

Not all cows are created equal

In the third part of a new series, British Dairying explores a recent study tour, hosted by Cogent Breeding and Livestock Improvement Corporation (LIC), which takes a look at the farmers who are refining breeding choices and using technology to make gains.

Across the world, dairy farmers are looking for ways to increase on-farm efficiency and milk production while reducing their emissions profile. The biggest contributors to greenhouse gases from agriculture are nitrous oxide from soils and methane from livestock and manures. Some UK farmers are looking to reduce herd numbers to achieve emissions goals, without sacrificing milk production and profitability. And they're making progress. In the 2022/23 milk year, average UK milk yields increased 0.5% to 8,133 litres/cow, while the national herd size reduced by 10,000 cows.

Artificial insemination with improved genetics is a leading factor in farmers achieving this balance. According to a recent



In New Zealand, 82% of the national dairy herd was mated through artificial breeding in the 2022/23 milk year

AHDB report, the UK leads global sales of sexed semen, with 84% of all dairy semen in the 12 months to April 2024 going through additional laboratory processing.

Cogent Breeding sells more than 2.3m straws each year to farmers across the UK and abroad. "Genomics offers us a huge opportunity to drive genetic gain and improve the efficiency of our base cows," says Cogent's Managing Director Stuart Boothman. "But to do this we have to ensure only the best are put to sexed dairy, so are breeding the best replacements."

Improving efficiencies

This trend is being seen worldwide. In New Zealand, 82% of the national dairy herd was mated through artificial breeding in the 2022/23 milk year. LIC, a New Zealand farmer-owned co-operative, has pioneered some of the biggest innovations in modern farming.

These include the systematic testing of milk quality, Long Last Liquid (fresh) semen, DNA technology to genomically identify and help select elite sires; and, more recently, a short gestation bull team bred to deliver offspring up to 10 days early.

As part of the study tour, 14 farmers from the UK visited Rockland Farms in Aria, South Waikato/

King Country, to see how Matt and Emma Darke are using genetics to improve efficiencies in their 1300-strong Jersey herd.

Once a day milking

The land is what can only be described as 'not dairy country'. Whereas most dairy farmers in the greater Waikato region enjoy flat, lush plains, Rockland Farms is 500ha of rugged terrain, where cows graze on 45°-sloped hilly pasture. A walk of up to 4.5km between paddocks influenced the couple's decision to milk once a day rather than the traditional twice-a-day system.

Seventeen years ago, the farm changed to artificial insemination for mating, with Matt upskilling to save the need for a technician to come on-farm. "Right at the start I was told by different companies 'the breed you need is a three-way cross'; a cow with low volumes and a bull with low volumes so we wouldn't put them under pressure on once-a-day milking," he says. "But it turns out it's 100% the opposite."

Emma works alongside LIC to pick nominated straws and sexed semen. "It's quite hard picking a bull that's going to work for what I class as a 'herd sire' that's going to have an impact across a wide range of cows," she says. "You can pick a bull that



Jersey cows have a low average liveweight, but are very efficient at converting forage into milk

required) to between 320kg and 420kg of milk solids/cow annually (New Zealand's milk price is calculated on milk solids not litres).

Refining the process

Over the years, Matt and Emma have refined their artificial insemination processes and now sell semen to breeding companies – they currently have LIC's number one Jersey sire. DNA parentage testing has further increased the farm's efficiency, profitability and sustainability. "Every best cow had a heifer," says Emma.

"There are 2,000 two-litre bottles of milk sitting up there in the paddocks every day and the cows bring them down for us."

An hour north, BBC Farms in Ōtorohanga showcases how herd genetics can be streamlined to improve breeding worth (BW - the measure of an animal's ability to breed profitable and efficient replacement heifers), production worth (PW) and

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will have an impact on certain cows, but if I'm wanting one or a group of bulls to do a decent job, the offspring need to be a lot better than their dams. The bull's got to have high volume, great components and good breeding values on capacity and udder traits, along with protein, fat and the will to milk."

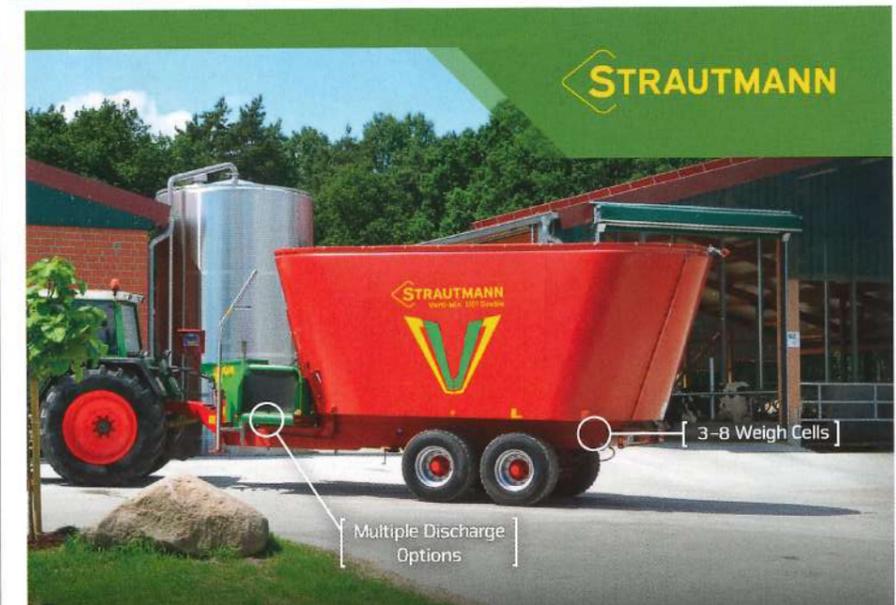
"We cull on production rates, not on age."

This approach has allowed Rockland Farms to make strategic decisions around culling and to improve efficiency. In recent years the herd's empty rate has sat at 6-8%. The farm's cows are also living longer and producing well into their later years. "We cull on production rates, not on age," says Emma.

Jerseys tend to have the lowest average liveweight across all ages (around 400kg) compared to Holstein Friesians and Holstein Friesian/Jersey crossbreds. But they are very efficient producers, converting around 11t of homegrown feed (and a small amount of additional palm kernel as



Matt Darke at Rockland Farms



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a farm's bottom line. Named for the first initials of its owners, Barbara, Brian, and Craig Mora, BBC Farms milks 1,700 Holstein Friesian and Holstein Friesian cross cows across four farms, covering around 488ha in total. Each farm is run independently using contract milkers. On average, the farms produce around 1,500-2,000kg/ha of milk solids or 480-550kg/cow.

Technology

Having previously worked in the agricultural corporate sector – Craig in banking, and his wife Kylee at LIC – the couple entered farming in 2013, going into partnership with Barbara and Brian on a purchased 380-cow farm.

This added to a (then) 220-cow farm that Brian and Barbara already owned. The family were soon able to expand operations and bought two farms and leased another, one of which they converted to a drystock farm.



Across the world dairy farmers are looking for ways to improve on-farm efficiency and milk production

“I’m not scared to change stuff.”

Kylee brought her experience in genetics and technology back to the farm. Each cow is fitted with an ear sensor and in 2023 they installed drafting gates in every dairy shed. Craig admits he took a bit of convincing. “We bought ear sensors for mating and got health and nutrition information with it,” he says.

“I suppose in my mind nutrition was for a total mixed ration system in Europe where the cows live in a shed. So I wasn't really a believer. But it was offered to us and we started using it. Our vet is really keen on

it and it's been able to show some pretty cool stuff around transition diet, rumination, eating minutes and seeing what we can change. Our vet is now able to tell us which cows are likely to be empty based on their dry-off and transition around calving.”

The golden rule

The farm herd tests quarterly, which helps identify low producers among the herd. The family have found that some of their smaller cows are some of their highest producers of milk solids – ultimately from using better genetics.

“Most people in New Zealand are a little bit scared of failing and are quite set in their ways,” says Craig. “But between the four of us including Mum, Dad and Kylee we're a pretty good team. We've all got different aspects to what we bring to the farm. I'm not scared to change stuff.”

The golden rule is that whatever they introduce has to be replicable across all the farms by all staff.

This also applies to breeding decisions, which have to be easy so that staff are able to do them day-to-day, says Kylee.

“DNA parentage testing is the biggest thing.”

This has included genomic testing, which the farm has been able to trial thanks in part to funding from a Fonterra-Nestlé partnership designed to help New Zealand farmers reduce emissions.

During the farmers' visit, Kylee was able to whip out her smart phone and

provide the genomic testing details of tagged heifers and cows in the nearby paddock. “There are years of breeding going into these things,” notes Craig.

“I couldn't tell you about the fundamental differences between the cows by looking at them; but Kylee's got the information at her fingertips – DNA, milk production, BW and PW.”

“We haven't always had this luxury. Going from milking 220 cows 12 years ago to milking 1,700 cows now, we've needed every cow we could get. That hasn't always led to us having a lot of choice, to be fair. We've tended to make a decision for mating based on paper – herd test data, BW and PW,” he adds.

“DNA parentage testing is the biggest thing we should be talking about as farmers if we want to cut emissions and have an efficient farm – looking at genetically superior cows.”

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Craig and Kylee Mora at BBC Farms milk 1,700 cows across four farms



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Transform green grass into white gold

A group of British dairy farmers gained insight into some of the world's most innovative pasture-based systems on a study tour to New Zealand. British Dairying reports.

While the UK has had its share of unusual hot summers of late, New Zealanders are accustomed to dealing with four seasons in one day on a regular basis.

For dairy farmers this means being flexible and forward-thinking in terms of pasture management and farm practices to maximise milk production - particularly since dairy is New Zealand's biggest export earner, worth around £8.7bn/year.

Farmers in the Waikato region of New Zealand's North Island have become particularly adept at pasture management in extreme conditions, dealing with drought in summer and floods in winter.

During a particularly warm week in late 2024, a group of 14 farmers from across the UK got to see first-hand what it takes to turn grass into the proverbial white gold in New Zealand.

Travelling as part of the first ever Cogent Breeding and LIC study tour, the farmers visited several farms under the blazing Kiwi sun to see how producers have maintained milk production by focusing on homegrown pasture, reduced fertiliser use, and efficient cropping.

“We want to work with nature’s biological nitrogen system.”

For many it was their first time in New Zealand, and it was an enlightening experience seeing the similarities and differences between the farming in the two countries. Owl Farm, a demonstration farm situated on the grounds of St Peter's School near Cambridge in the Waikato, has been reducing reliance on purchased concentrates and nitrogen fertiliser while maintaining the amount of homegrown pasture in the face of changing climatic conditions.

The farm milks around 360 cows on a dairy platform of 140ha. It uses a range of technology to help it achieve its goals, including LIC's MINDA herd management software, which integrates with other tools like Halter



Southern Pastures' Manako Farm in Tokoroa, near Rotorua is a 429-ha farm

wearables and milk co-op Fonterra's smartphone tools. Over the past nine years Owl Farm has been able to reduce its reliance on purchased concentrates from 400t dry matter (DM) to less than 100t.

At the same time it has increased the amount of grass and maize silage harvested from 80t DM to over 200t. The farm grows a range of annual and Italian ryegrasses, turnips, kale, maize and chicory, and supplements feed with palm kernel mix as required.

Demonstration Manager Jo Sheridan says Waikato farmers tend to expect a feed deficit in January and February, New Zealand's summer, when the paddocks dry out. "It's a case of securing feed to get through an acute feed deficit over summer and then being able to destock once pregnancy data is confirmed. We know we need to have seed in the ground by St Patrick's Day for when the rain comes," she says. "It's all about risk management and ensuring you can milk over summer and continue to grow healthy calves, which will set them up for the rest of their productive lives."

"Every summer we score each paddock, looking at the proportion of desired species along with clover and plantain percentage. Anything that is scored one goes straight into annual ryegrass followed by a spring-sown crop ready for next summer," she adds. "Anything that is rated two or three will have two-to-three-year lead-in time before it's ready to replace with a crop. You play to your

find the forage solutions that suit our changing climate. This means choosing forages that we know will grow well in hotter soil with less, irregular, rainfall, which we can capture as feed throughout our season."

Another part of reducing emissions is a strategic breeding programme using sexed semen and DNA profiling to selectively breed replacements from high genetic merit cows. This targets high feed conversion efficiency and low emissions, along with selection pressure for productive traits.

Efficient nitrogen use also plays a role. Just like in the UK, New Zealand has rules on the amount of synthetic nitrogen that can be applied to grazed pasture. In the UK this ranges from 120kg/ha on sugar beet to 300kg/ha for grass. In New Zealand, synthetic nitrogen application to grazed pasture is capped at 190kg/ha. Dairy farmers must record and report their nitrogen use annually.

Over the 2023/24 season, Owl Farm used just 90kg N/ha, down from 161kg/ha in 2017/18. In turn, its emissions reduced by 2,697kg CO₂e/ha.

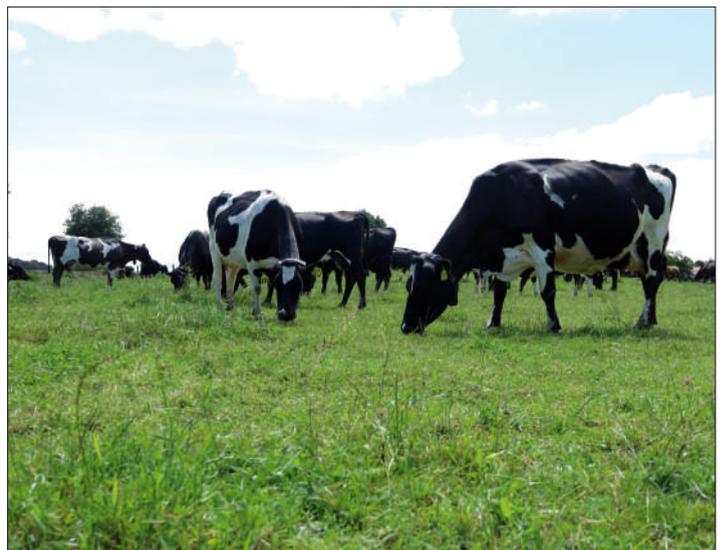
"We want to work with nature's biological nitrogen system," says Jo. "So we want to match the supply of nitrate with the uptake of nitrogen by our ryegrass. We make sure to put nitrogen on when the soil temperature and moisture is conducive to the plants growing." An hour south of Owl Farm, another

strengths - graze on annuals over winter, feed crops over summer, then perennial pasture from early March, with a 12-month lead-in."

Part of Owl Farm's strategy has been to switch to pasture that suits the changing climate and at the same time reduce its reliance on purchased feed. This in turn lowers the farm's overall emissions.

Changing climate

"We know that palm kernel, with a high footprint, is costing us from an emissions point of view," says Jo. "Over time we've been trying to swap it out for what we can grow on-farm without compromising animal wellbeing and we're trying to



Paddocks are scored for the amount of desired species, clover and plantain



Soil health is a crucial component of pasture management on Manako Farm

farm is taking steps to refine its pasture management and adjust its feed. Southern Pastures' Manako Farm in Tokoroa, near Rotorua is a 429-ha farm comprising 357ha of dairy, 48ha of bush and wetlands and 12.8ha of forest, with a 1000-strong herd split into two mobs.

Back in 2012 when Southern Pastures took over the farm, 30% of the cows' diet was imported supplementary palm kernel. The company was eager to change the regime and installed a new feed pad and infrastructure to allow it to incrementally swap out palm kernel and increase the amount of pasture produced on-farm.

Supplementary feed

The farm is now palm kernel-free, although Director of Farming Mark Bridges admits it has been a journey. "We had to spend some significant dollars on getting prepared for that. It wasn't something you just took out - 30% of the diet. So we set up for the space of having supplementary feed infrastructure," he says.

"One thing that we do a little bit differently to others is we've set up what we call our 10 Star Certified Values, which are audited by Assure Quality, a government organisation. All our farms are audited under this and have been since 2017."

The 10 values stipulate that each farm adheres to the following: Grass-fed diet, non-genetically modified organisms, 365 days' free-range cows, high animal welfare, high human welfare, no palm or tallow products, environmental sustainability, antimicrobial stewardship, climate change mitigation, no added hormones.

"The key part of it all is that we are grass-fed," notes Mark. "So we defined what grass-fed meant to us

and then we've marketed that: 96% of our cows' annual diet is grass-fed and this can include maize, grass silage and winter grazing.

"The four percent of the diet that doesn't make that criteria can come in the form of New Zealand-grown maize grain in the North Island or barley and wheat from the South Island. We can also use a little bit of dried distillers' grain coming out of New South Wales, Australia," he adds.

Soil health is a crucial component of pasture management and Southern Pastures has introduced dung beetles to Manako Farm as part of a trial.

Research has found dung beetles improve pasture productivity, soil biology and carbon content, reduce surface water runoff, and also reduce methane emissions by tunnelling and burying activity. The business also has permanent bee populations on all its farms as a natural means of pollination and preserving biodiversity.

"When I look at photos from 10 years ago, the grass was yellow," explains Mark.

"The land was barren. In our first year we grew a lot of clover and hardly any ryegrass. But over the years it's just got better and better."



Owl Farm and Manako Farm



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