Farm business environmental sustainability plan

The Farm Sustainability Program is Parmalat's commitment to working with our milk suppliers to responsibly manage environmental resources. We believe that the health of our water, land and air is vital to the ongoing sustainable growth and profitability of the Australian dairy industry.

Through adoption of innovation and best management practices, our dairy farmers are striving to meet the minimal impact expectations of our international and domestic customers, as well as the local communities in which they live and operate. Together, we realise there are opportunities to practice and demonstrate improved performance.

Bangalara Dairies, Bonville, NSW, 2450

Owner/ Operators: Jason & Michele Bake

Farm Profile: Jason & Michele Bake, together with their three girls and Jason's parents and sister, operate a 420 jersey/ jersey x milking herd on their 140 hectare (ha) property. They produce an average of 1.9 million litres of milk annually. The family has owned and operated the farm for over 100 years in the back-drop of one of Australia's prime tourist destinations, Coffs Harbour. The Bake's daughters are proud to be the 5th generation to call Bangalara home.

Hannah, Michele, Jorjah, Jason & Danica Bake

Farm natural assets: The milking platform (approximately 95 ha) is situated on the most productive alluvial soils of the farm between the fenced Bonville Creek, along the northern extent ,and a tributary and series of small wetlands in the property's south west corner. The rising areas of the property are of lower quality soil types used for heifer grazing or as part of the farm's cropping program. 17 ha of the farm is maintained for riparian, wetland or bush conservation. Land leased nearby is also used for cropping, harvested as home grown silage and fed to the milkers on a concrete feed pad built in 2009.

2016 Farm SWOT analysis

Strengths

- ✓ Commencing participation in the Parmalat program with a strong baseline from which to improve performance.
- ✓ The property is located well for access to trade & equipment services.
- ✓ The operation maintains a consistent, trade qualified labour force.
- ✓ Jason has a strong ability to "think outside the square" and extends his networks when necessary to explore innovative ideas.
- ✓ Operating a system which sources substantial feed from home grown crops means the business has quality control and is less exposed to external grain prices.

Weaknesses

- ✗ Lack of agricultural contractors in the region.
- ✗ The operation of a more complex farming system than others (ie cropping/ PMR) can mean errors have a greater financial impact.
- ✗ Energy consumption and cost is considered 'high' [1] for the property at 80kWh or $23.36 / 1000L milk produced (includes stock water bore pumping, effluent pumping & dairy use).

Opportunities

- ✓ Access to knowledge and future technologies through extensive network.
- ✓ Close proximity to other agricultural and non-agricultural based industries from which to learn and draw upon for new innovations.
- ✓ Increasing pasture utilisation to drive profit by analysing available farm data and working with a newly engaged agronomy advisor.

1. Source: Smarter energy use on Australian Dairy Farms- Analysis of regional assessment data: Subtropical (Dairy Australia, 2015)

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Threats

- ✘ Level of accountability because of proximity to urban fringes and horticultural enterprises.
- ✘ Feed availability and quality is reliant upon the success of home-grown crops.
- ✘ Electricity costs have risen by 60% in 5 years for the operation

Farm Sustainability Goals

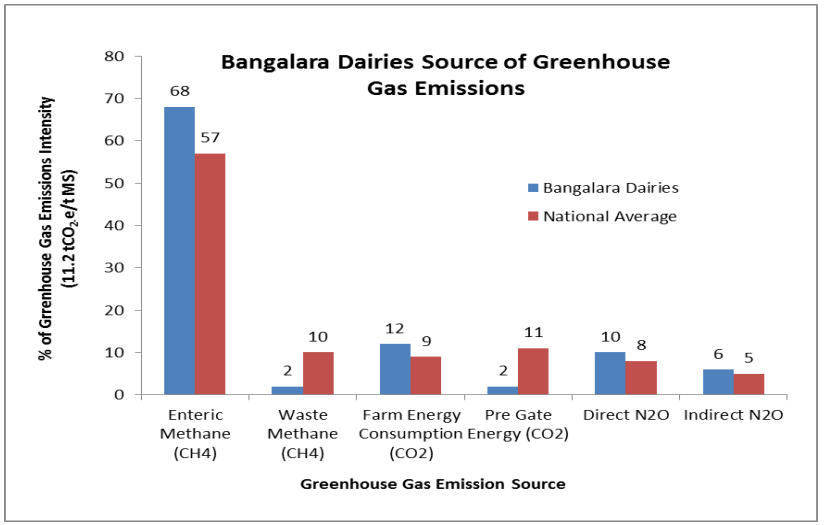
To operate a healthy, profitable business that will provide for our family and can be passed onto the next generation.

To enhance our land, water and soil assets by continuing to operate in a way that minimises impact to the environment whilst producing a product of quality for our dairy markets.

To embrace innovation and technologies which help to use resources more efficiently and minimise loss of energy from the farm system (nutrients, emissions, feed conversion, waste) which is more valuable to our family as energy converted into milk.

Existing farm sustainability activities

- ✓ An industry best practice Fert$mart Plan has been prepared for the farm.
- ✓ Annual soil fertility testing and trending is undertaken resulting in Nitrogen use on half the milking platform applied using the 4Rs principle[1].
- ✓ Effluent can be applied daily as a nutrient source to 30% of the farm area through two travelling irrigators.
- ✓ Approximately 12% of the farm is conserved for biodiversity.
- ✓ Effluent solids from the feed pad are stored in a bund and applied to crops.
- ✓ A waste management program is implemented to recycle plastics (bale wrap & netting), triple rinsed drums, paper & cardboard and propylene products (fertiliser bags & twine). A collaborative approach with staff was undertaken to ensure adoption (Waste storage area pictured above).
- ✓ Pit silage reduces the volume of silage wrap plastic used on the farm.
- ✓ The farm has had an industry best practice greenhouse gas emissions assessment undertaken so that abatement options can be explored.



Source: Bake DGAS Calculation, January 2016

1. 4R Nutrient Stewardship Principles- Right Source, Right Rate, Right Time, Right Place

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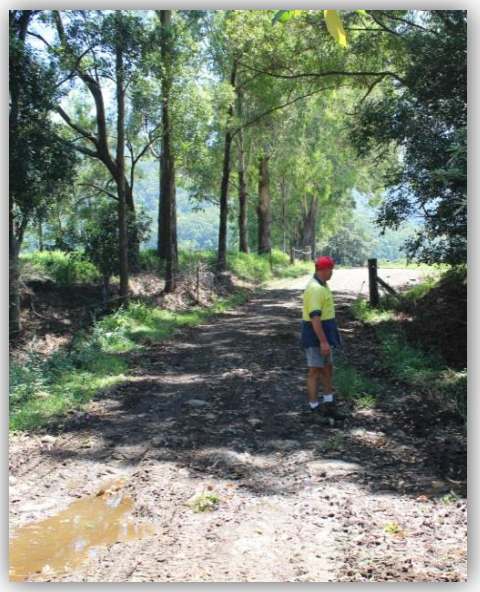
Future activities to achieve planned farm targets

- **Reduce energy use –** Less water entering the effluent solids trap would reduce the requirement to pump twice a day. By installing clean water diversions in the dairy yards (ie. cut-off diversion drain) and capturing water in tanks from the dairy roof, it is estimated that pumping frequency can be reduced by as much as 50% in the highest rainfall months.
- **Reduce energy use-** A pump & irrigation performance analysis will inform a recalibration of equipment and instruments to better align demand and delivery requirements. Substantial energy efficiencies can be made when pumps are performing optimally.
- **Increase effluent reuse efficiency**- Simple pipe realignment along identified laneways and across gateways will increase pumping efficiency and reduce labour required to manage the system.
- **Reduce sediment run-off**- By installing culverts, regrading, gravelling and compacting identified laneway crossings of waterways (Pictured).
- **Reduce reliance on external power sources**- Option to install solar PV panels on the dairy to match peak demand is to be explored. At current electricity usage and cost, this may be a viable undertaking for this operation.
- **Increase fertility of soils and reduce likelihood of nutrient loss**- Implement the farm Fert$mart Plan and work together with a trusted agronomist to monitor and review the plan.
- **Decrease nitrous oxide losses** by restricting effluent irrigation to dry periods and reducing lag time between capture and spreading.
- **Improve documentation of business performance-** Michele has been attending industry conducted business & finance training and plans to implement systems which will improve farm data analysis.
- **Protect all waterways from stock-** Fence final 10% of the tributary of Bonville Creek. This project will require the installation of a culvert to ensure ongoing access to the paddocks to the north, 290m of fencing & 500 locally sourced indigenous trees/ shrubs.
- **Increase conservation areas-** A number of fencing and planting projects have been identified to increase shade and shelter for stock, as well as provide pesticide drift protection from neighbouring horticultural enterprises. These projects require approximately 1km of fencing and 2500 locally sourced indigenous trees/ shrubs.
- **Improve best practice in safe storage & use of chemicals**- Standard Operating Procedures (SOP) for the safe handling of chemicals and hydrocarbons, as well as emergency response, will be document and posted in the storage facility.



Left: Reduce sediment run-off from laneways
Above: Effluent solids used on home grown crops more promptly will reduce N_2O emissions.

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2016 Farm Sustainability Targets

Reducing Environmental Impact Priorities	Relevant 2020 Dairy Industry Target (DA 2015 NRM Survey status)*	Farm Baseline	Farm Target 2020	Indicator	Annual Performance Progress
Improve nutrient, land & water management	8.1 90% of stock are excluded from waterways	✓ Farm aerial photo and map used to plan farm layout and identify conservation areas. ✓ All wetland areas protected (5ha) ✓ 90% of 3.9km creek & tributary frontage fenced (3.85 ha).	Final 10% (2 x 145m) of frontage fenced and revegetated (500 plants) including culvert crossing to continue access to adjacent paddocks.	% of waterways on property protected from stock. Access across waterways maintained to minimise sediment & effluent run-off into waterways.	Projects undertaken to increase farm waterways to 100% protection from stock.
	8.2 80% of dairy farms implement nutrient plans (2015 measure is 58%)	✓ Fert$mart Plan prepared April 2016 ✓ Effluent tested regularly to analyse nutrient value. ✓ Effluent spread across 30% of the farm (10% considered best practice)	100% of identified Farm Management Zones (FMZ) within desired regional fertility parameters.	Farm fertility levels are within desired regional fertility levels for PKS.	Nutrient application register is in place to track NPKS application according to Fert$mart Plan (kg/ha), including effluent. Applications. Fert$mart Plan is updated annually by an approved agronomist, including analysis of fertility trends.
			Reduce effluent volume requiring application to land.	Application hrs reduced per week.	Infrastructure changes in the dairy and holding yards undertaken to eliminate clean-water flow into the effluent system.
			Nitrogen Use Efficiency is known over each season and is exceeding industry best practice.	Nitrogen application rates are determined to maintain Crude Protein (CP) of pasture between 16%-20%. NUE is measured and is above industry best practice.	Plant tissue testing and CP% trending analysis is undertaken. NUE is improving annually.
	8.3 80% of dairy farms with irrigation having some level of automation implemented (2015 measure is 54%)	✓ Effluent irrigated using 2 travelling irrigators that require manual labour to access some areas of the farm.	Effluent irrigation infrastructure and equipment in place that requires minimal labour input to apply according to the 4Rs principles.	Infrastructure changes made to increase efficiencies. Labour hours required to apply effluent per ha.	Irrigated effluent application hours, rates, timing and placement are documented. Reduced labour hours required to apply effluent to land (hrs/ha).
	8.4 80% of dairy farms managing land for conservation & biodiversity	✓ 17 hectares (12% of farm) managed for conservation and	A further 0.7ha revegetated in areas already fenced from stock (approximately 1000	Sites revegetated identified and measured on farm map.	Annual projects undertaken to meet 2020 farm target.

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	(2015 measure is 45% of farms at an average of 7% of area per farm)	biodiversity.	plants). A further 2 ha of farm area protected from stock and revegetated to provide increased shade and shelter for stock (approximately 1km of fencing, 1500 plants).	Dedicated conservation area has increased to 20 ha or 14% of farm area.	
	8.5 100% of dairy farms actively managing noxious weeds	✓ LGA weed classifications known and an active seasonal weed control program in place (80 hrs/year)	Noxious and pasture weeds controlled on farm.	Land area (ha) requiring treatment and mortality rates documented. Labour hours required to eradicate infestations.	Reduction in area and labour time required to manage noxious weed infestations.
	8.6 100% of dairy farms have practices in place to recycle water on farm[1]	✓ Dairy is designed to re-use and recycle water wherever possible. ✓ Water quality is matched to water use requirement.	5% reduction in water use from bores to reduce energy & water consumption. High quality run-off water is diverted to storage tanks and used for high quality use such as teat wash or cow cooling in yards. All water emanating from the dairy is used for multiple applications. Clean water run-off from yards is diverted from the effluent system to reduce volume.	Baseline water consumption requirements have been determined according to use. Rainwater tanks have been installed for use in high quality applications. Water diversions with cut-off capabilities have been installed to yards & feed pad.	Reduction in bore water consumption, based upon water usage meterage for 14/15, at an average rate of 1% annually.

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Reduce greenhouse gas emissions intensity by 30%	10.2 Farm emissions abatement actions[2] (2014 NSW measured range is 9.4 to 17.2 tCO2-e/ t MS)**	DGAS industry best practice calculations demonstrate a current emission intensity of 11.8 tCO_2-e/t MS produced on the farm.	10% reduction in emissions intensity (tCO_2-e/t MS) Effluent management activities implemented to reduce energy use (pumping hours) and more efficient application of solids to crops (less storage time). Dairy equipment installed and operated to optimise energy efficiency.	Annual DGAS calculation undertaken to determine intensity (tCO_2-e/t MS). Recommendations of the Bake DGAS Summary Report are being implemented where cost effective. Recommendations of the March 2011 Energy Assessment Action Plan implemented.	Reduction in emissions intensity (tCO2-e/t MS) by an average of 2.5% per year.
Reduce waste to landfill by 40%	11.2 On farm measurement to be developed from DairySAT tool[3]	✓ 95% of polypropylene (1 tonne/ year) taken for recycling (seed & fert bags) ✓ 95% plastics (800kg/ year) taken for recycling (silage wrap, twine, netting) ✓ 100% oil/chemical drums recycled through DrumMuster. ✓ 90% paper & cardboard (150kg/ year) recycled. ✓ 70% (400kg) timbre collected for reuse by a local wood supplier. ✓ Reduction & re-use practices in place to mitigate impacts of plastics & polypropylene use.	No recyclable or reusable materials going to landfill. 10% reduction in waste generation across the farm. Of the waste generated, 30% reduction in waste to landfill intensity (t waste/ ML Milk produced) or only 10% of overall farm waste (t) going to landfill.	Baseline waste generation figure determined (t). Baseline waste to landfill (t) and waste to landfill intensity (t waste/ML Milk produced) determined.	Reduction in waste generation by an average of 2% per year. Reduction in waste to landfill intensity (t waste/ ML Milk) tracking at an average of 8% per year or tracking to achieve no more than 10% of overall farm waste (t) going to landfill. Waste management program is continuing and captures accurate performance data- weight (t) of waste generated and managed via recycling (t), reuse (t) or landfill (t).
Farm determined priorities* **	Effluent Management System is considered best practice.	Effluent system currently captures clean water that could be diverted or reused.	Good quality water is being captured for use in the dairy and yards.	Effluent Management Plan prepared for the farm by a registered expert.	Effluent management storage and reuse implemented according to the EMP. Steady decline in bore water consumption (L/ML Milk).
	Chemical & hydrocarbon standard operating procedures meet environmental and OH&S compliance.	No process in place to document herbicide use. No written procedures in place for emergency incidences	No reportable environmental or OH&S incidences on farm. Documented procedures in place for safe storage and	Storage, procedures and training comply with regulation.	Bi-annual AgSafe (or similar) audit undertaken.

		related to chemical or hydrocarbon spillages.	handling of chemicals. All staff trained in risk mitigation procedures and incident management.		
	Farm is utilising power as efficiency as possible to reduce reliance on expensive external energy sources.	Farm operations currently paying 29.2c/ kWh for power. Consumption intensity is 80kWh or $23.36 / 1000L milk produced	Relative cost of power consumption is reduced by 20%/ 1000L milk produced. A decision has been made on whether renewable energy sources are cost effective for the farm operation and actions have been undertaken.	Energy efficiency options have been undertaken. Alternative energy sources have been explored and implemented where payback period does not exceed 10 years.	Farm operation is demonstrating a trend of reduced farm energy consumption intensity (kWh/1000L) and reduced farm energy consumption costs ($/1000L).

[1]Potential links with Target 10 of the Australian Dairy Industry Sustainability Framework - 20% Reduction in the water consumption intensity of dairy manufacturers (L/ML milk processed). Baseline is 1.7L/ ML processed.
[2] This target has been identified in the Australian Dairy Industry Sustainability Framework with no targets set at this time. Target 10.1 sets a level of 30% reduction in emissions intensity by dairy manufacturers (tCO_2–e/ ML Milk). Baseline is 178.7 tCO_2–e/ ML milk processed.
[3]Potential links with Target 11.1a of the Australian Dairy Industry Sustainability Framework – Waste to landfill intensity of dairy manufacturers (t waste/ ML Milk processed)
*Dairy Australia Sustainability Survey, September 2015 (Down to Earth Research)
**Dairy Australia Dairy Farm Monitor Project, New South Wales, Annual Report 2014-15.
***Priorities were determined by undertaking Dairy Australia's Dairy Self-Assessment Tool (DairySAT), September 2015

Value to the farm operation

The following is an overview of potential costs associated with implementing activities where cash investment will be required. This has been estimated using current cost information, estimates from potential suppliers and estimated labour ($40/hr).

Action	Initial estimated cost ($)	Annual estimated operational cost ($)	Measurable annual value to farm ($)	Compliance associated benefits
Fert$mart Planning	*3,000*	*1,000*	*2,000*	✓ *Nutrient retained on farm*
Water diversion & capture (reduced pumping)	*6,000*	*500*	*2,500*	✓ *Nutrients retained on farm*
Effluent distribution system upgrades	*1,500*		*3,000*	✓ *Nutrient retained on farm* ✓ *Employee OH&S*
Dairy energy efficient equipment upgrades	*26,000*	*500*	*7,000*	
Alternative energy source PV Solar Panels (30kW)	*60,000*	*500*	*10,000*	
Farm data mgt (web based system)		*1000*	*3,000*	*Document control for compliance recording*
Conservation Projects	*15, 600*	*1,000*		✓ *Native animal & vegetation protection* ✓ *Water quality* ✓ *Food Safety (spray drift)* ✓ *Animal Health*
Ongoing Waste mgt program implementation	*800*	*2,500*	*2,500*	✓ *Animal Health* ✓ *Employee OH&S* ✓ *Food Safety* ✓ *Environmental Incidents*
Chemical mgt	*12,000*	*2,000*		✓ *Animal Health* ✓ *Employee OH&S* ✓ *Food Safety* ✓ *Environmental Incident (EPA)*

Supporting Documentation

Performance progress and value should be considered with reference to the following documents which underpin the indicators and targets established for Bangalara Dairies:

Bake DGAS Summary Report, January 2016

Bake DairySAT Action Plan, September 2015

Bake Fert$mart Plan (prepared by MNC Agronomy), April 2016

Bangalara Dairies Energy Assessment Action Plan, March 2011

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