

COMPOSTING MOOTELS IN A WEST COAST CONTEXT

Experiences and considerations
from three case study farms.

*an Our Land and Water Rural Professionals
funded project*

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**Date
Released** 21st August 2023

**Case Study
Farmers**

1. Coates, Murray and Gaye, Prospect Farm, Haupiri.
2. O'Regan, Matt and Carmel, Mangawaro, Inangahua Landing.
3. Oats, Tegel and Wendy, Turkey Creek Farm, Mawheraiti.



1. Peak Agricultural Consultants Ltd.
2. Rural Consulting Ltd.
3. Agrifood Systems Ltd.



PROJECT SUMMARY



One case study farmer's sage advice:

"Ask yourself, why do I want a composting mootel? Be clear on your purpose as there may be more affordable alternatives depending on your requirements"

The effect of composting mootels:

On people and cows:

- ✓ Happier cows equals happier staff.
- ✓ Lift in staff morale, largely due to the ability to more effectively care for cows during pressure periods such as calving, high rainfall events and periods of summer heat stress.
- ✓ Teams just as busy but in different ways. Often more productive and enjoying the work more.
- ✓ Improved feed utilisation.

On the environment:

- ✓ Nitrogen losses reduced by 18%, 43.5% and 52%*
- ✓ Phosphorus losses reduced by 20-30%*
- ✓ Reduced sediment loss over winter.

? Greenhouse gases: Unknown. Measurement of methane and Nitrous Oxide effects at the system level requires detailed research beyond the scope of this project.

**Based on Overseer modelling*

Considerations

- Mootels are expensive and require at least a 11% increase in base production to be viable.
- They can add complication and staff training may be needed.
- Mootels will not fix existing farm inefficiencies.
- Mootel area – case study farms range from 6.5-9.3m² per cow. Other references suggest 9-11m² per cow

Pastures and Feed

Feed utilisation

- It was expected feed utilisation would increase due to the ability to feed into dedicated feed lanes or troughs in all weather without risk of the herd trampling, pugging, or sleeping on the feed supplied.
- DairyBase analysis estimated the following feed utilisation of supplements fed:

Case study farm	% Increase ('22 to '23)	2022-23	2021-22	2020-21
Prospect	12%	95%	83%	90%
Mangawaro	26%	96%	70%	73%
Turkey Creek	7%	96%	89%	

✓ A key benefit is improved supplementary feed utilisation

Imported supplement use

Case Study Farm	Prospect			Mangawaro			Turkey Creek	
Season	22/23	21/22	20/21	22/23	21/22	20/21	22/23	21/22
Imported supplements (tDM/ha)	3.0	3.6	2.1	4.5	0.2	0.4	2.5	2.4

- Two farms maintained their supplementary feeding regime.
- One lifted supplement use significantly, but this was partially offset by reduced winter grazing formerly done on their support block.

Pasture growth

- Farmers expected an increase in pasture production of between 1-2tDM/ha, through reduced pugging pasture damage and improved utilisation.
- No clear increase in pasture harvested was observed, but the data is inconclusive and further study is warranted.

Case Study Farm	Prospect			Mangawaro			Turkey Creek	
Season	22/23	21/22	20/21	22/23	21/22	20/21	22/23	21/22
Pasture & crop harvested (tDM/ha)	9.5	7.0	9.9	11.0	10.9	11.6	10.8	10.1



Financial Analysis

- Total capital investment between \$3,200/cow to \$4,000/cow on case study farms.
- Could be up to \$6,000 per cow depending on area per cow, specifications and after accounting for inflation.
- Costs have been volatile in the last 2 seasons, so shop around.
- Cost structures:
 - Estimated net increase in farm working expenses of between 12-22c/kgMS, predominantly bedding costs
 - Saving in winter crop costs and utilization can cause significant savings
 - There will be significant savings from a feed utilization perspective if moving from a winter crop system to a cut and carry system on the same land.
 - Depreciation or operating capital will be the biggest cost increase ranging from 14c/kg at Turkey Creek to 22c at Prospect, and 27c at Mangawaro.
- Be careful with your capital - the investment will not 100% appear on your farm valuation. Optimistically you may get 50%.

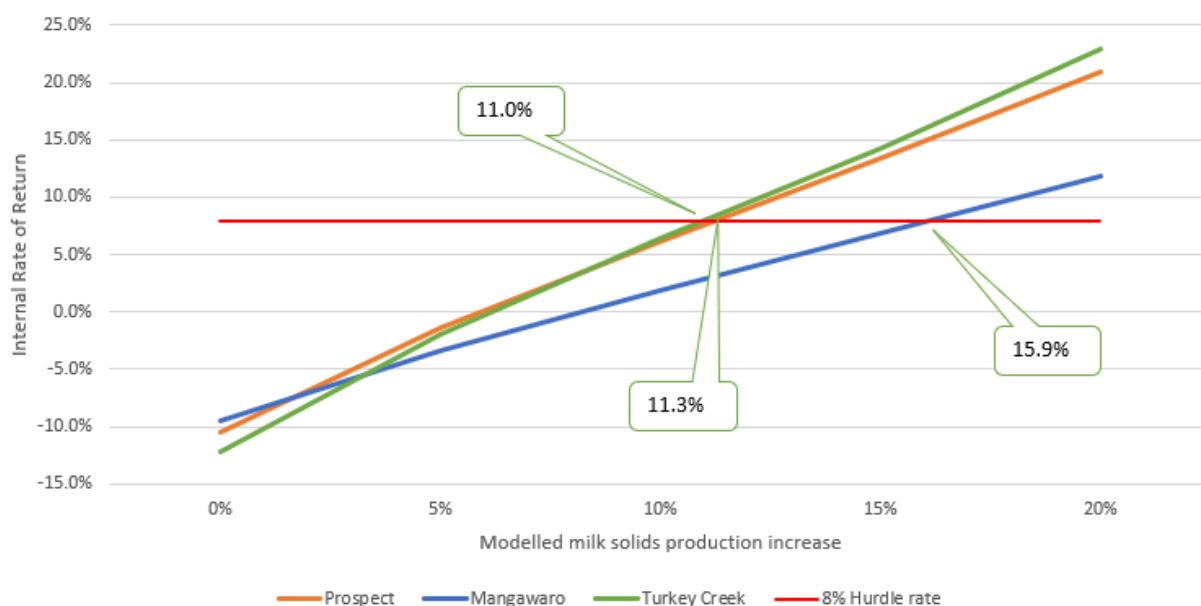
Key risks:

- Capital costs, funding and debt servicing costs.
- Achieving production and profitability gains.
- Compost stack performance issues.
- System creep.
- Limited impact on property values.

“Only build one if you can afford to do it right.”
(case study farmer quote)

- ✓ Two of the three case study farms exceeded the required break-even production increase in their first season.

Milk solids production increase required by each case-study farm to achieve an 8% return on investment (i.e. to cover the cost of funds)



Production increase (over 5yr avg.)	Prospect	Mangawaro	Turkey creek
Farmers expectation	11%	23%	12%
Modelled figure (to break even)	11%	16%	11%
2022-23 season result	0.5%	20%	15%

Mootel Management and Animal Health

Mootel effects on Animal Health and Welfare

- No evidence to date showing BCS improvement.
- However, Mootels allow maximization of intake and feed utilization over winter which can secure BCS gain.
- No evidence of improvement in mastitis.
- May lead to increased incidence of *E.coli* mastitis.
- Alleviation in heat stress
- Reduction of metabolic issues.
- No evidence to date of increased 6-week in-calf-rate.
- No evidence to date of effect on lameness.
- Appears to lead to significant reduction in death rates. (2%-3%)
- Likely to lead to an increase in Days-in-milk (up to 10 days)
- Likely to lead to an increase in per-cow production (10-15%)

Ventilation, Odour, and Drainage

- Ventilation is important. Calm foggy sites may lead to higher moisture levels
- No odour apparent
- No drainage observed from any of the 3 mootels

Bedding Management and Tilling

- Woodchip used for bedding material – current pricing \$22.50-\$30/m³
- Tilling aerates the woodchip, facilitating aerobic composting process and moisture evaporation.
- A range of tilling equipment and frequencies used by case study farmers throughout the season.
- Other studies advocate twice daily tilling, however, once is usually sufficient. Our case study farmers often only till every second day.

Key benefits to the cows (*from one seasons data*)

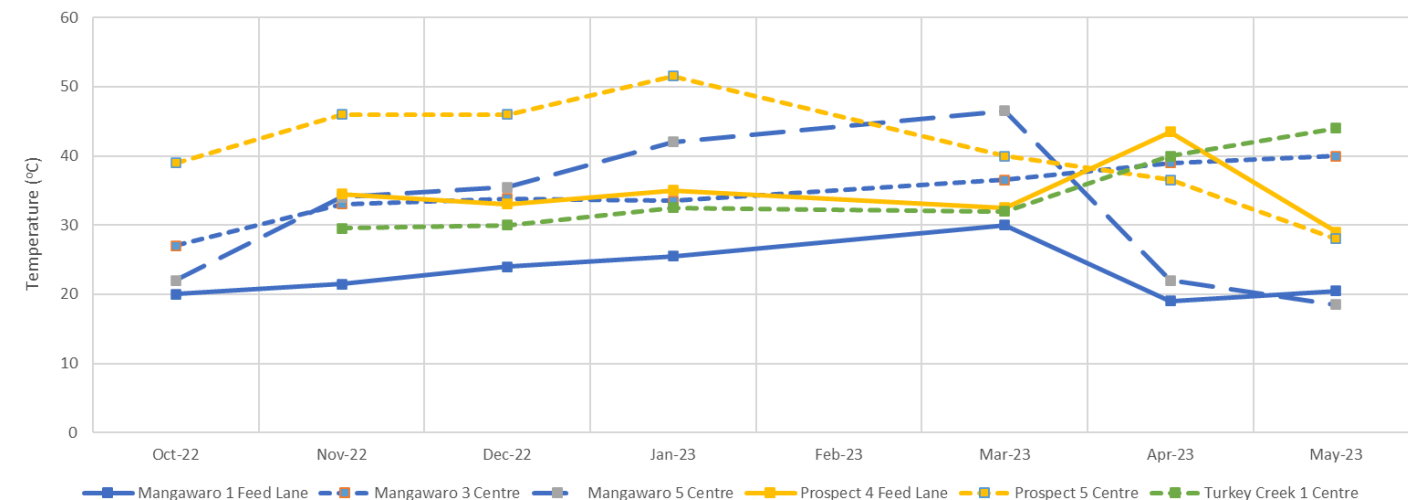
- ✓ Significant reduction in death rates
- ✓ Significantly reduced metabolic issues
- ✓ Ability to manage BCS gain more effectively
- ✓ Reduced heat stress
- ✓ Generally happier cows
- ✓ Increased days-in-milk and per-cow production

Case study farmers admit they are still learning and experimenting around optimum tilling regimes to maximise compost performance. This appears to be the biggest challenge , particularly in the feed areas.

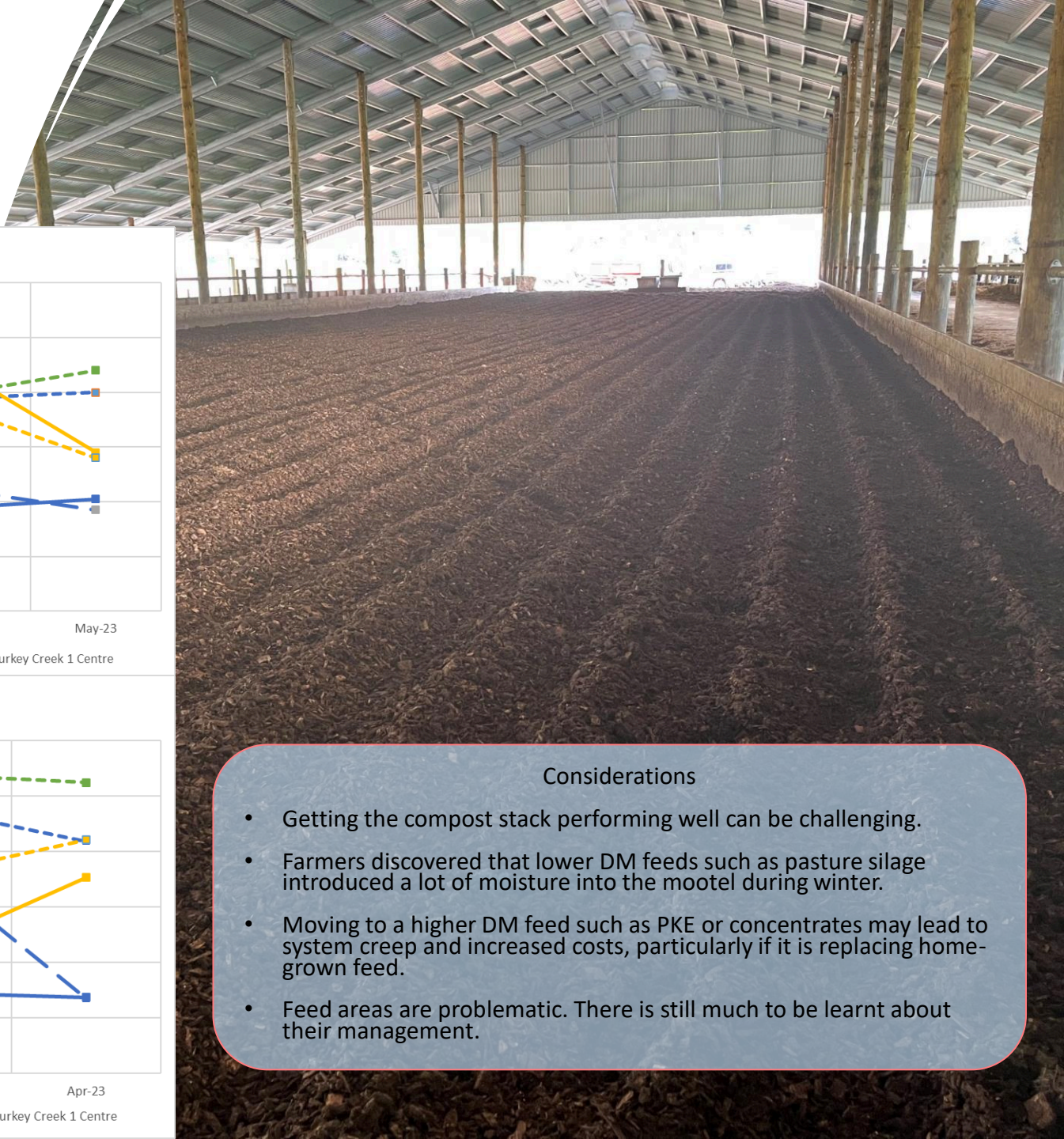
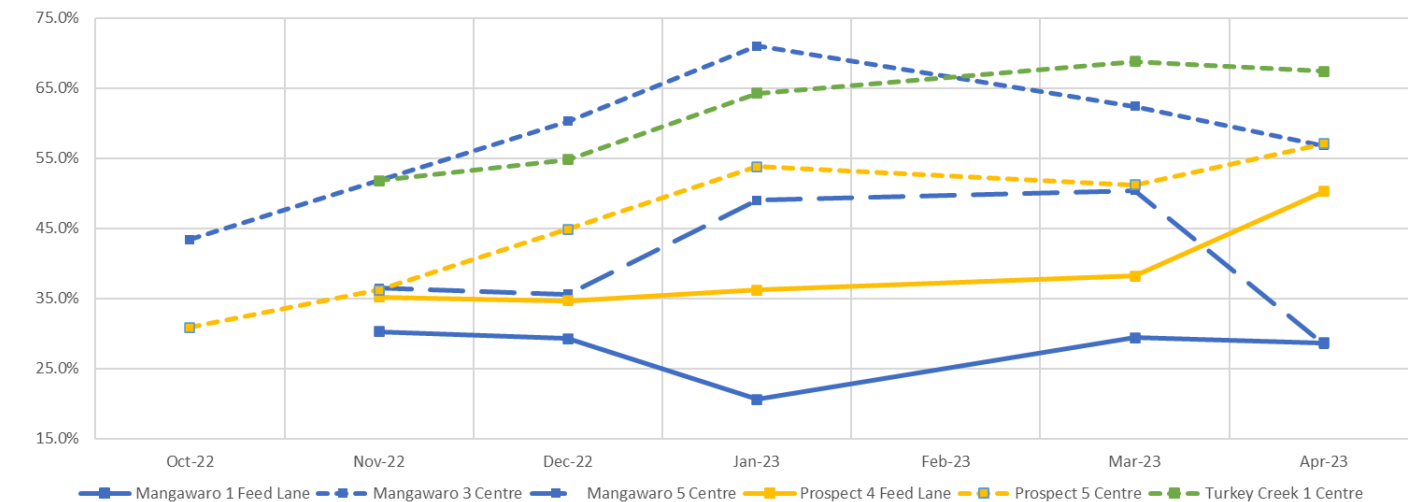
Temperature and Moisture Content

- Recommended to be 50-60 degrees at 15-30cm depth, and with DM content \geq 50%.
- None of the samples reached optimal temperatures, but our case study farmers were generally comfortable with this.
- Excess moisture inhibits the composting process; this is an issue around feed areas due to higher excreta concentration.

Compost temperature at 30 cm over time across 6 sampling sites



Dry Matter percentage over time across 6 sampling sites



Considerations

- Getting the compost stack performing well can be challenging.
- Farmers discovered that lower DM feeds such as pasture silage introduced a lot of moisture into the mooler during winter.
- Moving to a higher DM feed such as PKE or concentrates may lead to system creep and increased costs, particularly if it is replacing home-grown feed.
- Feed areas are problematic. There is still much to be learnt about their management.

Points of contact

The case study farmers are all happy to be contacted to share their knowledge, successes and failures. Likewise, feel free to contact any of the authors at any time.

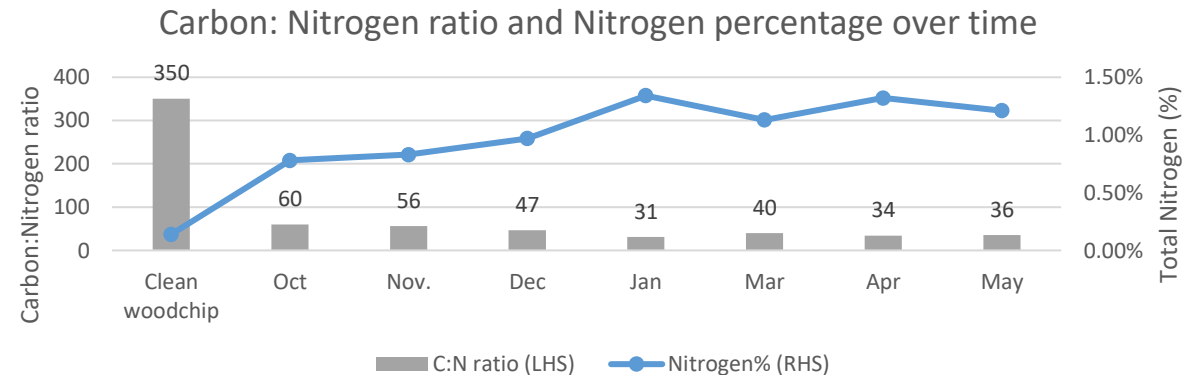
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Carbon to Nitrogen ratio

Sampling site 5 (centre area) - Prospect farm



Compost as fertilizer

After 12 months of use, the compost in the mootels contained:

- Prospect Farm: 10.9tN; 3tP, 15.5tK; 2.2tS – worth \$82,706
- Mangawaro: 7.6tN; 1.4tP; 6.9tK; 1.1tS – worth \$42,883
- Turkey Creek: 4.9tN; 1.2tP, 5.5tK, 0.9tS – worth \$32,403

*15:1 is a suggested target for compost removal.

Acknowledgements.

To our case study farmers;

- ***Murray & Gaye Coates,***
- ***Matt and Carmel O'Regan,***
- ***Luke and Charlotte Chisnall,***
- ***Tegel and Wendy Oats,***
- ***Thomas and Hannah Oats***

For so openly and freely sharing their time knowledge and their journey, and all those cups of tea, muffins and scones. We couldn't have done it without you.

Thank you all very much!

- ***Keith Woodford*** – Thanks for all the help and advice in designing and reviewing the study. We know you have not been well. We wish you all the best and hang in there.
- ***And The Our Land and Water Rural Professionals fund, for making this study possible.***

