

THE REGENERATIVE JOURNEY

— where are we going?

Regenerative agriculture is sparking debate around the country with some people huge advocates and others railing against practices they've labelled pseudo-science. For many others it's all a bit of a mystery.

We've gone out and talked to a range of people involved in regenerative farming and talked to scientists and funders of research as well as hearing from marketers responding to calls from consumers.

The New Zealand *Dairy Exporter* has always prided itself on fact checking and sharing information with you that's backed by science.

It's fair to say the jury is out on some practices used in regenerative systems and we aren't advocating for or against.

Instead we hope this gives you more insight into a term you will be hearing more about. We've gathered up some links so you can read further and we hope we've sparked your curiosity. We'd love to hear what you think and we're always open to hearing from you on topics you'd like our team to explore so we can all learn, grow and excel.

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MORE READING

Landcare and Our Land and Water white paper
bit.ly/3yRMggq

NZIAHS magazine issue on regenerative agriculture:
adobe.ly/3p8Wtkc

DairyNZ Dairy Tomorrow:
www.dairytomorrow.co.nz/

MPI and Primary Sector Council vision for agriculture:
fitforabetterworld.org.nz/

Te Taiao Report
bit.ly/3fErGZg

Regenerative farming practices projects
bit.ly/3uISZpu



ALIGNED for the future

Making a profit from regenerative agriculture is the next priority for Align Farms. **Anne Lee** spoke with chief executive Rhys Roberts and head of environment and innovation Clare Buchan. Photos by Holly Lee.

Align Farms' budgets for this season show it would need a premium of 20c/kg milksolids (MS) to bring the regeneratively run operation up to par with its conventionally run area in terms of operating profit.

That's based on a \$6.25/kg MS payout used as a long-run average, Align Farms chief executive Rhys Roberts says.

"Based on a \$6.25/kg MS payout the regen is about \$300/ha less profitable so we'd need that 20c/kg MS premium or we'd need to see other productivity and efficiency benefits like a 10% drop in our empty rate to bring profit to the same level."

At an \$8/kg MS payout the difference runs out to \$900/ha.

"Even at \$900/ha difference I'm reasonably content with this from a trial perspective because the budget doesn't include any financial benefits we might get in animal health or mating performance from the regenerative system.

"It doesn't take account of the environmental benefits we're getting either. We're using very low bought-in feed and no synthetic nitrogen on the regenerative side.

"But it's important to note we're content with it as a trial at this stage – if this was

put across all dairy farms in New Zealand, it would knock about \$1.5 billion out of the country's economy.

"This further illustrates the importance of taking a laser focus to the financial performance of this trial.

"We cannot lose sight of the importance of profit to a farming system remaining sustainable."

Even though he's ok with the additional cost, particularly at the \$300 difference based on the longer term payout he says he would be happier if it was \$300 ahead not behind.

"I feel like we won't get too much interest from conventional farmers until we're ahead so we either have to get some value for what we're doing or see some improved efficiencies if this is about where we end up."

This month Align Farms kicked off the first full season of its comparative study running half its Clareview farm using regenerative practices and the other half using conventional practices. Longfield farm is transitioning and is expected to join the trial next season.

On Clareview that means 148ha is now established in diverse perennial pasture species, no synthetic fertiliser and a pasture grazing regime that sees higher covers and



Regen ag field of dreams: Clare and Rhys.

residuals and more frequent shifting of cows.

Farm working expenses are significantly lower on the regenerative area at \$4.12/kg MS compared with \$4.42/kg MS due mainly to lower fertiliser and supplementary feed costs.

The farm team is using a science advisory board to help ensure the comparative study is robust and Rhys says the decision

to use 223kg/cow of grain as a bought-in supplement was one that sparked some good debate across the whole team including the board members and others they sounded out.

“In the end we decided to keep some supplement going into the regenerative side this season with the view we’re likely to be able to phase it out in coming seasons.”

There was also some debate about the higher stocking rate on the conventional farm but Rhys says it’s realistic given the type of system they have been running.

Cows on the conventional side will get 600kg/cow of grain, 100kg DM/cow of pasture silage and 100kg DM/cow of maize silage.

Fertiliser on the regenerative area includes fish fertiliser, guano, lime and compost or bought-in manure.

No urea or synthetic nitrogen is applied.

The *Dairy Exporter* will be taking a deeper dive into the fertiliser regimes at Align later this year.

GETTING FACTS AND DATA

Rhys says the budget has been set based on the typical costs they’ve run in previous years so the proof will be in the actuals spent.

“We’ve just divided our animal costs per cow for instance so there’s no difference in what we expect in terms of the budget between both sides.

“It may be that we see a reduction in animal health costs on the regen side and then again it could be higher.”

That’s what the study is about – getting the facts and data and then reporting back, he says.

Clareview has been transitioning to the diverse pastures and different fertiliser regimes over the past two seasons and in the last season Rhys says there was a notable improvement in somatic cell count (SCC).

“Typically, we see a bowl shape in our SCC graph so it starts high, drops and then climbs again at the end of the season but this year it started out as usual and dropped as we expect but it didn’t rise again.

“We’ll be tracking the animal health data this season very closely with the cows all fitted with Allflex collars.”

They’ll be able to monitor rumination and other health indicators and reproductive indicators using the collars and reports they generate.

“We’ll be able to compare rumination for instance between the two systems but we’ll also be able to see what’s happening compared with cows on our other farms going on and off other crops.

They’ve seen differences in water use with up to 40% less irrigation water going on regenerative paddocks at times last season.

“We’ve split the budget evenly for irrigation power costs in the budget but again we’ll see what the actuals show in terms of difference, if any, this season.”

Rhys says they had confidence in setting the budget based on some of the learning from last season.

“Pasture production on the regenerative side kept up with the conventional side to date but we have noted that while there were no real differences at peak growth times in the season we did see some differences that surprised us a bit in the shoulders.

“There was slightly reduced performance in the regenerative diverse pastures in



Healthy roots: Rhys holds up a healthy root mass.

Clareview farm facts with budgeted production and costs:

	Regenerative	Conventional
Area	148ha	148ha
Cows	511 cows	592 cows
Stocking rate	3.5 cows/ha	4 cows/ha
Production/ha	1450kg MS	1800kg MS
Production/cow	420kg MS	450kg MS
Supplement/cow	223kg grain	800kg DM
Fertiliser cost (including nitrogen)	\$67,000	\$120,000
Feed cost	\$84,000	\$217,000
Farm working expenses	\$4.12	\$4.42
Operating profit/ha	\$3,601	\$3,925

the shoulders, particularly in the autumn which went against what we thought would happen.

“What we’re asking now is whether that’s a soil fertility thing, or a diverse species thing, are we grazing at covers that are too high or are we grazing them down too low.”

REGEN WINTERING

Align Farms is also testing out a regenerative wintering system on its 497ha effective support block, Hinterlands, near Mt Somers.

The large scale property will winter 1500 mixed-age cows, 774 rising-two-year heifers and 1000 calves plus about 60 R2 bulls.

Although it’s dryland, in late May it was anything but, with the South Branch of the Ashburton River taking a detour across swathes of land in the Canterbury floods.

In January 77ha had been sown in diverse pasture and forage crop species but ironically the summer/autumn drought had taken its toll on both the diverse species and a late kale crop sown in January.

“In the end, although it wasn’t good it wasn’t as bad as we thought and both the diverse forage and late kale yielded 7t DM/ha when they were measured in May.

“Kale sown in November had also been drought affected but it came out at 12t DM/ha.”

The diverse forage included oats, barley, sunflowers, lupins, faba beans, buckwheat, quinoa, ryecorn, linseed, clovers, vetch and phacelia as well as brassicas – rape, swedes, kale and radish.

“I think we’ll find that we should have had the mix 60:40 brassica to cereals in favour of the brassicas but it’s the other way around.”

It was direct drilled into a barley crop that had been taken for cereal silage.

It wasn’t sprayed out before the diverse crop was sown and they did get regrowth from the barley.

“We would have preferred the cows from the regenerative areas of the dairy farms to be solely grazing the diverse crop but because of the lower yield they’ll be on kale until July.”

The questions they want to answer from the diverse winter forage is whether it will regrow, how well it can regrow and can they get a second grazing out of it.

Cows will be strip grazed and back fenced.

Align Farms head of environment and innovation Clare Buchanan says they’re aiming to carry out mineralisable nitrogen monitoring which may indicate how well the diverse crop and its regrowth can soak up excess nitrogen and act as a catch crop.

They’re also trying bale grazing one mob of cows on one of the diverse paddocks.

Bale grazing is a regenerative practice where bales of meadow hay are positioned throughout the crop.

Rhys says they’ve purchased 158 bales with about 10 bales put into each break on the diverse crop.

“So there’s a lot more hay than you’d normally put in with a crop and it’s just left out there for the cows to push around, eat, lie on with the aim to get them eating it but also spreading it around and transferring nutrients.

“I’m not sure just how commercially sound it is but we’ll trial it and see what we find out.”

Cows on kale will have a wintering diet of about 11kg DM/cow kale and 3kg DM/cow ryegrass straw while cows on the diverse forage outside the bale grazing trial will have a diet of closer to 8kg DM/cow forage and 6kg DM/meadow hay.

Having the Allflex collars will allow rumination times for cows on the two forages to be compared.

“It is exciting to be underway with this first full season of the study – we’ll have a lot more data and experience to share from now on.”



Rhys and Clare checking for rhizobia on the roots.

REGENERATIVE VERIFICATION

Align Farms has been working with Ata Regenerative to carry out an Ecological Outcome Verification, Align Farms head of environment and innovation Clare Buchanan says.

Monitor paddocks have been assessed for a wide range of indicators such as biodiversity, soil biology and soil chemistry and based on scores it’s determined whether the paddock and soils are deemed to be regenerating or degenerating.

The programme was developed through the Savoury Institute and is affiliated with the Land to Market programme – a regenerative verification programme connecting consumers with food coming from regenerative farms.

Clare says it involves both short and long term monitoring carried out annually and every five years respectively to assess the outcomes of farming practices.

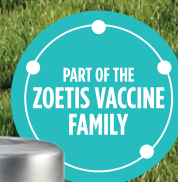
The *Dairy Exporter* has been following Align’s transition into regenerative agriculture since last year and we’ll be continuing to keep you updated through the coming season on their findings. Take a look back at our December 2020 issue and March 2021 for our previous stories.

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TO BE REGENERATIVE: verb, not noun

MPI chief science advisor Dr John Roche says researching regenerative agriculture is about testing what works for New Zealand farmers. **Anne Lee** reports.

The Ministry for Primary Industries (MPI) chief science advisor Dr John Roche says MPI's call for project submissions on researching regenerative agricultural practices is not about funding a fad.

Late last year MPI said funding applications were open through the Sustainable Food and Fibres Futures co-investment fund for projects that could develop sound, evidence-based research to test and confirm what works in New Zealand soils, climates and farming systems.

"We're very clear – we're not looking to support or fund a fad.

"Over the last 100 years we've had farmer-led innovation and scientists have worked hand in glove with farmers to refine, understand and develop those innovations.

"What's disappointing to me in the discussion and debate around regenerative agriculture is that we've seen some scientists stepping out of the discussions, not being prepared to look further at this, when actually we need them engaged."

Some questions on regenerative practices may be answered by research that's already been done but there were still questions that needed answering with new research.

"Some practices being considered

won't stand the scrutiny of scientific investigation but we want to marshal the research so we know what practices are true and have positive outcomes in our situation and which ones don't."

Evidence from funded research needs to be:

- Measurable
- Quantifiable
- Easily understood
- Shared freely.

Proposals for two studies are about to be announced – one on incorporating biodiversity into productive land and one on farm systems more able to withstand drought. Many more proposals are being processed.

An MPI Technical Advisory Group (TAG) for regenerative agriculture includes about 25 people. They met earlier this year to agree on a vision rather than definition, discuss key principles and both the technical and social outcomes regenerative agriculture should strive to achieve.

Both MPI and the Primary Sector Council have recognised regenerative agriculture in the "Fit for a Better World" vision for the primary sector.

It includes the Te Taiao report which outlines a four-year programme of actions relating to improving on farm practices for better environmental outcomes as

well as outcomes for animals, communities and economic resilience.

The overarching aim is to keep making those improvements but also to position NZ's primary sector and exports as world leading to enable greater returns from increasingly discerning consumers.

"We know there are consumers out there willing to pay more for regeneratively produced produce but we also know they don't exactly know what that means."

"Let's take our story to the market."

John says the concept of Taiao – look after the natural world and it will look after us – is at the heart of primary sector strategies and regenerative agriculture principles sit well alongside that.

There's an acceptance that regenerative agriculture isn't a prescriptive set of inputs or practices as it is for organic agriculture and the aim is to keep it that way, John says.

It's more outcomes focused and should be viewed as a verb rather than a noun, he says.



John Roche, Chief science advisor, Ministry for Primary Industries.

REGENERATIVE AGRICULTURAL PRACTICES

There is a whole suite of practices which are regenerating, improving the system across a wide range of outcomes.

So practices that are, for example, improving moisture holding capacity of the soil or lowering nitrogen loss can all be called regenerative.

"The important thing here is it doesn't mean that just because you're not using a specific practice, sometimes associated with regenerative agriculture overseas, that you're degenerative."

Farmers sit on a continuum for a whole range of outcomes and have priorities depending on where they sit.

"Being regenerative doesn't mean turning your back on conventional practices either."

"We have to get past the issues some people have with the word regenerative."

John's science career in the dairy sector

saw him champion NZ's ryegrass-white clover pasture-based system and loudly decry practices and products that weren't science based and cost farmers money.

"The regenerative narrative we have here, isn't at odds with that at all."

"We want evidence-based practices, innovation and continuous improvement across the whole spectrum of soils, animals, environment, people's wellbeing and profitability."

"Over the years NZ farmers have been the ones to work out ways to get through challenges, they've been the ones to come up with step-change innovations and this is a very farmer driven movement."

"We have to make sure the research is there to support the right practices that achieve the outcomes we're all looking for."

THE VISION FOR REGENERATING AOTEAROA

Primary sector principles and practices that in isolation or collectively can:

- Achieve improved outcomes for our productive landscapes, rivers, coastal and marine environments, biodiversity and natural ecosystems and animal welfare.
- Promote health and wellbeing for humans.
- Ensure we can grow and consume our food and fibre products sustainably.

MPI technical advisory group 2021

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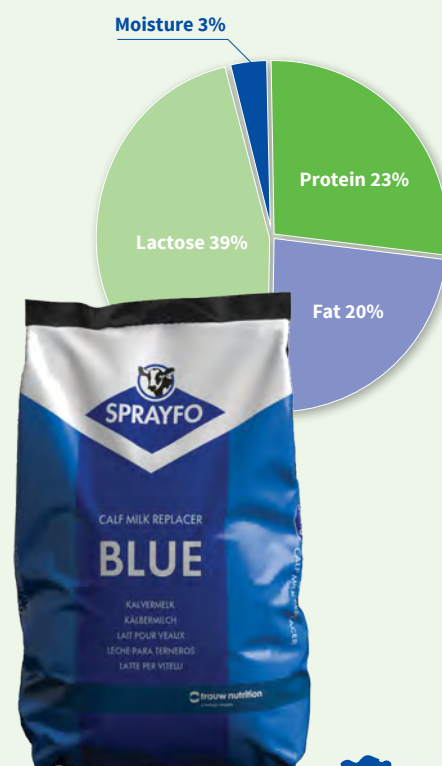
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Engage but ground the **PRACTICE IN SCIENCE**

Words by: **Anne Lee**

There's a bigger peril to conventional farming in New Zealand than engaging with regenerative agriculture – not engaging with it.

Bruce Thorrold is a strategy and investment leader at DairyNZ, responsible for allocating funding to research and extension programmes, in particular those relating to new systems and competitiveness.

The discussion around regen has become polarised, he says, and that's not a good situation to be in.

The philosophy or vision of what is “essentially a social movement” actually parallels the dairy sector's own vision – Dairy Tomorrow, he says.

It's also in line with the Ministry for Primary Industry's Te Taiao strategy.

“If you look at the philosophy of regen ag, which basically says let's farm in ways that make things better with a spirit of continuous improvement, a spirit of trying new things, a spirit of taking a holistic view of your farm, your community, your business, your people, your animals and your environment – that's our strategy, that's Dairy Tomorrow.”

Many of the practices too are in line with what farmers do now as good or best practice.

But there are some practices that just

aren't based on sound science or evidence, he says.

“That's the risk, so instead of solving the problem, farmers spend scarce capital and mental energy on making the problems worse.”

To avoid that risk, farmers, funders and sector groups should be embracing the overarching philosophy, engaging in the discussion and ensuring that the research and farm systems being developed are done so based on science together with farmer experience.

“If we do that, if we ground this in science and economics and then we use the creativity of researchers and farmers and find new ways, good ways of doing things – then we'll be right,” he says.

To disengage means leaving it to someone else.

He believes one of the reasons some scientists and farmers have come out so strongly against regenerative agriculture is they think that by accepting it as a philosophy it means accepting “conventional” farming is bad.

“It's this feeling that it means accepting blame.

“But the farmers who look to regen don't do it for that reason. They do it because they're looking for ways to do better, just the same way we're looking for continuous improvement in Dairy Tomorrow. “It's not about feeling blame.”



Bruce Thorrold, Strategy and investment leader at DairyNZ

Like many social movements or philosophies regenerative farming has attracted some “fringe elements” and some of the practices have no scientific backing.

Emphasis for instance can go onto creating soil conditions where fungi populations increase and they then work in harmony with plants to extract nutrients the plants need from the soil, limiting or eliminating the need for fertiliser inputs.

“We know from earlier research that when you stop putting fertiliser on, the fungi will get cracking but they mine the soil so over a period we're exporting nutrients (through meat and milk).

“You run your phosphorous status down for example and become phosphorous deficient and no amount of fungi will solve that.”

But there's no need to throw out the

PRACTICES EMPLOYED IN RA SYSTEMS (FROM LANDCARE RESEARCH WHITE PAPER)

Practice	Description
Diverse cover crops	Short-term non-cash crops sown between cash crops in arable systems, including species with different plant functional traits (>8 species). Seed growers may be limited to 4–8 cover crop species to avoid cross-contamination risks.
Diverse forage crops	Forage crops usually with >8 species that have different intended functions (i.e. animal nutrition, plant health and/or soil health). Commonly grazed in summer, autumn and winter.
Diverse perennial pastures	Diverse pastures are sown (16 to 40+ species sown using direct drilling) to assemble perennial plant communities with high functional diversity. Species composition and diversity change through time.
Bale grazing	Placing hay bales throughout paddocks that are strip grazed during winter. Hay is balanced with fresh pasture. Intentional bale 'wastage' creates a fertiliser effect and improves soil health.
No-till and residue retention	Sowing of crops or pastures without cultivation. Retaining some or all crop residues on the soil surface as protection.
Integrated pest management	Managing arable land to promote beneficial insects, especially those that predate crop pests.
Minimising synthetic fertiliser inputs	Multiple different strategies, including shifting to foliar application, increasing nutrient cycling and nitrogen fixation, changing fertiliser sources.
Minimising chemical inputs	Reducing/eliminating chemical inputs where practical, including seed dressings, weed sprays, fungicides, insecticides, drenches, dips, cleaning products, and/or substituting with biological alternatives.
'Buffering' synthetic and chemical inputs	Using carbon-based products such as humate-derived substances to chelate fertiliser and chemicals.
Inoculants, biostimulants and carbon-rich amendments	Inputs designed to enhance the function of soil, plant and animal microbiomes in either a targeted or general manner. Common products include fish hydrolysate, seaweed derivatives, diluted seawater, compost, aqueous compost extracts, biochar, isolated fungi/bacterial strains.
Mineral balancing and trace elements	Ensure sufficient amounts of soil minerals are present for optimal soil and plant function. Ensure minerals are 'balanced' so as not to antagonise the ability of plants to take up what they need. Some practitioners use the Albrecht–Kinsey soil audit methodology to diagnose balancing requirements.
Timing interventions using the lunar calendar	Some practitioners take into account lunar and other astral cycles to determine the timing of particular interventions on their systems, such as planting or harvest.
Regenerative grazing management	Adaptive multi-paddock grazing, deferred grazing.

whole concept because there's evidence a particular practice doesn't work. Farmers want to know what works and what doesn't, he says.

"Instead, farming could pick up on the Te Taiao, New Zealand farming Inc-take on regenerative agriculture with its culturally unique flavour and ground it in science and farmer experience.

"There's work to be done in understanding what some of these regenerative practices lead to in the soil and the wider range of values pasture diversity can give."

Research projects are in development for structured scientific studies together with farmlet work and work with farmers already using regenerative practices, he says.

DairyNZ principal scientist Ina Pinxterhuis was involved in the discussions that resulted in the Our Land and Water white paper, Regenerative Agriculture in Aotearoa New Zealand – Research pathways to build science-based evidence and national narratives. (link on page 41)

She says the white paper lists both principles and practices with some compatible with profitable, sustainable best practice dairying but some aren't and some need research.

One of the 11 principles for instance is to manage livestock strategically.

On the face of it, not a problem, but the regenerative agriculture practice of "adaptive multi-paddock grazing" isn't proven to give the benefits claimed, Ina says.

It involves using high stocking rates on high pre-grazing covers of diverse pastures for short periods (6-12 hours per day but some farmers up to six shifts per day) leaving higher residuals so drymatter is trampled into the ground with an aim to recycle nutrients, increase carbon and promote biological activity.



Ina Pinxterhuis,
DairyNZ
principal
scientist

“There are a lot of unanswered questions with this.

“Do animals at very high stocking rates on these diverse pastures really get to select what they want?

“Does the lower pasture utilisation (70%) compared with (85%) in conventional grazing simply increase the

risk of lower intakes of poorer quality feed given longer covers mean more dead material in the base and stalkier, more fibrous plants?

“Does it increase the risk of diseases such as facial eczema?”

“Is it really better for pasture for organic matter to be trampled in for nutrient recycling or does it work just as well if more, high quality feed passes through the animal first and is then deposited on the ground as dung and urine?

“We know that biodiversity above the ground increases the biodiversity under the ground but what soil biology is actually beneficial to the environment and the farm system?

“Could four plant species give us the biodiversity underground that will carry out the ecosystem services we need – so do we really need 16 or more?

“It may depend on how much organic matter you already have in your soils or where you’re at in terms of soil

improvement so it may be that there are a range of answers.

“We know there are benefits and risks to some of these practices but do we have enough tools for farmers to make the decisions on what might work for them and how can they experiment onfarm and learn?

“When our aim was to increase production, it was easy to see if something worked or not because farmers could measure it in the vat. But if we have different goals – such as supporting functional biodiversity, animal wellbeing, reducing nitrogen loss or greenhouse gas losses – as scientists we need to give farmers meaningful measures they can use.” Research, both component, structured research and research onfarm with farmers is needed to answer the myriad of questions so farmers can benefit from the good aspects of regenerative farming while avoiding possible downsides, she says.



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On a 'REGEN JOURNEY'

Russell and Charlotte Heald have transitioned to regenerative agriculture and organic farming over the past four years. **Jackie Harrigan** spoke with them to find out more about their journey.



Russell and Charlotte Heald with their children.

FARM FACTS:

- 322ha farm area
- 170ha milking platform, 108 ha eff runoff
- 460 cows 4 years ago reducing to 430, 400, now peak milking 385cows
- Production: 157,000kgMS pre-change, dropped to 125,9000, drought hit last season reducing to 106,000kgMS (300kgMS/cow)
- Target: 350-400kgMS/cow

Russell Heald discovered his regen pasture mix was like a blast from the past when he found, in his grandfather's diary, the seed mix used on their Norsewood property in the 1927/28 season.

"It was almost identical to the nine species we are using."

Russell and Charlotte have been on a 'regen journey' for the past four years, also transitioning to organics, trying to find a less stressful system of farming, and are more than happy with the outcome.

The couple says the holistic regen/organic system is proving just as profitable as the previous conventional operation and they have less work, less worry, less animal health issues and less bills to pay.

Moving to biological fertilisers (fish slurry), to a diverse pasture species mix and longer grazing rounds, while transitioning to organics, using all homegrown feed and going OAD milking has been a lot of change in the past four years - with mixed results from a couple of dry summers thrown into the mix on their 170ha milking platform.

Production has taken a hit, say the couple, but dropping out \$200,000 of PK and silage from the supplement budget helped, while cutting animal health costs from \$60/cow to \$15-18/cow has shaved

another \$15,000 from the farm working expenses.

"The high payout has certainly helped ease the bit of a hit we took."

While income is down, so are stress levels - for cows, staff and owners, Russell and Charlotte, who have just bought the family farm from Charlotte's family trust and formed an equity partnership for the trading company.

The OAD has reduced lameness and mastitis has dropped, and reproduction has improved with an empty rate of 5% over the past two years - although this year it jumped to 12% for reasons not yet known.

Visits from the vet have dropped to two times last season.

BRINGING FUN BACK INTO FARMING

With labour of one full time team member and a couple of permanent part timers helping with relief milking and calf rearing, staff retention is no longer the massive problem it was.

"Our fulltimer is so happy, he has come from System 4-5 farms, and is now working a 11:3 roster with every second Friday and weekend off and cups on at 7am. He is much happier with his work life balance."

In fact Russell says the system change has brought the fun back into farming.

"It's made it more enjoyable for everyone."

With support from Calm and Farm and Regen advisor Greg Barclay from Soil Connection, the couple have worked their way through the very different way of farming that regen involves.

Fertiliser consists of fish slurry - which has naturally occurring N,P,K and S along with a host of trace elements, sprayed on with an ocean-based dry mix with lime, dolomite, Se, B, Co, and sea salts.

Russell says they don't focus on the chemical element breakdown rather that the fertiliser boosts the soil biology and increases organic matter - which Brookside Labs in the US has tested as having increased from 5% to 9%.

"We don't follow the NPKS replacement model, it's more about getting the soil biology going and getting the carbon sequestered and cycling from the atmosphere," Russell explained.

Pastures are sown with nine different species and grown to higher covers, running different and longer rounds up to 35-45 days long at different times of the year so the plants are fully energised and full of sugar. The grazing regime consists of trampling 1/3, eating 1/3 and leaving 1/3. The trampling is about getting the trash recycling through the soil biology for the plants to use again. The longer round allows time for the plants to recover nutrients and cycle them through the fungi network, and makes the system far more resilient if the weather turns against them, Russell says.

Under a 20-30 day round the rye/clover pastures tended to suffer heat stress and gave up in a hot summer, Russell explained, but the longer round and variety of species were much more resilient, with the longer round and higher covers meaning grass grows for longer and less feeding out is needed.

"With the greater number of species there is always something that keeps growing and the feed quality holds on longer in the sward - there is a better balance of protein and carbs and that translates into better animal health," he says.

The summer cropping mix has 12-13 species in the mix and the couple have learnt that some plants are for the soil and some are for the animals.

'Our cows tell us that the approach is working - they are so much more relaxed and chilled out.'

While production has dropped through the journey to organics and regen practices, Russell and Charlotte have a goal to increase to 350-400kgMS/cow by compacting their calving and having more days in milk.

They have a zero bobby calf policy that works by using Wagyu semen and rearing and running the calves contracted to First Light on their runoff before they transfer to the finisher.

"Some people get hung up on production but our sustainable and environmental approach is more profitable than what we have been in the past and it's more resilient to adverse events.

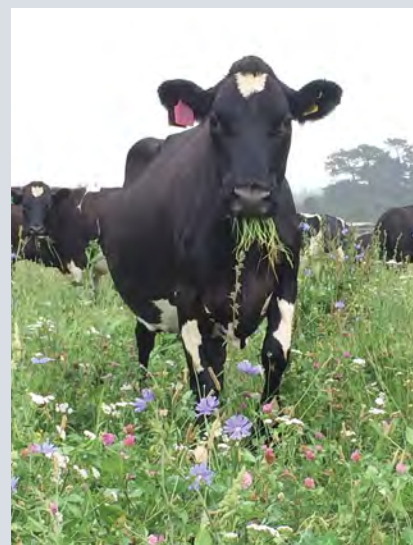
"Healthy soils equals healthy plants equal healthy, happy cows equals happy farmers - that's our motto onfarm."

The couple says their journey has turned heads with other local farmers, some who have challenged what they are doing and some who have shown immense interest.

"We do what we do and what works for us - every farm is different and every farmer is too."

"You just have to do what you do and what makes you happy - that's the most important thing - and knowing that we can run a lower stress system with a better environmental footprint in the world while building carbon and resilience is important."

**"WE DO WHAT WE DO
AND WHAT WORKS FOR
US - EVERY FARM IS
DIFFERENT AND EVERY
FARMER IS TOO."**



A dairy cow in regen pastures at the Heald's property.

DIVERSE PASTURE MIXES INCLUDE:

- Red Clover
- White Clover
- Plantain
- Chicory
- Phalaris
- Cocksfoot
- Timothy
- Prairie Grass
- Fescue
- Tetraploid perennial ryegrass
- Italian Rye



TAKING GRAZING to the next level



Next Level Grazing regenerative farming coach Siobhan Griffin.

“GROWING SUNFLOWERS AND OTHER ANNUALS IS FOR ARABLE FARMING. FOR ANIMAL GRAZING WE WANT PERSISTING DIVERSE PERENNIAL PASTURES.”

Words and photos by: **Karen Trebilcock**

Regenerative farming coach Siobhan Griffin is not a big fan of sunflowers. “The colour yellow I like to see in paddocks is that of dandelion flowers.”

The long tap roots of the dandelion plants plus their ability to grow in early spring and in summer dry puts them on Siobhan’s list of perennial pasture species for dairy, sheep and beef farms along with ryegrass, cocksfoot, timothy, chicory, plantain, brome grasses, red and white clover and a host of others.

“There has been a little bit lost in translation with regenerative farming coming to New Zealand.

“Growing sunflowers and other annuals is for arable farming. For animal grazing we want persisting diverse perennial pastures.”

And her Next Level Grazing clients throughout the country are proving it’s working.

“Regenerative is any type of farming that grows soil carbon. And the more soil carbon you have the more grass you will grow and we want to grow more grass each year per hectare than the year before it.”

She said farmers should monitor their pasture production per hectare and make

sure it is growing year on year. She teaches farmers how to keep track of this data on grazing plans designed to help farmers achieve optimal pasture recovery all year round and grow more grass.

Although New Zealand farmers knew to wait to graze ryegrass until it reached the three-tiller stage, she said few managed to do it, especially in the summer.

Instead, most farmers grazed pastures when ryegrass was not optimally recovered at the two or two and a half leaf stage, which was at the same time as the faster growing but less palatable brown top and fog grasses were at the four-tiller stage.

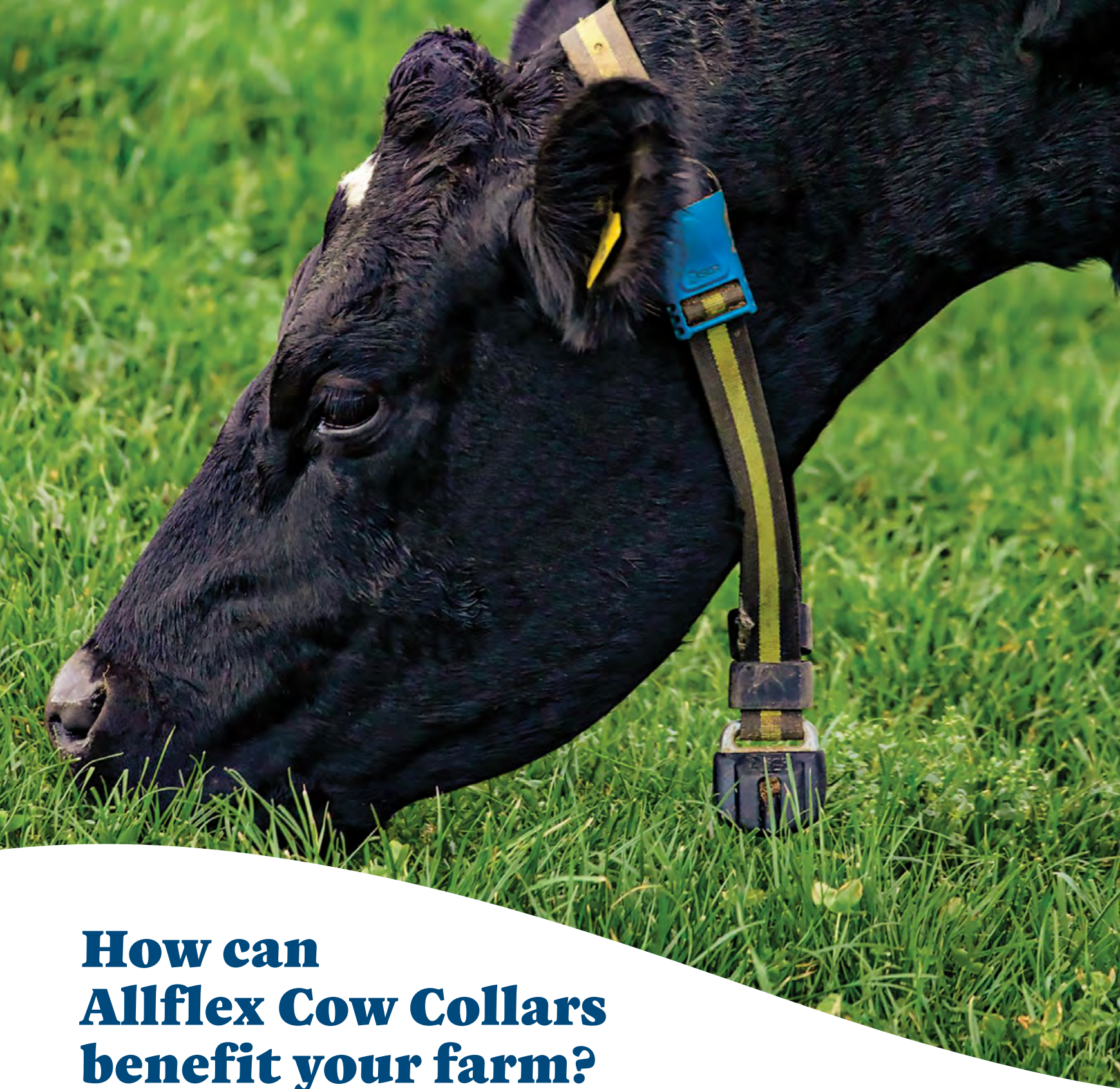
“And as we know grass grows so very quickly (that) brown top and dogstail and all the other grasses we don’t want start to dominate.”

It was one of the reasons why our ryegrasses were not persisting, she said.

As well, perennial ryegrass root structures were not good enough to hold up cattle in wet weather, especially in winter.

“And then you get mud and you damage your clovers and your ryegrass roots. A web of deep diverse roots from pasture plants including timothy and cocksfoot hold up livestock better in wet conditions.”





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Siobhan examines the leaf stage of ryegrass on the sheep farm in South Otago where she lives.

SYMBIOTIC RELATIONSHIP OF RYEGRASS

Siobhan said pure swards of ryegrass and clover is not what nature intended.

“Ryegrass likes being around other grasses. They have a symbiotic relationship, not a competitive one, and it can grow easily to the four or five leaf stage if it’s supported. Clovers are the same.

“You don’t lose clover growth because of shading.”

A mix of perennial grass and clover species also provided protection from drying winds and sun if allowed to reach optimal recovery which is just before plants put up a seed head. This keeps soils moist and cooler for longer in summer – the conditions ryegrasses like.

“We get the most solar energy from the sun at the height of summer but often our pastures are very short by then from drought and we get no benefit from it.

“Our farms are big solar energy collectors, and we have to think of them like that.”

But getting to a mixed sward, if not starting with a bag of seed, takes several years.

“If you start slowly you will get there. Don’t try to do it in one year. Mother Nature takes her time but she gets it all done.

“Start with grazing ryegrass at the three-tiller stage all year round, then the following year target the three and a half-tiller stage and then the four-tiller stage and you will start to see the difference in the pasture species coming through.

“On most farms the seeds of timothy and cocksfoot and other plants are already there. You just have to give them the recovery time and the residuals they need to grow.”

As covers lengthen, she said it was important to lengthen residuals by the same amount.

The grass left behind, if most of it is trampled, builds soil organic matter.

“I used to think it was just cow dung and urine that fed the soil but they’re just like the compost inoculant. It’s the trampled grass that is important. That’s what feeds the worms and everything else living in the soil.”

Appropriate mob sizes and shifting stock four times each 24 hours made sure all of the sward was evenly eaten, instead of fussy cows eating what they wanted. What is not eaten should be trampled if animal density is correct.

“In regenerative grazing, quality is achieved by non-selective trampling instead of high utilisation and this allows the soil biology to have a feed as well as achieving the best animal performance since the livestock gets the best quality at the tops of the plants.

“Each time of the year has an optimal recovery time for pasture. In late spring it can be between 15 days to 22 days and in March it will be about 35 to 45 days, depending on where you’re farming.”

“Don’t look at your plate meter, look at your grass. You want all of the leaves to have points before you graze it again.”

Siobhan is not against fertilisers, though she prefers fertilisers like fish and seaweed which do not damage soil biology.

“The land used to be covered in bush and we have imported to it a Eurasian ecosystem – the pasture species, the animals, even the worms and we’re still changing it.

“This country probably used to raise more kilograms of poultry per hectare than it now does in lambs.

“So we’ve got to focus on building soil carbon, top soil, to recover what productivity we’ve lost.”

“REGENERATIVE GRAZING WITH LIVESTOCK IS THE ONLY FORM OF AGRICULTURE WHICH CAN BUILD TOPSOIL ON A LANDSCAPE SCALE AND THIS CAN RESULT IN FAR BETTER ENVIRONMENTAL OUTCOMES THAN GROWING ANNUAL CROPS FOR FAKE MEAT AND MILK.”

SPREADING THE PASTORAL FARMING STORY

Worried by increasing supermarket space taken up with “fake” meat and milk in the United States, Siobhan Griffin believes New Zealand’s pastoral farming systems is the good news story that will make sure we stay a premier food producer.

The former New York State dairy farmer, and now a Next Level Grazing regenerative farming coach based in South Otago, said the way our soils sequester carbon using livestock made a joke of vegan’s claims that cows were not good for the planet.

“There is the consensus out there that cows are causing climate change, but it couldn’t be further than the truth.

“Cows grazed on regeneratively managed pastures create a deep carbon sponge underneath them in the soil.

“Green growing plants supply liquid carbon via their living roots to trade with the network of soil life including fungi who make minerals and water available

to the plants in complex symbiotic relationships.

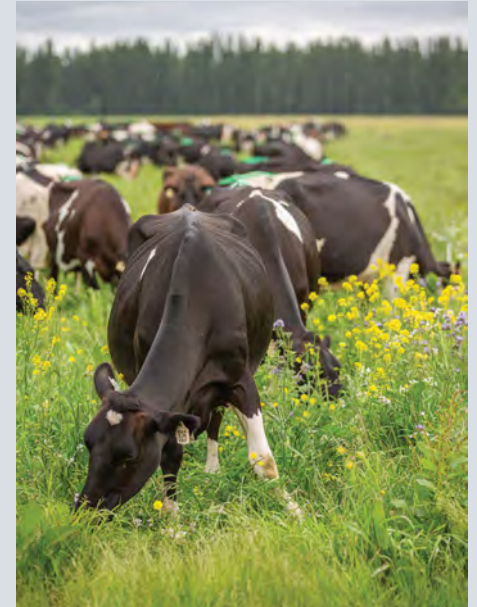
“This is how regenerative grazing can increase mineral associated soil organic matter which sequesters long lasting carbon.

“Regenerative grazing with livestock is the only form of agriculture which can build topsoil on a landscape scale and this can result in far better environmental outcomes than growing annual crops for fake meat and milk.

“Having animals grazing grasslands sucks carbon out of the air and if only half of the farms in New Zealand were regenerative it would offset all of the country’s climate change emissions.

“My farm in New York State increased soil organic matter by 0.5% per annum which worked out to be 7.54 tonnes of carbon/ha or 27 tonnes CO₂/ha. (7.54t/ha x 44/12 = 27t CO₂/ha)

“If New Zealand pastoral farmers



increased soil organic matter half that, the 7.8 million ha of grassland would sequester 105 million tonnes of CO₂ per year. New Zealand emits 81 million tonnes per year.”



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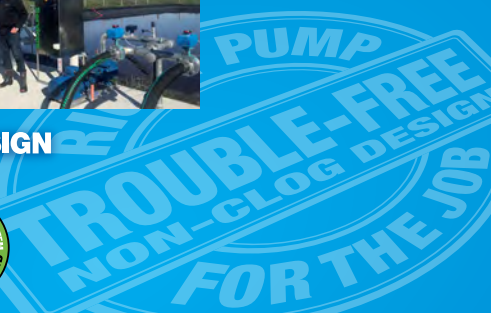
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The science-based ORGANIC ADVOCATE

Former climate change scientist turned organic vegetable grower, Dom Ferretti, says farmers can use pasture to remove carbon from the air. **Anne Hardie** reports.

You don't expect an organic vegetable grower to say there's nothing better for the soil than pasture and cows, but that's exactly what Dom Ferretti advocates.

As a former climate change scientist with a PhD who worked for NIWA on greenhouse gases (GHG) including carbon dioxide, methane and nitrous oxide, he's qualified to make that statement. He says farmers can use pasture to remove carbon from the air and store it in the soil, reduce methane emissions from their animals and also reduce nitrogen leaching.

After 12 years working on climate change issues, he now puts science into practice, using regenerative agriculture methods on an organic market garden in Nelson with his partner, Jeanette Ida. Ferretti Growers is a small business near Brightwater where they grow half a hectare of vegetables outside, plus 600m² under plastic, with most packed into weekly boxes for their regular customers.

For years they made copious amounts of compost for their soils and it cost them thousands of dollars each year, plus time to mix, load and spread it onto their gardens. Any imbalance in the compost caused an imbalance in the soil. It got them thinking about alternatives and when they learnt they could get enough nitrogen for their vegetables from cover crops, they decided to try that route. Dom says their first trial

with cover crops was a "lightbulb moment" for him that showed they could grow their vegetables with a lot less work and spend just a couple of hundred dollars a year on a mix of seeds.

Within the mix are plants with roots to open up the soil, add nitrogen and other nutrients, or produce flowers to attract beneficial insects. The positives don't stop there. There's less risk of nitrate leaching, the plants provide a stable form of nitrogen and improve the soil health, while providing the invisible benefit of sequestering carbon from the air and storing it in the soil. He says it's not just about the nitrogen and carbon though. In the soil there's the increased microbial activity and fungi networks that connect individual plants together and transfer not just nitrogen and carbon, but also water, other nutrients, minerals and trace elements.

GREAT POTENTIAL FOR PASTORAL FARMERS

It works well for an organic market garden and Dom says the potential is even greater for pastoral farmers who can make a difference in the battle against climate change. He says regenerative agriculture has the ability of increasing the soil carbon by 1% per hectare per year by sequestering



Climate change scientist turned organic vegetable grower, Dom Ferretti, in his organic garden.



IF JUST 10% OF FARMERS ACROSS THE WORLD ADOPTED REGENERATIVE AGRICULTURE PRACTICES, THEY COULD ABSORB ALL THE CARBON THAT NEEDS TO BE STORED.

A typical mix of seeds used for Dom's cover crops. Dom is an advocate of regenerative agricultural practices and encourages pasture farmers to give it a try.

it from the atmosphere and storing it in the soil.

"Grasses are so good at absorbing carbon because of their extensive root systems. That enables them to draw carbon out of the atmosphere quickly and in big quantities.

"It's the fastest way to sequester it out of the atmosphere and store it in the soil."

He says the best way of drawing that carbon from the air is to let the grass grow as long as possible – the longer round the better on dairy farms – which increases the root system in the soil. Stalky grasses are high carbon crops that are particularly good to store in the soil.

Cows enter a paddock as a herd, eat it down and trample stalks and stems into the soil which stores that carbon and feeds the soil biology below the surface.

Farmers need to keep the soil covered in pasture or crop though.

If the surface is bare, the microbes head deeper to avoid the sun, the soil surface dries out and carbon will oxidise back into the atmosphere, depleting the soil.

If just 10% of farmers across the world adopted regenerative agriculture

practices, Dom says they could absorb all the carbon that needs to be stored. New Zealand farmers, with their pasture-based agriculture, only need to tweak their systems to do their part.

"We're in a pretty unique position as a country to make major changes."

But he acknowledges it is a mind shift for farming and help is needed from the Government to fund New Zealand, research, workshops and seminars to show farmers how it can be done and the results. He says there is plenty of research with proven results in North America and Europe.

Storing carbon in the soil has benefits that go beyond climate change. For every percent of carbon stored in the soil, Dom says the topsoil will store another couple of hundred litres of water.

"You've got a longer stand of grass and root system which stops water running off. If you've got a drought, you've got that extra water held in the topsoil so pastures keep going longer."

Storing extra water reduces leaching and runoff, which for dairy pasture means more nitrogen is held in the soil profile rather than leaching into the water table.

In the market garden, they are replanting with cover crops as soon as vegetables are harvested to stop the soil drying out and also stop weeds taking over. Next, they plan to work out ways of interplanting rows of vegetables with green cover crops to keep down weeds and actively feed the soil biology while simultaneously cropping. Basically a path of living mulch.

Pastoral farming gets the same benefits. As well as storing carbon and reducing leaching, Dom says growing a diverse mix of grasses and legumes to a decent length and time is simply good for the soil.

The longer the grass the better as that increases activity below ground and more decaying plant matter becomes food for the microbes, worms and everything from beetles to slaters and centipedes.

Grazing itself is one of the best practices for the soil as manure and urine add beneficial microbes and the process of trampling forces biomass into the soil to feed its living food web.

"In a forest, the leaf litter layer between the soil and mulch teems with life. Properly managed pasture can achieve similar results."

LOVING THE LEGUMES

A broad mix of plants also reduces the fertiliser bill as he has discovered for their organic vegetables.

“The first thing for me was you can get enough nitrogen into the soil through legumes, so I don’t need to make mountains of compost. For farmers, you can get that nitrogen into the soil through clovers and other legumes. There are so many different types of clovers. The second realisation for myself, which is just as applicable to pasture farmers, is that you don’t need as many inputs when the microbial activity is more diverse and is functioning in a better way. They’re accessing a wider web of nutrients in the soil that plant roots can’t get on their own and they are making it available to the plants. They’re working in a symbiotic relationship and partnering up, they can bring in more water, more nutrients and minerals so the resulting growth is better.”

Spraying a paddock out to plant a crop destroys much of that activity in the soil. He says it kills microbial activity, especially when it’s a systemic spray that travels down the roots of the plant where microbes and bugs feed.

“After spraying with glyphosate, the little guys come in to feed on the dead material and get a big hit on their populations.”

With fodder crops, he says those crops would benefit from other plants planted with them because of the benefits to the soil and also to reduce pests.

“Whenever you have a monoculture you have a great magnet for whatever pest likes that crop to come and have a massive party and invite all its friends.”

When it comes to methane belched into the atmosphere from cows, Dom says regenerative agriculture can reduce the amount of methane produced. In his time with NIWA, he worked on the development of instruments to measure methane from animals. Though he now thinks that was tackling the wrong end of

the stick because we should be researching what goes into the cow’s diet.

Methane, he says, is a waste product of ruminant digestion and if the gut bio doesn’t have the right microbes or doesn’t have big healthy populations of them, the gut won’t be able to digest that food well.

Ruminants were designed to eat a varied diet in the wild, he points out. A varied diet leads to a healthy population of bacteria in the gut and therefore better digestion to absorb more minerals and goodies out of the food that bodies need.

“We just need to put more grasses that already exist into their diet - a little tweak and a tune -and we won’t have so much of a problem. We could still have cows roaming around emitting lots of methane and it actually wouldn’t matter that much if we had healthy soils absorbing carbon through regenerative agriculture practices because the large farmed areas would soak up so much carbon into the soils.”

A mix of plants in the diet is the equivalent of ‘five a day’ of fruit and vegetables, he says, that provide different compounds, minerals and oils that are nature’s medicines.

“Animals respond well, you don’t need as many chemicals or fertilisers and farmers and stock lead happier lives.”

The reason methane is such a big deal in New Zealand is because of high stocking numbers, the use of herbicides, monoculture crops and tillage which he says results in a net carbon source to the atmosphere. Those practices also mean the soils aren’t thriving, he says.

If more farmers could switch to regenerative agriculture, soils wouldn’t lose as much carbon and it would start going back into the soil.

Again, he says it’s a mind shift for farmers to move toward regenerative agriculture though. Which is why he suggests farmers try regenerative planting methods on just one paddock of their farm. He says all they need is a good mix of pasture species with different root systems to direct drill into existing pasture.



Love that smell. Dom says that if the soil is healthy, it will give off a good aroma.



A mix of plant species in cover crops benefits the soil.

“We all need to be aware of the important role plants and soil have in affecting climate change. We can capture carbon in the soil and keep it there. The soil can literally save us. This is our chance to stop major climate change and clean up our waterways. Rather than being blamed for the problem, farmers can actually be our heroes.”

He says there are now groups being set up to support farmers wanting to know more about regenerative agriculture. He also suggests interested farmers look online for podcasts, documentaries and short films to get them started.

