Farm efficiencies lead to reduced emissions

Case Study – Timboon, Victoria

Farm Background

Norm and Tanya Vogels are lifelong farmers, progressing from share farming to leasing and then buying the farm. Currently they milk around 215 Holstein cows on 165 ha of predominantly perennial rye grass pastures. The farm is in a high rainfall zone near Timboon in south-west Victoria, receiving around 950mm/year annually. High rainfall is a key limitation to stocking rates with areas becoming boggy over winter. Norm and Tanya provide most of the labour on farm and employ contractors where needed.

Like many farming families the Vogels went through a stage prior to 2020 where their personal circumstances didn't allow them to devote as much attention to detail with farm management and the use of inputs as they would have liked. Over the past four years Norm and Tanya have been able to focus on increasing production without increasing inputs. Small changes like incorporating 30ha of leased area into the milking area enabled the Vogels to be more flexible with urea applications. Improved pasture and fertiliser management and consistently implementing changes in a timely manner has resulted in increased efficiency, increased profitability and reduced emissions intensity.

"In the last 4 years we have seen a significant increase in farm production without more inputs, we have just done a better job. We needed to do this to drive profit but it also appears to have helped with our emissions".

The Vogels have not paid much attention to measuring their emissions until now, but they have focused on reducing electricity use knowing that it was impacting on profitability. In recent years, Norm and Tanya have upgraded the heat exchanger, installed a variable speed drive (VSD) vacuum pump and in the last 12 months they have installed 64.6 kW of solar panels and 80kW of battery storage. Over the winter months they observed a 50% reduction in use of electricity from the grid and are expecting bigger savings over summer with longer days increasing the utilisation of the solar panels during milking. The gains from the solar panels and battery storage will likely reduce the emissions intensity further, as the impact won't be noticeable yet in the 2023/2024 data.

Physical description of the farm and summary of farm performance

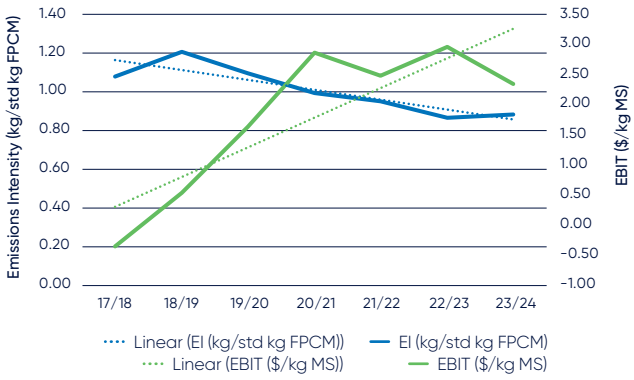
Farm details	Farm system	Farm performance ($)	Emissions intensity
Land area 135ha milking area and 165 total useable ha **Average rainfall** 950mm **Irrigation** None	**Grazing system** **Herd type** Holstein **Herd size** 215 cows **Autumn calving pattern** **Medium-High Grain Feeding (2.5 t DM/cow)**	**Earnings Before Interest and Tax (EBIT) per kg milk solids (MS)** $2.46 ($1.64 - $2.95) **Return on Total Assets (ROTA)** 6% (4.1-7.6%) (average and range over the past 5 years)	Reduced from about 1.2 to 0.88 kg/standard kg Fat and Protein Corrected Milk (FPCM) between 2018/19 and 2022/23

Delivering for Dairy

Key messages

Focusing on efficiency and profitability has resulted in a substantial decrease in emissions intensity reduced from about 1.2 to 0.88 kg/standard kg Fat and Protein Corrected Milk (FPCM) between 2018/19 and 2022/23 with an increase in Earnings Before Interest and Tax (EBIT) from -$0.35 in 2017/18 to an average of $2.59/kg of milk solids in the last three years. This has occurred mostly through a focus on optimising efficiency from inputs to improve profit.

Figure 1 Changes in farm emissions intensity and profit over time



Farm system

The Vogels family maintain a relatively simple farming system that is primarily home-grown pasture based with some supplementary grain. Their farm is located in a higher rainfall area of south-west Victoria with an average annual rainfall of 950 mm/year. Stocking rates are currently at 1.3 cow/hectare. They milk 215 Holstein cows that calve from April onwards for 12 weeks, having built the herd from 185 in 2017.

Farm production has increased by 30% over the last 8 years due to:

- Increased milking herd by 15% (185 – 215), peaking at 230 in 2021/22
- Improved pasture management
- Increased grain feeding when responses are high, and it is profitable
- Soil testing and applying different fertiliser blends where appropriate to optimise pasture production
- Strategic fertiliser management including not using urea when it is excessively wet or dry
- Bull selection based on many criteria including production, stature and udders

They have always focused on maintaining a relatively simple system with a single calving period and a basic feeding program that is suited to their conditions.

Emissions intensity and farm planning

Milk solids production went up by about 30 per cent over the 2017/18 to 2023/24 period but, total emissions went up by less than 10 per cent and the enteric methane emissions (which make up about the largest portion of the emissions) went up by about 20 per cent. Hence, their increased cow efficiency has made a substantial contribution to less methane emitted per kg of MS produced. They have gone from producing about 400 kg MS/cow in 2019/20 to about to 500 kg MS/cow in 2023/24. The quantity of grain fed per cow did increase dramatically until the last three years when the higher milk price provided the opportunity to profitably feed higher levels of grain, and this change may not have led to increased profit in lower milk price years. The improved cow efficiency may have come about through genetic gain as well as improved nutrition. Currently the Vogel's are looking at a range of features in a bull.

> "We select bulls on many criteria, production, stature, udders. If we have the option to also get our highest priorities and get reduced emissions, we are interested."

The Vogels have been looking at their electricity use, with the dual purposes of reducing their electricity use and reducing their emissions. Emissions from electricity has almost halved in 2023/24 compared to earlier years. This has contributed to the reduced emissions intensity even though it is only a small proportion of the total for the farm. Norm and Tanya will be interested to see their emissions intensity next year, once the impact of the new solar and battery installation is noticeable.

Another contributor to the reduced emissions intensity was a general reduction in nitrogen fertiliser (and more targeted application).

Generally the Norms have not been giving attention to tracking the emissions from their farm but they are really interested to better understand their emissions. They are open to purchasing more efficient equipment or feeding supplements in future, but it needs to make sense with efficiency and profitability being their primary goal.

In summary, emission intensity had not been a focus for planning, reductions in the emissions intensity were made by increasing the efficiency of the dairy, the herd and the pastures. In future Vogels will consider other interventions like breeding and additives to further reduce their emissions intensity.

The overall profitability of the business has become stronger and more resilient in the last few years with an average ROTA of about 6% over the last 3 years, which is well above the average for their region.

Farm details

	2019/20	2020/21	2021/22	2022/2023	2023/2024
Milking cow numbers	200	230	225	205	215
Milking area (ha)	120	120	120	135	135
Rainfall (mm)	808	1,034	879	1,209	523
Irrigation (ML)	0	0	0	0	0
Milk Solids (kg MS)	80,000	103,000	112,000	100,000	108,000

Primary indicators

	2019/20	2020/21	2021/22	2022/2023	2023/2024
Business efficiency					
EBIT per kg Milk Solids	$1.64	$2.87	$2.48	$2.95	$2.34
Return on Total Assets managed %	4.1%	7.6%	6.0%	6.7%	5.2%

Cost and price indicators

	2019/20	2020/21	2021/22	2022/2023	2023/2024
Milk price ($/kg MS)	7.46	6.61	7.52	9.96	9.48
Total variable costs ($/kg MS)	3.80	3.51	4.45	5.22	5.22
Homegrown feed costs ($/t DM)	$103	$121	$172	$158	$188
Cost of Production (including inventory changes) ($/kg MS)	$6.83	$5.63	$6.81	$8.62	$7.70

Efficiency indicators

	2019/20	2020/21	2021/22	2022/2023	2023/2024
Tonnes of grain per cow	1.6	1.9	2.4	3.0	2.5
Milk solids as a % of cow liveweight	72%	81%	91%	89%	91%
Proportion of homegrown feed in the diet	73%	67%	63%	56%	58%
Homegrown feed consumed (t DM) per 100mm rainfall and irrigation	0.9	0.6	0.6	0.4	0.8
Homegrown feed consumed (t DM/ha)	7.0	5.8	5.3	5.1	4.3
Milk solids per Labour Unit (kg/FTE)	51,000	66,000	72,000	63,000	62,000
Nitrogen fertiliser kg/usable hectare	135	137	166	59	111

For further information

For more information about managing climate and environment, including initiatives for efficiency of dairy farm inputs and supporting actions to reduce greenhouse gas emissions, visit the Dairy Australia website or speak to your local team.

https://www.dairyaustralia.com.au/climate-and-environment

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Dairy Australia
1800 004 377
enquiries@dairyaustralia.com.au
dairyaustralia.com.au

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