



Good structure was vital to “hold and house” soil biology which itself needed a healthy balance of bacteria and fungi.

Roadshow plays to thousands

BY: ANDREW SWALLOW

Like it or loathe it, the term regenerative agriculture has gained quite a following in the past couple of years. Two advocates of its principles, Jono Frew and Peter Barrett, completed a 27-venue tour of New Zealand travelling from Hokianga to Invercargill in a couple of campervans this winter, relaying their experiences and views to audiences of up to 250 people.

They say they did the tour to “help farmers learn that there is a mindset that empowers them to save money and be more profitable. It involves becoming more aware of the implications of our actions on soil microbiology.”

Building soil health is at the heart of what they believe and more active life in soil makes farms more resilient.

Frew kicked off each seminar relaying how he’d come to be a regenerative agriculture coach following a conventional farming then agchem specialist career, before outlining what he now sees as serious shortcomings in many common farming practices.

Soil tests using aggregated samples

from the top 7.5 or 15cm were first in his sights. Those sample depths might be appropriate for ryegrass and white clover, but the diverse pasture and crop mixes used in regenerative systems draw nutrients across a much wider profile. Also, tests such as Olsen P only provide a snapshot of phosphate already in plant available, soluble form, not the reserves which healthy plant roots and associated mycorrhizal fungi might access, he said.

That accounts for why he and farmers such as Peter Barrett see pastures and crops perform well without fertiliser even on soils with nutrient test results well below the “optimum” levels indicated on standard reports.

Monitoring plant health through herbage analysis, and not just for the macronutrients N, P, K and S, is his preferred approach.

“We need to start to think beyond just macro nutrients.”

Soil cation exchange capacity (CEC) was useful because it showed how much nutrient a soil could hold, and to determine the ideal ratio of calcium to magnesium. For example, a soil with a CEC of 15 ideally the ratio should about 7 to 1 he said.



Peter Barrett of Linnburn Station speaking in Timaru this winter.

“Too much magnesium and you end up with concrete slabs. Too much calcium and the soil’s too fluffy.”

Carbon or organic matter content of the soil was also a key metric because every 1% increase in carbon allowed a soil to hold another 145,000 to 160,000 litres of water*, and it improved structure.

Good structure was vital to “hold and house” soil biology which itself needed a healthy balance of bacteria and fungi, ideally in the order of one to one, he said.

If bacteria dominated, soil would be too fine and compacted. Bacterial dominance was often a symptom of nitrogen fertiliser use and soil would smell bad as a result.

“If you apply nitrogen to the soil, the bacteria go nuts.”

However, some bacteria, including those in root nodules of leguminous plants, fix

False science

BY: DR DOUG EDMEADES

Regenerative Agriculture is pseudo-science – false science. Its deception lies in using the language of science without the substance of science – evidence. Its very name is deceptive because ‘Regenerative Agriculture’ implies conventional agriculture farming is degenerative. It rides on a worldwide wave of negativity that asserts that we – humans – are destroying our planet.

But stand back and look at the big picture.

If conventional agriculture is degenerative how come agricultural production continues to increase. Google “Our World in Data”. Pick any crop and any country and the same picture emerges – agricultural production increases year on year. The evidence does not support the suggestion that our soils are degenerating.

RA enthusiasts make a big deal of the benefits of RA on soil quality and health, with a major emphasis on soil biology, and suggest conventional agriculture is having a negative effect on soil quality/health? What does the evidence tell us?



New Zealand soil scientists got together over two decades ago and came up with a minimum set of soil tests which collectively describe soil quality. Seven tests were identified: three which measured the soil biological activity, two which measured soil chemistry, and two that measured soil physical quality. Target ranges were defined for each.


These tests have been used in nationwide surveys (in 2014 and again in 2017) of across all land use sectors (agriculture, horticulture and forestry) in NZ and indicate, with some exceptions, that our NZ soils are in good heart especially in terms of soil biology!

They also make some outrageous claims about fertiliser. They claim, contrary to the scientific evidence, that chemical fertilisers, especially superphosphate and urea, kill the soil biology, making the soil sterile. In any case, they argue soluble fertiliser are



Dr Doug Edmeades.

not required because RA practices feed the soil biology and thus unlock otherwise unavailable nutrients, and especially P, from the soil reserves. Once again this is not supported by science.

Sometimes science must be asserted. As Charles Darwin put it: sometimes to kill an error is as good a service as, and sometimes even better than, the establishing of a new truth or fact. 

• *Dr Edmeades is an independent soil scientist and consultant.*

nitrogen from air and convert it to plant-available ammonia so they're not all bad, hence the need for balance.

Fungi give soil more structure, and feed off more complex carbon compounds than bacteria. In the case of mycorrhizal fungi, they act as “the internet of the soil”, allowing the roots of plants coated in them to reach nutrients from vast areas - reaching nutrients kilometres away he said.

However, not all plants benefitted from mycorrhizal fungal associations, including brassicas which was why monocultures of them were so dependent on fertiliser for high yield and got hammered by insects.

Cultivations, herbicides, fungicides and some fertilisers all damaged mycorrhizal networks – “super and DAP burn these guys on contact; they absolutely nuke

them,” he noted – but whatever was done to destroy them, given the right soil conditions they'd always come back.

Healthy mycorrhizal fungal populations were why growers such as Barrett were producing mixed forage stands yielding more than 10 tonnes drymatter (DM)/ha with no fertiliser despite soil tests indicating some macronutrients were deficient, he added.

Growing diverse mixes of plants helped build soil biology and structure because each plant species released a unique combination of root exudates so would favour different strains of fungi and bacteria. Similarly, the range of root structures across species, from deep, sub-soil fracturing tap roots to more fibrous shallow roots, could enhance soil structure

and resilience of crops to drought.

Frew said diverse stands of forage also boosted stock performance.

“Cows ate less drymatter and yet their production increased: we don't usually see that in March,” he said, showing a video clip of dairy cows grazing a 35-species mix near the Rangitata.

The mix had been direct-drilled into a compacted, poorly producing grass paddock yet within six months it had increased soil organic matter by half a percentage point, as well as producing a spectacular above ground stand, he said.

Species diversity also built resilience into the system, such that when conditions didn't favour one species, there would be others that would benefit, and the feed

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grown didn't have a tight use-by window.

"These crops stand there waiting for when you need them!"

Short, high stock density grazing was the key to using such feeds and some loss to trampling was good because it helped spread cows' weight, reducing soil compaction and raindrop or sunlight damage to soil surface structure and biology. Longer residuals also meant less interruption of growth.

"In a perennial stand, you want them to just eat the top: eat a third, trample a third, and leave a third to still capture sunlight. When we leave a bit behind, we can just keep on growing," Frew said.

'Too much magnesium and you end up with concrete slabs. Too much calcium and the soil's too fluffy.'

That continued growth was particularly important underground: remove too much above ground by grazing or cutting and roots not only stopped growing, but they stopped feeding the soil biota that was essential to gathering nutrients and supplying them to the plant, so the whole system suffered.

Surface litter from trampling helped prevent run-off and aided infiltration of rain or irrigation, he added. Infiltration rate could be checked by banging a wide-bore pipe – drain-pipe or wider – into the soil then filling the top to a set depth, typically an inch, and timing how long it took to soak in. He said he'd seen an inch of water disappear in seconds on undamaged soils but still be there hours later on others in need of remediation.

Traditionally, remediation meant coming

in with cultivators to remove compaction but direct-drilled deep tap-rooted plants and certain species of worms could do the same thing, enhancing soil structure and biology rather than bashing it to bits.

Barrett, who has been direct-drilling mixes of dozens of species of forage plants to renovate grazing land at Linnburn Station, Central Otago, told the meeting that approach was succeeding where conventional had failed, and he could do three or four times the area for the same cost.

"We can do 850 to 1000ha with what we used to spend on 250ha."

Sometimes it would take two seasons of mixed annual cover crops to get the soil biology going and crops pumping but it would get there and when it did, a diverse mix of annuals plus perennials was sown so the latter gradually took over to provide a long-term productive pasture of diverse grasses, lucerne, clovers and herbs.

His mixes typically include 20 to 60 species, with at least one from each of five key plant types: grasses, legumes, brassicas, cereals, and chenopods. It had been a process of trial and error working out what worked best.

"We've done 5000ha of this now and we have probably made more mistakes than anyone else in NZ whilst also having the most success!"

However, in Maniototo's often dry summers, such mixes meant he could now build a reserve of standing feed that would stay green long after surrounding grassland had gone grey, and could be used at any point from December through to the following winter.

Since he started with such mixes in 2014, capital stock numbers have remained constant and trading stock has been introduced into the system to use the extra feed to be utilised.

BARRETT'S BACKGROUND

Raised in Wellington, Peter Barrett's the son of a dentist and took on the family owned property in 2012 having run campervan businesses here and in the United States. The station had been run by managers since 1986 when his grandfather died and, as he puts it, with sheep farming not printing cash during that time maintenance of assets had not been proactive and the "asset needed a lot of love." Pastures needed to be renewed, fences repaired or replaced, houses tidied up.

Initially he followed standard spray-cultivate-drill advice to establish crops and renew pastures but when a ryegrass and clover reseed failed and a fertiliser rep advised him just to do the same again, he thought there had to be a better way.

In 2013 independent soil specialist Graham Shepherd came to Linnburn and taught the staff how they could assess all 200 paddocks on the station and Barrett analysed the results, grouping them into 10 areas.

"I'm big on spread sheets and collecting data."


Earthworms were poor in numbers, which was "a little alarming", so Barrett started searching the internet and sought the advice of US cover crop specialist Gabe Brown.

"He said stop sending your money to town: don't soil test, cultivate or use fertiliser; get extremely diverse seed mixes and put them in the ground!"

And that was Barrett's "if nothing else" advice to his audience: don't get bogged down in the detail of soil food webs and carbon cycles; just break the monocrop, fertiliser-dependent system on a small area of the farm by sowing a diverse species mix and go from there.

"You will learn as you go."

"At Linnburn we have reduced our fertiliser spend hugely and we have more green drymatter than ever, and in places we never did, and we have more birds and worms."

"We are far from perfect [and] we have a long way to go but we are now resilient. We do not need to keep introducing inputs to maintain production." 



Cattle amid a mixed stand of annual species on Linnburn Station.



Crisis? What crisis?

Another soil scientist's view on regenerative rhetoric. By **Andrew Swallow**.

Farmers experimenting with regenerative agriculture may find new systems and benefits, but beware associated sales pitches, unsubstantiated claims, and rhetoric rubbishing established practice that's been proven by sound science, Lincoln University Professor of Biogeochemistry, Leo Condrón says.

"My problem with regenerative agriculture is it is being advanced by painting a picture of a crisis that doesn't exist in my opinion," he told *Country-Wide* having read the report on p72 of this issue from one of Jono Frew and Peter Barrett's Regenerative Agriculture Roadshows.

"It is being promoted as if there's a massive systemic problem that we've got to fix, which I don't agree with at all and it's certainly not a crisis."

That said, Condrón adds that it is widely acknowledged that there are ongoing and emerging issues associated with use and management of soil in New Zealand that do need to be addressed, including erosion of hill country, loss of high quality land to urban development, conservation and protection of intensively managed lowland

soils, and reduction and control of nutrient transfer from land to water.

Some practices promoted as regenerative are simply existing knowledge repackaged, such as use of minimum tillage to reduce loss of moisture, organic matter, and soil structure, he notes. The possible advantages of others, such as using highly diverse forage mixes, are unproven, while the claimed benefits of establishing and maintaining certain cation ratios have no sound scientific basis.

Cation exchange capacity is the ability of soil to retain and release cations and is a useful measure of soil fertility, but the main driver for that, and many other soil properties and processes, is organic matter, not cation ratios, he says.

Consequently, adequate soil organic matter is absolutely imperative for healthy, fertile soil, and many of the anecdotal benefits of regenerative agriculture relate to the adoption of practices designed to increase soil organic matter content. But increasing organic matter content of agricultural soil without drastically changing land-use is challenging, as is accurate measurement of changes in soil

organic matter content over time.

With regard to soil biology, bacteria and fungi account for over 95% of soil organisms and their activities are governed by the supply of energy in the form of organic carbon from plant photosynthesis, which in turn is determined by the quantity and quality of organic matter inputs to soil.

Some practices promoted as regenerative are simply existing knowledge repackaged.

There is no evidence that nitrogen fertilisers 'make soil bacteria go nuts', as Frew put it, and even if they did, that wouldn't necessarily be a bad thing. It would simply be a consequence of more vigorous plant growth releasing more carbon into the soil in plant matter and root exudates, and probably via urine and dung too, resulting in a more abundant

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soil biology, including bacteria.

As for superphosphate ‘nuking’ soil biota, while there is some damage in the immediate vicinity of a fertiliser granule during dissolution, the scale of any effect needs to be taken into account.

Applied at 100-200kg/ha, superphosphate granules contact a minute proportion of the 750 to 1000t/ha of topsoil there is in the top 7.5cm and any damage caused to bacteria, fungi or other soil organisms will be minor compared to benefits from subsequent enhanced plant growth.

Research has shown that annual applications of up to 376kg/ha of superphosphate to a grazed pasture for over 60 years significantly enhanced soil biological activity, Condrón says.

Scale is also key to understanding the likely impact of adding specific bacteria or fungi to soil as so-called “bio-stimulants”. Given that a hectare of soil may contain up to 15 tonnes of organisms including more than 100,000 different species of bacteria and fungi, Condrón says it is difficult to envisage that the application of small quantities of bacteria or fungi will have any effect on the biological cycling and availability of nutrients. In fact, extensive research has shown that the application of commercial preparations of “plant growth promoting” and “phosphate-solubilising” bacteria have no significant impact on plant growth under field conditions.

Research has shown that annual applications of up to 376kg/ha of superphosphate to a grazed pasture for over 60 years significantly enhanced soil biological activity.

Mycorrhizal fungi do play an important role in plant nutrition but many species are already present in agricultural soils and while introducing new species may be beneficial for some novel plants, this is usually done via inoculation of seeds rather than by field application, he notes.

Condrón also questions whether humic acid or humate applications can make any difference to biological activity on a field scale. Humic substances, including humic acid and fulvic acid, make up over half the organic matter in soils naturally, hence



Worms in top soil.

a typical New Zealand topsoil of 750-1000t/ha at 10% organic matter already contains up to 50t of humic substances per hectare. Accordingly, it is very difficult to understand how applying small quantities of humate or humic acid preparations can make any significant difference to properties and processes associated with naturally occurring humic substances, and that’s backed up by the limited field research reported to date, he adds.

Limitations of soil tests is one area where Condrón echoes Frew to some extent. Tests mainly reflect how soil chemical properties and processes influence nutrient solubility, which is appropriate for calcium, magnesium, and potassium where availability of the nutrient to plants is principally controlled by chemistry, he explains. However, more than 90% of the nitrogen and sulphur in soil is chemically bonded to carbon in organic matter (“organic nitrogen”, “organic sulphur”) and not immediately available to plants. Similarly, about 50% of total phosphorus is bonded to carbon (“organic phosphorus”).

These nutrients are released or “mineralised” from organic matter by bacterial, fungal and plant enzymes cleaving the carbon-nutrient bonds, hence Olsen P tests and sulphate-S tests do not adequately reflect the role of soil biological processes in determining potential plant availability, though a soil test using an extended incubation period is available, at a price, to measure the potential for a soil to release nitrogen from organic matter.

Condrón notes that reducing or eliminating mineral fertilisers appears to be a common strategy in regenerative agriculture but continued nutrient input

is necessary in any sustainable agricultural system to replace nutrients removed in produce, he stresses.

That said, improving nutrient use efficiency and tightening nutrient cycles in agricultural systems is an ongoing objective of vast amounts of research worldwide in order to minimise environmental impacts and conserve finite non-renewable resources, especially phosphate rock.


“Overall utilisation of fertiliser nutrients in agriculture is very low. For example, only 10-30% of the phosphorus in fertiliser will be utilised by plants in the growing season following application.”

Most of it accumulates in the soil as stable forms of mineral phosphate and organic phosphorus, so-called “legacy P”. Similarly there are accumulated reserves of organic nitrogen and sulphur in many soils.

Research to access those reserves mainly focuses on using existing agricultural and novel plant species, plus their associated microorganisms (mycorrhizae etc), in various crop rotations and grassland systems, including intercropping, use of cover crops, and/or green manures.

Hence it is possible that increasing the diversity of plants in grazed pasture systems, as the regenerative advocates suggest, may enhance mobilisation of legacy soil P and reduce maintenance phosphorus fertiliser requirements, he says.

Whatever the drivers, scientifically sound, independent research into claims made by proponents of regenerative agriculture is desperately needed.

“We need hard, empirical data on what are the upsides and downside of these approaches,” he concludes. 



The classic farm discussion group pasture topics are when to graze, for how long and when to spell it and that's for only several species.

Regen ag's up to 40 species too many

BY: JOANNA GRIGG

Higher legume content in any pasture must be the goal.

But adding a plethora of herbs, legumes, flowers or vegetables all together is not the answer, Dr Derrick Moot, Professor of Plant Science, Lincoln University says.

Like kids eating every jelly bean except the black ones, stock favouritism means the tastier legumes disappear first. Next to follow are those less able to compete for light and nutrients, or those annuals not managed for reproduction.

Farmers considering following the Government's push for embracing Regenerative Agriculture and its suggestion for sowing up to 40 species in one pasture,

in a "suck and see" approach, should consider how that might work in reality.

Moot suggests farmers carefully consider the species mix in a permanent sward and how they need to plan to maintain the composition and quality over time. High legume content is the king for sheep and cattle growth and lactation.

Research shows that perennial ryegrass and plantain will dominate at the expense of white clover over time, especially with nitrogen fertiliser (Myint, Wood, Black, Lincoln University, 2019). Research on dairy farms shows optimal milk production occurring when pastures contain 40% legumes (Cosgrove, 2005).

Moot is concerned that farmers who follow blanket recommendations for very high levels of pasture diversity without a clear focus on what species and why, nor

good science around how to manage them for a particular purpose, may emerge from the experience disappointed.

Regenerative Agriculture has at its core a message of diversity of pasture species. Its emerging popularity follows unsustainable monoculture practices (namely cereal crops) in Australia and North America, which can use up soil nitrogen and organic matter.

In a letter to Agriculture Minister Damian O'Connor, May 2020, Dr Moot and Dr Warwick Scott (retired Senior Lecturer in Plant Science) said they support several aspects of conventional agriculture that are promoted within Regenerative Agriculture.

"Practices such as rotational grazing, high quality leafy legume based pastures, direct drilling, overcoming nutrient deficiencies, and landscape farming to provide ecosystem services."

But they also believe that the scientific principles underpinning New Zealand's current agricultural systems are in danger of being devalued by a system that they see as having several serious shortcomings.

In particular, Moot describes the promotion of pasture mixes of up to 40 species as of no benefit to farmers.

"In parts of Europe farmers get paid for the number of different species they grow in a sward and that sward may never be grazed by an animal. It's a completely different set of drivers here in New Zealand."

Farmers in NZ have existing systems to graze and maintain a three-way grass, legume and herb mix successfully. They can maintain a legume-dominant system through lucerne stands, red and white clover with plantain, or a subterranean clover and grass combination, depending on their environment.

Moot queries the need to complicate it further with more species and a range of cultivars with different flowering dates and growth activity.

"Ecological principles show that it is virtually impossible to maintain beyond a year or two, as competition for light and nutrients causes extensive self thinning.

"Our own research shows that no more than three (grass, legume, herbs) make up over ninety percent, regardless of the number sown.

"In irrigated and high rainfall environments, no matter what we start

with we end up with mainly ryegrass with about twenty percent legume, even if we look after it. Ryegrass catches the light and handles the grazing, so dominates.”

LARGE RESIDUALS

Moot queries encouraging large pasture residuals and then drilling into these because excessive vegetation can block coulters. Moist areas with thatch would be prone to slugs and springtails, increasing the chance of establishment failure from insect damage. Crushing machinery may be appropriate on dry stony soils but could cause compaction on moist heavier soils, he said.

Direct drilling is certainly advocated wherever possible to maintain soil structure and minimise loss of soil carbon. At times, however, full cultivation is required to prepare an adequate seedbed.

Regenerative Agriculture endorses talk about the importance of spelling pasture as if it’s something new, Moot said.

“Ask a New Zealand hill country farmer and they will tell you how they graze blocks hard at some times of the year and at other times let seeds regenerate, particularly in dryland environments.”

Many of the principles of Regenerative Agriculture are not new here and do promote best management practice.

“Our dairy grazing has always embraced rotational grazing with pre and post heights balancing pasture growth and quality.”

Minimizing set-stocking in sheep and beef systems is also advocated as best



Get reacquainted with a sward stick and tried-and-true rotational grazing strategies rather than looking for species-mix silver bullets. Ideally keep pastures between 1500 to 3000 kilograms of drymatter per hectare.

management practice and is actually the basis of the lucerne grazing system Lincoln University developed for dryland regions, Moot said.

Leaving higher residuals at every grazing lowers pasture quality but it can be used when necessary to retain moisture and aid recovery after drought. Moot recommends farmers concentrate on appropriate grazing management for their pastures in their system rather than follow a one-size-fits-all approach.

Recent work by Dr Alistair Black is revisiting plant trials last done in the 1960s and 1970s. The research is taking dry matter measurements from 270 different plots, with pastures ranging from single species swards through to mixes of up to six different species.

“We are looking for combinations of species that over-yield – in other words give a better growth output than they do singularly,” Moot said.

“We found this with a grass, clover and herb mix – ryegrass, plantain and clover giving a synergy of growth and quality.”

YE OLDE GRAZING LAWS

Go back 10 years to when sward sticks were handed out by seed agents and farmers were posted pasture quality guides from the newly rebranded Beef + Lamb NZ. These pasture quality resources showed what 20%, 40% and 60% legume content looked like in a mixed sward pasture.

Dr Derrick Moot, Lincoln University, would like farmers to pull these resources out again and use them.

“It’s our grazing management that is key to growing quality meat and wool as well as profitability and sustainable soil management.

“It is about building and maintaining dry matter and quality, not all about the number of species in the mix.”

The ideal pasture height for stock performance and for protecting soils, and your bank balance, is 1500 to 3000 kilograms of dry matter, he said.

This pasture height is also safer for parasite larvae intake. He admits it is not possible to achieve this all year round but it should be the target.

“Sheep and beef farmers must refocus on good pasture management, not get distracted by faith-based silver bullet solutions.”

He said set-stocking should be avoided.

Plants should not be grazed continually beyond their critical leaf index area if you want production – in other words, not to the boards time and time again. Once plant green leaf drops below three m² of leaf per m² of ground it is suboptimal for light interception and water use efficiency. He said rotational grazing followed by a spelling period is a conventional idea, but needs to be revisited by some farmers.

“Don’t be afraid to mob stock ewes and lambs to create feed ahead of them.”

Do this with lucerne when lambs are about three weeks of age, he said. This gives the benefits of rotational grazing, followed by a single spell during flowering to build root reserves.

Soil fertility is not enhanced by adding microbes, he said. Rather, add sulphur as this is particularly important for legumes and is used up over time, becoming in short in most hill country environments.

“Soil is a jungle of many microbes, mostly on the point of extermination due to shortage of moisture. After moisture, the numbers take off.”

He points farmers towards the Lincoln University Dryland Farming page and the Beef + Lamb NZ Knowledge Hub as good places to sharpen up on grazing management.

LOWER STOCKING RATE LINKED WITH LOWER PROFITS

A study in Australia* examined the findings of a National Environmental Science Programme report “Graziers with better profitability, biodiversity and wellbeing” by Ogilvy, Gardiner, et al.

The original report concluded that a cohort of Regenerative Agriculture graziers were more profitable. The study concluded that this analysis was inappropriate as a measure of profitability and that the cohort were less profitable over 10 years (2007-2016) with return on investment of 1.66% compared with 4.22% for graziers who said they did not practice Regenerative Agriculture.

This was most closely linked to differences in stocking rates. The study notes that there was no quantifying of environmental differences, which would have been highly valued.

*Regenerative Agriculture – Counting the Costs, John Francis, Holmes Sackett consultancy, Australian Farm Institute, May 2020.





NZ pastures already supported large quantities of soil carbon and soil organisms.

Scientists call out regen ag

An emerging interest in regenerative agriculture (RA) is questioning the validity of NZ's farming systems. The claims have prompted some of NZ's leading scientists to publish a report in the New Zealand Institute of Agricultural and Horticultural Science magazine *AgScience*, to try and sort out the nature and legitimacy of statements made by RA supporters. **Jo Cullance** took a look at the report.

The report says New Zealand has world-leading 'new generation' pastoral production systems, backed by a dedicated team of scientists, agronomists and breeders.

The science behind the systems was not bound by belief or dogma. It evolved, and scientists are obligated to adopt 'better' practices whether they be organic, regenerative, conventional, gene editing or genetic engineering.

ORIGINS OF REGENERATIVE AG

Retired scientists Dr Warwick Scott and Dr Derek Wilson investigated the origins of RA to see how, or if, the factors that helped foster this system are applicable to NZ.

RA originated in the United States in response to soils becoming damaged, in particular on land that was used for exhaustive cropping in unsuitable situations with little or no livestock farming. This flawed practice resulted in the creation of the dustbowl of the 1930s,

when huge quantities of degraded soils were lost by wind blow.

RA then spread to Australia where poor soils with low fertility were cropped exhaustively, resulting in degradation.

In contrast, NZ soils are not degenerated and claims they need rescuing are misplaced. It was accepted there had been some ill-advised cases of land use and intensification in NZ. Professor Leo Condron said the extent and degree of significant soil degradation in NZ



NZ soils are not degenerated and claims they need rescuing are misplaced.

was limited to small areas that had been subjected to long-term intensive production of crops such as potatoes, onions, and seasonal vegetables (market gardening).

Managed agroecosystems in NZ were mainly permanent stocking or rotational grazed pasture used for milk, meat and fibre production. This land use had been shown to maintain high quantities of soil organic matter. Equally, most arable crops in NZ were grown in rotation with grassland, which effectively maintained soil organic matter and soil health.

Many aspects of RA echoed best-management practice. For example, the balanced management of nutrient

inputs and outputs to minimise adverse environmental impacts, the use of direct drills to minimise tillage and place seeds and fertiliser precisely, the integration of animals in farm systems, rotational grazing and management of existing vegetation to optimise plant establishment and minimise the impacts of pests and diseases. Like with RA, these elements had the objective of looking after the soil and the environment.

The distinction from RA was the established practices were based on sound evidence and value propositions resulting from peer-reviewed research. In contrast, RA was without critical scrutiny of its relevance, evaluations of its likely benefits,

or an understanding of the science that underpinned the systems to which it was being applied.

SOIL HEALTH AND ORGANIC MATTER

RA focused on the improvement of 'soil health', and suggested importing organic matter in the form of compost or biochar as a way to increase soil organic matter and improve soil health. The practicality and impact of doing this at the required scale was unknown.

Professor Condron said understanding of the composition and extent of soil biodiversity and how it affected ecosystem function and productivity was still limited. Extensive field trials of various bio-stimulants designed to improve plant growth and sustainability by altering the composition and activity of soil microorganisms, had in most cases shown no significant impact on plant growth and soil biology under field conditions.

SOIL NUTRIENTS

If plants are harvested (by machine or animal) and removed, the fact is eventually soil nutrients would be depleted. At some point externally sourced nutrients would need to be applied to sustain the soil's life-supporting capacity.

RA supporters promote the base-cation saturation ratio (BCSR) approach to soil nutrient testing. This theory involved adjusting the ratio of calcium (Ca), magnesium (Mg) and potassium (K) to feed the soil and let the soil feed the plants. This theory suggested balance was important and balance determined soil quality, plant health, and plant growth. The competing theory held that ratios were irrelevant and plant growth was determined by the minimum quantity of the nutrient present, which determined plant growth. A review of the BCSR ratio in America concluded "continued promotion of the BCSR ratio would result in inefficient use of resources in agriculture and horticulture".

RA supporters disliked synthetic fertiliser, believing it to be both unnecessary and causing harm. Science proved soil contained many more essential nutrients than traditional soil tests taken to assess soil fertility show, however only about 10% of the total nutrients measured are plant 'available'. In New Zealand scientists



Most arable crops in NZ were grown in rotation with grassland, which effectively maintained soil organic matter and soil health.

have calibrated soil tests for pH, P, K, S and Mg against plant response to indicate the amount of external nutrient input needed. Fertiliser application followed the 4R principles – right rate, right place, right time and right form.

Dr Doug Edmeades said over the years, various iterations of the New Zealand Government’s agriculture ministry had developed a soil-testing system suited to our soils and confirmed the ‘overcoming limitations’ approach for plant yield that formed the foundation of the MAF soil advisory service.

Dr Ants Roberts said soil biology played an important role in soil function but was bound by a First Law of Thermodynamics-like situation. For example, energy can neither be created nor destroyed, but can change form. This meant soil biology cannot create mineral nutrients, but can change the form of the nutrients, which affected plant availability. This indicated no matter how numerous, active and diverse species of plants were grown in harmony, this would not create new nutrients.

PASTURE SEED AND MANAGEMENT

Associate Professor Kerry Harrington said it was difficult to determine whether RA farming in NZ would increase, maintain, or reduce the NZ weed problem. Though given the multi-species use recommendations it seemed likely weeds would increase. Glyphosate was commonly used to control weeds and RA allowed for some use, but had it mixed with other things such as fish and fulvic acid to reduce the rate. This was against all research recommendations, reduced effectiveness and might lead to a build-up of resistance to glyphosate, he said.

Multi-species pasture mixtures and grazing less tightly than in conventional agriculture was similar to herbal ley management in organic agriculture. But unless sowing rates were kept low, only the most aggressive species survived. This meant complexity was reduced and money wasted on failed species. If sowing rates were kept low enough to allow some of the more useful species to establish, weeds would also establish. There were many weeds animals did not eat, especially under

low grazing pressure. In addition, most of the chosen pasture mixtures did not persist for as long as perennial ryegrass and white clover swards.

NZ agriculture was already embracing a move towards biodiversity by retiring land on steep slopes and in riparian zones, and by establishing native plants in these sensitive areas.

PASTURE SEED PRODUCTION

Regenerative agriculture in New Zealand offered farmers a straightforward approach to getting started. 1. Do not overthink, keep it simple. 2. Find a paddock that you wish to improve. 3. Get a seed mix for the paddock. 4. Plant the seed, watch it grow, and learn.

Though empowering for the individual, these rules ignored the rigour of testing and review, learned by science. The huge range of variables in farm systems (for example, topography, soil type, paddock history, between seasons in rainfall, temperature, stock type, previous diet, soil moisture and so on), meant that any effects observed could seldom be isolated

and attributed to the seed mix. Dr Colin Eady and Courtney Inch said farmers, like many people, make anecdotal comments linking cause and effect of one variable, which could lead to erroneous conclusions.

Planting more than 40 species mixtures to increase diversity and improve soil structure raised four issues for the NZ seed industry. The first was sourcing, producing, and supplying complex seed mixtures in an inherently inefficient process that would probably result in a serious cost premium, with increased costs in infrastructure requirement, inventory storage and seed mixing. Importing multiple species would increase the biosecurity risk, and growing such diverse species risked cross-pollination and contaminating premium export brassica vegetable seed.

Second, most of the species mixtures proposed were not native, so any diversity increase would not at least on one level be natural in NZ.

Third, NZ pastures already supported large quantities of soil carbon and soil organisms.

Finally, research by Lincoln University scientists had shown optimal pasture production, feed quality and animal performance results were achieved with a well-grazed, simple but multi-species mix of grass, legume and herb.

Eady and Inch wrote farmers had a choice, a complex multi-species mix based on a 'do not overthink, try it and see approach', or a recommended mixture for their farming system based on robust data and the cumulative wisdom of more than 100 years of research and breeding, endorsed by independent industry bodies with known environmental, production and societal credentials.

FARM SYSTEMS

A farm system was an ecosystem that was managed to deliver food and fibre products to support humans. As with any entity, change in one element could lead to unexpected changes in others, and be felt over both the short and long term. Some impacts were predictable, others unpredictable, some favourable, others not so. RA was described as 'holistic', which recognised the interconnectedness of the elements in a farm system. With RA being a recent concept, Dr Warren King said definitive studies of pastoral farms run according to regenerative principles

were lacking so it was not yet possible to conduct a critical 'holistic' farm system assessment. However, there was research available around specific practices promoted by RA, which considered the potential impact on the whole farm system. RA suggested using a long-grass grazing system; evidence from NZ trials showed this would reduce the average forage quality, change the tiller dynamics of the grass species in the sward, and change the pasture species composition. It might reduce total pasture production, reduce animal productivity, increase soil organic matter, biological activity and soil moisture retention. The unpredictable included changing soil nutrient dynamics and how it would impact on animal health.

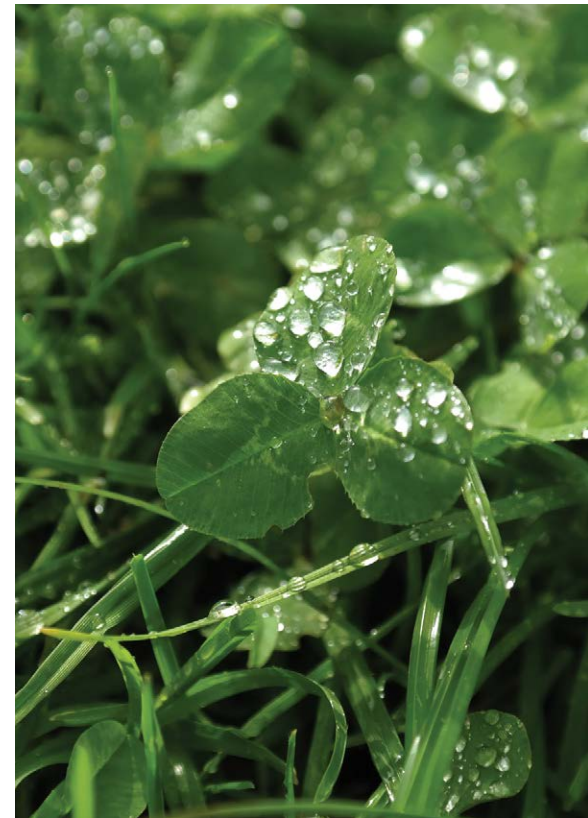
King said there was an urgent need for targeted research, focused both on specific metrics as well as whole-farm outcomes of the practice, before robust conclusions could be drawn.

'Professor Jon Hickford said there was no 'one-size fits-all' approach to NZ farming or a singular best-practice farming system.'

ECONOMICS AND WELLBEING

Dr Jacqueline Rowarth said people achieving efficient food production should be held in high regard. She quoted from the *Farmers Guardian*, how agribusiness professionals and farmers from overseas have lauded New Zealand farmers. "Working smarter, not harder is the ethos of New Zealand farmers who treat food production as an expert profession, leaning on data to drive results." Yet despite this, New Zealand farmers are stressed and searching for improvement, she said.

The wellbeing promises of RA were attractive to farmers, but wellbeing was subjective. From a small amount of Australian research, it indicated RA graziers had greater wellbeing than 'conventional' graziers. The 14 RA graziers studied were not making more money, were under greater financial stress, and were not more financially resilient during drought than the average graziers in the same age group,



but they felt better about their operations because they were being supported by consultants and educators. Rowarth said wellbeing associated with RA reflected support. She said it could be argued that support was what NZ farmers had been given through the Ministry of Agriculture Farm Advisory Service, and those farmers supported in this fashion set the foundation for NZ's current world-leading position.

Professor Jon Hickford said there was no 'one-size fits-all' approach to NZ farming or a singular best-practice farming system. There was probably a place for RA in NZ if interpreted at the level of trying to improve some aspects of our conventional systems. But there needed to be clear evidence provided of benefit, be it in food quality, environmental impact or profitability.

"Wishing your system to be better is not enough, because it must be demonstrably and reliably better," he said.

The full report, written by leading agricultural scientists, in the New Zealand Institute of Agricultural and Horticultural Science magazine *AgScience*, can be found at <https://indd.adobe.com/view/693a575a-5482-4df0-bc4d-f986d3bce648>



RA proponents convinced people there was a problem with NZ farming when there is not.

Scientists lash out at RA white paper

Some agricultural scientists have criticised a new white paper on regenerative farming which they say is lacking in research and reeks of cheque book politics.

Joanna Cuffance reports in this special three part series.

A new white paper on regenerative agriculture (RA) in New Zealand has provoked the ire of top agricultural scientists. They point to a lack of research, questionable science and emotive language.

Within that paper is the admission “We undertook a time-constrained scan of the peer-reviewed literature and websites for a high-level stock-take of the available information. We gathered all the information we could find in under five hours using Google Scholar, Web of Science and Google searches.

NZ Institute of Agriculture and Horticultural Science (NZIAHS) president Jon Hickford said he would have hoped that greater care was taken to ensure the credibility of what was released under Landcare Research’s name.

“Even if an undergraduate told me that this was how much research they had done, then they would be soundly criticised. From staff at one of our larger Crown research institutes (CRIs), it is astounding,” Hickford said.

The white paper is Regenerative agriculture in Aotearoa New Zealand – research pathways to build science-

based evidence and national narratives. It sets out 17 priority research topics and introduces 11 principles for regenerative farming in New Zealand. The lead author was Dr Gwen Grelet, a senior researcher at Landcare Research.

Hickford confirmed authors were contracted in, and in some cases offered \$8000 to “contribute”. According to Hickford, “chequebook politics” took place with the white paper, with the architects of the paper thinking they could buy support, and thus gain more support and acceptance for their RA views.

Professor Leo Condon from Lincoln

University, who was invited to be part of the “collaboration,” but not paid, said he was invited to a Zoom meeting with numerous participants. Condron agreed with virtually nothing which was said and did not get to speak.

Lincoln University adjunct professor Jacqueline Rowarth, also questioned how some of the science was represented in the paper and was now going through the 17 urgent research priorities putting references against them to show what research had already been done.

Some of the claims in the paper had been researched, peer-reviewed and published in scientific journals, yet RA practitioners were dismissive of the science, said Condron.

MISCONCEPTIONS IDENTIFIED

AgKnowledge’s Dr Doug Edmeades identified several misconceptions, including the claim synthetic fertiliser disturbed diversity and function of the soil microbiome, whereas many studies showed correcting nutrient deficiencies using

mineral fertiliser enhanced soil biological activity. There was also no credible science to support the suggestion carbon-based products such as humate-derived substances could chelate fertiliser. Chelated fertiliser improves the bioavailability of micronutrients.

The beneficial claims of using fish hydrolysate, seaweed derivatives, diluted seawater, compost, aqueous composts extracts, biochar and isolated fungi/ bacterial strains to improve soil, have been suggested before, but the Maxicrop Court Case during the 1980s found these to be exaggerated.

The writers suggested that “intentional bale wastage” created a fertiliser effect which improved soil health. Edmeades said every farmer knew if they self-feed a bale of hay in winter, animals munch around, pug and leave a giant excreta patch. There was little nutrient value in hay itself and the nutrients left behind by the animals had been collected from elsewhere in the paddock.

“No net gain in fertiliser nutrients at the

cost of an area of damaged soil,” he said.

Using the Albrecht-Kinsey soil audit methodology to diagnose balancing requirements (of nutrients) has been shown in both science and economic research to result in higher fertiliser costs for no additional benefit.

The paper noted “some practitioners take into account lunar and other astral cycles to determine the timing of particular interventions on their system, such as planting or harvesting.”

“Such practices would take agricultural science firmly back to the middle ages when witches were burnt at the stake, Edmeades said.

Professor Derrick Moot said the white paper used very emotive language. He felt the ideas had little value to NZ, but suggested the proponents seemed to be hoping to source some money by writing a political document which suited the narrative of the Government. It lacked scientific integrity, had no definition and included a list of principles which was just someone’s wish list.

RA proponents 'factually incorrect'

Regenerative agriculture practitioners speak very well, use the words and jargon of science, but are factually incorrect, Lincoln University professor Leo Condron says.

He was commenting on Landcare’s white paper on regenerative agriculture (RA) in New Zealand.

It reported anecdotal evidence for the benefits of RA is growing and farmers are recording their observations and sharing them via social media.

NZIAHS president Jon Hickford said with regeneration there was the suggestion of degeneration and that NZ was bad, but there was not a lot of evidence to support this,

The white paper identified 17 priority research topics to be looked into.

Hickford’s colleague adjunct professor Jacqueline Rowarth was now going through the 17 “priority research topics,” identified in the white paper putting references against them to show that the

research has been done.

Agricultural scientist Dr Ants Roberts said research in soil biology was still in its very early stages. This meant some of the claims made by RA could not be verified, as the science was yet to be developed, or it would cost hundreds of millions of dollars to do the research.

Roberts said what was known was soil biology cannot create mineral nutrients, but it could change the form of the nutrients, which affected plant availability. It was clear, no matter how numerous, active and diverse the soil biology was, nor how many diverse species of plants are growing in harmony with root systems exuding all manner of elicitors and bioactive substances at different depths in the soil profile, this would not create new minerals.

The fact was, if plants are harvested by machine or animal and removed, eventually soil nutrients will be depleted. Then at some point externally sourced nutrients would need to be applied to

sustain the soil’s life supporting capacity.

Condron said science conducted small steps. Scientists need to be a specialist in their field, which takes a lot of training, and each scientist researches an intricate area. He said it was like building a house block by block, each scientist works on their block, understanding it, learning how it works, and then the scientists work together to build the house.

According to Condron, nothing of what the RA proponents said is new. For example, 25 years ago a market gardener who was concerned about his soil asked Condron, in his capacity as an agronomist, for advice. He suggested resting the land to give it time to recover, and planting a green manure. The farmer who needed to get two to three crops a year from the land, to keep up with demand and meet costs, did not think it would be possible. However, he followed the advice of adding a green manure into the rotation, and was very proud to show

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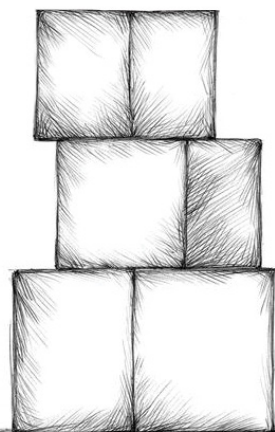


“...it [science] was like building a house block by block, each scientist works on their block, understanding it, learning how it works, and then the scientists work together to build the house.”

Condron the results of his advice.

Solving one problem can create another, solving one problem can also accidentally solve another, he said. Decades ago Canterbury Plains, with its light soils and low rainfall was used a lot for growing grains, but with high winds soil was blown away, to mitigate this pasture was introduced to the system and crop farms changed to half cropping and half sheep, with the grass stabilising the soil. This mostly solved the problem and diversified farmer’s income, he said. Now that much of the Canterbury Plains was used for dairying, with the pasture required for cows, there was no wind erosion and a permanent increase in the soil’s organic matter.

The use of anecdotes to create an emotional response, to support a persuasive argument that the writer is putting forward was a concern for Massey University associate professor Kerry Harrigan. He said if the white paper authors were hoping that the meagre research dollars available for agricultural research in NZ might get sucked into this type of study, it would leave no money for more constructive research into improving the sustainable farming systems already operating.



Be an innovator, not a follower

Instead of importing an American idea like regenerative agriculture (RA), New Zealand should develop their own brand of agriculture, says Lincoln University professor Jon Hickford.

“New Zealand should be charting their own course,” he said.

NZ is big enough and smart enough to do our own thing and we do not need to follow the regenerative agriculture fad, or the next fad which comes along, to chart our own direction in the world, he said.

“We certainly don’t need to tolerate snake oil merchants and poor-quality science.”

A simple concept of healthy water, healthy land, healthy food and healthy people is really good, he said. It could be transformed into an NZ brand that we could all be proud of.

Science professor Leo Condron said a lot of farmers were looking to step off the treadmill. No farmer wakes up each morning and says “how can I ruin some more land?” Farmers, as individuals, always do their own thing on their own farms, now this desire to do the right thing was being exploited, he said.

Condron said this RA “nonsense” was exploitive. He fully supported change but not in this way. RA proponents convinced people there was a problem, and portrayed themselves as a salvation for rural systems. These people had a vested interest in defining what to do, Condron said.

Condron disagreed NZ had the problems claimed. Along with Hickford, he acknowledged NZ production systems were not perfect and there were pressing problems with biodiversity loss, water quality and carbon, which must be addressed.

“We must also keep our farmers profitable, and any move that reduces their productivity especially when competing for markets against highly subsidised overseas producers, need to be viewed cautiously,” Hickford said.

“We still have got to make a living for

the country,” he said.

Professor Derrick Moot said RA was essentially a faith based ideal. People needed to decide the principles they wanted to farm to. There was a strong dichotomy of farming as a way of life, or, farming to make money, he said.


“We certainly don’t need to tolerate snake oil merchants and poor-quality science.”

“You either believe in the science or you don’t,” Moot said.

With the European RA farming model, they do not farm but rather they manage the landscape. It was a different driver, he said. Big corporations bought the land as an investment, and with substantial government subsidies they were guaranteed an income from it despite low production. These ideas were not fit for a New Zealand context, which relied on the agriculture sector being economically sustainable.

Farmers needed to make money. As they receive money, they can develop more riparian areas and native bush. Without good productivity farmers can not afford to do these activities, unless the taxpayer pays, Moot said.

Hickford agreed, fencing delicate areas needed money, and he felt there should be formal recognition for what farmers did.

A collaborative discussion about how do we best manage land, to make the most effective use of it was needed, Hickford said. For example, he asked if we wanted to improve the carbon in the soil in the McKenzie Country. This could change the barren landscape into greenery, and may possibly, though unintentionally, lead to more intensive farming in that area. What land was suitable for housing also needed to be included in any discussion. 

» Next issue: Landcare’s response



Landcare seeks apology over regen ag article

Landcare Research has responded with concerns to a series of three articles on regenerative agriculture (RA) published in *Country-Wide* April. **Jo Cuttance** reports on their concerns and *Country-Wide*'s response.

The opportunity to respond to criticisms some New Zealand scientists had about the white paper was turned down by lead author Landcare Research senior researcher Dr Gwen Grelet.

The paper is titled, Regenerative Agriculture (RA) in Aotearoa New Zealand – research pathways to build science-based evidence and national narratives

In April 2021, *Country-Wide* printed an article which raised concerns about the validity of some of the scientific claims, methodology used, and the collaboration

and consultation process used in the production of the paper.

Landcare Research responded via email to *Country-Wide* outlining its own concerns about the story and asked for an apology for printing it.

The email signed by Landcare Research science and knowledge translation general manager Graham Sevicke-Jones along with land and water national science challenge director Dr Jenny Webster-Brown. It included the following (abridged) concerns. *Country-Wide* also asked some academics to review Landcare's concerns.

Landcare's concerns were:

- The white paper did not encourage or suggest the practices reported by RA practitioners in New Zealand, and the purpose of these, which were outlined in table 4 'Practices employed in RA systems' on pages 19-20.
- The article and editorial presented one small piece of background research that informed one table within the white paper (a time-constrained literature scan for a specific topic discussed in the paper) as if it was the full extent of the research. The letter confirmed the white paper was informed by consultation via focus groups, surveys and expert working groups, as well as comprehensive literature reviews, altogether involving over 200 people and 80 co-authors and reviewers over six months. The white paper contained over 180 references, including 97 articles published in peer reviewed academic journals.
- The paper was funded according to standard science funding practices, in which research institutions and other organisations and experts are subcontracted and funded for their peoples' time contribution to projects. This was not the same as a cash offer to contributors. This refuted the article which claimed report authors were "offered \$8000 to contribute".

Country-Wide's response

The academics, who *Country-Wide* has agreed not to name, replied.

They counted 70 authors, not 80 as claimed. In regards to the Landcare Research claim the white paper did not encourage or suggest RA practices, the academics referred to sentences in the white paper:

Such challenges will likely need to be addressed if NZ is to claim to deliver "regeneratively-produced" food and fibre. (Findings, third paragraph). The assumption was that NZ wanted to make the claim and therefore set the scene for RA.

Also the sentence, "NZ should evolve its own RA narrative based as much on soil carbon retention as on its increase and functionality, elimination of sediment losses, and the development of its RA farming systems to foster both 'total' and native biodiversity." (findings, fifth »

RA research author fails to reply

BY: JO CUTTANCE

Landcare Research senior researcher Dr Gwen Grelet declined to respond to the concerns raised about a white paper on regenerative agriculture (RA), of which she was lead author.

In April, *Country-Wide* published articles about concerns of the validity of some of the scientific claims, methodology used, and the collaboration and consultation process used in the production of the paper, by some of New Zealand's leading agricultural scientists.

The white paper titled, Regenerative Agriculture in Aotearoa NZ – research pathways to build science-based evidence and national narratives, set out 17 priority research topics, and introduced 11 principles for regenerative farming in NZ, was released in February, this year.

Dr Doug Edmeades was concerned about

misconceptions in the paper regarding different fertilisers and effects they had on the soil. Along with professor Derrick Moot, Edmeades felt some of the ideas in the paper had little value to NZ's agricultural sector.

Professors Jacqueline Rowarth and Leo Condron were concerned about how some of the science had been presented in the paper.

Agricultural scientist Dr Ants Roberts also questioned where some of the scientific proof was.

NZ Institute of Agriculture and Horticultural Science president Jon Hickford wanted clarification of how the white paper's authors and contributors were funded.

Grelet was invited to talk about these concerns, and where she felt RA fitted into NZ's agricultural sector. Initially, the interview was accepted.

Following questions being emailed

through, the interview was declined via Landcare Research's communication department. However, an interview would be allowed via email with Landcare Research setting several conditions which were not accepted by *Country-Wide* for reasons of ensuring journalistic integrity.

Landcare Research staff then emailed *Country-Wide* a request to publish a correction they had written and for an apology. This letter was forwarded to some academics for them to review and gain their recommendations. From the time the letter was received, reviewed and returned, there was not enough space in May's Beef special edition to print it, therefore the deadline asked by Landcare Research for printing the letter was missed.

Country-Wide would still like to interview Dr Grelet.

Landcare has now lodged a complaint against *Country-Wide* with the NZ Media Council. 🗨️

» paragraph). To the reader, the white paper established RA as being required, the academics found.

In regard to the research involved it was clear there was more involved than just the five hours. However, the so-called consultations/working groups did not invite contribution.

The academics felt the response by Landcare to the claim report authors were "offered \$8000 to contribute," admitted the authors were offered dollars for their time. There was no mention of the nature of the contracts in the article. However, the academics did suggest the following questions would help clarify the circumstances.

- Were the contracts with the author (to provide them a personal payment), or with the host institution?
- If they were with the host institution, does that mean the host institution endorses the view of the authors?

Country-Wide would still like to have Dr Grelet's response to the criticisms of the

...AN INTERVIEW WOULD BE ALLOWED VIA EMAIL WITH LANDCARE RESEARCH SETTING SEVERAL CONDITIONS WHICH WERE NOT ACCEPTED BY COUNTRY-WIDE FOR REASONS OF ENSURING JOURNALISTIC INTEGRITY.

white paper and where she saw RA fitting into NZ's agricultural sector.

The questions emailed through to Dr Grelet included how the paper came about and why she wrote it, along with what her own personal interest in RA was.

Other questions asked about the reasons for the recommendation of using fish hydrolysate and seaweed derivatives to stimulate the soil, and using carbon-based products and substances to chelate fertiliser, despite this not being scientifically supported.

She was asked about the dismissal of science which contradicted claims made about synthetic fertiliser.

She was asked if she believed the science is there for RA. Scientists said only about 10% of soil microbes had been described, and the science had not yet been developed to be able to verify or dismiss the claims made about soil biology.

Questions about who was paid and what was their contribution for payment were asked.

There were also questions about collaboration and consensus. The paper was presented as a unified collaboration of more than 200 people, yet some people who took part said they neither had an opportunity to speak, nor did they agree with what was being said.

She was also asked if she wrote the paper in a way which suited the Government's story in a bid to get more research funding for herself and co-authors. 🗨️

• Readers can access the white paper here: ourlandandwater.nz/regen-ag-white-paper



Regen ag: Not as easy as claimed

Paul Burt has advice for proponents of regen ag.



“CAN WE AFFORD FEEL-GOOD PRODUCTION SYSTEMS THAT DON’T MAXIMISE OUTPUT FROM INCREASINGLY SCARCE RESOURCES?”

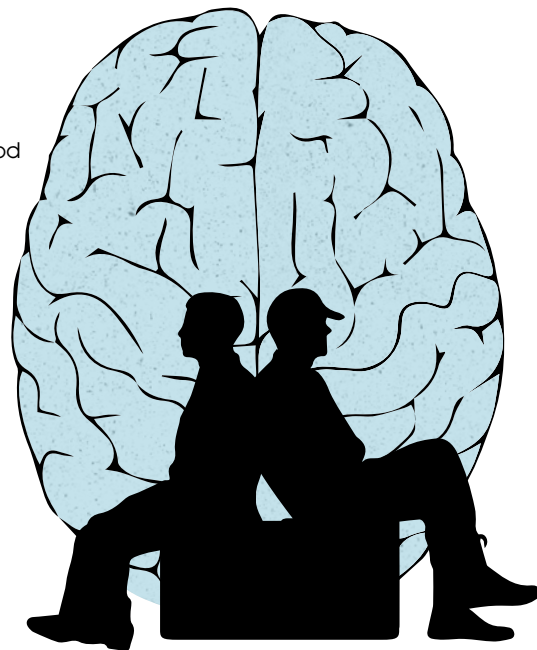
MR. BURT, I NORMALLY DON’T WASTE energy on non-believers but you need to be challenged. Your continued negativity even makes it difficult to address this letter. I’m disinclined to begin with “Dear” but I imagine your type is not culturally prepared for Kia ora. It is tiresome to keep being told RA won’t cut the mustard (mustard is not part of our 37 variety seed mix). I can only conclude that you have a problem with change, yet your way of doing things has produced glaring examples of why change is so necessary. Degradation of our waterways is in large part due to high stocking rates and leaching of phosphate and nitrate fertilisers. I can’t think of too many examples of desertification (degradation of dryland ecosystems) in New Zealand but there are lots overseas I could point to because of the practices of farmers like you. You’ve lost 50% of sheep farming income because you never progressed from selling raw wool by the tonne.

Mainstream agriculture doesn’t understand the regenerative push is not as a more productive alternative, it’s much greater than that. We are responding to what consumers are asking for and taking the story of food and fibre and its production through to that level. Your dismal failure with wool leads me to believe you have no concept of the term “psychological premium”. In an organic nutshell it is the extra money that can be enticed from the consumer because they are convinced the product and its production meets or exceeds their expectations. The holistic nature of our systems is what the modern consumer feels good about. I acknowledge we sometimes have a problem with our radical fringe but they are busy at the moment trying to rehome the Australian mouse plague. You have my sympathy, clinging to your treadmill while it slowly grinds away environmental, social and financial returns. I only hope you see the light in time.

Reg Agro.

Hi Reg, thank you for your insights. We could probably be good mates in another life because we are both passionate about the land although you probably don’t work it. We both care about the wider environment and in common with every other first

Feel-good
versus
realism.



world citizen we both over consume. The difference is that I am a realist. Agriculture has bigger forces at play than the science/art of nurturing plants and animals. For a start, there is social geography. The total area of land is fixed and the world population is growing. Then there is economics. The scarcity factor gives land a steadily increasing value which must be paid for. In addition, there is physics. Land is needed to produce food, food is energy and the building blocks of that energy must be kept in balance, it can’t be conjured from nothing. With the mounting implications of global warming we’ve forgotten that clean water and adequate food are more pressing needs for many. Can we afford feel-good production systems that don’t maximise output from increasingly scarce resources?

I assume your outputs are less than the conventional model because I have yet to see benchmarked physical and financial data from an RA farm that tells me otherwise. Hill country pasture farming in NZ (comparatively little artificial N) couldn’t have achieved its production gains if the science behind them was faulty. Unintended consequences are another issue but we are learning and taking steps to mitigate our mistakes. Another thing you are right about is psychology. In the future more and more people will have to be convinced to eat factory food because pressure on resources will not let present agricultural systems cope. Food production, especially from animals, is under threat.

So where does this leave the best pasture farming country in the world? We are good at what we do but we could do better. Take ideas from both camps and ensure every gram of food and fibre that leaves these shores reflects the prestige and price of a Swiss watch. We can’t feed everyone but we can feed the discerning, while caring for the environment and keeping the nation’s head above water.

Regards, Paul 🍷