

3. ENVIRONMENT



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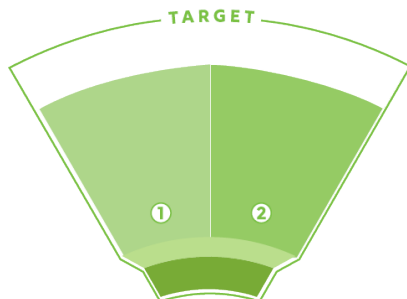
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Disclaimer:

While every effort has been made to ensure information provided in this handout was true and correct and the time of going to print, Owl Farm takes no responsibility for the use of data outside of the purpose to inform readers of the current situation at Owl Farm for the purpose of the Focus Day.

ENVIRONMENT



	PRIMARY KPI	OWL FARM TARGET	2020/21	2019/20	2018/19	2017/18	2016/17
①	Biological GHG/ha CO ₂ equiv	3 yr average trending down	9945	9074	9192	9548	10057
②	Modelled N loss kg/ha/yr	3 yr average trending down	34	32	33	33	38

Summary points - Primary KPIs:

- Higher milk production increased both modelled nitrogen (N) loss and biological greenhouse gas (GHG) emissions through Overseer. Trends over time indicate that we are continuing to reduce our environmental footprint.

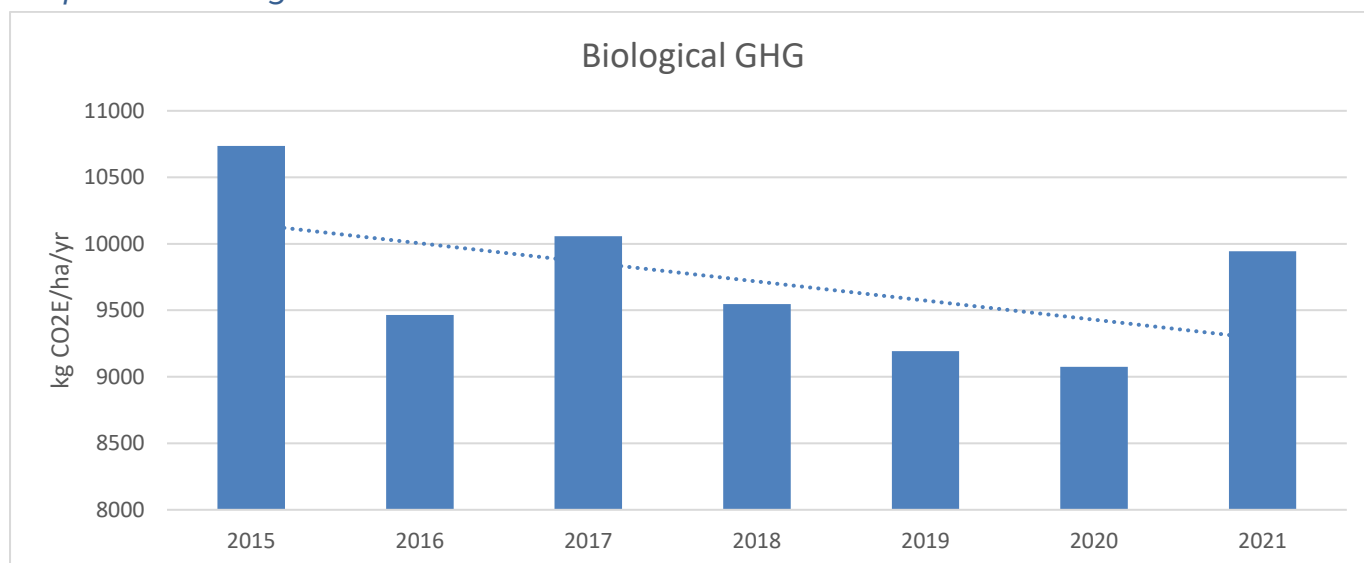
Summary points - Secondary KPIs:

- Continued reduction in N fertiliser use and reduced Purchased N surplus (from Fonterra records)
- Total GHG increased by 2.8% with an increase in methane (+12.4%), no change in nitrous oxide (N₂O), and a reduction in carbon dioxide (CO₂) (-24.8%)
- Phosphorus (P) loss from root zone as modelled by Overseer increased from 0.8 to 1 kg P/ha
- Visual Soil Assessments and soil tests carried out by Ballance show good soil health
- Actions from our Farm Environment Plan continue to be carried out
- Freshwater use in the shed is monitored annually

GHG mitigation

Extra milk production is assumed to come from extra dry matter intake in Overseer. Farmax modelling showed that we produced an extra 10,940 kg MS with an additional 14 t DM eaten. Our goal is to maintain production with continued reduction in biological GHG emissions.

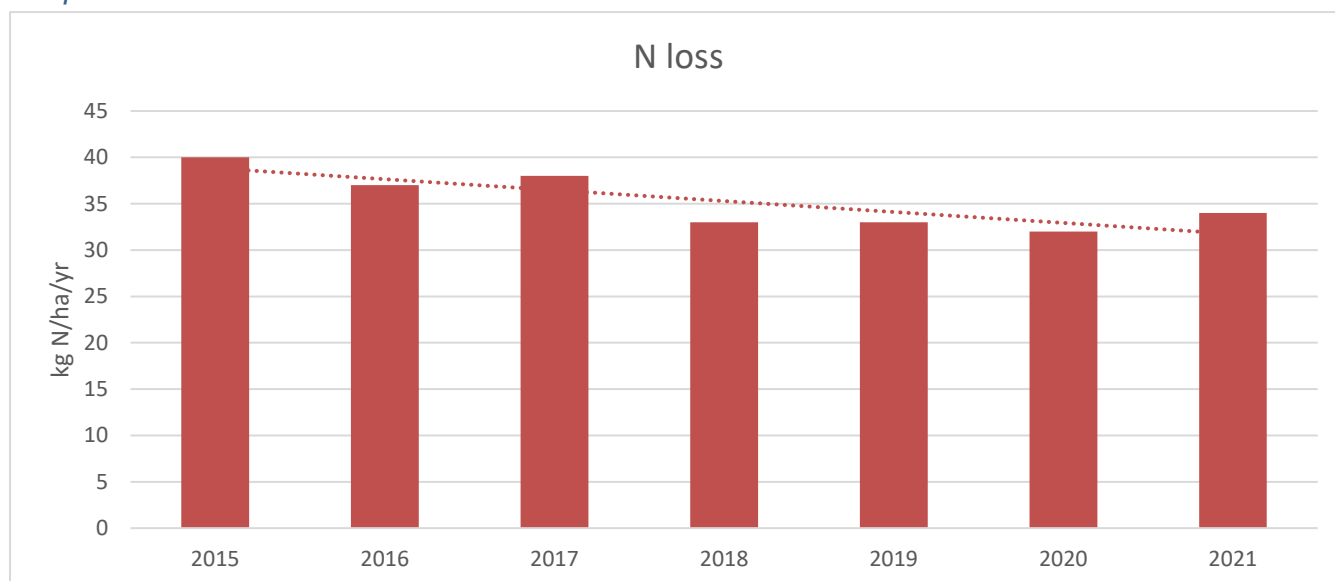
Graphic 3.1: Biological GHG trends over time



Nitrogen Management

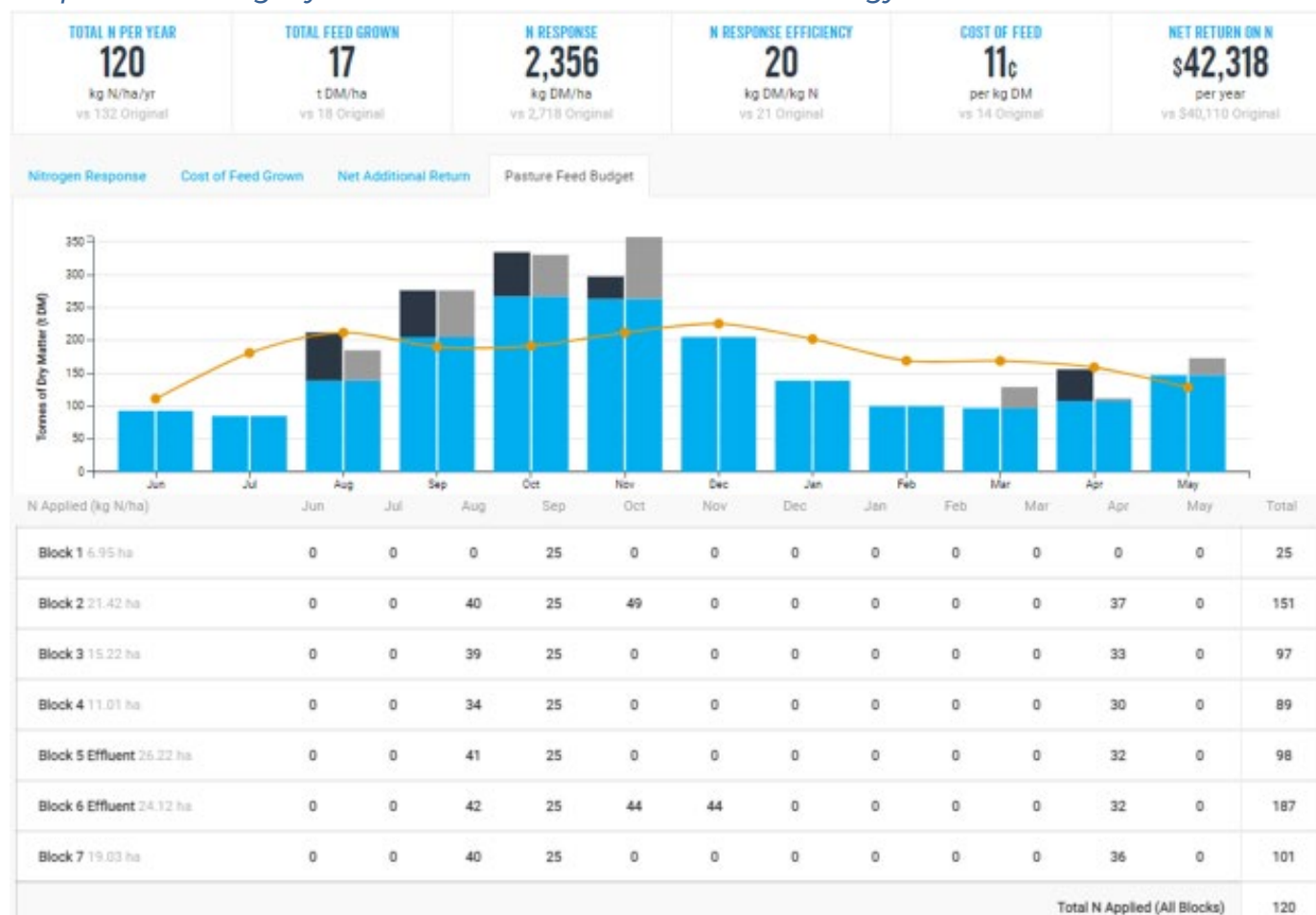
Modelled N loss has increased as we had more cows on the milking platform during the autumn (i.e. later culling due to feed availability). The wetland catchment area has been re-assessed due to NIWA's monitoring, and reduced from 33 ha to 7.6 ha from land mapping software. Monitoring of the wetland from 2017 to 2020 has shown it is working effectively with an average nitrate load removal of 61.7%.

Graphic 3.2: N loss trends over time



Nitrogen fertiliser applied on pasture has reduced from 161 kg in 2017-18 to 138 kg in 2020-21. No nitrogen is applied in June and July and only nitrogen for new grass is used in May. We have gibberellic acid available if needed. Working with Ballance Agri-Nutrients, we have used My Pasture Planner to develop a nitrogen plan for the farm to optimise use in conjunction with total N soil test. This is to further reduce nitrogen use to 120 kg N/ha on the pastoral block (plus nitrogen use on crops) for the 2021/22 season. All new grasses are planted with Ecotain Plantain (which is now recognised in Overseer to further reduce nitrogen loss) plus two white clover and one red clover species.

Graphic 3.3: Using My Pasture Planner to create N use strategy



Farm Environment Plan (FEP) actions

We continue to use our FEP to guide our actions on farm and have completed an Effluent Management Plan that is available for users at the shed. We are focused on developing the GHG mitigation strategy for our FEP in the 2021/22 season.

Graphic 3.4: Farm Environment Plan table of actions

CURRENT ACTIONS

Target Date



Develop an Effluent Management Plan

31 May 2021

FUTURE ACTIONS

Target Date

RECOMMENDATIONS

Target Date



Monitor leachate from silage stacks



Maintain documents to support farm inputs, outputs and management practices



Planting below Kibby block - partially completed



Removal of wildling pines and gorse from river riparian buffer



Continue to monitor and clean cutouts



Submit Farm Dairy Records



Submit Farm Dairy Records



Ongoing irrigator maintenance



Manage effluent pond levels



Continue scraping entry exit race as required



Continue yearly race maintenance



Avoid applying nitrogen when wet over subsurface drainage



Waterway ongoing maintenance for all waterways



Drain from driving range toward river - Relocate fence and further plant

01 Dec 2027

Biodiversity and planting

An integrated planting plan has been developed with Wildlands which involves nine management units. St Peter's school students pot up and grow out 1000 regenerative native species through the Trees for Survival programme, which they kindly plant out on the farm each year. We have over 7 ha of stock-excluded areas on the farm which include wetlands and native plantings. The planting plan includes shade and shelter objectives, along with wetland maintenance and enhancement planting of drain and stock-excluded areas.

This has created a planned programme of work over the next 3-5 years for us to source, plant and release with the help of our community.

Purchased N surplus/ha (Fonterra data)

Reports from Fonterra produced from dairy diary records show that our purchased N surplus came down from 133 kg N/ha in 2019/20 to 110 kg N/ha for the 2020/21 season.

P loss from root zones

With adequate Olsen P levels on the farm (average of 42 over the last 6 years) we continue to apply maintenance-only fertiliser. We do zero cultivation on crop ground and for pasture renewal and manage very low levels of pugging without wintering infrastructure (using strategic area allocation and carrying high covers through the winter).

Soil health – physical, chemical and biological

Soil tests are carried out annually, representing seven management blocks. Each crop paddock receives its own soil test and specialised fertiliser recommendation. All crops are direct drilled to minimise soil disturbance and carbon levels, and CO₂ emissions are currently being measured by Waikato University as part of their research projects. Visual soil assessments are carried out every few years to check changes in physical and biological health of the soil.

Graphic 3.5: Angus Dowson (Ballance) carries out Visual Soil Assessment at Owl Farm



SCORE CARD
Visual indicators for assessing soil quality
under pastoral grazing on flat to rolling country

SOIL INDICATORS

Land use: *Pastoral*
Site location/Paddock name: *39*
Date: *16/07/21*
Soil type: *Allophanic*

Textural qualifier: ☐ Sandy ☒ Loamy ☐ Clayey
Moisture condition: ☐ Dry ☐ Slightly moist ☒ Moist ☐ Wet
Seasonal weather conditions: ☐ Dry ☒ Wet ☒ Cold ☐ Warm ☐ Average

Visual Indicator of Soil Quality	Visual Score (VS) 0 = Poor condition 1 = Moderate condition 2 = Good condition	Weighting	VS Ranking
Soil structure & consistence (Fig. 1, p.57)	2	x 3	6
Soil porosity (Fig. 2, p.59)	2	x 3	6
Soil colour (Fig. 3, p.61)	2	x 2	4
Number and colour of soil mottles (Fig. 4, p.63)	2	x 2	4
Earthworm counts (Fig. 5, p. 65)	1	x 3	3
Surface relief (Fig. 6, p. 67)	2	x 1	2
RANKING SCORE (Sum of VS rankings)			25

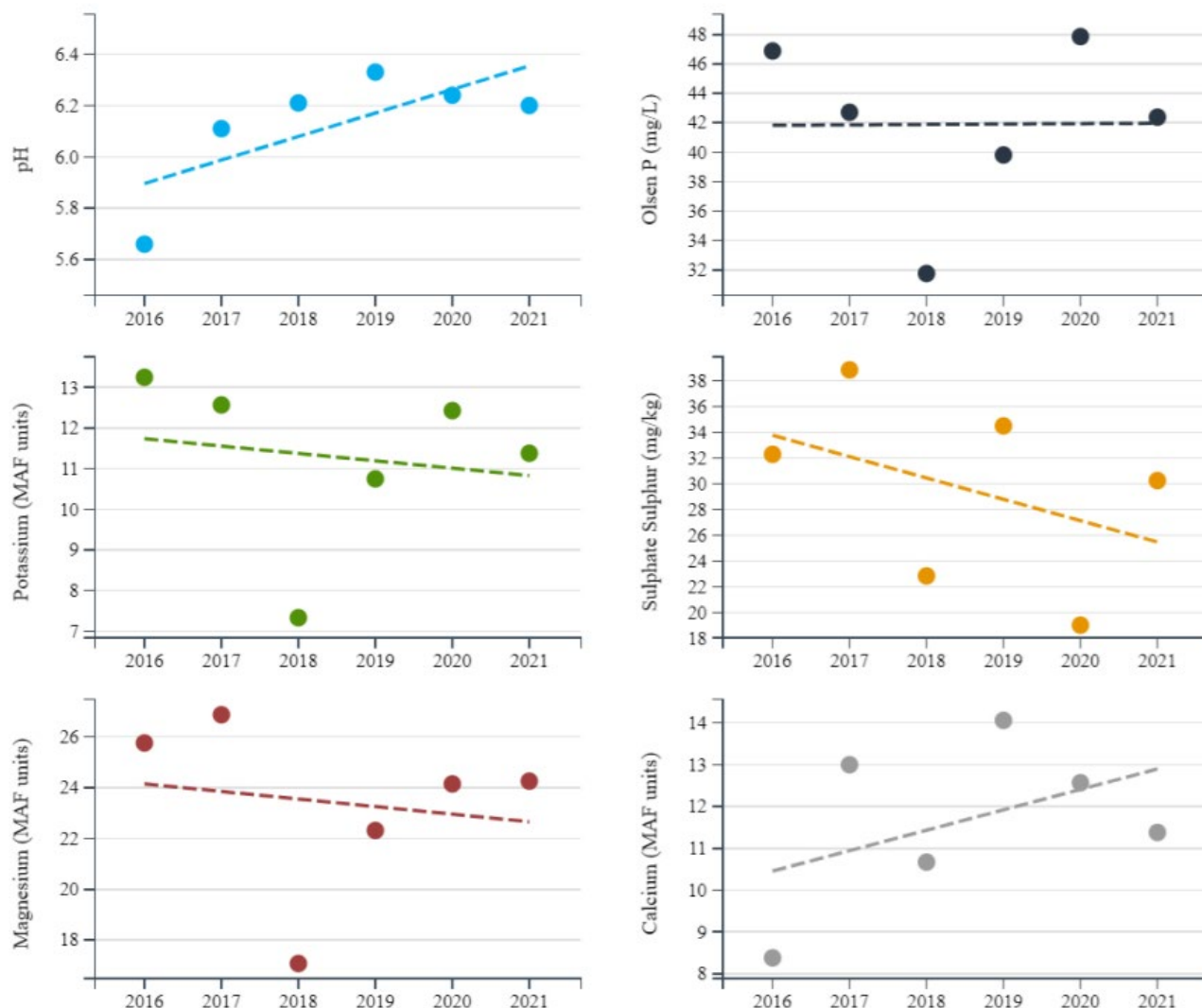
Soil Quality Assessment	Ranking Score
Poor	< 10
Moderate	10 – 20
<u>Good</u>	> 20

If your soil quality assessment is moderate or poor, guidelines for sustainable management are given in Volume 2, Part Two.

PTO

Graphic 3.6: Soil test result trends over time from My Ballance

Graphs show the best fit regression line for the soil test data selected.



Shed freshwater use

Shed freshwater use is measured annually with the target of reducing use to 55 L/cow/day. With sprinklers used to reduce heat stress and a longer lactation we used 88 L/cow/day in the 2020-21 season. This is an increase from 86 L/cow/day the year prior.