Performance plus sustainability

Germinal Grassland Guide

Sowing future seeds | germinal.com

Performance plus sustainability

Germinal Grassland Guide

Contents

Food production and farm incomes

Reducing climate risk

Agriculture is moving in a different direction, it must. Food security is one of the greatest challenges we face and as the global population continues to grow, the pressure on food production systems is immense.

Climate change is increasingly causing adverse impacts on agricultural production. The effects are evident, with increased droughts, severe rainfall, and temperature extremes becoming more common. Nature degradation also presents real challenges to farm business operations and financial returns. Soil compaction and the loss of organic carbon are serious threats to soil health affecting agricultural production and our resilience to climate change.

Sustainable food systems

To build resilient food production systems, grassland management must evolve. Farmers play a pivotal role in this transformation as stewards of our grasslands.

Germinal is helping agriculture respond to these impacts and accelerate access to practical adaptation solutions.

Climate smart grassland management is an approach that supports the shift to sustainable food production systems. Reducing emissions, protecting soil health and water quality, and improving biodiversity are all vital for future generations.

Climate smart strategies ensure that farms can remain profitable and resilient while contributing to global efforts to combat climate change.

“Agriculture - It’s the practical application of science, and it feeds people. Science is invaluable, you’ve got to be able to give farmers a product that gives them confidence. And confidence comes from having replicated research trials and information for technical people like us to go out and give good quality advice.”

Claire Bailey Archibald
Area Sales Manager,
Germinal Ireland, Northeast

“To balance productivity, profitability, and sustainability, farmers must reduce their environmental footprint.

This is not a choice but a necessity. Without adapting practices now, the long-term viability of farms will be at risk, making it harder for future generations to produce food.”

Paul Billings
Managing Director,
Germinal UK & Ireland

Science that supports agriculture

Plant breeding is fundamental because the answers are there in new traits. Enhanced varieties with pest and disease resistance, higher yields, and resilience to climate stress are key to optimising production with plant genomics paving the way to a more sustainable future.

Our investment in research continues to focus on developing new climate smart technologies. Farmers are already adopting innovative practices to grow the right crops in the right places, enhancing efficiencies on their land.

As responsible businesses within the food chain, we can all contribute and take positive steps to ensure agriculture remains a strong natural resource and legacy for the following generations.

Our focus on ruminant livestock

Our mission is to help farmers respond to the impact of climate change and build resilient food production systems in the face of a rapidly growing population.

Performance + sustainability

A climate smart strategy

This guide is built around **5 key climate change challenges** and offers practical grassland management information with links to useful online resources.

Reducing emissions
improving air quality

Soil health
protecting our soils and improving fertility

Nutrient efficiency
reducing inorganic fertiliser inputs

Plant resilience
using tolerant varieties

Biodiversity
supporting nature recovery and wildlife habitats

How Germinal is doing this:

Sustainable product solutions

Giving farmers access to new science based technologies from our R&D division Germinal Horizon.

Specialist forage knowledge

From lab to farm, Germinal is bringing science, agronomy and practical hands-on farming together to lead the way in sustainable food production.

Trusted advice

With our 200 year legacy of grass and forage seed expertise, Germinal partners with farmers sharing technical knowledge and best practice for grassland management.

We're helping farmers

Protecting resources
Best practice management

Optimising efficiency
Get more from less

Adopting technology
Innovation in plant breeding

"Agriculture has always had challenges and farmers have always had challenges; but the challenges now are different than they once were. They are more than just outside of your farm gate - the environmental sustainability of products, pressure from processors and retailers are really focusing the mind on what forage can do for a farmer."

Dr Joanna Matthews
Technical Trials Manager,
Germinal Horizon

Reducing emissions

Climate Smart CLEAN

Reducing emissions

Grasslands are a vital carbon sink, absorbing CO_2 from the atmosphere as grass grows, and sequestering it in soil as organic matter. Ruminant livestock that graze them, produce gases that contribute to climate change. There is an important need for agriculture to reduce these harmful gases from cattle and sheep production to improve both air and water quality.

Greenhouse gases (GHG) include carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O).

Grass is not just grass, get climate smart performance

Germinal's innovative Aber High Sugar Grass is scientifically proven to reduce emissions and is particularly effective at reducing ammonia and nitrous oxide. Feeding these modern high quality varieties maximises performance and also benefits the environment.

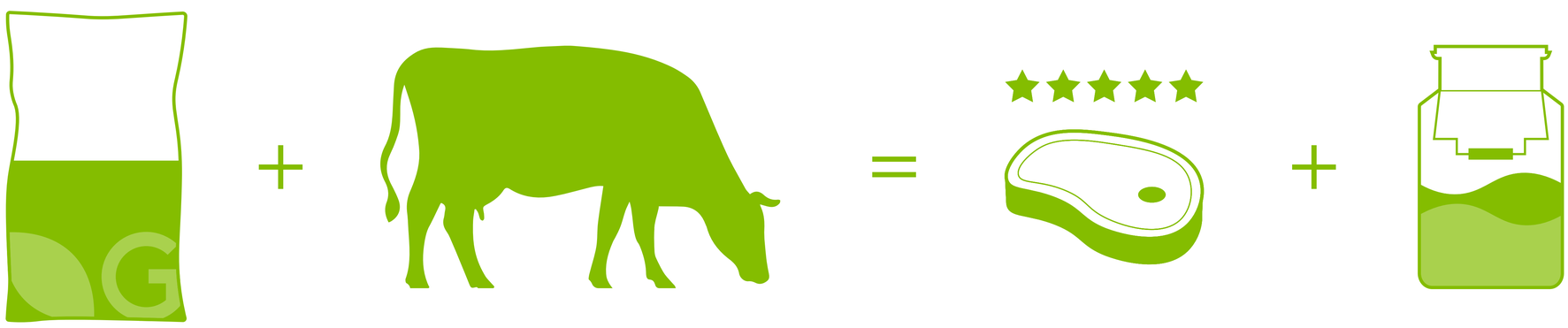
How does Aber High Sugar Grass work?

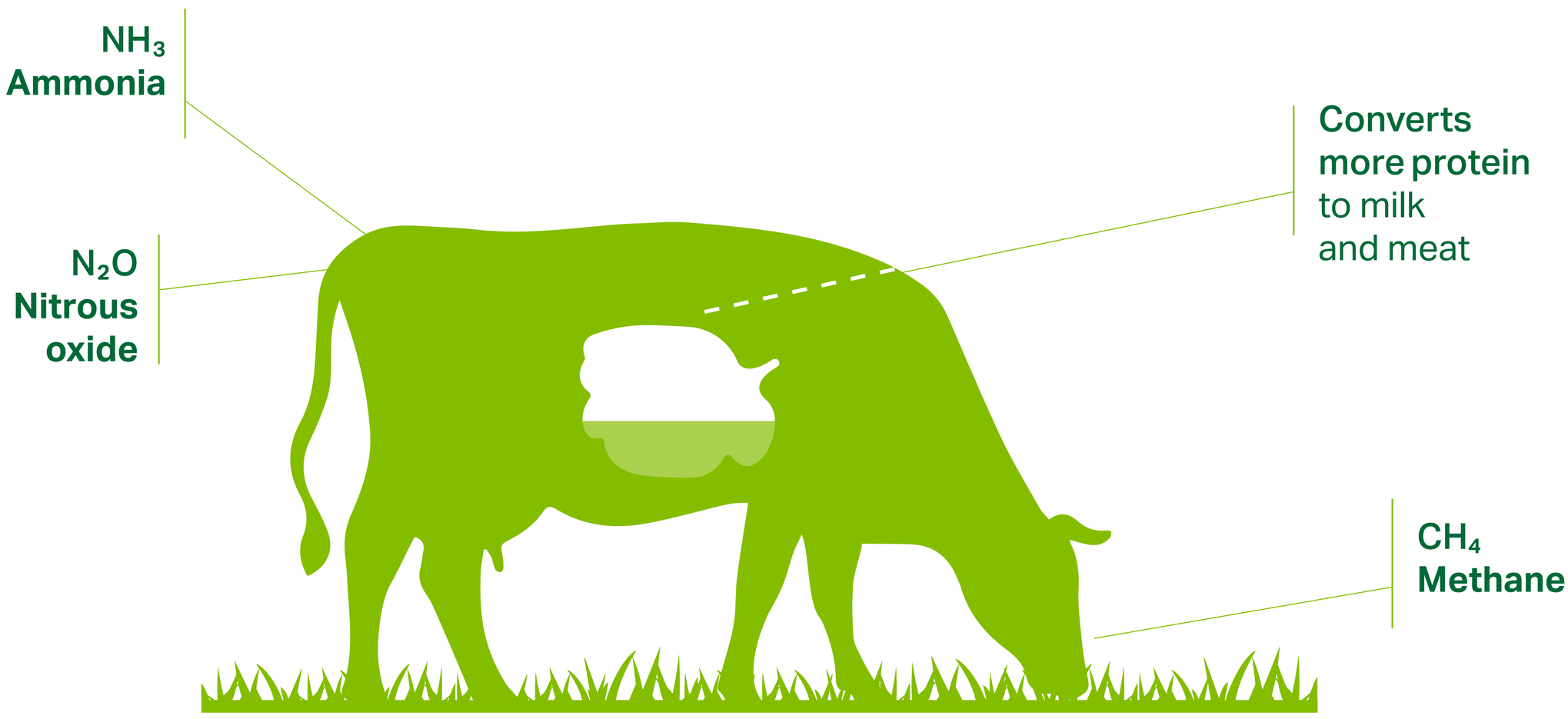
Grazing Aber HSG enables the cow to **convert more of the protein in grass to milk and mea**t, with less being emitted as pollutants.

20%
higher live weight gains

increased quality

6%
more milk per cow

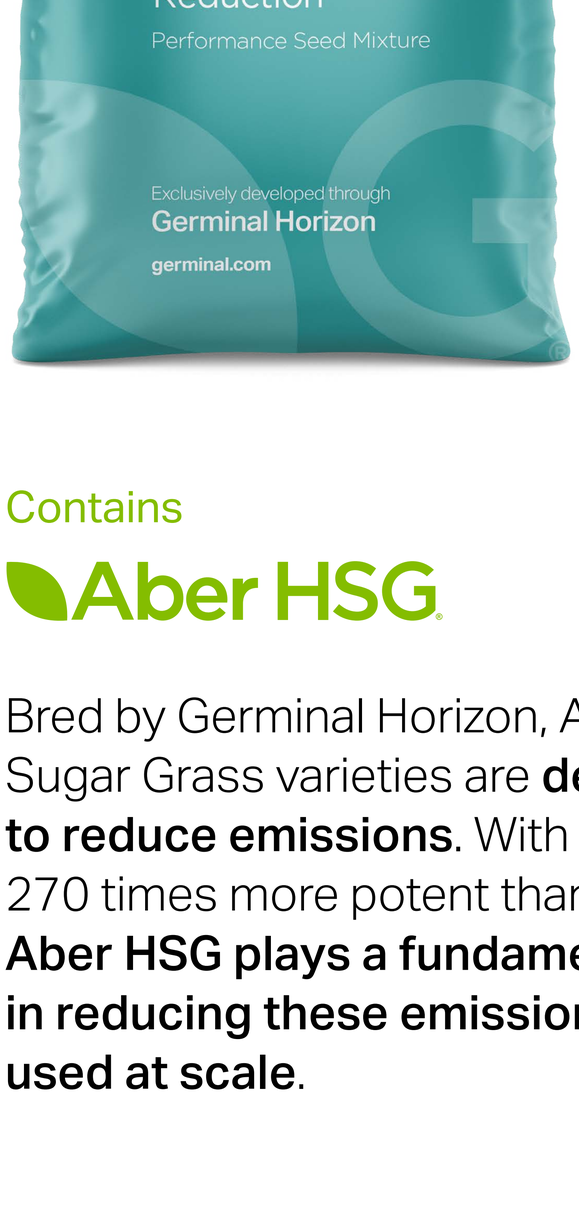




“The adoption of high sugar grasses gives benefits to the farmer in terms of livestock performance, but it also gives benefit to the environment by reducing the emissions that come from the animals.”

Dr Joanna Matthews

Technical Trials Manager,
Germinal Horizon



Contains

Aber HSG

Bred by Germinal Horizon, Aber High Sugar Grass varieties are **designed to reduce emissions**. With N_2O being 270 times more potent than CO_2, **Aber HSG plays a fundamental role in reducing these emissions when used at scale**.

If you are looking at the environmental impact of livestock emissions -

Find out more about our Climate Smart Clean range.

LEARN MORE

Soil health

Climate Smart
THRIVE

Soil health

Soil management is fundamental to all agricultural systems. We rely on soil to produce our food, it's vital for both people and planet. Degradation and declining fertility of agricultural soils through erosion, loss of organic matter, contamination and compaction have a significant impact on production and threaten the natural ecosystem through loss of biodiversity.

By focusing on soil health, farmers can reduce costs, use fewer chemicals and rebuild biological life in the soil, making it healthier, productive and more resilient to extreme weather. Healthy soil can also absorb massive amounts of greenhouse gas emissions – playing a key role in the drive to tackle climate breakdown and the soil biome biodiversity crisis.

Biodiversity in our soils

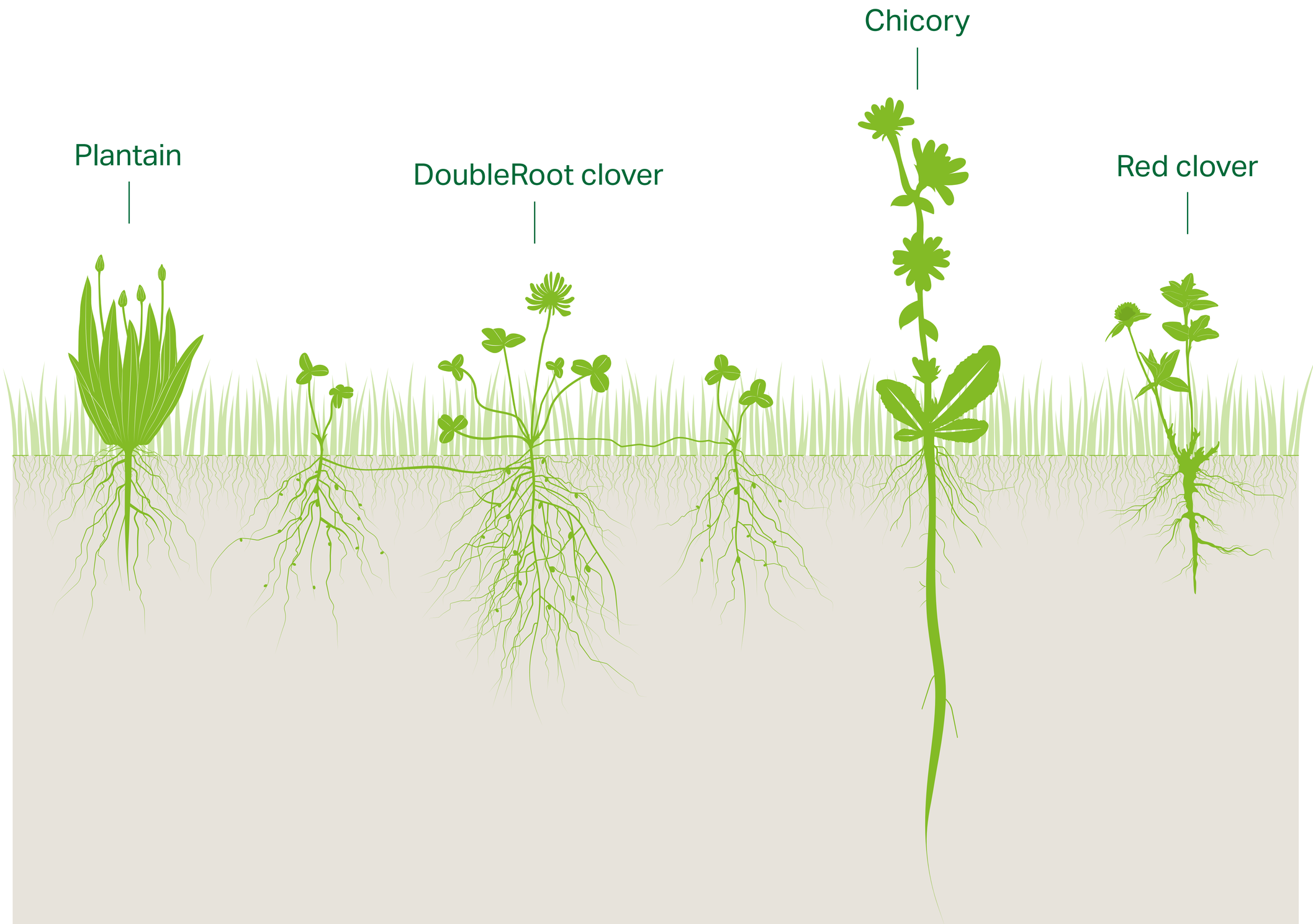
Maintaining good soil health is key to enhancing productivity and improving soil structure, organic matter, drainage and fertility. Soil is a complex biological system containing a community of bacteria and fungi. The biodiversity of these soil organisms positively impacts ecosystem functions like nutrient and water movement which are directly related to crop yield.

Using multi-species to improve soil fertility

Diverse grassland swards incorporating legumes and deep-rooting forb species like plantain and chicory can deliver many advantages including an increase in animal performance and a boost for biodiversity supporting insects, birds and wildlife.

"By focusing on soil health, farmers can reduce costs, use fewer chemicals and rebuild biological life in the soil, making it healthier, productive and more resilient to extreme weather."

Dr Mary McEvoy
Technical Director,
Germinal Ireland



Multi-species

Herbal leys are a complex mix of grasses, herbs and legumes. Having a diverse species mix makes the sward work harder overall, with different plants performing different functions.

Alongside chicory, plantain and clover, mixtures that include mineral rich species such as yarrow, sheep's parsley, and burnet support both livestock nutrition and biodiversity.

Benefits of multi-species

- Improved soil structure and soil carbon
- Greater production from livestock
- Greater rooting mass
- Improved trace element and mineral access
- Improved soil aeration
- Increased stress tolerance and resilience to drought

Germinal's Climate Smart Thrive contains exclusive varieties developed by Germinal Horizon.

germinal.com/horizon

Start with soil fertility

Find out more
about soil types, testing and pH levels.

LEARN MORE

Get serious about soil

Find out more
about our Climate Smart Thrive range.

LEARN MORE

Nutrient efficiency

Climate Smart
CAPTURE

Nutrient efficiency

Nutrient use efficiency refers to the ability of plants to use fertiliser efficiently for growth. Lack of Nitrogen (N) and Phosphorus (P) availability can limit plant growth. This is usually addressed by applying fertilisers to improve yields. However, the use of artificial fertiliser is a key source of GHG emissions and excessive N and P negatively impacts natural ecosystems through nitrogen leaching.

Using clover to optimise nitrogen efficiency

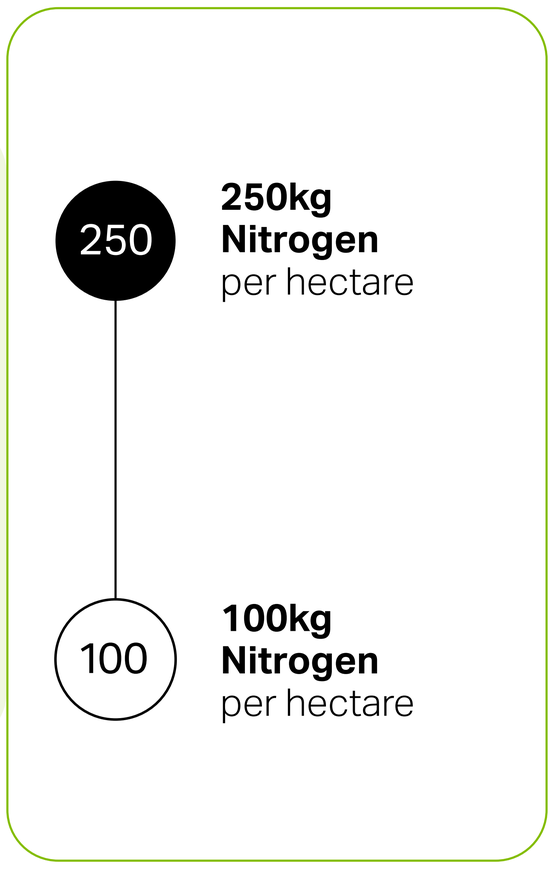
Clover is a nitrogen-fixing legume that essentially creates its own fertiliser—and feeds nearby plants, making them a sustainable way of providing nutrients naturally within the crop.
This reduces reliance on artificial nitrogen fertilisers.

Well-managed resources are at the heart of sustainable farming systems. Choosing varieties that are more self-sufficient in accessing or producing these nutrients provides positive benefits for the environment and a significant reduction in costs.

The nitrogen-fixing properties of clover and rhizobia combinations help reduce GHG emissions on farm by reducing the artificial nitrogen fertiliser requirement. Adding clover to a grass pasture provides further benefits to livestock through an increase in protein content, improved palatability, nutrition and soil quality.

Clover capability

Clover reduces both the requirement and associated cost of fertiliser applications without impacting grass yield.



With the potential to supply between 100kg and 250kg N/ha

Benefits of clover

- Homegrown protein, traceable and inexpensive
- Reduces nitrous oxide emissions from chemical N application
- High nectar and pollen to attract pollinators
- Helps improve water quality
- Improves soil fertility
- Reduces input costs
- Nutrient-rich for animal performance

“We like the clover, it produces its own nitrogen, grows itself and it’s helping the grass around it to grow as well because it’s putting nitrogen back into the soils.”

Richard McKeown

Beef and sheep farmer,
Northern Ireland

Nitrogen fixation

The clover plant works with beneficial bacteria called rhizobia to fix atmospheric nitrogen and transform it into ammonia (NH_3), a soil-bound form that plants can use. The plant cannot carry out this process itself, but it is vital for the production of the building blocks of proteins.

The bacteria live in root nodules that operate like small power factories that nourish the surrounding plants.

If you want to benefit from the power of clover

Find out more
about our Climate Smart Capture range.

LEARN MORE

Plant resilience

Climate Smart
ADAPT

Plant resilience

Increasingly frequent changing weather patterns bring into focus the need for grassland systems that are tougher in times of environmental stress. Unpredictable rain or drought due to climate change is leading to increased risk and higher rates of plant stress and disease. To help manage these risks and maintain productivity, introducing greater diversity is a sustainable management option.

Risk reduction

Multi-species swards including clover have proven their value in periods of dry weather, particularly on free-draining soils, where deep-rooting species can access moisture from deep in the soil.

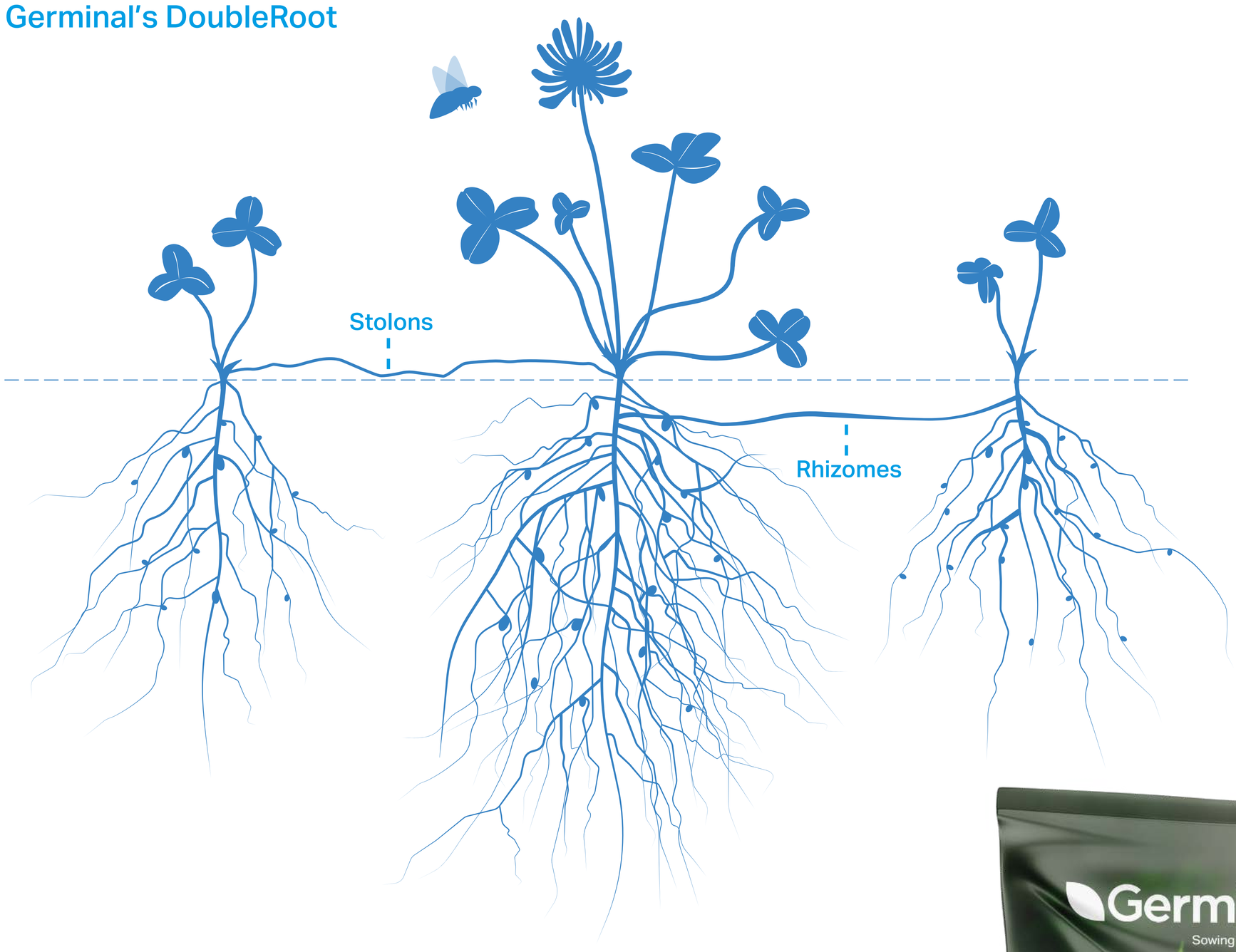
Germinal's DoubleRoot is a climate smart forage and a confident homegrown protein choice that reduces risk when cold and drought are a real possibility.

This unique clover is a hybrid of Caucasian clover and white clover that delivers the benefits of both species, to enhance farm production and bring environmental gains.

"DoubleRoot plants maintain their vigour in periods of water deficit after conventional white clover has wilted and recover quicker after extreme cold temperature events and after grazing."

Dr David Lloyd
Head of Plant Breeding,
Germinal Horizon

Germinal's DoubleRoot



Contains

DoubleRoot®
Climate Smart | Hybrid Clover

Germinal's DoubleRoot can adapt in adverse conditions and is suitable for many systems since it is drought tolerant, persistent under grazing and very palatable for livestock.

As a companion to grass, it has many advantages including soil improvement, nitrogen fixation and boosting the food supply for bees and insects. Clover's nectar-rich flowers attract many pollinators which support biodiversity.

The science of DoubleRoot

A progressive clover for climate smart farming.

LEARN MORE

Find out more

about our **Climate Smart Adapt** range.

LEARN MORE

Germinal's Climate Smart Adapt contains exclusive varieties developed by Germinal Horizon

germinal.com/horizon

Biodiversity

Climate Smart
RESTORE

Biodiversity

Food production and environmental schemes

The Climate Smart Restore range of mixtures has been formulated to meet the demands and requirements of the various environmental schemes across the UK and Ireland. The fundamental objectives of these initiatives are the same - to improve soils and biodiversity, support vital ecosystems and reduce the carbon footprint of production.

From herbal leys to legumes, overseeding to organic, our expertly formulated mixtures contain high quality multi-species varieties with Germinal Aber High Sugar Grasses (Aber HSG) for added production and environmental benefits.

“We stay connected to the changing requirements of farming needs, including government incentives that reward sustainable food production.

There are a complex set of rules governing these mixtures, but as forage experts we are a support partner for sustainable grassland management strategies.”

Harley Brown-Keech

Area Sales Manager, Germinal GB
Central England and North Wales

Designed by forage specialists

Find out more
about our Climate Smart Restore range.

LEARN MORE

Supporting Biodiversity

Livestock and nature perform well together when land is sustainably managed.

With a climate smart approach to grassland we can all benefit from improved carbon sequestration, water quality, soil fertility, biodiversity, wildlife habitats, and ecosystem resilience.

Guides -

Soil fertility
Reseeding
Silage production

Soil fertility

Central to sustainable production and resilient farming systems is the importance of agricultural soils, alongside air and water, to protect our food supply and environment.

Nutritious homegrown grass and forage depends on healthy soil. Best practice soil assessment and management supports better business decisions and improves crop yields.

What is soil fertility?

The overall health of soil is a result of an integration of chemical, biological and physical soil properties. These three components together impact the capacity of soil to supply nutrients and sustain healthy plant growth.

1. Biological

This includes essential living organisms in the soil like bacteria, fungi, nematodes, earthworms, and more.

Each organism plays a unique role helping to break down litter and cycle nutrients through the soil. Adequate biodiversity improves the adaptability of soils to varied conditions, improving plant productivity.

2. Physical

Physical structure includes soil texture, particle size, ability to store water and allow drainage. When soil is compacted, water struggles to flow, potentially leading to waterlogging.

Root growth and air movement can also be stunted by soil compaction. Good physical structure allows rain in, which reduces runoff and erosion while encouraging soil aeration.
A good structure will also benefit the root development of plants.

3. Chemical

Chemical relates to the pH and nutrients in the soil. Organic matter is a store of essential nutrients including nitrogen (N) and phosphorous (P), which are available to the soil through mineralisation.

The impact of soil pH on nutrients

Fertile soil will contain major nutrients, secondary nutrients, and trace elements to support plant nutrition. Suboptimal soil health prevents grass and forage from performing at their best.

Soil analysis should be your first step to maximising production. With clear analysis, you can efficiently and cost-effectively improve soil fertility to support forage production.

Checklist:

How to improve soil fertility

1. Do a soil test

Regular soil testing is critical to managing essential nutrient levels. Targeted fertiliser applications are used to correct nutrient levels, benefiting both soil and plant production.

2. Plan your fertiliser needs

Fertiliser is a costly input, so apply it efficiently based on field requirements – a GPS system can help. Fertiliser should only be applied in suitable weather conditions - minimising fertiliser runoff is important to protect watercourses.

3. Understand your soil type

Recognise the challenges and strengths of your soil and work to support and protect soil structure.

4. Lime

Apply if a requirement is identified in your soil test. Adjust soil pH based on what you plan to grow. The optimum is 6.2-6.5 for grass and 6.5-7.0 for grass-clover swards.

5. Maintain P and K levels using soil index

This will depend on your stocking rate and production system. Check if you have a P allowance and aim to correct deficits where possible. Slurry is an important part of maintaining P and K levels. Aim to meet your P and K requirements rather than exceed them.

6. Test slurry

Quantify the value of your slurry. Slurry analysis is the best method to ensure you are not over or under fertilising a crop.

Find out more about soil fertility.

LEARN MORE

Reseeding

Germinal grass

Reseeding with the right varieties offers the potential to grow higher-yielding, higher-quality grass that lowers bought-in feed costs and drives production.

Germinal's award-winning Aber High Sugar Grass (HSG) varieties are recognised for performance and form the foundation of Germinal's Climate Smart range of mixtures.

Delivering on meat and milk production, they can also address harmful emissions by reducing ammonia and nitrous oxide from livestock.

Reseeding to drive livestock production

The benefits of reseeding

- Increased total DM production
- Improved quality of feed and digestibility meaning increased animal performance
- Improved spring and autumn grass supply
- Access to new and improved breeding genetics
- Greater response to applied nutrients

Success factors

- Field characteristics
- Soil fertility
- Cultivation techniques
- Timing of sowing
- Mixture or seed selection
- Stocking rate
- Post sowing management

Find out how

Germinal's **Aber HSG** helps protect air quality.

LEARN MORE

Healthy pasture will produce a greater quantity of high-quality forage.

Good grassland management can be sustainable and profitable using **Aber HSG** to lower your on farm carbon footprint and maximise animal performance.

Checklist:

Reseeding

1. Identify fields for reseeding:

Sustain production by aiming to reseed 10-15% of your farm each year.

2. Soil test:

Target pH is 6.2-6.5 with optimum P and K index of 3. Winter is a good time to test, but ensure it's three months after the last nutrients have been applied.

3. Spray off the old sward:

This is to restore the soil's access to oxygen, sunlight, and water.

4. Choose the best reseeding method:

Prepare a fine, firm seedbed and select a reseeding method that makes sense for your requirements.

5. Liming fields:

Lime should be applied as per soil test results. If not ploughing, prilled lime will counteract acidity from the decaying sward.

6. Fertiliser:

Apply N, P, and K as per guidelines and soil test results.

7. Select the right grass seed:

Choose a mixture with varieties suited to the field's purpose for example, grazing or silage.

8. Sow the seed:

Sow 14 kg seed/acre in good conditions, no deeper than 10-15mm.

Continued on next page

Checklist:

Reseeding

9. Rolling:

Ensure good soil-to-seed contact to encourage germination.

10. Pest control:

Monitor your grassland reseed for pests (e.g. slugs, frit fly, leatherjackets, rabbits etc). Take immediate action where necessary.

11. Weed control:

Post-emergence weed spray is essential, apply approx. 5-6 weeks after establishment, before first grazing. Where clover seed was sown, use a clover-safe spray.

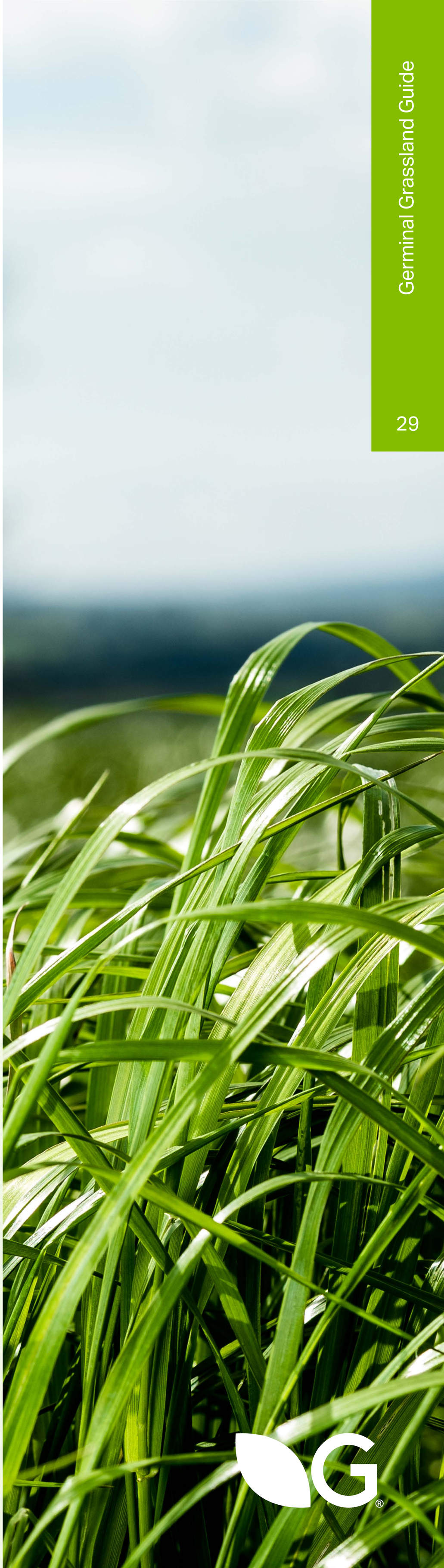
12. Grazing management:

Graze a new reseed frequently and at light covers to encourage tillering and help create a dense sward.

Discover more

in our full reseeding guide.

LEARN MORE



Silage production

Producing good quality homegrown silage gives livestock a source of nutritious and sustainable forage for winter feeding.

Choosing the right grass and clover

The best silage mixtures will contain a mixture of perennial, hybrid, or Italian ryegrass varieties. Red and white clovers can also be included to fix nitrogen.

You should also think about the proportion of diploid and tetraploid varieties. Diploids are more persistent and create a denser sward, better suited to wetter conditions. Where a dual purpose mixture is used and long term grazing needed, tetraploids have a more upright growth habit and can be faster establishing.

Ensure the heading dates within the mixture are as tight as possible (one week optimum) and coincide with target cutting dates to maximise quality.

Considerations

- Planned duration of the sward
- Number and timing of cuts in a season
- Silage only or dual-purpose
- Quantity and quality
- Is drought tolerance required?

"For quality silage production, red clover has got to be a must. It increases the protein content and will yield the same amount as a perennial ryegrass plant, but with much reduced or even no nitrogen. Red clover in a silage sward will also improve soil structure."

Ben Wixey

Agricultural Director, Germinal UK & Ireland

Balancing quantity and quality

When making silage, it is usually the case that as quantity increases, quality decreases. This is because the more mature and higher-yielding crop will have lower nutritional value.

Therefore, a compromise is needed on when to cut your silage ground. This can be determined by your livestock class and performance targets.

For maximum yield without significant compromise of quality, most crops are best cut approximately one week before heading.

Clamps and bales

High-quality silage can be made in both clamps and bales, and both systems have their place on modern livestock farms. The choice depends on individual farm circumstances and a range of variables.

Using a silage additive for clamped grass will not salvage poor-quality forage. However, when the right product is selected for the right purpose, they may help make good silage even better.

Wilting

Wilting to achieve an optimum silage dry matter of **30-35% via clamp** and **35-40% by bale** should ideally be quick and short, so a maximum of **24-36 hours.**

- Using a mower-conditioner will increase the speed of wilting and reduce losses of sugar, protein and dry matter.

- Leaf pores only remain open for two hours after cutting. The speed of moisture loss is five times greater than after pores close so spread the crop quickly after cutting.

- Spread the crop over 100% of the field area, again to increase the speed of wilting grass silage.

8 silage production tips

1. Ensure the forage harvester is blowing all chopped material into the trailer.

2. Set forage harvester chop length according to grass dry matter content.

3. Sheet the clamp sidewalls.

4. Consider using a ‘clingfilm’ as a second top sheet to reduce oxygen ingress.

5. Ensure all machinery entering the silage pit has clean wheels.

6. Fill the clamp quickly in thin layers whilst ensuring sufficient compaction.

7. Sheet down quickly after finishing.

8. Weigh down the top sheet sufficiently.

Germinal Horizon
Research and Innovation

Sustainability through science

Germinal is a forage pioneer always looking to the future with world first products.

Our investment in research through Germinal Horizon is a commitment to developing productive varieties that deliver Climate Smart performance.

Find out more
about our product development at Germinal Horizon.

LEARN MORE

Germinal Horizon
Aberystwyth – Wales

Research and innovation in plant breeding.

Germinal's plant breeding team is based at IBERS, Aberystwyth University, a specialist institute in agriculture.

This is a strategic programme of research focused on developing climate smart products and groundbreaking varieties in a world recognised grassland research environment.

Development of Aber HSG and DoubleRoot.

Germinal Horizon
Wiltshire – England

Real-world research to improve farming futures.

A dedicated trials facility situated on a working livestock farm conducts a strategic programme of activities.

Bridging the gap between lab and farm, an expert team works with growers, plant breeders, industry and farmers to help address future challenges on how to adapt farming systems, be sustainable and profitable.

Germinal Horizon
Broadfield – NZ

Rigorously testing new Germinal varieties in New Zealand, where drought and cold weather can be even more extreme.

Broadfield facilitates niche breeding for the New Zealand climate and extension work from Germinal Horizon Aberystwyth.

Aber HSG

DoubleRoot®
Climate Smart | Hybrid Clover

"Forage research has the ability on many levels to improve the sustainability of your farm economically, environmentally and fundamentally."

Dr Joanna Matthews

Technical Trials Manager,
Germinal Horizon

Germinal Climate Smart solutions can be used as part of an approach to sustainable food production. Developed to support ruminant livestock systems, they include world-leading hybrid clovers, multi-species ecosystem heroes, biodiversity boosters and soil improvers.

All mixtures are available with our award-winning net zero hero, Aber High Sugar Grass, the ultimate forage powerhouse scientifically proven to reduce emissions.

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