A year in the life of a regenerative agriculture transformation.

The agriculture sector and those of us that work in it – from farmers to food producers to consumer brands – have a huge role to play in tackling two of the biggest challenges facing our world.

The first challenge is ensuring we can feed a growing global population, the other is doing so while adapting to a changing climate that is making food production more difficult and less reliable. At the same time, the agri-food sector is projected to generate 196 million tonnes of greenhouse gas emissions by 2050, which plays a significant role in accelerating this negative cycle.[1] We need large-scale and high-impact interventions to address these interlinking challenges, and the agriculture sector has the power and responsibility to play a major role in the solution.

Transforming the way we produce food will mean significant but achievable adjustments to how we farm. This new approach can broadly be called regenerative agriculture, a term that we at McCain define as an ecosystem-based approach to farming that aims to improve farmer resilience, yield, and quality by improving and restoring soil health, water-use and quality, enhancing biodiversity, and reducing the impact of agro-chemical products on the environment. At the same time, regenerative practices can help reduce the carbon impact of farming through reduced on-farm emissions and the potential for locking or sequestering carbon in the soil. Regenerative practices combine traditional farming methods that are aligned with natural processes, with new innovation, technology and management practices. The aim is to produce high-quality and reliable yields while tackling the food system and climate challenges we face.

Adopting regenerative practices comes with challenges and opportunities. Identifying best practices that are scalable and easily adoptable by farmers across the world is vital. However, this can only be achieved through collaboration – full system change involving farmers, scientists, agronomists, educators, food producers, financers and consumer brands all working together.

McCain's approach to regenerative agriculture

At McCain, we rely on a dependable and high-quality potato harvest every year.

To support this critical business need, we are among the leading global food producers embracing regenerative agriculture. Our potato farmers – a network made up of more than 3,500 direct relationships across the world – are vital to this transformation. By 2030, we aim to have 100% of McCain potato acres implement our 'Onboarding' level of regenerative agriculture practices, and 50% reaching the 'Engaged' level.[2]

A key tool in this ambition is our Regenerative Agriculture Framework that outlines core regenerative principles and outcomes for farmers and the food system. The Framework contains high-level pathways for farmers to make incremental progress towards farming regeneratively in their own specific circumstances. Throughout this transition period, we at McCain, including our field representatives and agronomists who are all trained in regenerative practices, support our farmers through a combination of technical, financial and educational resources. The goal is to help farmers become more resilient and competitive for the long term.

Our Farms of the Future program is another way we are supporting the transition to regenerative agriculture. This comprises two (soon to be three) innovative farms that are helping determine, scale and showcase best practice in regenerative farming. These farms undertake new research and trial technologies, working with partners to take risks, make mistakes and eventually overcome any challenges so our farmers don't have to. We pass on all our knowledge and outcomes to our partners, but also more widely to the industry.

Our 500-acre Farm of the Future at McCain's home in New Brunswick, Canada, focuses on Northern hemisphere practices, while our Farm of the Future Africa, located in Lichtenburg, South Africa, explores Southern hemisphere approaches. As well as creating a better understanding of regenerative agriculture practices and their impact, both farms seek to reimagine the way we grow a potato that is better for both farmers and the planet.

This Deep Dive highlights a year on a regenerative farm, based on our work at our Farm of the Future Canada but also reflecting the wider experience of an annual regenerative farming cycle. Alongside, we have picked out specific experiences in the southern hemisphere at Farm of the Future Africa, as well as highlighting the perspectives and insights from some of our research, finance, commercial and farmer partners. With this exploration we aim to bring the regenerative transition to life, building understanding and uptake and we invite others to join with us in helping create the future of our food system.

Philippe Thery
Chief Agriculture Officer

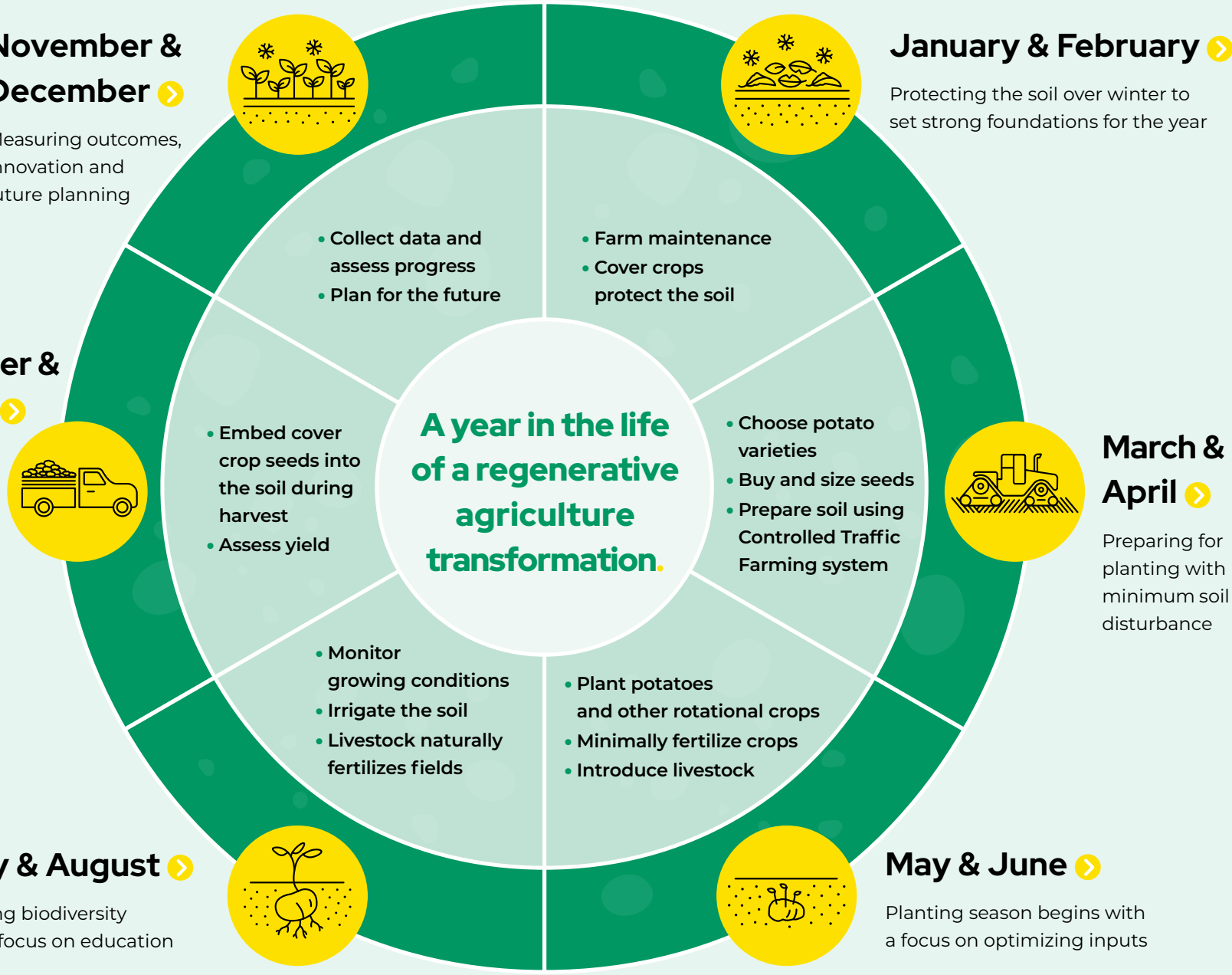
Key Regenerative Agriculture Principles

- Ensure farm resilience
- Armour soils, preferably with living plants
- Enhance crop and ecosystem diversity
- Minimize soil disturbance
- Reduce agro-chemical impact & optimize water use
- Integrate organic and livestock elements

This Deep Dive explores an annual regenerative agriculture cycle based on our work at McCain's Farm of the Future Canada, but also features insights from McCain's Farm of the Future Africa and the experiences of some of our key partners.

Each of the six sections of the Deep Dive, shown in the outer circle on this page, explores a two-month period throughout the year. The inner circle of the diagram describes some of the key activities on the farm in each month, which are explored in more detail in the pages ahead.

Click button to go to specific section



January & February

Protecting the soil over winter to set strong foundations for the year

Key Regenerative Agriculture Principles

At the start of the year, harsh conditions are the daily reality at our Farm of the Future in New Brunswick, Canada. Extreme weather can cause problems, and vital nutrients and organisms in the soil can be lost if the soil is left too exposed or allowed to erode, which can harm the potato crop. This means we need to focus on protecting – or armouring – the soil so that our fields are ready for the beginning of the farming year in spring. Our winter preparation and planning helps ensure that when the snow melts and the soil thaws, it is nutrient-rich, aerated and full of life, ready for crops to be planted.

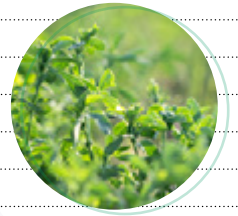
Armouring the soil with diverse cover crops is our top priority

The most effective way to armour the soil is to cover it with living plants called cover crops. These are planted in fall during the potato harvest and help the soil stay healthy over the colder months. Plants growing and spreading their roots into the earth helps aerate the soil, reducing compaction and improving water filtration. More moisture in the soil means plants absorb more water and nutrients, resulting in higher quality crops. Less compacted soil also reduces the need for tilling later in the year – a process that can disturb valuable microorganisms like fungi and release sequestered carbon into the atmosphere, with negative impacts for the climate. Cover crop planting also creates a physical barrier from wind and rain, which can otherwise cause erosion and drain valuable nutrients, such as nitrogen, from the soil. Even after the cover crops die, they turn into mulch on the surface of the soil, offering a protective barrier right through to spring.

Our cover crops also help support and stimulate a rich and diverse ecosystem across the farm. Having a variety of plants in the soil encourages a mix of nutrients that create the perfect conditions for microorganisms and other organic life to thrive underground. At the same time, a wide variety of plants and flowers attract pollinators, insects and animals that further build the ecosystem. This all supports the growth of our crops and makes them more resilient to pests, disease and the impacts of extreme weather. So, when we plant cover crops we plant a wide variety: 28 varieties to be precise.

Cover crops used at Farm of the Future Canada

Category of cover crop and its benefit	Species
Legumes: Legumes are highly effective at pulling nitrogen into the soil from the air while controlling for erosion and increasing soil organic matter, which acts as a reservoir for water and nutrients.	Alfalfa Frosted berseem clover Red clover Faba beans Birdsfoot trefoil Black forage peas Chickling vetch
Grasses and Cereals: Grasses and cereals have extensive root systems that effectively retain nitrogen. They also create large amounts of biomass, suppressing weeds and increasing soil organic matter.	Pearl millet Sorghum sudan grass Japanese millet Corn Timothy Arsenal meadow grass Brome grass Meadow fescue Perennial ryegrass Orchard grass Oats
Brassica: Brassicas are very good at preventing soil borne pests and diseases.	Brown mustard Fodder rape Groundbreaker radish Daikon radishes Kale Oilseed radish Purple top turnip
Other Species:	Phacelia (Borage family) Buckwheat (Knotweed family) Sunflowers (Sunflower family)



Farm of the Future Africa: Cover crops

Regenerative farming principles must be adapted to the local context. The work underway at our Farm of the Future Africa is crucial for generating knowledge around how these principles come to life in the Southern hemisphere.

In South Africa, cover crops play a vital role in armouring the soil to protect against extreme heat and drought. The cover crops we select at Farm of the Future Africa help limit erosion, increase water infiltration and retention and provide natural fumigation of soil-borne pests. We also pick species that provide good manure, with the mulch they produce being used to improve our irrigation systems, minimizing evaporation and conserving moisture. Current cover crops include cereals, legumes, brassicas and borage, all of which help the soil to retain vital nutrients, increase organic matter and promote biodiversity. We have also been experimenting with crops which have specific functions. For example fodder radish can help to hold nutrients like nitrogen and phosphorous in the soil while also reducing root knot nematodes, a common soil-borne pest.

March & April

Preparing for planting with minimum soil disturbance

Key Regenerative Agriculture Principles

Buying seeds and preparing the farm for growing season

As spring arrives on the farm, our preparations for planting pick up speed. One important task is to select and buy potato seeds. Potatoes are highly susceptible to drought and water-stress as their shallow roots have a limited capacity to store water. That's why choosing the right varieties is vital. On our Farm of the Future Canada we plant three varieties of potatoes: King Russet, Caribou Russet and Russet Burbank (see our spotlight on water-stress tolerant potato varieties). The first two are particularly tolerant to water-stress, allowing us to maximize our water efficiency without risking the yield. Once our varieties are selected and the seeds are purchased, we use a machine to separate them into different sizes. This helps optimize our precision sowing processes for similarly-sized seeds and ensures that plants will eventually grow in a relatively uniform way.

Locking carbon into the soil

The preparation we have done over fall and winter by armouring the soil with cover crops helps minimize the extent to which we need to disturb the ground in spring – the time when most conventional farms would need to undertake significant tilling to prepare for planting. One of the main benefits to minimizing soil disturbance is that it helps to lock carbon into the soil and prevents it from being released into the atmosphere. It also helps with nutrient retention, water infiltration and increases soil organic matter. To further enhance our ability to sequester carbon into the soil, we are partnering with Cornell University to pioneer a piece of research focusing on non-organic carbon sequestration.

Using Controlled Traffic Farming and specialized machinery to avoid soil compaction

To ensure our soil remains well-aerated throughout the season with minimal tilling, we use technologies that prevent farm traffic from compacting and damaging the soil. Controlled Traffic Farming ("CTF") uses a system of permanent, but limited, wheel tracks across fields where machines like tractors travel, reducing how much of our soil is compacted.

To achieve this, all our machinery is guided by a specialized Raven GPS steering system with sub-inch accuracy, which keeps it on its tracks. The tracks are spaced 3.4 metres apart with four row beds set in between – wider than usual to reduce the number of tracks overall. This unique spacing means our machinery wheels are retrofitted to sit at 3.4 metres apart. Two pieces of equipment that help reduce soil compaction are the basket hiller and the dammer-diker. Both of these attach to the tractor and work to aerate the soil and increase water retention, particularly by creating pockets which hold water in place underground.

We are measuring the effectiveness of our CTF system through our partnership with the Government of Canada Agriculture and Agri-Food Canada department. So far, our findings suggest that our CTF system reduces soil erosion, nutrient loss and soil bulk density, while improving water infiltration.

Partner Spotlight

Wayne Honeycutt, President and CEO, Soil Health Institute: “Farmers are already experts in their field, they just need support in the journey to regenerative agriculture”

Insight from our expert partners

We’re delighted to see that interest in regenerative agriculture has really taken off in the last few years. While the term covers a lot of different approaches and philosophies, one value held in common is the idea of improving soil health. Healthy soil can help build resilience to increasingly frequent extreme weather events, reduce reliance on expensive fertilizers, and build what we soil scientists call “Available Water Holding Capacity” which helps farmers to improve crop quality and achieve more stable yields year on year. Regenerative agriculture is therefore one of those rare win-win situations for farmers, agricultural industries, the environment, and ultimately for society.

There are several ways that industry can support the transition to regenerative agriculture. A critical area of support is to provide practical, location-based education programs. Farmers are already experts at what they do, but education programs can be very useful in showcasing new practices and helping to make well-informed decisions for their specific farm, production system, climate, soils, and personal goals.

My experience is that farmers learn best from other farmers. That is why at the Soil Health Institute we are working with McCain to set up peer networks or “cohorts” of farmers and technical specialists so they can hear from each other how they successfully adopted regenerative practices and how they’ve benefited. McCain has developed a very thoughtful framework that allows farmers to see where they currently are on their regenerative journey and what steps can be taken to progress to the next level. We can help farmers along this journey by focusing on what is important to them: building drought resilience, reducing input costs, reducing erosion, and of course increasing profits. All of these areas can be addressed by focusing on soil health.

Ensuring that businesses let farmers know that adopting regenerative soil health practices is important to them is also key. That sends a clear signal about industry priorities and what the future holds for farmers wanting to partner with key brands. Similarly, educating other groups that influence the uptake of regenerative agriculture, particularly landowners and land managers is equally important. “Full system” perspectives can be challenging to manage in situations where a farmer is leasing land, so wider adjustments to the business model are needed.

The future success of regenerative agriculture at scale boils down to one key ingredient: giving farmers the information they need to make it a success. In some cases that may mean providing information on the business case for a regenerative agriculture practice, or it may mean demonstrating how healthy their soils can become using robust data. The good news is that we have a good idea of what is needed, and many farmers are recognizing how improving soil health through regenerative practices can help them build resilience and improve their bottom line. I’ve never met a farmer who, after transitioning to regenerative soil health systems, ever went back!

May & June

Planting season begins with a focus on optimizing inputs

Key Regenerative Agriculture Principles

Planting the potatoes and other crops

In mid-May we plant the seeds for our crops, marking the beginning of the growing season. By early June, the first plants begin to emerge. This last season we were able to plant the seeds without tilling the fields first, which is a testament to the work done in fall and winter to armour and prepare the soil.

Potatoes are not the only crops we plant. Our Farm of the Future Canada works on a four-year crop rotation schedule, which means a proportion of our fields are always planted with non-potato cash crops. In 2023 we focused on oats, which were planted at the beginning of June and harvested in late September. In previous years we have also planted barley and wheat. Diverse crop rotations help prevent pests and disease and provides opportunity for nutrients in the soil to replenish. Crop rotation also increases biodiversity, which thrives on variety. In addition, our choice of non-potato cash crops are all no-till varieties, so both the soil and climate benefit from lack of disturbance.

Optimizing our use of inputs

Reducing agro-chemical impact is one of our key Regenerative Agriculture Principles. The production and application of synthetic fertilizers make up a significant proportion of our carbon footprint on the farm, and overuse can also have an unwelcome impact on soil and groundwater. If we can create rich and healthy soil naturally, it can reduce the quantity of inputs needed, and therefore the cost for farmers. Reducing the use of agro-chemical products doesn't happen overnight and can only be changed once the soil is thriving. One way of looking at it is that we have to earn the right to reduce our reliance on inputs through our good work focusing on soil health.

At Farm of the Future Canada, we have been able to reduce our use of synthetic fertilizers while maintaining crop quality and yield. In 2022, we were able to reduce our nitrogen fertilizer application by 13% compared to a typical farmer in the area. This is a testament to the great work the Farm of the Future team has been doing with cover crops, low-till interventions and increased water retention. When we do use synthetic fertilizers, we're able to use them as required, with precision application delivering smaller volumes of synthetic fertilizer for maximum impact and value. We also think carefully about the environmental conditions before spraying. For example, considering the weather, visibility of spores in the air, and historical data allows us to make targeted decisions about how we use inputs.

Livestock arrives at the farm to help naturally fertilize our fields

Introducing livestock is another powerful tool for increasing nutrients in the soil without using synthetic fertilizers. At the end of May, local cattle arrive on the farm and spend the summer grazing on our cover crops. As a key part of the food system, cattle produce and spread natural fertilizer, recycling nutrients such as nitrogen and carbon back into the food chain and encouraging organic growth without disturbing the soil. We use a process called strip grazing to ensure an even application of manure: livestock are confined to a strip of fresh pasture for a few days at a time, then moved to a new strip to fertilize and allow regrowth where they have grazed.

Our livestock integration model sees cattle borrowed from neighboring farmers, rather than farmers having to keep their own livestock year-round. We initially had a tough time convincing local cattle producers to partner with us – the arrangement was new and unusual, and it was difficult to communicate the benefits. However, after one rancher took a chance on us and was impressed to find their cattle returned healthier and better fed than ever, word spread quickly and cattle producers are now keen to join forces.

Partner Spotlight

Jack Smith, Farms Director at AG Wright & Son (Farms) Ltd, South Cambridgeshire, UK: “Our biggest goal is to make sure that the next generation keeps on farming”

Insight from our expert partners

Regenerative agriculture is a hot topic among farmers. But whether you agree with it or not, it’s hard to argue with the underlying principles: looking after the soil, reducing chemicals, being as unintrusive as possible. Really, these ideas are just good farming practices that have been used for generations.

The concept of regenerative agriculture is hard to define so it’s helpful that McCain have put their own definition and framework against it. On our farm, we use a range of practices from the McCain Regenerative Agriculture Framework, adapted to our specific needs – we primarily grow in soil with high organic matter. For us, these regenerative practices are doubly important as we try to preserve and improve the lowland peat soils of the United Kingdom.

We’re planting cover crops early to armour the soil, reducing agro-chemical inputs where appropriate, introducing livestock, and trying to improve biodiversity and pollinators by planting headlands with a wildflower mix provided by McCain. We’re also trying to reduce soil movement by reducing the number of passes over the fields and by not plowing. One way we’ve managed to stop plowing is by only growing on better land with a better supply of water, rather than growing on marginal, lower-quality land. If you’re trying to do more with less, you have to start with the best land.

The autumn [fall] of 2023 in the UK was a very difficult season but also an example of how regenerative practices are helping us. There were some pretty horrendous weather conditions but actually our fields were in better health than they would have been a couple of years ago. If this had happened three or four years ago, before we started changing how we farm, we’d be in more trouble.

The main motivation for making the change is to grow a better and more financially viable crop. You have to pick the practices that are going to work for you so you don’t increase risk too much. Farmers often turn to intensive farming and chemicals to try and overcome risk and maintain or increase margin, but this can be a challenge in itself as more inputs mean more cost that can actually reduce margins. In regenerative agriculture we have to make big changes to processes while maintaining yield and margin. If we can’t make money, it’s not going to happen. There is always going to be risk involved, but we have to find ways to make sure it is shared widely across the value chain.

I’ve been involved in the Sustainable Agriculture Steering Group with McCain, and it’s encouraging to see that they have the leading potato advisors in the UK designing and trialing these systems. Being involved with programs like that you learn a lot and get to sound out ideas about what works and what doesn’t. You also meet other farmers with the same attitude as you, see their farms and pick up new ideas to replicate on your own farm. The future of farming is change. We can’t continue to do what we were doing 10 years ago and hope for better results – that’s just madness. Farming has to keep evolving with research and best practice.

My advice to farmers thinking of taking on regenerative approaches is to get started. You can’t ignore it so be bold, get involved, learn from your neighbours. That’s certainly where we’re at. We’ve not finished changing by a long way, and we’re not perfect. But we are involved with the conversation and as a fourth-generation family-owned farm, our biggest goal is to make sure that the next generation keeps on farming.

July & August

Thriving biodiversity and a focus on education

Key Regenerative Agriculture Principles

The soil is rich and pollinators are drawn to the fields

By the high summer, the flurry of planting activity has finished and the potatoes are starting to grow. During this time, the farm is brimming with life. Above ground, pollinators and other insects are attracted to the flowers of our crops and cover crops. At Farm of the Future Canada we have encouraged natural flower vegetation on the borders of our fields, which are now full of species like alsike clovers and birdsfoot trefoil, providing an essential habitat and source of food for bees and other insects.

Beneath the ground, the soil is also teeming with life. Our cover crops and careful preparation of the soil have created a vibrant ecosystem of microorganisms, bacteria and organic matter. Well-aerated soil means worms and other invertebrates can move freely through the earth, and the soil can breathe.

Over the past few years, we have partnered with the Centre for Biodiversity Genomics based in Guelph, Canada, to gain even more insight into our soil at this time of year. Their cutting-edge DNA metabarcoding process provides us with more comprehensive soil biodiversity information, which means we can better understand the bacteria, fungi and animal communities that make our fields their home. The process can also provide biological information that contributes to a more holistic decision system informing our choices around agro-chemical products and allows us to quantify the benefits of regenerative agriculture on soil health and productivity at scale.

Maintaining the right conditions for healthy crop growth

Monitoring and optimizing growing conditions is our main focus over the summer months. This challenging job is made even more difficult by the impacts of climate change. In particular, water supply has become less predictable, water-stress more common, and as a result we are seeing an increased risk of pests. We are therefore investing in technologies that make it easier to make the right interventions, in the right locations, at the right moments.

One important intervention for many farmers is irrigation, which enables us to minimize water-use. At Farm of the Future Canada, we installed pond irrigation systems designed to capture and store excess rainfall while also providing water for our livestock. We also constructed a solar-powered drip irrigation system that can deliver water precisely and in a way that reduces the risk of creating the conditions for disease and mildew. However, heavy rainfall throughout the growing season in 2023 meant our new irrigation technology was not needed this year. This served as an important reminder of the reality of volatile conditions in a changing climate, but we expect to have it in use next year for assessment of its effectiveness and impact.

The use of crop protection products like herbicides and pesticides is another important part of crop development over the summer. Pests will always be present, and we want to reduce their impact in a way that uses as few inputs as possible. Our first defence is natural methods of pest control. Certain cover crops, such as oilseed radish, naturally prevent soil borne pests and diseases without the need for herbicides. In the future, when we do apply crop protection products to the plants at Farm of the Future Canada, we will be using highly targeted, AI-controlled, ‘see and spray’ technology to ensure precise application. Our tractors will use cameras and sensors to identify specific issue areas and only spray those plants that need it, removing the need to spray across entire fields. More broadly, McCain is supporting farmers with new technologies. For example, McCain recently launched Presia Ag Insights, a new business unit which strengthens decision-making capabilities through satellite imaging and machine learning.

How we support our farmers' regenerative transformation

Focusing on education allows farmers to build skills and networks

Above ground, the farm is also buzzing with visitors, farmers and McCain partners eager to learn and grow alongside each other on this journey. Demonstration days and programs held throughout the year are hugely important. Farmer Field Days take place in the summer and this year's program covered new advances in research, a demonstration of 'see and spray' technology, and discussions of the challenges associated with harvesting, irrigation and livestock integration. Hosting these days at Farm of the Future allows us to share knowledge through a powerful 'show and tell' approach (for more information see our spotlight on measuring progress).

However, perhaps the most valuable aspect of the Field Days is the opportunity for farmers to build networks with their peers, which enables them to share their first-hand experiences of the regenerative transformation. By bringing farmers together for these events and programs, we hope to create cohorts of peers who can support each other and share their experiences long after the Field Day has ended.

Multi-stakeholder collaboration

1. Economic Support

- Financial solutions & direct funding
- Long-term contracts
- Government support & public subsidies

2. Technical support

- Showcasing practices
- Demo farms and innovation hubs
- Deep relationships with field reps

3. Measuring progress

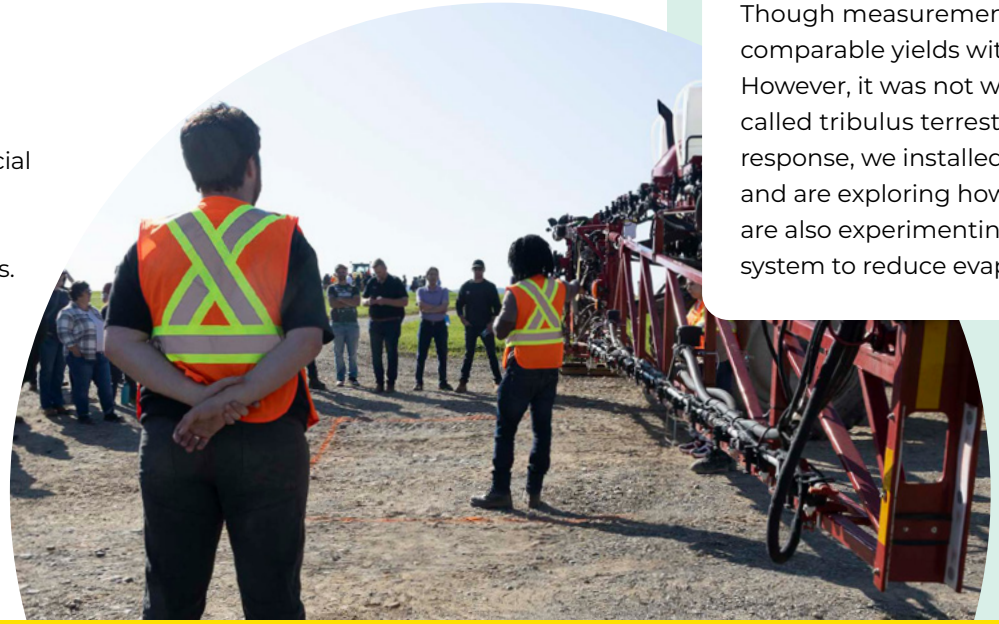
- Data measurement and surveying
- Digital technology solutions

Financial support and investment are critical for accelerating the transition

One of the key challenges to the adoption of regenerative practices is the financial barrier. Many farmers share concerns about risks to short-term yields, investment in new equipment and the commercial model. Studies show there is significant opportunity in moving to regenerative practices in the long-term, but we recognize extra support is needed now.

We therefore work closely with partners to provide support that can de-risk both the transition period and the longer-term business model. One way we do this is through a blend of different types of financial support. For example, in France we offer farmers six-year commercial contracts, and a premium price for regenerative crops.

Across our growing regions, we also work with financial and commercial partners to offer incentives and preferential loan terms to our regenerative farmers, allowing them to invest in new equipment, technology and expert services. We have set up different incentive programs with Farm Credit Canada, Credit Agricole, Rabobank and NatWest. In addition, our partnership with McDonald's Canada, the $1M Future of Potato Farming Fund, provides cost-sharing grants to help farmers begin and scale their regenerative transformation.



Farm of the Future Africa: Irrigation

Our Farm of the Future Africa regularly experiences hot and extreme weather conditions, and is often operating under water-stress. This makes our Regenerative Agriculture Principle of increasing water efficiency even more vital.

Our most significant intervention so far has been introducing a drip irrigation system which uses technology to constantly monitor the moisture in the soil and deliver the optimal amount of water where it is needed. We installed drip lines at the same time as planting and ridging the soil, thereby reducing passes of the field by machinery.

Though measurement is still being optimized, we have managed to achieve comparable yields with much less water applied, indicating early success of this system. However, it was not without its challenges. We found that historic infestations of a weed called tribulus terrestris, or 'devils thorn', was puncturing the drip tape. This year, in response, we installed thicker, more expensive drip tape to protect our irrigation system and are exploring how we can increase efficiency by mechanizing drip line removal. We are also experimenting with introducing mulch from our cover crops into the irrigation system to reduce evaporation and conserve moisture, making it more efficient.

Partner Spotlight

Rabobank: “The large-scale transformation to regenerative agriculture presents risks, but we’ve been able to create tailor-made financing solutions to the specific challenges farmers face”

Insight from our expert partners

Our team at Rabobank is working alongside McCain to increase uptake of regenerative agriculture practices by offering farmers incentives and support. A large-scale transformation to regenerative agriculture presents risks, and we in the banking industry are good at assessing risk. By working closely with McCain and its farmers, we’ve been able to create tailor-made financing solutions that enable investments in equipment and technology that growers need for regenerative practices.

As part of our three-year partnership in the Netherlands, launched in early 2023, McCain offers farmers a multi-year contract including education, technical assistance, a premium for regenerative produce and access to demonstration farms. As farmers advance, our team at Rabobank offers sustainability-linked incentives such as loans with discounts once growers receive a high score on sustainable practices. We are also offering financial solutions that blend our own products with public subsidies in the Netherlands, making it easier for farmers to access financing. Looking forward, we are exploring offering equipment financing in an agile and competitive way to remove barriers for farmers, and potentially expanding the partnership to Australia, New Zealand and the USA.

More broadly, one of the most significant commercial challenges for the regenerative agriculture sector is proving the model to banks who may find it hard to quantify the benefits of improved resilience, as well as the significant cost of inaction. Regenerative agriculture is still viewed by many as more volatile than conventional farming. The solution to this is more data on both farming and commercial outcomes of programs like ours.

Once this data is in place, regenerative agriculture should become an even more attractive space for financial services providers – in the long term, it will create more resilient and stronger supply chains for our customers, which means reducing risk for banks. At Rabobank, another key motivation is the opportunity to reduce our Scope 3 emissions and wider environmental impact by helping reduce the emissions footprint and agro-chemical inputs of the agriculture sector. And of course, offering exciting new products to regenerative farmers will be powerful in attracting new customers, particularly when linked to a high-profile partnership like the one we have with McCain.

We’re proud to be at the forefront of supporting the transition to regenerative agriculture and delighted that we can partner with McCain on the journey. Our hope is that over the next three years and beyond, the industry can take a significant step forward towards a regenerative future.

September & October

Harvesting the potatoes and assessing the yield

Key Regenerative Agriculture Principles

Before the harvest we once again begin to plant cover crops

By mid-September, the potatoes are ready to be harvested. This means unearthing the tubers while trying to minimize disturbance to the soil. Of course, when harvesting potatoes we can't avoid digging, so we use the opportunity to undertake other beneficial practices at the same time. Days before we begin the harvest, we lay down cover crop seeds such as oats and brown mustard, so that they can be embedded and mixed into the soil as we harvest the potatoes. These cover crops quickly grow and protect the soil, restarting the annual cycle at the farm.

We also practice fall bedding, which means irrigating, fertilizing and tilling the fields into their traditional hill beds before the winter arrives. Over the colder months, these hills freeze and thaw, loosening the soil that we disturbed during the harvest season. This removes the need for additional tillage in the spring, and as a result reduces the need for additional labour, heavy machinery and fuel consumption.

The harvest itself takes over a month of hard work from our farmers, but finally they see the fruits of their labour. By the end of October, all of the potatoes and rotational non-potato cash crops are out of the ground, and the fields are prepared for the fast-approaching winter.

With the potatoes harvested, we begin to assess our yield

As potatoes make their way into our storage buildings and out towards our McCain factories, we're able to review our yield. Data from local conventional potato farmers sets a benchmark for the quality and quantity of tubers we hope to harvest. In 2023, at the Farm of the Future Canada, our regeneratively farmed potatoes had fewer internal defects than local averages, likely due to improved water filtration in the soil because of less soil compaction. In terms of quantity, our year-on-year data shows that our crops remain stable around the local average.

Alongside this, we are currently carrying out analysis to measure the farm costs and economic benefits associated with regenerative practices compared to local conventional farms. On the one hand we have recognized cost savings from reduced synthetic fertilizer use and lower costs in fuel and labour due to reduced tillage. On the other hand, there have also been cost increases from buying crop protection products with a lower environmental impact. While it is early days and additional economic and environmental benefits are still being captured (we are in year three of a full four-year rotation), so far regenerative practices have not had a negative impact on yield. This will continue to be an area of analysis at Farm of the Future Canada in the months to come.

Farm of the Future Africa: Crop rotation

At Farm of the Future Africa, we produce four cash crops – potato, maize, soybean, and wheat – on a four-year rotation cycle. The varieties we plant in this cycle are specific to the southern hemisphere both in terms of climate adaptation and local market need. Crop rotation has the same benefits in the Southern hemisphere as in Canada, giving the fields time to restore nutrients and, in the case of maize and soybean, benefit from no-till harvesting. Our maize is also underseeded, a process in which a cover crop is planted into an already established crop. This practice helps to increase biodiversity and biomass which has positive effects on soil health, crop health and yield. As well as benefiting the soil, our non-potato cash crops have delivered higher-than-expected retail prices, which we can reinvest into innovation at the farm. For farmers looking to make the transition to regenerative farming, this provides a great proof-point for the financial benefits.

Partner Spotlight

McDonald's: "Our ability to serve communities for decades to come is intertwined with the resilience of our suppliers and the farmers, ranchers, growers, and producers within our System."

Insight from our expert partners

At McDonald's, everything we serve starts on the farm. Our ability to feed communities is intertwined with the long-term resilience of our suppliers, and the farmers, ranchers and producers within our System. Additionally, the strength of our supplier community is critical to our ability to advance science-based climate action and drive nature-based solutions. Regenerative agriculture is an important part of our climate strategy, and the implementation of these practices will help us contribute to a resilient, thriving food system, allowing us to continue providing affordable, more sustainable food in 40,000+ communities around the world.

This work necessitates System-wide, collective action. Our work with McCain, and direct collaboration with farmer partners, helps us better understand the impacts on their farming partners and their businesses – and the support that's needed. A farmer's transition to regenerative agriculture practices is no small feat, and farmers have to shoulder the burden of a steep learning curve of fairly dramatic changes to complex production practices, with financing and yield results being key considerations. Partnering with McCain brings us closer to the farm level and helps us advocate for broad-based policies and solutions that can help transform food systems.

Our work with McCain is an example of an important collaboration that is making a positive impact at scale through both farmer engagement and education throughout McDonald's system. Across multiple global markets, including Canada and the UK, we have worked with McCain to create dedicated funds that incentivize farmers' transition to regenerative farming. Through the McCain team's potato production expertise, we are able to prioritize the most impactful regenerative actions, and our hope is that additional categories will ultimately benefit from our increased understanding of how to partner and scale these changes. The McDonald's team recently visited McCain's first Farm of the Future in New Brunswick, Canada. This was a great opportunity to see regenerative farming in action and understand the impact these practices could have at scale.

Regenerative agriculture is still a new topic for consumers – but interest is growing. People enjoy learning about how their food is grown, and where it comes from. As one of the largest consumer-facing brands in the world, we see our role as helping raise consumer expectations, empowering them to expect products to be sourced in a way that prioritizes responsible production while protecting nature, ecosystems and communities. We look forward to our continued partnership with suppliers like McCain as we further our efforts and feed and foster communities for decades to come.

November & December

Measuring outcomes, innovation, and future planning

Key Regenerative Agriculture Principles

With the harvest complete, we begin to reflect on the year

With the potatoes collected from the fields, our cover crops once again cover the landscape. We can now take the opportunity to reflect on the challenges and successes of the year.

The Farm of the Future External Advisory Board, a collection of agronomy practitioners, scientific experts and farmers play an important part in reviewing our annual progress. Twelve months previously, they encouraged us to focus on further reducing synthetic fertilizers and increasing our use of cover crops and green manure. While the data is still being processed, we have gained some valuable lessons. For example, we saw the positive impacts of cover crops and learned that selecting the right blend of cover crops is crucial. We also found that the timetable for planting and terminating them is equally important as missing deadlines can lead to weed growth. This year we had an added challenge in reducing agro-chemical impacts because some cover crops survived through winter so had to be terminated before the planting season. Reflecting on these lessons means we can make more informed decisions next year.

Assessing our progress against the Regenerative Agriculture Framework

At the end of the year we also assess our outcomes against the seven indicators of our Regenerative Agriculture Framework. This helps us to identify areas where we have made progress or faced challenges, giving us a clearer view on where we need to focus in the year ahead. We encourage all of our farmers to go through this process annually to continue to improve and progress through the levels of our Framework.

Following the harvest, we reflect on our progress against the Regenerative Agriculture Framework Indicators:

Assessing progress against the Regenerative Agriculture Framework

Regenerative Agriculture Framework Indicators	Reflection questions
Armoured soils preferably with living plants	• What percentage of the soil surface has been covered by living crops or residue and for how much of the year?
Enhanced crop diversity	• How many different crop species have been grown?
Minimized soil disturbance	• How many times did we till the soil? • How did we adopt conservation tillage in rotation crops? • By what intensity did we decrease tillage across rotation?
Reduced toxicity of pesticides	• Which crop protection products were used to reduce environmental, human and consumer impact? • What is the Environmental Impact Quotient (“EIQ”) value per hectare?
Enhanced farm and ecosystem biodiversity	• What percentage of our land has been dedicated to natural habitat?
Reduced agro-chemical impact and optimize water-use	• Were all inputs applied based on Decision Support Systems (“DSS”) or expert advice from a recognized crop advisor? • What percentage of crop nutrient needs were provided from organic sources?
Increased organic soil matter	• What was the percentage increase in organic matter in the soil?

Meanwhile, regenerative potatoes become fries

As winter draws in, our regeneratively-farmed potatoes are being transformed into McCain products and making their way to our dinner tables. But today, few consumers will know that. Despite its huge importance to the future of the food system and the climate, there is little public awareness about regenerative agriculture. At McCain, we want to be part of changing this.

In 2022, McCain pioneered consumer engagement and education on regenerative agriculture. We produced Regen Fries, fries made from potatoes grown through regenerative agriculture practices. Regen Fries were served through pop-up events in Canada, US, and the UK. To engage and educate consumers, McCain, in partnership with Livetopia, developed an immersive Roblox game, which was a playful digital twin of McCain’s Farms of the Future. So far, the game has engaged over 41 million players. Through this initiative consumers were able to learn about regenerative agriculture while tasting delicious Regen Fries.

Conclusion

Collaboration

The regenerative transformation needs to be a collaborative movement, with all players in the value chain playing their part. In particular, governments are key to creating the right enabling environment through financial, regulatory and technical policy and support. For example, McCain Foods USA recently partnered with the Soil Health Institute and Campbell Soup Company and received funding from the Natural Resources Convention Service – a USDA agency – to help potato farmers in Maine and Wisconsin trial and adopt climate-smart practices. We also collaborate at an industry level, such as through our membership of the Canadian Alliance for Net-Zero Agri-food ("CANZA"), helping create a sustainable future for Canada's food sector. Coalitions such as the Sustainable Markets Initiative ("SMI") Agribusiness Task Force, One Planet Business for Biodiversity ("OP2B"), and the Sustainable Agriculture Initiative ("SAI") Platform are also important platforms to connect with others in the food and agriculture industry to better understand how to scale regenerative farming.

Looking ahead

Over the coming year the focus for Farm of the Future Canada will be on introducing new technologies, expanding partnerships and research, as well as demonstrating the economic benefits of the transformation and reducing cost of entry for farmers. We also plan to open our third Farm of the Future by fiscal year 2025. In parallel, we are reviewing and updating our Regenerative Agriculture Framework to reflect evolving best practices, and in early 2024 we will publish our annual report of the progress made on each of our Farms of the Future.[3]

With no one-size-fits-all blueprint for how regenerative agriculture should be implemented, our work with researchers, farmers, commercial and financial partners is helping develop best practices and educate farmers on how to make the transition. None of this will happen overnight, but we are making good progress and are committed to sharing our successes and challenges as we work towards our target of implementing regenerative agriculture across 100% of our potato acreage by 2030. If you are interested in joining us, please get in touch – we would love to connect. A huge thank you to our team at Farm of the Future Canada for their support in producing this Deep Dive, and to all of our farmers and partners across the world for their energy, enthusiasm and hard work to make the regenerative transition a reality.

References.

1 Canadian Alliance for Net-Zero Agri-food.

2 'Onboarding' and 'Engaged' are the first two levels of regenerative agriculture proficiency in our Regenerative Agriculture Potato Framework. For more information, see our Regenerative Agriculture Framework here.

3 Farm of the Future Canada Year 1 Report; Farm of the Future Canada Year 2 Report.

We welcome any feedback.

Contact us at **sustainability@mccain.com**.