



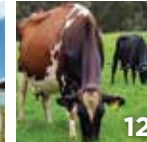
# NORTHERN HORIZONS



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**Inside this issue**  
Nitrogen (N) fertiliser use  
FertSmart tips for soil testing  
FertSmart – making fertiliser profitable  
Reduce feed wastage and lower costs  
+ more



## Farm Business Resilience Program Phase 1 Wrapped Up, Phase 2 Underway



**Roslyn D'Addona**  
Dairy Extension Officer  
Department of Primary Industries,  
Queensland



The initial round of the Queensland Government's new industry-wide drought assistance, the Farm Business Resilience Program, has now been completed. The program operated from July 2022 to September 2025 with some impressive outcomes and engagement achieved across the Queensland dairy industry during this time. Due to the success of the initial program, funding has been secured from both the Queensland and the Australian Government for Phase 2 of the project which will run from October 2025 to June 2029.

Phase 2 of the dairy FRBP project will be co-delivered in a similar way to Phase 1 of the project (see Figure 1). DPI Principal Extension Officer, Mark Bauer will be managing the program with delivery and input from DPI extension

officers, Subtropical Dairy and eastAUSmilk.

Phase 1 of the project focussed heavily on assisting as many dairy farmers as possible to develop new Farm Business Resilience Plans. This process involved identifying

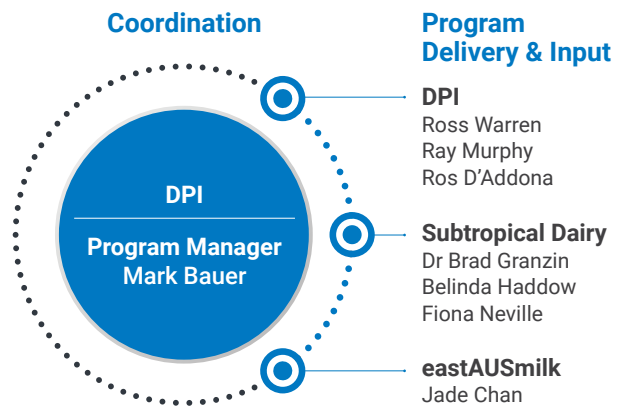


Figure 1. Structure of co-delivery of Phase 2 of the Farm Business Resilience Program for the Queensland Dairy Industry

continued page 3

# Contents

|   |    |
|---|----|
| Farm Business Resilience Program<br>Phase 1 Wrapped Up,<br>Phase 2 Underway                                 | 1  |
| Editorial SDP Chair   | 2  |
| El Nino, La Nina??  | 5  |
| Nitrogen (N) fertiliser use on<br>dairy pastures  | 6  |
| Milking efficiency: power smarter<br>on your dairy farm   | 9  |
| FertSmart tips for soil testing   | 10 |
| FertSmart –<br>making fertiliser profitable   | 12 |
| Reduce feed wastage and<br>lower costs  | 14 |
| Heat detection in year-round<br>herds – Keeping it simple   | 16 |
| Near Miss – A fencing job that<br>changed everything  | 18 |
| Project Update – P6a Resilient<br>cattle (heat tolerance)   | 20 |
| SATs – School Based<br>Apprenticeships and Traineeships<br>on Queensland and New South<br>Wales Dairy Farms | 22 |
| 2026 Event Calendar   | 23 |

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# Northern Horizons Editorial SDP Chair



## Welcome to *Northern Horizons*.

This edition of *Northern Horizons* includes a range of resources addressing the fuel and fertiliser crisis currently affecting Australian dairy value chains. Dairy Australia has been operating under a coordinated, industry-wide response to this complex and fast moving issue. This response has included activating its Issues Management Framework, establishing a cross functional internal working group, and working closely with Australian Dairy Farmers (ADF), the Australian Dairy Products Federation (ADPF), and the broader industry to ensure a consistent and aligned approach.

Subtropical Dairy extension staff have been, and will continue to be, in contact with farmers across our region to better understand issues relating to fuel and fertiliser availability and rising costs within different farming systems. Dairy Australia and Subtropical Dairy are also ensuring farmers and their service providers have access to clear, practical, and timely information. This has been delivered through fact sheets, webinars, social media, and a dedicated website landing page featuring regularly updated resources.

At the same time, Dairy Australia has been strengthening its understanding of the potential on farm impacts of fuel and fertiliser disruptions. This includes ongoing data and insights work to model how these challenges may influence production levels, input decisions, and overall farm profitability. Importantly, Dairy Australia is also contributing to broader industry and government discussions.

This edition also features information on the second phase of the Queensland Department of Primary Industries' Farm Business Resilience Project (FBRP), which is funded by the Future Drought Fund. Through this program, farmers—including farm managers and employees—can access subsidised learning and development opportunities in strategic business management, farm risk management and decision making, natural resource management, and personal and social resilience.

The FBRP provides practical support to help farmers:

- Upskill in strategic farm business management and planning, aligned with best practice industry standards
- Use data to understand strategic business risks and improve decision making processes
- Explore innovation and diversification opportunities, including new farming practices, systems, and markets
- Consider succession planning and develop new approaches to managing people and time

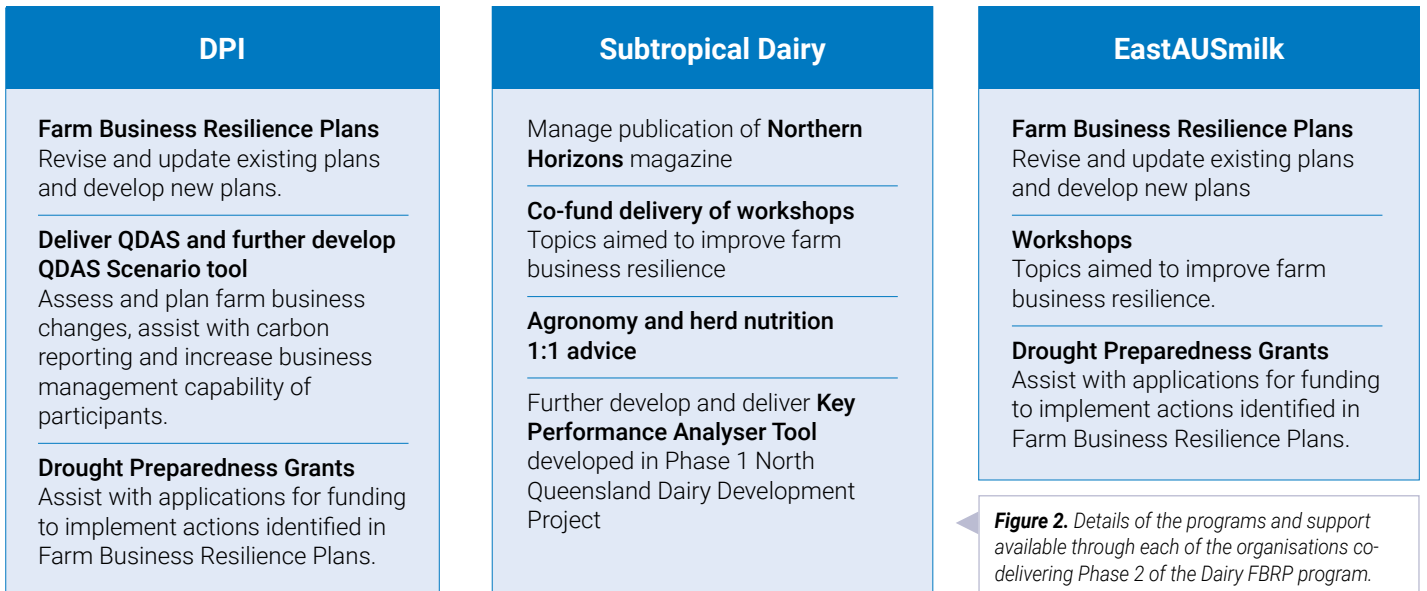
The program also offers:

- An assessment of farm business performance to identify opportunities to build resilience and track progress
- Support to develop or update farm business plans tailored to individual operations
- Access to one on one professional advice, along with practical tools and resources to apply on farm

Since its inception in 2021, Subtropical Dairy has delivered more than 148 FBRP events involving 1,825 participants, as well as 262 one on one consultancies. We look forward to continuing our work with the Queensland Department of Primary Industries during Phase 2 of this important project.

Once again, welcome to *Northern Horizons* and I hope you find this edition of value and interest to your business.

**Luke Stock**, Chairman,  
Subtropical Dairy Programme Ltd.  
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the risks to the resilience of the business and then developing a plan to implement on farm actions which addressed these risks. Through Phase 1 of the project, 132 Queensland dairy farms, or more than 50% of the industry, developed a Farm Business Resilience Plan. This was an outstanding result and exceeded the target of 120 farms for Phase 1 of the program. Additionally, from July 2022 to September 2025, across the co-delivery organisations of DPI, Subtropical Dairy and eastAUSmilk the FBRP program contributed funding towards 610 farm business resilience related sessions attended by 3,420 participants. These sessions included 1:1 farm visits, small and large group sessions, conducted either face to face or on-line, as well as regular discussion groups.

The strong uptake of Phase 1 of the program resulted in more than half of Queensland dairy farms developing a Farm Business Resilience Plan. Consequently, the focus of Phase 2 of the program will move to assisting farmers to implement and revise existing plans to ensure improving farm business resilience becomes a process of continuous improvement. Engaging with farmers who are yet to develop a plan will also be a priority in Phase 2. This will be achieved through support and capacity building programs available from the co-delivery organisations. Figure 2 provides details of the programs and support available from each of the co-delivery organisations.

From the start of Phase 1, the Queensland government has recognised the importance of implementing the actions identified in Farm Business Resilience plans to improving the drought resilience of agribusinesses. The initial Drought Preparedness Grant program administered



by QRIDA was open for applications until mid-June 2025 and provided a significant incentive of up to \$50,000 for farmers to implement the actions identified in their Farm Business Resilience plans. In late December 2025, the second Drought Preparedness Grant scheme was opened for applications. Similar to the first scheme, the drought preparedness grant may be used for purchasing, installing or upgrading permanent capital infrastructure, including

- a) pipes, water tanks and water troughs;
- b) dam construction and/or expansion (including de-silting);
- c) drilling a working bore;
- d) water conservation infrastructure and equipment including more efficient irrigation;
- e) water pumps and power supply used to run water pumps;
- f) construction or expansion of storage, mixing and feeding out equipment for grain, fodder, molasses and other supplements;



- g) grain storage and equipment that improves the ability of the grain growing business to manage drought;
- h) reasonable freight components to purchase and install equipment or infrastructure;
- i) consumables including fuel for own machinery used in relation to the drought preparedness project; and
- j) contractor costs or non-salaried employee costs directly associated with implementing the drought preparedness project.

The images on this page show a range of capital infrastructure projects undertaken on Queensland dairy farms that were successful in applying for grant funding through the initial Drought Preparedness Grant scheme.

In the second round of the Drought Preparedness Grant scheme, the amount of the grant is 25 per cent of the cost of purchasing the permanent capital infrastructure, up to a maximum grant amount of \$50,000. The maximum grant amount of \$50,000 is inclusive of any grant received under the previous round of funding so, unfortunately, farmers who received the maximum \$50,000 in the initial drought preparedness grant scheme are not eligible to apply for this round. Additionally, to be eligible, the project must be identified in the action plan of the applicant's farm business resilience plan, and no more than a 50% deposit can be paid before the grant application is approved by QRIDA.

If you are interested in finding out more about any of the opportunities available through the Farm Business Resilience Program or would like assistance to develop or revise a farm business resilience plan and/or apply for a drought preparedness grant, please contact a member of the FBRP team. ■ ■



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The Farm Business Resilience Program is jointly funded through the Australian Government's Future Drought Fund and the Queensland Government's Drought and Climate Adaptation Program.



Australian Government



Future Drought Fund



Drought and Climate Adaptation Program



Queensland Government

# El Nino, La Nina??



## Ross Warren

Senior Extension Officer,  
Department of Primary Industries Queensland

**Perhaps by the time this article hits the mailbox it may be out of date and good general rain will have been received across the Subtropical Dairy region. It has certainly been a mixed bag this summer. Some areas have had tremendous rainfall events to grow high yielding crops and pastures while other districts are in desperate need of moisture. The generally dry conditions have contributed to a spike in the grain and hay market, and some shortages of barley and corn grain locally. If the upward grain price trend is prolonged, margins will tighten and further scrutiny of diets and cows will be required to maintain high margin over feed costs going forward.**

Even though rainfall has been sporadic in southern Queensland, forage inventories are generally satisfactory across most farms, be that conserved feed or pasture. Additionally, there have been opportunities to grow or purchase hay and/or silage over the last couple of seasons at reasonable prices. It is encouraging to see so many dairy farmers prioritising feed security and looking forward with feed budgets to ensure future forage requirements are met. There are tools and calculators available through service providers and online through Subtropical Dairy and Dairy Australia. Spending some time analysing a forage budget and taking appropriate action can help maintain a strong financial position, rather than being forced to purchase spot forage in the future.

For farms with irrigation, supply and allocations are mostly above 90% across the state. This presents an opportunity for those businesses for the cool season ahead, or perhaps a conundrum. If winter pastures, for grazing, are normally 100% of the irrigation area, it may be appropriate to apportion some of the irrigation to crops that may be readily conserved and that are high tonnes per megalitre (ML). Winter cereals such as barley and wheat grown on the Darling Downs, for example, need around 3 ML (rainfall and/or irrigation) to produce a crop. Depending on the irrigation and soil profile this may suit, however, we know that summer crops are much more water use efficient. Following through winter and focussing on an early summer crop will provide increased tonnages for the water used, for example maize will usually be at greater than 4.6t DM/ML. Most dairy farmers have efficient low pressure irrigation systems; however, some high-pressure travelling irrigators are still in operation. An irrigation assessment in the Mary Valley recently identified that a high-pressure system was costing \$252/ML in electricity. This highlights the need to evaluate total tonnes of dry matter per ML of irrigation applied. An irrigation and forage budget is an activity worth completing to assist with this decision-making process. Again, spending some time in advance on this may mean the difference between a profit or a loss.

The 2024/25 QDAS data indicated that there was an increase of 35 (milking and dry cows) for participating farms from the previous year. This is healthy for the industry and total milk supply for the state, however it is important to be conscious of herd dynamics if we do enter an extended dry period. Feed budgets and forward forage projections will help determine if



the herd will experience reduced dry matter availability at some stage. If there are periods of deficit it may be prudent to consider a measured cull. Meatworks prices are at an all-time high, \$7.50/kg dressed for cows over 300kg (March kill). Now may be an opportunity to strategically lighten the herd numbers. Large Friesian cows are returning over \$2,250, with some over \$3,000. There is really no excuse to retain freeloaders regardless of the weather ahead.

Each year the Top 25% of QDAS farms are identified and there are several key features leading to exceptional financial performance. In the 2024/25 sample, one resounding aspect was that they had adequate pasture and/or conserved forage inventory for their business. They also had on average, higher production per cow (7,271L, 1,643L higher than the remaining 75%) and margin over feed cost (54.3c/L). All these businesses have a distinct focus on their forage base, its quantity and quality, and balance of feed ingredients. Feed related costs represented 49% of milk income in the 2024/25 QDAS sample. This has been a constant (or even higher percentages) every single year of my whole career. Clearly this is a priority focus area for dairy businesses in the Subtropical Dairy region, managing feed and its costs should demand a large amount of every dairy farmer's time. It is one of the factors contributing to high levels of financial success.

Approaching winter with a firm forage plan and feed inventory will reduce some stress and ease potential financial pressure if the season does turn dry. The Farm Business Resilience Project has been recently funded for a second phase after a successful initial program. This joint Queensland Government and Federal Government initiative strategises drought preparedness over traditional forms of support during drought periods. The Queensland Government has provided financial support through programs like the drought preparedness grant that assists primary producers with the implementation of projects that will position their businesses to better cope with climatic challenges. Please make contact with QDPI if you are considering making an investment. We will be able to assist with the application. ■ ■



# Nitrogen (N) fertiliser use on dairy pastures

## Best management practices

These were developed to ensure maximum nitrogen use efficiency (NUE), while also minimising avoidable environmental losses. Remember, losses of N are wasted input costs.

### General guidelines for N management

- **Apply N strategically, rather than by a fixed recipe.** Before each N application, estimate the likely N response (i.e. experience, consultants) and compare the cost of the additional pasture produced to other purchased feed options.
- **Only apply N when pasture is actively growing and can utilise the N.** Ensure that soil moisture is adequate to sustain the regrowth, rainfall is likely in the regrowth period, temperatures are conducive to good pasture growth, there is a good species composition and other major soil nutrients are non-limiting (see FertSmart guidelines for other nutrient requirements).
- **Apply N at rates of 20 to 50kg N/ha per application, no closer than 21 days apart at the lighter rates and preferably at least 28 days apart at high rates.** It can be useful to multiply the daily equivalent N rate by the interval between N applications (e.g. **1.5kg N/ha per day by 21 days = 32kg N/ha applied**). During the peak growth period, with good soil fertility and newer cultivars, it may be justified to increase the maximum rate to 60kg N/ha for a single grazing rotation in spring.
- **Ensure that the extra pasture grown is utilised** either through grazing or as harvested forage, as utilisation has a big impact on the economics of using N. Likewise over-grazing of pasture can lead to delayed response to N in the following grazing rotation.

### ✓ Right Rate

- The most efficient pasture growth responses occur when N fertiliser is applied at rates of between 20-50kg N/ha at any one time. This is because the steepest response to N occurs at these rates and drops off as rates increase.
- Do not apply above 50kg N/ha in any single application and do not apply N closer than 21 days apart, as this will increase N losses exponentially and may risk animal health. The exception may be on highly productive pastures, through their peak growth period, with a newer cultivar, and where soil moisture is not limiting, then pastures may respond to rates of 60kg N/ha per application for a single grazing rotation in spring.
- Applying less than 20kg N/ha in any single application will often produce unpredictable N responses i.e. 20kg N/ha on 2ha may produce less than 40kg N on 1ha. Likewise, 80kg N applied to 1 hectare (80kg N/ha) is likely to produce less pasture than applying 80kg N to 2 hectares (40kg N/ha) due to decreasing N responses on the flat part of the curve.

### ✓ Right Place

- Apply N to pastures with a high density of desirable species. Ryegrass and kikuyu pastures will respond better to N than other less desirable pasture types or weedy pastures.
- Apply N to pastures with a good ground cover. Gaps or bare areas in pastures will result in more N lost through leaching, denitrification, run-off and volatilisation.
- Apply N to pastures that have no limitations to major soil nutrients. Regularly soil testing will establish the nutrient status of the soil and if other major nutrients or pH are limiting growth, these can be addressed before or at the same time as the N application (see FertSmart guidelines [fertsmart.dairyingfortomorrow.com.au/farm-advisors/soil-fertility-guidelines/](https://www.fertsmart.dairyingfortomorrow.com.au/farm-advisors/soil-fertility-guidelines/) for other nutrient requirements).
- Do not apply N to pastures that are drought stressed, or water-logged (i.e. where water is running off the surface), or where they will be grazed at less than 2.5-leaf regrowth stage (or canopy closure) for temperate grasses (e.g. ryegrass) and 3-leaf stage for tropical grasses (e.g. kikuyu and paspalum).
- Consider applying less N to the front half of a paddock than the back, as cows transfer N towards the gate. Avoid applying N to animal hot spots (e.g. gateways, water troughs, shelter belts, stock camps) as these areas have high N loading already and are prime N loss areas on dairy farms.

## ✓ Right Time

- Apply N as soon after grazing as possible, as this is when plants need access to N for maximum regrowth potential.
  - As a rule, for every day you delay applying N postgrazing, you can lose 1% of the potential N response.
- Avoid grazing until growth has reached at least the 2.5-leaf stage (or canopy closure) for temperate grasses (e.g. ryegrass), or the 3-leaf stage for tropical grasses (e.g. kikuyu, paspalum), to maximise the nitrogen use efficiency, the energy: protein ratio in the diet and therefore the amount of N excreted or lost.
- Temperate pasture grasses (e.g. ryegrass) generally respond to N fertiliser when soil temperatures (at 10cm) are above 4°C, and subtropical pasture grasses (e.g. kikuyu) respond to N fertiliser when soil temperatures are above 10°C. Remember, this is the average soil temperature at 10cm over the regrowth period, NOT just on the day of application.
- Autumn and summer N responses on dryland pastures are highly dependent on adequate soil moisture.
  - Don't apply N unless there is adequate soil moisture in the root zone from either irrigation or rainfall, plus there is a good prospect of irrigation or rainfall to follow through the regrowth period (e.g. summer and autumn in southern Australia). In southern Australia, following a wet summer with active pasture growth, there will be little N left in the soil at the autumn break, meaning there will be a reasonable response to applied N when the rains start. In contrast, if the summer is dry there will be substantial mineralisation of soil organic N, but little pasture growth to utilise this, meaning a dry soil profile with plenty of left-over N leading to a poor response to applied N at the break.
  - In sub-tropical east coast Australia, a lower N response should be expected in late summer/autumn due to high amounts of soil organic N mineralisation and N application frequency and rates can be reduced accordingly. N losses are likely to be lower in the late winter/spring so higher rates can be applied.
  - Irrigation at the start of the season should commence before the soil water content drops below the Readily Available Water (RAW) zone, as it is difficult to bring the soil water back into the RAW zone for optimum pasture growth rate, thereby limiting the potential response to N fertiliser.

## ✓ Right source

- **Urea** is currently the cheapest pure source of N.
  - Assuming soil moisture is adequate for pasture growth, ammonia losses from urea fertiliser are usually not large enough to justify the price per unit N of other sources.
  - If applying N to waterlogged soils, an ammoniated source (e.g. urea, ammonium sulfate) is better than using a nitrate source (e.g. Urea Ammonium Nitrate).
  - While liquid sources of N are typically as effective as solid N sources, if applied at the same rate of N, foliar uptake of N alone is unlikely to meet the N requirements of pasture.
- As **inhibitor coated fertilisers** cost more per unit of N and seldom produce additional pasture. They are only cost-effective if the N rate applied is reduced by the expected reduction in N loss. Urease inhibitors are only required in situations where high ammonia loss is expected, such as autumn on dryland systems (see Managing ammonia losses).
- Other **inhibitor coated fertilisers** demonstrate variable effectiveness. Nitrification inhibitors (e.g. ENTEC®) have been shown to produce similar yield responses with 20% reduced application rates on heavier soils after prolonged use. Currently available slow-release urea products (e.g. polymers) are not cost effective on dairy pastures.
- **Other nutrients:** The response to N will be limited by the availability of other nutrients. Ensure adequacy of macro (P, K, S) and micro-nutrients (e.g. Molybdenum), based on regular soil and plant analysis.
- **Di-Ammonium Phosphate (DAP)** is a cost-effective source of N, if the P is needed at the same time.
  - When using DAP, calculate the P rate required first then consider 'topping up' with urea to ensure an adequate N fertiliser rate i.e. 100kg of DAP/ha will only apply 18kg N/ha, which may not produce a predictable N response.
  - When applying N and P fertiliser together, refer to the FertSmart guidelines for minimising run-off losses of P.
- **Sulfur (S):** Low soil available S can reduce the response to N. Ammonium sulfate or S blends can be a useful source of both N and replacing soil S, particularly where single-superphosphate has not been applied for a few years.
  - Ammonium sulfate is an expensive form of N and it will acidify the soil rapidly with regular use.
  - Sulfate can also leach out from free draining soils during high rainfall or irrigation, so only apply the S when needed and at the recommended rate.
- **Lime:** Where N fertiliser is applied regularly and at high rates, depending on soil type, a proactive strategy of soil testing and liming may be required to prevent soil acidification.

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## Other factors to consider

### Soil N mineralisation

- Around 1-2% of organic N will be mineralised from soil organic matter annually (approximately 150 to 250kg N/ha), but mainly supplied in the warmer months.
- In southern Australia, soil N mineralised and not utilised by the pasture over a dry summer means there will be surplus N in the soil at the autumn break; thus only apply N later in autumn once deeper soil moisture is adequate and pasture growth has resumed. As mineralisation of organic N is low in winter, N fertiliser will be required to maximise pasture growth.
- In subtropical regions, dry periods (3-6 weeks) in spring (October) or summer (January) can cause pasture growth to cease while N mineralisation continues, building available N in the soil. However, profitable responses to applied N are still possible where rainfall events exceed 75-100mm, especially for producing silage.

### Managing ammonia losses

- Ammonia loss is highest under hot, dry, windy conditions. Ammonia losses from urea are also highest during the first 48 hours after application, while the urea granule is breaking down to ammonia (called hydrolysis).
- As a general principle, ammonia volatilisation losses from urea should be small, if best practice is followed i.e. do not apply urea where soil moisture is limiting, especially on hot and windy days.
- Between the cooler, wetter months (May to November in southern Australia), or under irrigation in the subtropical annual ryegrass season, ammonia volatilisation losses from urea fertiliser are too small to justify switching to higher-cost N fertiliser sources. During this period, urea does not need to be watered into the soil – assuming there is enough soil moisture, rainfall or irrigation to justify the N, as urea will be able to absorb enough moisture to dissolve.
- Ammonia volatilisation losses in summer average around 10 to 15% under dryland conditions, which still does not economically justify switching to other more expensive sources of N. Avoid applying urea fertiliser the day after a rainfall event during periods when potential evaporation is high (e.g. hot, dry and windy), as this may increase volatilisation losses above 30%. Under these conditions, irrigating after urea application will greatly reduce ammonia loss.
- If urea fertiliser is applied in drier periods without irrigation (November to March in southern Australia) you can apply the urea 2 to 3 days prior to grazing to minimise wind speed at ground level and reduce ammonia volatilisation during the critical loss period (first 48 hours). Care must be taken to avoid cows ingesting lumps of fertiliser as this could lead to ammonia toxicity.

### Managing ammonia losses – spray irrigated pastures

- Apply N fertiliser within 24 hours prior to spray irrigation.
- In summer, where evaporation is high, avoid applying urea fertiliser after irrigation as this is likely to increase volatilisation losses.

### Managing ammonia losses – flood irrigation

- Urea is best applied just before irrigation but minimise run off into drains, as this will carry dissolved urea. In some cases, not fertilising the last few metres of the irrigation bay can capture the urea dissolved in the irrigation head water.
- If urea fertiliser is applied after flood irrigation, soil moisture should be adequate to dissolve the urea and minimise volatilisation, but avoid wheel damage to the wet soils. Minimising nitrate leaching and denitrification.

- Avoid applying N fertiliser to warm (>10°C), waterlogged soils, as this increases the risk of N loss through denitrification.
- If applying N to cold (<10°C), wet soils use urea or ammonium based fertilisers and avoid nitrate based fertilisers (e.g. UAN).
- Avoid applying N fertiliser near streams/riparian zones and over drainage lines within a paddock.
- If irrigating, take care to avoid overwatering, as this may result in nitrate leaching and run-off of dissolved urea, as well as inefficient water use.
- Avoid applying high rates of N fertiliser to free draining soils during periods of high leaching potential (e.g. high rainfall).
- Use of nitrification inhibitors may be warranted in high drainage or waterlogged sites to prevent N losses to the environment (nitrate leaching, gaseous loss by denitrification).

### Minimising surface runoff losses

- The volume of water lost as runoff determines the N lost in runoff
  - avoid overwatering and surface runoff.
  - Use a weather forecast to minimise runoff after N application. When soils are saturated, wait at least 2 days after rainfall for excess run-off water to drain, before applying N.
  - Where possible, re-use drainage water.
- Do not apply N fertiliser near drains, channels, dams, lakes or riparian areas. In a hump and hollow, avoiding applying N to the hollow as this is likely to receive N through surface movement anyway.

### Dung and urine management

- Minimise the time that cows spend in the laneways and ensure that runoff from laneways, feedpads, sacrifice paddocks or other standoff areas drain to pastures and not directly into waterways.
- Effluent should be viewed as a valuable fertiliser resource, and nutrient testing should be used to ensure that no more than 50kg N/ha is applied to a pasture at a time.
- High stocking density will result in high losses of N from hot spots in the farm.

### Animal health and nitrogen

- Avoid high rates of N fertiliser on annual ryegrass and kikuyu, as these can accumulate potentially toxic levels of nitrate. Perennial ryegrass, fescue, cocksfoot and white clover are not known to accumulate toxic levels of nitrate.
- If nitrate toxicity is of concern, do not graze pastures 7 to 14 days after N fertilisation or if water-limited as nitrate levels increase in water-stressed plants. Likewise, do not graze pastures 14 to 18 days after N fertilisation if pastures are high in crude protein (e.g. spring or autumn with high N fertiliser rates) and animals are not receiving an energy supplement or lower quality hay or silage to counterbalance the high N in the pastures.
- Do not apply more than 60kg N/ha in a single application, particularly with higher pasture growth in autumn and spring.
- Avoid subjecting cows to rapid diet change e.g. from low to high quality pasture, or to pasture with capeweed or volunteer brassicas, especially dry cows or heifers. Likewise, never give starved, unadapted or dry cows, unrestricted access to highly N fertilised pastures.
- Cows that are suffering as a result of excess N in their diet tend to select for lower quality roughage. A bale of low quality 'bedding' hay in the corner of the paddock can be used as an indicator of protein or nitrate stress. ■■



# Milking efficiency: power smarter on your dairy farm

**Sam Spina**  
QRIDA Regional Area Manager  
Far North Queensland



Energy costs can be one of the heaviest drains on a dairy farm, from milk cooling and hot water to irrigation and pumping. But smarter energy use doesn't just reduce bills, it can make day-to-day operations more productive and resilient.

Across Queensland, dairy producers are finding that targeted improvements can deliver results. For example, an energy efficiency audit carried out by the Queensland Farmer's Federation (QFF) found an Atherton Tablelands dairy saved \$10,047 and 9,964kWh per year by improving their irrigation with the installation of an automation system.

### Here's five on-farm energy efficient upgrades dairy farmers could consider:

- 1. Focus on milk cooling efficiency:** Milk cooling runs every day. Keeping coolers and refrigeration systems well maintained can significantly reduce energy use.
- 2. Upgrade hot water systems:** Hot water for wash down is essential, but energy intensive. Efficient systems, good insulation, and timers help avoid unnecessary heating costs.
- 3. Optimise irrigation and pumping:** Correct pump sizing, irrigation layout, and fixing leaks or blockages reduce energy use while supporting consistent pasture growth.
- 4. Upgrade vacuum pumps and motors:** Milking equipment is a constant energy draw. More efficient pumps or variable speed drives can cut power use without affecting performance.
- 5. Look beyond the shed:** Simple upgrades like switching to LED lighting, maintaining cooling systems, improving ventilation, and considering renewable energy options, such as solar, can all contribute to lowering overall energy use.

A concessional QRIDA Sustainability Loan of up to \$1.3 million can help eligible dairy producers fund on-farm energy efficient upgrades.

Visit QRIDA's Sustainability Loan webpage or call QRIDA on 1800 623 946 to find out more about how you can power more and spend less with QRIDA. Visit the Queensland Ag Energy Hub website to find out more about energy information for farmers.

*Note: The case study referred to in this article is a Queensland Ag Energy Hub case study. The Queensland Ag Energy Hub is managed by the Queensland Farmers' Federation (QFF) and was funded by the Queensland Government.*

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# FertSmart tips for soil testing



**FertSmart is the Australian dairy industry's national nutrient management framework. It has been developed to improve the efficiency and profitability of fertiliser and effluent use on Australian dairy farms.**

Before applying any fertiliser, it is important to assess which nutrients are required and the amounts needed to address deficiencies and replace those removed by the farming system. Soil testing provides this analysis and means you apply the right fertiliser at the right rate, time and place.

## FertSmart soil testing

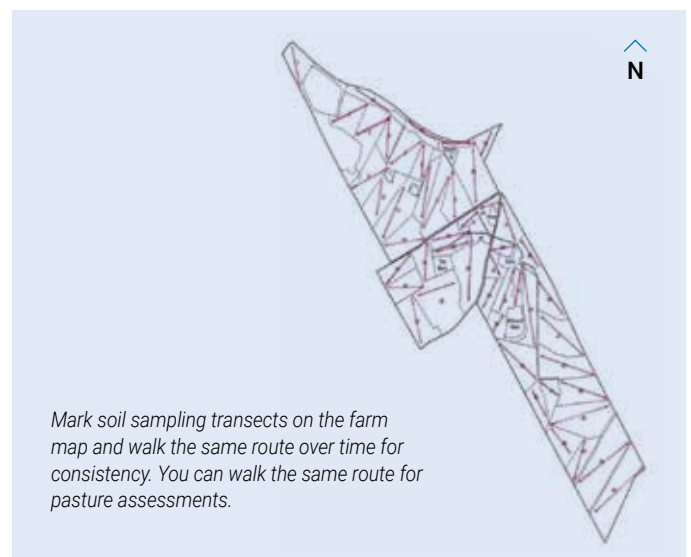
Regular observation and monitoring of soil chemical, physical and biological status is the cornerstone of FertSmart.

FertSmart uses the principle of soil testing Farm Management Zones (FMZ). These are areas of your farm which share similar physical characteristics and are managed in a similar way. It is best practice to soil test a representative paddock within each FMZ every 2-3 years.

Expect to pay around \$100-\$200 per soil sample, depending on number of samples, type of analysis and sampling costs. Money invested in soil testing can potentially save many thousands of dollars in fertiliser costs whilst growing more grass. Skimping on soil testing is false economy.

Plan your soil testing program with your agronomist and maintain over time, according to your plan.

Draw soil sampling transect lines on the farm map or record with a GPS, to ensure consistency when sampling. Avoid gateways, troughs, trees and pugged areas to get a representative transect across the paddock. Every person soil sampling over time should walk the same route for consistency.





**Soil temperature** observations are useful for timing fertiliser applications, particularly in colder areas. This is particularly important for nitrogen, which should only be applied when the grass is actively growing.



A **penetrometer** is useful for identifying compacted areas in the paddock. Penetrometer readings over time will be the most reliable gauge for monitoring impacts of different management practices to reduce compaction and pugging.



#### Take note of:

- Drainage – poorly drained areas are anaerobic and this will limit grass growth and increase the risk of nitrous oxide losses.
- Pugging damage.
- Rooting depth of pasture.
- How soils change with depth. Is there a heavy clay subsoil restricting root growth?
- Weed and pest impacts on the pasture.
- Every observation will give you a better understanding of your farm, its potential and how to manage different parts of the farm. ■

#### Best practice tips

- For consistency over time, sample at the same time of the year.
- Avoid sampling within 3 months of liming or 2 months of applying fertiliser.
- In cooler regions, soils are typically sampled from late spring to autumn. Warmer regions should be sampled to suit farming activities.
- Be organised and get your samples done well in time so that you can book in the fertiliser spreader.
- Dairy pastures are typically sampled to 10 cm depth, although some farms (especially in Tasmania) have historically been sampled to 7.5 cm.
- Take a minimum of 30 cores per paddock to form a composite sample, with the required amount for the lab being taken from the aggregated and mixed 30 core "bulk" sample.
- Complete sample information forms as required by the laboratory, keep samples cool and Express Post to laboratory for soil analysis.
- Send early in the week to avoid postage delays and consider adding a cool pack to keep samples cool.
- Use a NATA or ASPAC accredited laboratory as these labs have procedures for quality assurance and cross checking analytical results.
- Ideally, use the same lab over time for consistency in analysis. Costs and turnaround time are important decisions in choosing which laboratory to use.
- Keeping track of your soil test results is important. Often a colour-coded map (see previous page) is a good way to visualise fertility across the farm.
- Keep your soil tests and use them to build a picture over time of how fertility is changing on different parts of the farm. Many agronomists now use commercial software packages to track soil test results for their clients.



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# FertSmart – making fertiliser profitable



## HOW FERTSMART ARE YOU?

Optimum use of fertilisers creates a “win-win” situation for both farmers and consumers.

- It provides value for money for dairy farmers, important for profitability.
- It ensures minimal environmental impact, boosting consumer confidence that farmers are acting responsibly in the production of dairy products.

There are a series of common sense actions agreed to by farmers, agronomists, and fertiliser distributors that indicate if a specific farm business is optimising the use of fertilisers on their farm.

Do this quick test to see how you rate. Depending upon your score you may have to adjust your management to achieve a “best practice rating”.

The following questions cover the key components to being a FertSmart dairy farm business.

| Question  | My score<br>0 to 10 |
|---|---------------------|
| <p>1 <b>Do I consider soil type constraints in the development of a fertiliser plan?</b><br/>E.g. free draining sandy soils leach potassium rapidly.</p> <p><b>0</b> = Soil type is not considered at all <b>10</b> = Soil type is always considered</p>  |                     |
| <p>2 <b>Do I have a farm plan with accurate paddock areas?</b></p> <p><b>0</b> = No farm plan with paddock areas <b>10</b> = A mapped farm plan with precise paddock areas.</p>   |                     |
| <p>3 <b>Are there areas on my farm that are likely to have different nutrient levels due to management issues or practices? E.g. night grazing areas, effluent areas etc. Do I have them identified to be treated differently in regard to nutrient applications?</b></p> <p><b>0</b> = There are different areas but they are not fertilized differently <b>10</b> = Farm Management Zones (FMZ) are precisely calculated and nutrients applied according to the requirements of each FMZ.</p> |                     |
| <p>4 <b>Do I conduct soil tests using the same transect within each FMZ, via the same NATA accredited laboratory, at least every two years?</b> This is to assess the soil fertility trends on the farm.</p> <p><b>0</b> = NATA accredited soil tests have not been done for 5 years or more<br/><b>10</b> = Soil tests are completed in the same paddocks and the same transect across the paddock every two years.</p>  |                     |
| <p>5 <b>Have I investigated the potential use of effluent and manure on areas of the farm? Have I turned this potential into action?</b></p> <p><b>0</b> = On-farm nutrients are not utilised at all and investigations have not been investigated<br/><b>10</b> = Use of on farm nutrients has been investigated and installed and accounts for 20% or more of the nutrients applied or mapped area of the farm.</p>   |                     |

| Question   | My score<br>0 to 10 |
|--|---------------------|
| <p>6 Do I evaluate the associated animal, human and environmental risks when nutrients are applied during the year?</p> <p><b>0</b> = No consideration is undertaken and the nutrients are applied irrespective<br/> <b>10</b> = All risks are considered and evaluated before all fertiliser applications.</p>  |                     |
| <p>7 If imported feed on to the farm is &gt; 20% of feed consumed, do I consider it as a nutrient source and incorporate it into a nutrient budget and the analysis of trends in soil tests results?</p> <p><b>0</b> = It is relevant (greater than 20%) but is not considered at all and no nutrient budget is done <b>10</b> = It is considered when relevant and used in context with the trends of soil test results, and incorporated into a nutrient budget.</p> |                     |
| <p>8 Do I develop an annual fertiliser plan using all of the above factors, then implement it subject to the seasonal and environmental conditions encountered?</p> <p><b>0</b> = There is no annual fertiliser plan prepared<br/> <b>10</b> = An annual fertiliser plan is prepared then implemented and reviewed as the year proceeds</p>  |                     |
| <p>9 Does someone (me, my agronomist, my fertiliser distributor) keep detailed records of what nutrients have been spread and where on the farm? Are these referred to in the development of future plans?</p> <p><b>0</b> = No records are kept <b>10</b> = Records are kept virtually on a paddock by paddock basis.</p>   |                     |
| <p>10 Do I consider basic soil health indicators such as soil structure, in the development of a soil nutrient plan?</p> <p><b>0</b> = Soil health aspects are not considered at all <b>10</b> = Soil health issues are always considered.</p>   |                     |
| <b>TOTAL SCORE</b>   |                     |



### What does your total score tell you about how FertSmart you are?

#### Above 90

It is likely that optimum, responsible use of nutrients is occurring in your business.

#### 70-90

FertSmart compliant; no action essential but could be considered.

#### Below 50-70

Adjustments are required to become FertSmart compliant.

#### Less than 50

Significant changes are urgently required to become compliant. If you rated below 70% it may require discussion with your FertSmart approved advisor. ■ ■

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# Reduce feed wastage and lower costs

## KEY MESSAGES

Every kg not eaten adds cost.

Wastage can add 20–35% to feed costs.

Biggest losses occur at feed-out.

Bare ground and wet conditions increase losses.

Better systems and management reduce wastage.

Allow for wastage when planning feed.

## Introduction

With rising fertiliser and fuel costs, every kilogram of feed matters. Any feed that isn't eaten is money lost. Reducing wastage is one of the quickest ways to lower feeding costs and get more value from both home-grown and purchased feed.

## Start with your feed costs

Feed is one of the largest variable costs on a dairy farm. Wastage increases the cost of both home grown and purchased feed.

Rising fuel and fertiliser costs are likely to impact feed prices and tighten margins. Reducing wastage is one of the simplest ways to improve farm performance.

Losses occur through:

- Delivery and storage.
- Mixing of diets.
- Feed-out to cows.

Feed-out losses are typically the largest and offer the greatest opportunity to reduce cost.

## Understand the cost of wastage

Feed wastage affects cost in two ways:

- Feed offered but not eaten.
- Reduced feed quality due to spoilage, contamination or weather.

For example, 30% wastage on hay purchased at A\$400/t increases the effective cost to A\$520/t.

Small losses quickly become significant, particularly when feeding large quantities.

## Allow for wastage in your feed budget

Feed budgets should include realistic allowances for wastage across:

- Storage.
- Mixing.
- Feed-out.

If wastage is not accounted for, feed demand will be underestimated and shortfalls can occur.



## Feed-out method matters

Feed wastage varies widely depending on how feed is delivered.

Typical wastage rates:

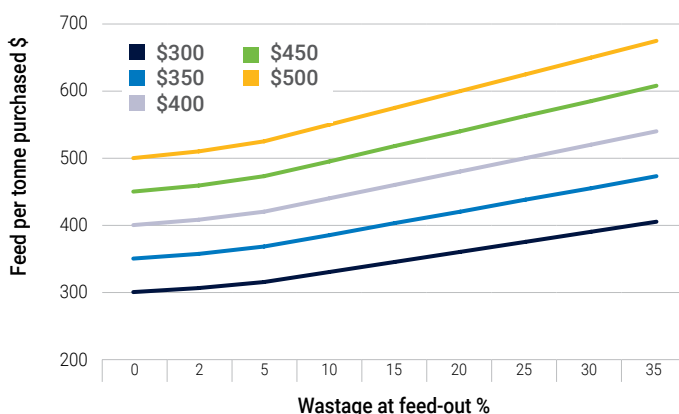
- Feeding in dairy at milking (grain) 0–2%.
- Feeding in grazing paddock 5–25%.
- Feeding on bare ground or sacrifice areas up to 35%.
- Permanent feedpad systems 0–10%.

Management within each system also has a major impact.

| Feed-out method  | Minimum | Typical | Maximum |
|--|---------|---------|---------|
| In the dairy at milking  | 0%      | 1%      | 2%      |
| In grazing paddock, on pasture   | 5%      | 15%     | 25%     |
| In sacrifice paddock, fed on bare ground, in ring feeders, or under a fence line         | 5%      | 25%     | 35%     |
| On permanent feed pad incorporating a compacted surface and purpose-built feed troughing | 2%      | 5%      | 10%     |
| On permanent, fully developed feed pad with concrete surfaces                            | 0%      | 3%      | 5%      |

*NB These figures assume dry conditions. They may not reflect the full range of wastage that might occur under wet conditions.*

**Table 1:** Feed wastage using different feed-out methods



**Figure 1:** Feed cost per tonne consumed by cows

## Reduce wastage during feed-out

### Feed quality and preparation

- Keep chop length appropriate to reduce sorting.
- Feed fresh, palatable feed and discard spoiled material.
- Mix rations correctly when using a mixer wagon.
- Use additives such as water, molasses or oil to reduce sorting.
- Service mixer wagons regularly.

### Feeding infrastructure

- Use feeders that limit feed being pulled out and dropped.
- Provide adequate trough space minimum 75cm per cow.
- Set trough height to support natural feeding position.
- Maintain clean, smooth trough surfaces.
- Use concrete aprons to reduce mud and contamination.
- Design systems to allow easy cleaning.

## Feed wastage of different feed-out systems



Up to 30%

Temporary, relocatable feed-out area. Forages or mixed rations are fed out on the bare ground in the paddock, in hay rings or old tyre tractors or under an electric fence line, etc.



Semi-permanent feed-out area. Compacted surface and low-cost troughing, such as conveyor belting and second-hand feed or water troughs.



Permanent, basic, feed-out facility. Compacted surface and concrete feed troughs or cement strip under electric wires.



Under 5%

Permanent, fully developed, feed-out facility. Cement surfaces and feed alley. May be covered by a roof.

**Figure 2:** Feed wastage of different feed out systems



## Feeding management

- Match feed allocation to cow demand.
- Avoid overfilling troughs.
- Sequence feeding across the day.
- Clean feed-out areas regularly.
- Avoid feeding onto long pasture.
- Manage competition between cows.
- Adjust feeding based on weather conditions.
- Calibrate feeding systems to deliver accurate amounts.

## Focus on what you can control

- Within any feed-out system, wastage can vary significantly.
- Attention to feed quality, infrastructure and daily management can reduce losses and improve feed efficiency without increasing cost.
- Reducing feed wastage is one of the most practical ways to improve profitability, particularly when feed prices are high or supply is limited. ■■

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# Heat Detection in Year-Round herds – Keeping it simple

**Belinda Haddow**  
Extension Team Lead  
Subtropical Dairy



## What is heat detection and why bother?

Efficiently detecting cows on heat and submitting them for mating at the correct time, either by artificial insemination (AI) or natural matings, is a key driver of reproductive performance and profit in a dairy business. Poor heat detection can result in wasted semen, longer dry periods for individual cows and poor overall herd reproductive performance. Common errors in heat detection include not prioritising it as a job, missing cows that are on heat, breeding cows too early or too late, and mating cows that are not on heat. Australian research approximately 15 years ago in seasonal and year-round calving herds indicated every missed heat in a herd costs \$200. This is likely higher in today's dollars.

## How do we know if we have a problem or an opportunity to improve?

In year-round calving herds, one useful indicator of heat detection is the percentage of mature cows inseminated by 80 days after calving (80-day Submission Rate).

The Submission Rate is the proportion of eligible cows detected in heat during the mating period. A high submission rate shows that your cows are cycling and showing signs of heat and you have systems in place to detect heats. A low submission may mean you have cows that are showing heats but they are not being detected, or you have lots of 'non-cyclers' in the herd that are not displaying signs of heat, or a combination of both scenarios. A non-cycler is a cow that has not started normal heat cycles after calving. This may mean she had low body condition at calving, too much body condition loss after calving, lameness or other health problems.

To calculate your Submission Rate in a year-round herd, record the number of mature cows (>four years old) that were intended for mating, then count the number of these cows that were mated in the first 80 days after calving. A Submission Rate of less than 60% is indicative of a substantial risk that heats

were missed during the first 80 days after calving and reproductive performance in the herd has been diminished by a significant amount.



If you have more detailed breeding records available, you could do further investigation of your herd's reproductive performance with the [Heat Detection tool for year-round calving herds](#).

## What are we looking for? The signs of heat

Cows generally show signs of heat every 18 to 24 days, with an average of 21 days in mature cows. When a cow is well fed, comfortable, in good body condition and healthy, the average interval from calving to first heat is 30 to 35 days. A cow is most likely on heat if she is standing to be mounted by other cows and if her heat detection aids have been activated. She may be on heat if she is attempting to mount other cows, she is restless or bellowing, she has mucous around the vulva, she has mud on her flanks or she is spending time together with the 'hormonal' group in the herd. A training video on heat detection in dairy cows can be found on [Dairy Australia's YouTube channel](#).



**On heat:** standing to be mounted



**May be on heat:** trying to mount other cows

Remember that not all cows will display every behaviour of heat. Signs of heat may be harder to detect in high producing cows, lame cows, in hot conditions, where there are only small numbers of cows in heat and where cows have poor footing. Obviously, all cows are hard to detect on heat if we are not observing them at various times of the day, if we don't know what we are looking for, if staff are not trained to detect heats, or cows are poorly identified.

## What are our options to improve heat detection?

Nothing beats time spent observing the herd to detect heats but there are heat detection aids available to assist the process. Tail paint and heat mount detectors (Kamars and scratchies) are



### Correct placement of tail paint

Apply a strip

- no more than 20 cm long ›
- no more than 5 cm wide over the rear segment of the backbone
- no further back than the start of the tail
- sufficiently thick to cover the skin with some hair fibres still visible.

great visual aids for heat detection when used correctly. There are also a range automated heat detection systems and herd synchrony programs available that can be put in place with the help of your dairy vet. It is important to note that aids are just aids. Even automated heat detection systems will need human interpretation to ensure the correct decisions around mating are being made.



#### Applying a heat mount detector

- Follow the manufacturer's instructions for applying the heat mount detector.
- Use the recommended adhesive.

*This heat mount detector signals that the cow has been mounted and is likely to be on heat.*



A scratch-off heat mount detector



A heat detection collar

#### A very visual case study

Recently at our Sunshine Coast Heat Detective on-farm workshop, Brad Holt's practical herd heat detection system was a big take-away for many who attended. Brad and Casey Holt, and their family, operate a 220 cow, pasture-based dairy in Cedar Pocket on the Sunshine Coast. They also have several staff who work in the business. Given this, they have set up a simple heat detection system which is very visual and works well in their business.

At 35 days post-calving, cows have green tape wrapped on their tail and a scratchie applied. Cows are mated if they show signs of heat and the green tape and scratchie are removed. Each Friday, any cow that is 10-17 days post-mating is drafted off and has blue tail tape applied and another scratchie. These cows are monitored until they are either confirmed pregnant with a pregnancy test, or they show another heat leading to another mating.

It is a quite simple, very visual heat detection system which works well in their production system. The cow groups are clear and any cow that has an actionable event upcoming will have tail tape;

- Fresh cows – **no tape, not ready to mate**
- Eligible but not yet mated – **green tape**
- Mated, not confirmed pregnant – **blue tape**
- Confirmed in calf – **no tape**

Time lags in the herd are greatly reduced with this system. If a cow is noted bulling or showing signs of heat and has no tape, she likely is fresh and isn't mated yet or may have lost her calf. She can then be investigated further. Everyone in the farm team understands the system and can see what's going on in the herd.



The Holt's regularly have herd health visits every two months and keep track of their herd reproductive performance through Fertility Focus reports. These reports give an overview of herd reproductive performance through submission rate, non-return rate and conception rate. You can access these reports and other heat detection and herd reproduction resources at [Dairy Australia's website](https://www.dairyaustralia.com.au).



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# A fencing job that changed everything

**Di Gresham**  
Human Resource Consultant



**It is often the ordinary jobs that feel the most familiar. These are the ones you have done before and do not seem especially high risk: moving fence posts; repairing a boundary fence. There is always the drive to get through the work before the day runs out.**

For Brett, that was exactly how this day began.

Brett and his employer, Jason, had been replacing a boundary fence on the far side of the property, a couple of kilometres from the dairy and cattle yards. It was physically demanding work and they had already been at it for a couple of days.

By mid-afternoon, Brett had taken the tractor back to a stockpile of fence posts to load the carry-all and transport more posts to where they were working. The posts were solid, heavy timber posts that had been cut on the farm some time earlier from a tree brought down in a storm.

Working alone, Brett was using a winch to pull the posts onto the carry-all. It was hard, physical work. He had already moved several posts and was preparing the next one when everything went wrong.

As Brett bent down to pull a post forward and attach the winch wire, the posts stacked behind it shifted and rolled. He tried to move back, but stumbled into the carry-all. Before he could recover, the weight of the rolling posts came forward and trapped his leg.

Alone and in extreme pain, Brett believes he blacked out for a time. Somehow, he managed to call Jason for help, but it was still some time before Jason got to him.

When emergency crews arrived, they were faced with a complex and confronting rescue. Brett's leg had been badly crushed beneath the posts, which had to be moved carefully to free him. A large emergency response was required as crews worked to stabilise him and do everything they could to save his leg as they freed him.

Brett had suffered multiple fractures to his lower leg. He also required a

fasciotomy to relieve pressure building up in the muscles around the injury.

Recovery was long and difficult. Months of rehabilitation followed, along with the physical and mental challenge of adjusting after such a traumatic incident. For six weeks, Brett was unable to bear weight on the injured leg.

Brett's story is a confronting reminder of how quickly routine farm work can become a medical emergency. There was no dramatic machinery failure, no unusual weather event, no high-speed incident — just a physically demanding task, heavy materials, a moment of movement in the load, and no chance to recover once things started to go wrong.

That is often how serious injuries happen on farm. Not in the jobs that look dangerous from a distance, but in the everyday work that can quietly carry significant risk.

Brett's story is a confronting reminder of how quickly routine farm work can become a medical emergency. There was no dramatic machinery failure, no unusual weather event, no high-speed incident — just a physically demanding task, heavy materials, a moment of movement in the load, and no chance to recover once things started to go wrong.

## Lessons from Brett's story

This incident highlights several important farm safety lessons.

Heavy materials such as timber posts, rails, pipes and logs can be unpredictable when stacked, moved or pulled. Even when they appear stable, they can shift, roll or slide suddenly, especially when one piece is removed or tension is applied. Loads do not need to be lifted high or moved fast to cause catastrophic injury.

Working alone increases the risk. When something goes wrong in an isolated paddock or on the far side of a property, response time matters. Even where help is available, distance, terrain and communication delays can all affect how quickly assistance can arrive. In a crush injury, those lost minutes can make a major difference.

Fatigue and physical strain are also worth considering. After a couple of long days of hard fencing work, tiredness can affect judgement, footing, body position and reaction time. Jobs involving repeated lifting, dragging, pulling and awkward postures deserve proper planning, especially later in the day when workers are more likely to be fatigued.

There are practical steps farms can take to reduce the risk of this type of incident:

- Assess how heavy or unstable materials will be moved before starting the task
- Avoid positioning yourself in the path of rolling, shifting or falling materials
- Use mechanical handling methods that keep people clear of the load wherever possible
- Review how posts or similar materials are stacked so they are less likely to move unexpectedly
- Avoid doing high-risk loading work alone in isolated areas
- Make sure there is a reliable way to communicate and call for help
- Consider whether the job should be broken into smaller, safer steps rather than pushed through quickly
- Stop and reassess when a task becomes awkward, tiring or harder than expected.

Most importantly, this story is a reminder not to underestimate familiar jobs. Just because a task is common, does not mean it is low risk. On farms, many serious injuries happen during maintenance, repairs and material handling – the very jobs people often see as part of a normal day's work.

A routine task can become life-changing in seconds. That is why taking the time to think through the risks beforehand is never wasted.

### The hidden toll of a farm incident

When a serious incident happens on farm, the impact is rarely limited to the person who is injured. For Jason, there was the shock of finding Brett trapped, the stress of the emergency response, and the emotional weight of seeing someone badly hurt while simply doing a day's work.

In the aftermath, there was also the disruption to the farm business, the pressure of dealing with a workplace investigation, and the lasting effect that an event like this can have on confidence, decision-making and peace of mind.

Serious incidents leave a mark on everyone involved. ■ ■

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## Project Update

# P6a Resilient cattle (heat tolerance)

**Managing dairy cattle in hot, humid conditions is an increasing issue for the Australian dairy industry, with climate change and the trend towards intensification. Improving heat tolerance in dairy cattle has benefits for both the business (maintaining production and reproductive performance in hot months) and animal welfare (improved cow comfort in hot conditions).**

Under the supervision of Dr Anna Chlingaryan, Dairy UP PhD student, Alice Shirley, explored the diversity in dairy cattle responses to heat events. By collaborating with DairyBio and DataGene, the outcomes of this work will contribute to developing an improved tool for breeding dairy cattle with improved heat tolerance.

### Heat Tolerance ABV

Published by DataGene, the Heat Tolerance Australian Breeding Value allows farmers to identify and breed animals with greater ability to tolerate hot, humid conditions with less impact on milk production.

The current Heat Tolerance ABV is derived from genomics only – the DNA testing of animals. It has a relatively low reliability which has contributed to slow uptake by farmers.

This Dairy UP project aimed to develop phenotypes for heat tolerance to add to the model for the Heat Tolerance ABV. Phenotypes are indicators of animal performance that can be measured in commercial animals. Combining genomics with traditional and new measures of heat tolerance should improve the reliability (accuracy) of the Heat Tolerance ABV.

### Collecting phenotypes with sensor technology (Dairy UP)

The Dairy UP team analysed data from innovative sensor technologies (core body temperature) through advanced statistical methods.

Data automatically downloaded via API were used to build animal-level datasets to improve our understanding about which animals are more susceptible to heat.

Data was collected from cows on three Australian pasture-based dairy farms fitted with rumen sensors (reticuloruminal boluses) to monitor core body temperature, every 10 minutes, 24 hours a day. A total of 1429 animals were involved in this research, plus 28 heifers from the University of Sydney farm in NSW.

In addition, climate data from the past 20 years was obtained from the Bureau of Meteorology to match the observations from the cows.

A water threshold model was developed to account for water intake, isolating the impact of drinking events on core body temperature.

### Drinking behaviour

Analysis of the sensor data confirmed significant variation between individual animals' reticuloruminal temperature (core body temperature) and their drinking behaviour over time. This work also demonstrated the core body temperature of cattle increased at lower Temperature and Humidity Index (THI) levels than previously thought.

For example, the rumen sensors were indicating a rise in core body temperature at 67 THI. Until now, it has been recommended that herd managers prepare for a heat stress

### Data, Advanced Technology and Automation (DATA)

Dairy UP's P6 project is exploring ways to use existing farm, climate and industry data to develop ways to monitor cows and systems. Reports and tools based on this data could be used by farmers to make better decisions, for example about heat management, health and feeding.

Copious volumes of data are collected across the Australian dairy industry. Until now this has been stored in numerous, separate data bases.

This project aims to utilise data, advanced technologies and automation to integrate information from multiple sources to enable the creation of tools that support on-farm decisions.

P6 is a suite of three projects that combine animal science and data science. Each project is being undertaken by a PhD student.

P6a: Resilient Cattle (heat tolerance).

P6b: Resilient Cattle (health): early intervention for improved animal health, enabled by advanced sensing.

P6c: Digital Feeding – data-driven feeding to optimise grain allocation in pasture-based herds.

This document provides an overview of Project P6a Resilient Cattle (heat tolerance).



event at 70 THI, with negative effects on production expected at 75 THI.

The research also confirmed that cows drink more often during summer and less in winter. As expected, cows in herds in warmer regions also returned to the trough to drink more times, on average, in a day compared to those in cooler climates.

Further analysis found that drinking behaviour can be used as a reliable indicator of heat stress. Drinking was a consistent behavioural response to cope with internal and external heat. Those animals that drank more often during rising THI displayed a decline in reticuloruminal temperature. They were also able to maintain production under higher internal temperature. These findings open up new opportunities to integrate additional phenotypic indicators into the genomic-only model currently used to calculate the Heat Tolerance ABV, thereby improving its reliability.

## Enhancing phenotype calculation (Dairy UP)

The Dairy UP team developed a hybrid artificial intelligence (AI)-based model (HAIM) to improve the assessment of heat tolerance in dairy cattle.

They used machine learning techniques and 20 years of historical climate and dairy cattle production data to enhance the heat tolerance phenotype calculation.

Traditional methods for determining heat tolerance in dairy cattle involve statistical models that use the rate of decline in milk yield as Temperature-Humidity Index rises above 60. Dairy UP's HAIM combines the predictive capabilities of machine learning algorithms with these established statistical models, allowing for the detection of intricate relationships within the extensive data.

The HAIM revealed patterns that might remain hidden when using traditional models alone, enhancing the understanding of heat tolerance in dairy cattle and the identification of more heat-tolerant animals.

The traditional statistical method and HAIM model overlapped in identifying 84% of heat tolerant animals, but the HAIM replaced about 8% of the cows that weren't identified with the statistical method, while accounting for a greater proportion of the total observed variability (i.e. increasing accuracy).

## Combining phenotypes and genotypes (DairyBio)

This collaborative project is being undertaken by DairyBio and La Trobe University PhD student, Laura Jensen under the supervision of Professor Jennie Pryce.

This project combines the genetic and performance data from animals with a variety of approaches including the sensor technologies from the Dairy UP project.

This information may allow the model for the Heat Tolerance ABV to be extended to incorporate sensor phenotypes which could help to identify animals that better tolerate hot and humid conditions with less impact on their milk production.

Sensors are one example of new research methods that could improve how we select for heat tolerance, capturing its full complexity.

Success in this area will come from collaboration among animal scientists, combining genomics with traditional and new measures of heat tolerance. ■■

## Collaboration

### Dairy UP

DairyBio (Dairy Australia, Gardiner Foundation & Victorian Government)

### DataGene

Charles Sturt University

### SmaXtec

University of Sydney

## More info

### Project lead

Prof Cameron Clark,  
Charles Sturt University

E: [camclark@csu.edu.au](mailto:camclark@csu.edu.au)

## Published articles

Chlingaryan, A et al An AI-based hybrid model for dairy cattle heat tolerance phenotype, *Smart Agricultural Technology*, Volume 12, 2025

Chlingaryan A, et al (2025) AI for a dairy cattle heat tolerance phenotype. *ADSA Abstract*

Pryce Jennie E et al (2022) *Impact of hot weather on animal performance and genetic strategies to minimise*

*the effect. Animal Production Science* 62, 726-735

Shirley A. K. et al (2024) *Review: Ruminant heat- stress terminology. Animal* Volume 18, Issue 9.

Shirley A.K. et al (2025), *The diversity in dairy cattle reticulorumen temperature: Identifying water intake events, Computers and Electronics in Agriculture*, Volume 235, 2025, 110357



## Stillbirth ABVs to address leading cause of calf deaths

From April, DataGene is publishing two new Stillbirth Australian Breeding Values (ABVs) to address the leading cause of death in Australian dairy calves.

Available for all breeds, the Sire Stillbirth and Maternal Stillbirth ABVs give dairy farmers a breeding tool to reduce stillbirths.

Between 5-7% of Australian dairy calves are stillborn or die within the first day. Stillbirth is the leading cause of death in Australian dairy calves – more than double scours and respiratory disease combined. Internationally, stillbirth rates as high as 10% have been reported.

Cows and bulls will each receive two ABVs: Sire Stillbirth and Maternal Stillbirth. The Sire Stillbirth ABV predicts the percentage of progeny that are born dead, while the Maternal Stillbirth ABV predicts the percentage of calvings that result in a dead calf.

Both calf and cow have a role in a successful calving. From a breeding perspective, it is important to breed for calves that are born alive and cows that give birth to a live calf.

While many environmental factors contribute to the risk of stillbirth, genetics also play a role. Research conducted by Dr Michelle Axford as part of her PhD studies showed there is enough genetic variation between animals within a breed to enable selection for a lower risk of stillbirth. This indicates that genetic improvement is achievable through sustained selection.

To breed for fewer stillbirths, farmers should select animals with Stillbirth ABVs less than zero. Most Holstein and Jersey bulls fall between -2% to +2% for Stillbirth ABVs. The best bulls are below -5% for Stillbirth ABVs. Stillbirth ABVs are published in the Good Bulls App, DataVat, and heifer genomic results.

The reliability of the Sire Stillbirth ABV in a young genomic Holstein bull is about 60%, similar to the reliability of the ABVs for Fertility and Overall Type. The reliability of Maternal Stillbirth is about 52%.

While the benefits of lowering stillbirths are clear for calf welfare, there are additional welfare and productivity benefits arising from lower maternal stillbirth rates. Studies have reported that cows experiencing stillbirths show reduced pregnancy rate, increased days open, and lower milk yield early in the first lactation. ■■

For more information contact: [DataGene 1800 841 848](tel:1800841848) or [enquiries@datagene.com.au](mailto:enquiries@datagene.com.au) or [datagene.com.au](http://datagene.com.au)

# SATs – School Based Apprenticeships and Traineeships on Queensland and New South Wales Dairy Farms



A School-Based Apprenticeship or Traineeship (SBAT) allows a local secondary student to work part-time on your dairy farm while completing a Certificate II in Agriculture, Certificate III in Agriculture or Certificate III Dairy Production.

## How it works

- Student attends school and works on-farm each week.
- Student works at least 7.5 paid hours per week over each 3-month period, (traineeship duration varies from 12-24 months depending on qualification).
- Training is delivered by TAFE or another Registered Training Organisation. In most cases these certificates are fee-free, with only a small materials fee.
- The traineeship counts towards the student's QCE.
- Students usually start the traineeship in Year 10 and must be at least 15 years of age.

## Wages

Paid under the National Training Wage (Miscellaneous Award 2020). Rates vary, so employers must check the current Fair Work pay guide at commencement, this is a guide only.

## Current SBAT Pay Rates (Certificate I-III)

From 1 July 2025

| Student level    | Hourly rate (from 1 July 2025) |
|------------------|--------------------------------|
| Year 11 or below | \$13.57                        |
| Year 12          | \$14.95                        |

## WHY IT BENEFITS YOUR FARM

The student undertakes work experience on your farm to assess their suitability for the role.

Reliable part-time labour during school terms (students can also work in school holidays by agreement).

Build future workforce capability in your region.

Try a worker first through work experience before signing a contract.

Ongoing support from Traineeship support organisations.

Priority hiring incentives from the government (for Certificate III in Agriculture and where eligible)  
\$1,000 at 6 months,  
\$1,500 at 12 months.

## More information

Contact your Dairy Australia People Experience Lead

### NSW, Gippsland

Tania Ketteringham 0412 040 504

### Western Victoria, Tasmania, WA

Ella Dixon 0417 167 244

### Murray, SA, Subtropical

Melva Tyson 0439 667 425








Listen to Jade's interview on DairyPod:  
*Dairy pathways: Transition from school to workforce.*



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\*Eligibility criteria applies. The information contained herein is for general information purposes only. You should not rely upon this information as a basis for making any business, legal or any other decisions.

# 2026 Event Calendar

| DATE        | EVENT                        | REGION              | LOCATION    | CONTACT         |
|-------------|------------------------------|---------------------|-------------|-----------------|
| <b>May</b>  |                              |                     |             |                 |
| 18          | Heifers on Target/Dairy Beef | Darling Downs       | Crows Nest  | Belinda Haddow  |
| 20          | Managing People              | National            | Online      | Belinda Haddow  |
| 20-22       | Raising the Roof             | Victoria            | Shepparton  | Alicia Richters |
| 26          | Milking Mastitis Management  | Far North Coast NSW | TBC         | Brad Granzin    |
| 27          | Milking Mastitis Management  | Mid North Coast NSW | TBC         | Brad Granzin    |
| <b>June</b> |                              |                     |             |                 |
| 1           | Disbudding Best Practice     | South-east Qld      | Harrisville | Belinda Haddow  |
| 2           | Milking Mastitis Management  | Darling Downs       | TBC         | Belinda Haddow  |
| 4           | Milking Mastitis Management  | Sunshine Coast      | TBC         | Belinda Haddow  |
| 17          | Milking Mastitis Management  | South-east Qld      | TBC         | Belinda Haddow  |
| TBC         | Milking Mastitis Management  | Far North Qld       | TBC         | Fiona Neville   |

Brad Granzin 0431 197 479  
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 Fiona Neville 0427 033 709  
 Alicia Richters 0427 916 650

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