10 Steps

Reducing the carbon footprint of **Tasmanian dairy**

3

Efficient cows are key

breed for energy use over cow size

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Considering that 65% of the carbon footprint on dairy farms come from the cows (methane - from belching, dung and effluent), there is a large opportunity to reduce methane emissions while maintaining production.

This is by having a lower liveweight per hectare which is achieved by either a lower stocking rate or lighter efficient animal (reducing total feed demand).

It is important to understand how the liveweight of your herd contributes to your environmental footprint. Bigger cows require more energy to grow to mature size and for maintenance than a smaller cow. For these bigger cows to be efficient for both milk production and emissions they need to be able to produce milk production (milkfat and protein) relative to their size comparable to the smaller cows within the herd.

Yes, smaller cows generally means a higher stocking rate. The farm total methane emissions is directly relative to the total feed intake. Therefore to improve efficiency with feeding levels constant we need more energy from feed going to milk production rather than animal growth and maintenance.

The economic optimum cow and stocking rate on any farm may vary based on the feeding levels, farm infrastructure and cost structure. Optimising the stocking rate and liveweight of cows on farm is an important component of farm profitability and is one of the factors influencing a farms environmental output.

If dairy farmers can reduce the amount of feed to get the same or more output, there is an environmental and economic benefit of doing this.

Two Herd Example

The graph in Figure 1 below shows liveweight plotted against their potential milksolids production per kilogram liveweight. This shows on average lighter animals have a higher milksolids production relative to their liveweight than heavier animals.

Splitting the population in two, above and below 500 kg gives the following values.

	>500	<500
Number of animals	2571	1651
Median Liveweight (kg)	537.9	462.4
Median kg MS/kg Liveweight %	82%	90%

Fig.1 Production efficiency relative to Liveweight

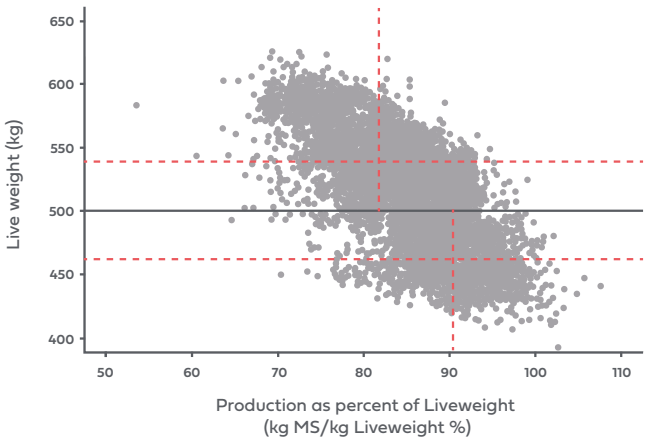


Figure 1 (Right)
Production efficiency relative to liveweight. (Derived using the BV's of all 4226 dairy breeding bulls registered with NZAEL born from 1/1/2010 to 31/12/2019)

Using the data, and creating two representative farms would equate to the following:

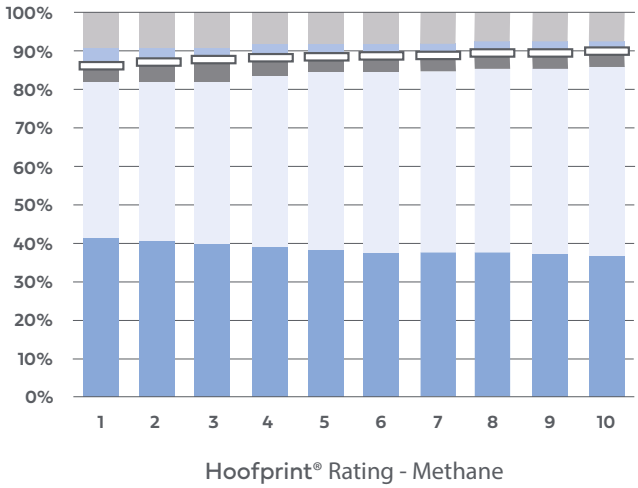
Comparable Farm Example:	Farm A	Farm B
Feed eaten (kg DM/ha/year)	14,000	14,000
Herd average liveweight (kg)	462	538
Milksolids production per cow (kg/cow/year)	418	440
Stocking rate (cows/ha)	2.74	2.45
Liveweight per hectare (kg/ha)	1,268	1,320
Production per hectare (kg MS/ha)	1,147	1,080
Enteric methane per hectare (kg CH_4/ha/year)	302.4	302.4
Enteric methane per milksolid (kg CH_4/kg MS)	0.264	0.280

For Farm B to produce the same production per hectare as Farm A they would require an additional 856 kg DM/ha feed, equivalent to 5-6 bales of silage/ha/year due to the additional maintenance requirements and result in an additional 6% more enteric methane emissions.

This graph (right) shows how animals apportion their lifetime energy intake based on their HoofPrint® rating – methane. The highest rating (10) and most efficient animals apportion the greatest amount of lifetime energy to milk production and relatively less to maintenance than all lower rating groups.

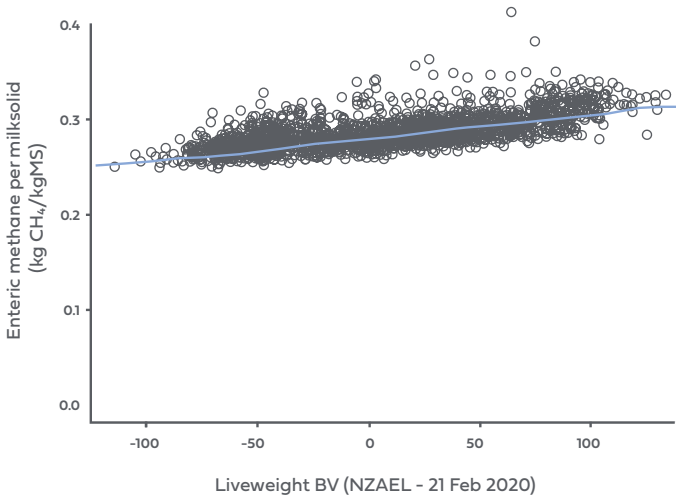
- Grazing/Walking
- Growth
- BCS Change
- Pregnancy
- Lactation
- Maintenance

Lifetime energy use (MJ ME)



For every additional kilogram of liveweight there is an increase of 0.2g of methane produced per kilogram of milk solid. Within the graph (right) the base of 0 is equivalent to a cow at 500kg live weight.

Lifetime enteric methane per kg MS related to Liveweight



Action Points

1. Establish the herd liveweight average and their milksolids production as a percentage of liveweight. Aim to produce milksolids at 90% of liveweight or higher, with the greater proportion of feed being put into milk output and not maintenance. To improve this on your farm you need to consider the genetics and the farm/feed management.

Tip: For the greatest ability to improve your herd, weigh each cow and calculate their production as a percentage of liveweight. This will enable you to make more informed breeding and culling decisions.

2. Aim to optimise the liveweight per hectare through stocking rate and cow size to match the pasture growth curve.
3. Breeding for the type of cow that fits within your farm system. Consider what production is your "sweet spot" and target a cow producing at 90-100% of liveweight. e.g. cow producing 450 milksolids should be no heavier than 500 kg.

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