be productive. This in turn leads to healthier plants and healthier animals producing nutritious food.

How do I know if my soil is healthy?

Assess the health of your soil using the following checks. Dig a square of soil and examine it for the following:

- Colour: is the soil uniform in colour throughout or is there a difference between the topsoil and subsoil? Or any orange mottling to indicate waterlogging?
- Smell: does the soil smell particularly acidic or stale?
- Rooting dynamics: is compacted soil causing matting or shallow rooting of crops/grassland?
- Worm count: an average UK field is expected to contain approximately nine worms per soil pit. It is best to do worm counts in spring and autumn when conditions are conducive to worm activity. By repeating counts at the same time each year, changes in the relative worm population can be monitored.
- Soil test: if applying fertiliser or manure to land, soil must have been tested within the previous five years for pH, phosphorus, potassium and magnesium. Regular soil testing indicates if there is a particular nutrient deficiency or excess limiting the consequent yield of the crop grown.

Can soil be 'grown'?

Yes, particularly if regenerative practices are followed.

How can I improve soil health?

By adopting the regenerative farming practices detailed in this booklet.

Does improving soil health increase the amount of carbon in it?

Yes, it is one of the significant benefits. Increasing soil health typically increases its organic matter and therefore its carbon content.

Livestock Integration

Why is it important?

The benefits seen from ruminant animals grazing on pasture have developed over millennia. The bison of north America, wildebeest in Africa and caribou across Asia grazed land in massive numbers producing fertile soils. In contrast, these soils have been depleted by modern agriculture in a relatively short period of time.

Introducing livestock and grassland rotations into arable or degraded systems can improve soil fertility and function through increased nutrient cycling promoting above and below ground biology. Biomass produced above ground in grassland systems is often mirrored below ground. Grazing animals remove plant matter, then return urine and manure to feed future growth.

The 'golden hoof' impact of animals stimulates soil biology and helps break up any soil surface crust. The hooves aid water infiltration and tread in organic matter, which earthworms and other fauna pull down into the soil.

Grazing and cutting systems affect the root and soil structure differently; mismanagement of either can impact soil health.

Overgrazing or overstocking can damage a sward and kill off the most palatable species. It can also cause soil compaction. Grazing to the correct height provides a good basis for forage production. Measuring sward height helps maintain a productive ley and reduce the likelihood of overgrazing and impaired plant productivity. Rotational grazing systems are preferable as they result in greater sward height following rest periods of 20-30 days. When a sward is cut too close to the soil surface, 'scalping' can create areas of bare soil vulnerable to degradation, run-off after heavy rain and 'sun-baked' soil slowing grass recovery.

Dung beetles are particularly important in grassland as they breakdown manure to aid soil fertility. Encouraging such beneficial species reduces the reliance on chemical parasite control which may be returned to soil in manure causing unintentional consequences to soil fauna.

What can you do?

Replicate 'natural grazing' by rotationally grazing cows, aiming to graze as many fields as possible at least once a year. Leave a reasonable amount of grass and manure behind, followed by longer rest periods giving plants time to recover.

Minimise soil disturbance

Why is it important?

Soil disturbance through cultivation breaks up the network of mycorrhizal fungi attached to plant roots enabling crops to access nutrients. It also causes soil to burn up organic matter and release CO_2. Ploughing a field releases approximately three tonnes of CO_2 per hectare; more if you cultivate vigorously.

What can you do?

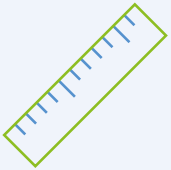
Where possible avoid ploughing and/or other cultivation and consider using methods of crop/ley establishment which disturbs the soil least. Extensive soil cultivations are usually chosen because of compaction problems and the depletion of leys. Preventing these issues and using techniques such as direct drilling (possibly preceded by sub-soiling or sward-lifting) can save time, cost and soil disturbance.

Artificial fertiliser/sprays can disrupt soil biology and make plants dependent on these chemical fixes. Healthy soils and plants communicate through a network of fungi and plant exudates, assisted by only applying what is necessary. Fertiliser applications should be tailored in both amount and type, based on regular soil tests.

Soil health facts

Soil contains 4 times more carbon than all the plants and trees in the world

A teaspoon of healthy soil contains more organisms than there are people on the planet



Increasing soil depth by 1mm is equivalent to 10 tonnes per hectare

The weight of organisms below the soil surface is equivalent to 80 cows per hectare in a permanent pasture

Protect soil surface

Why is it important?

Bare soil with no 'armour' to protect it is exposed to extremes of hot and cold. Rain washes away topsoil more easily and wind can blow baked soils into the air.

Good land management increases the structural resilience and stability of soil. Soil able to withstand more extreme weather patterns provides better yield protection for grass/crop production and more economic security for a farm business. Climate change and the altering environmental conditions require soils to adapt to longer periods of both dry and wet weather.

Deeper rooting systems can extract water from a greater depth making them more drought tolerant, and different root structures can correct other underlying concerns such as compaction or a low organic matter content.

Diversifying swards and implementing cover or companion cropping increases transfer of air and water into the soil, benefiting life above and below ground.

What can you do?

Build the organic matter content of soil to increase its water-holding capacity and reduce direct losses through erosion and run-off by, for example, undersowing arable crops or using cover crops after maize. Also allow grassland to grow taller before grazing, not being afraid to let cows trample some grass down into the soil. Resist topping pastures to make them look tidy.

Maintain soil cover to slow the impact of rainfall and provide a growing plant to mitigate degradation. Vulnerable times include post-harvest of combinable crops, over-wintered stubbles and maize land without cover crops.

Encourage plant diversity

Why is it important?

Different species have different tolerances to mixed weather conditions. A multi-species sward can extend grazing periods and be more resilient, as well as provide a more nutrient-rich diet. Mixed species also complement and benefit each other. For example, the nitrogen-fixing ability of legumes assists grasses, while deeper-rooting species help combat compaction and aid root growth of neighbouring plants. From a carbon sequestration perspective, the roots of different plants use sunlight to deposit carbon, and the broader rooting system from herbal leys increases the potential for gas and water exchange.

Sites must be assessed carefully before increasing species diversity. If, for example, the field is already within a rotation, increasing diversity is relatively simple by introducing a catch, cover or companion crop. If the field is long-term permanent pasture, or a sensitive habitat area, more sympathetic measures must be undertaken to preserve the existing ecology and benefits the land provides.

In establishing new species, oversowing into existing swards is sometimes more economic than a full reseed, and often without the requirement for extended exclusion periods. Time of year, soil condition and how the land is being used (grazed, silaged, harvested) all influence the best establishment method.

Growing cover crops is becoming a more popular way of increasing soil organic matter as well as providing a break within the rotation. This opportunity to refresh the soil and provide rooting and residue variety help stimulates the organisms below ground. Species selection is often guided by other crops in the rotation and a requirement to provide extra forage for grazing livestock.

What can you do?

When reseeding, consider using a multi-species mixture, containing different types of grass, legumes and herbs. Alternatively, oversowing into existing leys by direct drilling or using a fertiliser spinner can also increase the diversity of grass leys. Ask your agronomist/seed merchant what works well in your area and the best time to sow.

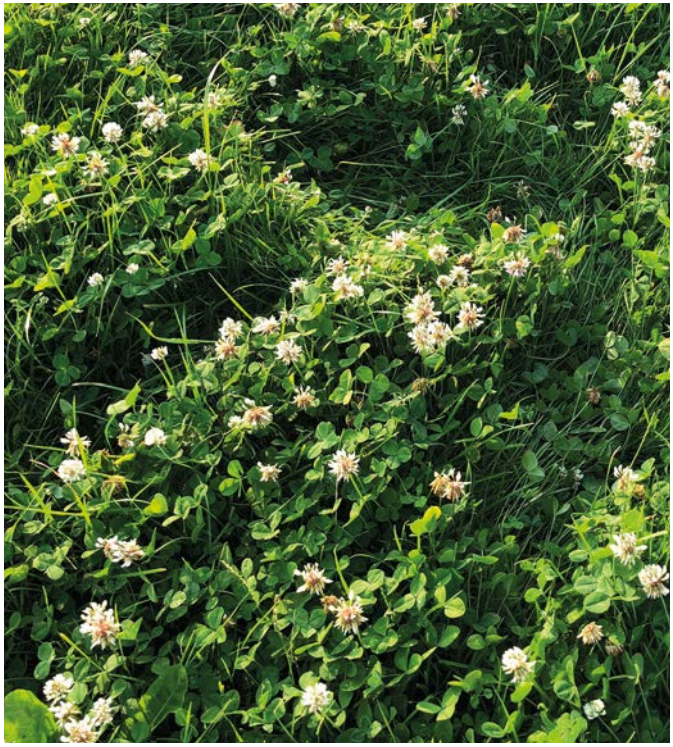
Maintain living roots

Why is it important?

Soil organisms need feeding, relying on the nutrients provided by living plants. In an absence of plants, these organisms begin to die off. By maintaining a living root, soil is continuously being built, using sunlight to drive carbon into the soil. It also helps minimise soil erosion as the plants and their roots prevent run off.

What can you do?

Make sure there is always a living crop in the ground, whether the next growing crop or a cover crop. Ask your agronomist/ seed merchant for advice on options for keeping a living root in your soil all year.



Summary

We all recognise climate change is affecting many areas of the world. We see farmers suffering serious long-term droughts and wild-fires, flash flooding and even destructive hail wiping out crops just days before harvest. Even in Scotland there have been reports of drought-stressed pasture.

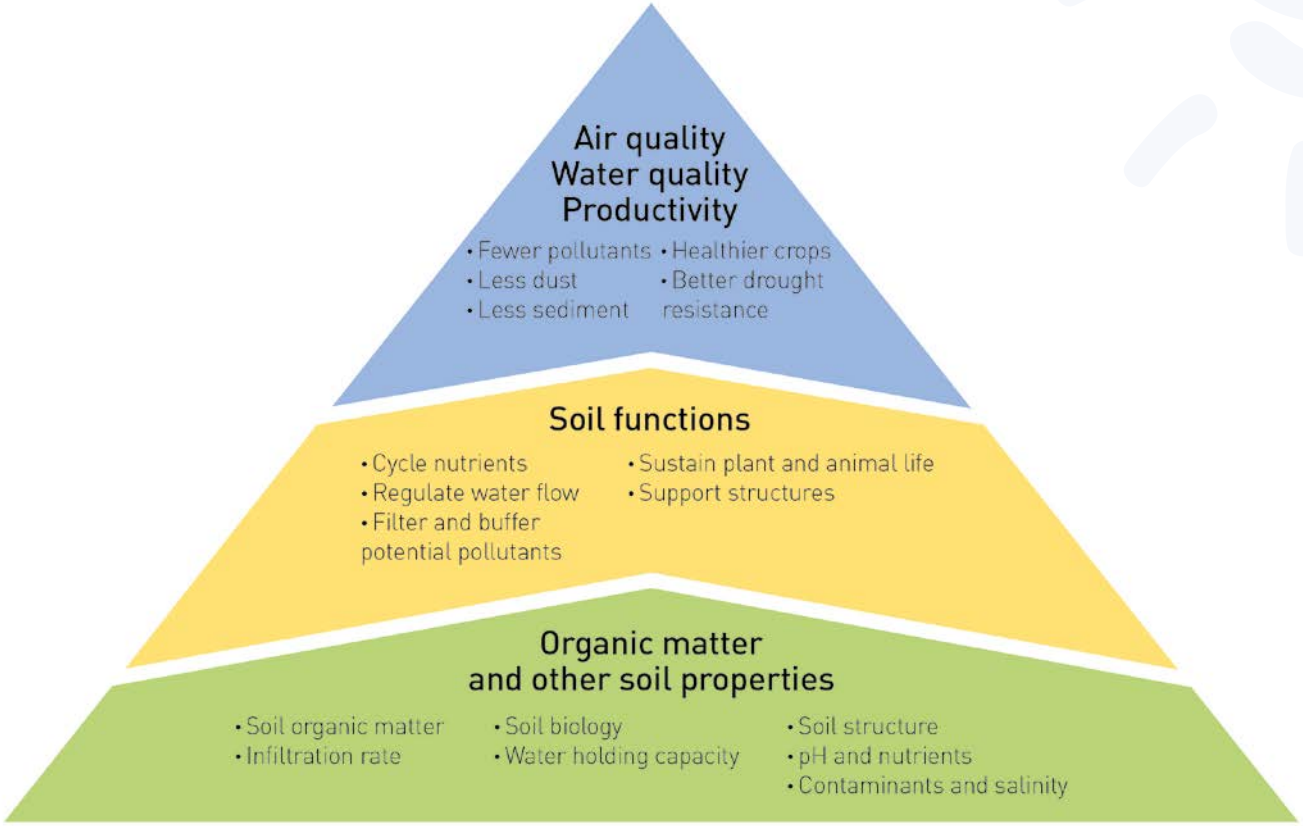
Evolution is about adaptation and those that adapt quickest become the most successful. We believe First Milk members' farms will be much more resilient if we increase soil organic matter and introduce greater ground cover, provided by longer sward residuals and multi-species, deeper-rooting leys.

Implementing one or two regenerative practices in isolation is unlikely to be effective. Introducing a herbal ley into a soil subject to intensive cultivation, fertilising and spraying for a number of years is likely to result in a poor crop. The benefit of clover/legumes is their root nodules hosting beneficial bacteria which undertake nitrogen fixation. If these bacteria are absent from the soil due to previous farming practices, the legumes will not immediately flourish – there is a transition period. Unless soil biology is allowed to re-establish, the cycle of chemical dependency continues.

Regenerative farming is about working with natural processes. There will still be a place for using fertiliser and sprays in the future, but like antibiotics, only when necessary, and with a review to assess how their use might be reduced in future.

The many benefits of following this approach include up to 50% of carbon emissions associated with milk production being stored in soils annually. In doing so, First Milk members will not be as reliant on expensive inputs and their cows more likely to have a nutrient-rich diet requiring less intervention.

Soil Quality: the foundation of regenerative farming



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