Multi-species pasture case study

Kate Mirams and Peter Neaves

Farm overview – Neaves/Mirams Farm

Kate Mirams and Peter Neaves run a dairy farm in Newry, North-west of Maffra, West Gippsland. They have been farming there for 21 years. The total useable area owned is now 160 hectares with a milking area of 106 hectares and the remainder grazed by young/dry stock and used for fodder production.

The property is on alluvial loam soils which are generally fertile, retain moisture and have moderate drainage. The climate is temperate with mild winters and warm summers and there is good access to irrigation water though the Macalister Irrigation District network. The combination of soils, climate and access to irrigation water make it an ideal location to support year-round pasture production.

Kate and Peter have a milking herd of about 320 Friesian, Jersey and cross-bred cows. The feeding system is pasture-based, with moderate supplementary feeding. Calving occurs mostly in August/September.

Why shift to multi-species pastures?

Kate and Peter have always been interested in sustainable farming and see regenerative farming as an extension of that in the operation of their farming system. From 2019, Kate and Pete have been supported to conduct a demonstration site on a newly laser graded section of the farm, initially to find out if following laser grading, 'regenerative' practices would more quickly repair soil than 'conventional' practices. Financial and in-kind staff time support has been provided by West Gippsland Catchment Management Authority, Agriculture Victoria, Macalister and Districts Landcare Network and GippsDairy. Early results convinced Kate and Pete that the cost, quantity and quality of pasture grown under the regenerative system was similar to the conventional system, and further deeper root penetration and higher water infiltration rates could be achieved with the regenerative system.

Their preferred pasture mix is cocksfoot, perennial ryegrass, red clover, white clover, lucerne, chicory and plantain. Prairie grass and some tropical C4 grasses, such as paspalum, have not been sown but make a valued contribution to the multi-species pasture. They have generally established multi-species pastures through a three-step process of (i) autumn spraying and sowing a winter active annual crop; (ii) spring spraying and sowing annual summer active crop; and (iii) autumn sowing of perennial pasture mix. There may also be a spring top up with chicory, lucerne and plantain. They have more recently been direct drilling the perennial pasture mix into clover dominant paddocks without spraying. This will be their preferred method of establishment going forward as they noticed that the plants took longer to establish good root depth when the paddock had been sprayed out before sowing.

Kate and Peter let the pasture generate a high biomass prior to the first grazing to allow the species to develop deep roots. Once established, they generally employ a longer grazing rotation (five or ten days longer than previously) to allow plants to develop a deeper root system.

Delivering for Dairy

Since moving to biodiverse multi-species pasture, nitrogen fertiliser application has decreased dramatically. The focus on improving soil fungi has also meant they no longer apply super phosphate and muriate of potash. Kate and Peter expect these changes to result in improved soil health, particularly increased carbon which will improve the soil's water holding capacity. They are hoping to see an increase in soil carbon in the results of the next round of soil testing.

Kate and Peter do not use insecticides to manage pests within their multi-species pasture, as pests rarely target all species in the mix. They have found that there is always enough diversity to provide feed if one or two species are being targeted by insect attack.

Key learnings and benefits

Since implementing multi-species pastures and regenerative practices, Kate and Peter have observed the following changes on their farm:

- Achieved comparable pasture yields and maintained good palatability of pasture.
- Maintained profitability.
- Reduced expenditure on nitrogen fertiliser.
- Improved biodiversity and gained improvements in soil health (increased water holding capacity, carbon stores).
- Foliar application of nutrients has supported good pasture growth.
- The multi-species pastures work well with both flood and spray irrigation.
- Establishing and managing multi-species pasture is a dynamic process; something will always grow well if matched to the paddock and conditions.

Kate and Peter will continue to focus on maintaining diversity, whilst maintaining productive benefits.

The numbers to back up the story

The comparison below is a comparison of the whole farm system performance prior to the adoption of multi-species pastures (2013/14 to 2018/19) and since the adoption of multi-species pastures (2020/21 to 2023/24). It should be noted that multi-species pastures are one aspect of the system change which focus on improved sustainability/biodiversity. It is not an isolated analysis of the contribution of multi-species pastures but, it does provide useful insights into the performance of the system with multi-species pastures in it.

Profitability was higher during the multi-species pasture period, with a Return on Total Assets (ROTA) of 8.3 per cent, compared to 5.5 per cent in the previous period. While the multi-species period coincided with generally higher profitability across the Gippsland region, the business maintained a ROTA close to the regional average for irrigated Gippsland Dairy Farm Monitor farms. In the pre-multi-species period, the business had a ROTA of 5.5 per cent, compared to the regional average of 4.6 per cent, while in the multi-species period, the business recorded 8.3 per cent, slightly below the regional average of 8.4 per cent. Additionally, EBIT per kilogram of milk solids increased from $1.50 in the pre-multi-species period to $3.00 in the multi-species period.

Pasture consumption per hectare showed minimal variation between the two periods, consistent with findings from the on-farm study. The proportion of homegrown feed in the diet has generally been maintained in the 60 per cent to 70 per cent range. Hence, the exposure to risk from fluctuations in supplementary feed prices appears to be very similar in both periods. There was a significant reduction in nitrogen fertiliser application. The average rate applied on the milking area dropped from 184kg N/ha to 67 kg N/ha during the multi-species period, with a further reduction to 20kg N/ha in the 2023/24 year. Fertiliser costs in total were similar, with less spent on nitrogen fertiliser but increased expenditure on other products. There was only a slight increase (about $2,000 per year) in sowing and seed costs in the multi-species period. Homegrown Feed costs per tonne of dry matter were the same in both periods at $88/t DM (note costs have not been adjusted for inflation) and were lower than the regional average for irrigated farms which increased from $114/t DM to $132/t DM in the more recent period.

Table 1 Farm details and business efficiency

	Before multi-species 2013/14 -2018/19	After multi-species 2020/21 – 2023/24
Milking cow numbers	236	289
Milk solids (kg MS)	113,000	144,000
EBIT per kg milk solids	$1.50	$3.00
Return on total assets managed %	5.5% (4.6% Gippsland irrigated farm average)	8.3% (8.4% Gippsland irrigated farm average)

Key points

- The inclusion of multi-species pastures does not appear to have had a detrimental impact on pasture consumption or profit.
- This has been achieved with a reduced reliance on nitrogen fertiliser and hence the business is less exposed to fluctuations in nitrogen fertiliser prices.
- In summary, they have maintained pasture yield and profit, without increased risk and have increased biodiversity.

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Acknowledgement
Dairy Australia acknowledges the funding from levy payers and contribution by Commonwealth Government.

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5771.20 | Mar 2025