ADAPTING MANAWATU DAIRY FARMS TO REGIONAL COUNCIL CATCHMENT TARGETS

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Summary
The Manawatu-Wanganui Regional Council (MWRC) One Plan has identified 29 sensitive water management sub-zones of catchments. The approximately 420 dairy farmers in these sub-zones must prepare farm plans describing the practices that they will use to manage the impacts of potential nutrient, sediment and microbial contamination of their farms. They then use these plans to support their application to the MWRC for a landuse consent.

DairyNZ has worked with MWRC to put in place a pilot project that assists farmers formulate the farming system changes required in their farm plans and to apply for their consents. Two examples are described in this paper of relatively high producing farmers that have successfully participated in the project. These farmers intend to modify their farming systems including increasing their use of dairy effluent, reducing nitrogen fertiliser, improving feed flow, and herd composition, to increase dairy production by 5-15% and at the same time decrease their estimated nitrate leaching by over 10%.

In both examples the farmers have committed themselves to making changes that could be difficult to implement in an uncertain future. The changes will require the farmers to develop their existing skills in farm management even further. Both sets of farmers are motivated by wanting their communities and the public to be more positive about the contribution of dairying to the economy, New Zealand's way of life and our national environmental stewardship.

One Plan Policy Background
The MWRC combined regional policy statement, regional plan and regional coastal plan is known more simply as the One Plan (2014). As required in the Resource Management Act (New Zealand Government 1991, section 15), this plan contains provisions to control nutrient, sediment and microbial contamination levels in the region's water bodies – its lakes, rivers, streams, wetlands and estuaries. The MWRC has identified in the region 29 sensitive water management sub-zones with about 450 dairy farms. These zones are where water quality is particularly affected by farm runoff and leaching. For these catchments the One Plan has a set of rules about managing nutrients that affect all existing dairy farmers operating within the catchments along with other intensive agriculture such as cropping, horticulture and irrigated drystock. These rules in the One Plan require farmers in these sub-zones to prepare farm plans by specified dates. The farm plans must show how the owners will meet the requirements for being a controlled landuse activity, or a restricted-discretionary land use. If there is no farm plan provided within the required time continued land use may be non-complying under the One Plan.

The One Plan consent requirements have general provisions addressing phosphorus, sediment and microbial losses to waterways and numerically specific provisions regarding

the acceptable nitrate losses to waterways. Nitrate discharge targets (kgN/ha) are attached to each land class within the catchments, and these reduce over time. These provisions and targets are incorporated within each farm plan.

Role for Overseer ®

The use of Overseer is part of the rules in the One Plan, initially this was Overseer version-5.4 . Implementation of the One Plan requires the continued availability of Overseer for the agricultural community to provide decision support software and assist farmers address nutrient management within their long term planning.

Farmers are used to working within the constraints of the feed flow on their farms (Frengley 1973), and similarly with their finances. Nutrient limits add an additional constraint that can be antagonistic to feed utilization and profit maximization (PCE, p41). Resolving these multiple constraint dilemmas can require modifications to farming systems, introduce new decision making processes and/or grow farmer capability. Having Overseer enables farmers to more easily assess the environmental risks associated with their farming systems and management options. However, on its own Overseer is not enough to resolve complex system interactions and incorporate human and social factors in their farm plan decision making.

DairyNZ Pilot Project

DairyNZ has worked with Manawatu-Wanganui Regional Council to put in place a pilot project that assists farmers and those working with them to make the farming system changes and create opportunities for industry development within nutrient constraints. DairyNZ and the Regional Council contacted 10 private consultants already working in the region and with backgrounds in nutrient management and farming systems.

The purpose of the pilot project was "to build alignment with farm consultants so that a uniform approach was in place to assist farmers in obtaining their consents from the Regional Council".

For each farmer the process involved:

- The Regional Council providing them with farm maps and a baseline description of the farm for 2013
- Developing Overseer baseline files and files of future scenarios
- An economic and environmental evaluation of the mitigation options open for them to consider
- A strategy for making improvements to their farming system
- A consent application prepared with supporting material

Farmers initially expected the project to be providing them with the least cost method for achieving compliance with the rules in the One Plan. Over the year since the project started farmer expectations have changed. One farmer has even said, "we don't even think about compliance now, by using best practice and becoming more profitable we are using resources more efficiently and achieving compliance is no longer the issue". For some farmers their system improvement strategy for profitability and productivity involves cutting costs and increasing profitability. Other farmers improvement strategy for profitable production involves increasing the efficient use of their most limiting resources to increase production.

Example Farmer Increasing Production on a Small Intensive Dairy Farm

This farmer in his mid-thirties is on a family farm in the Tararua District. The farm is smaller than is typical for the district (it less than 80 ha compared with the average 120 ha) and has a relatively typical stocking rate of 2.7 cows/ha. All waterways are fenced to dairy company and regional council standards. Baseline pasture production was calculated by Overseer to be about 12,000 kgDM/ha per year, 90 kg of nitrogen was applied but no supplements were brought on to the farm. Dairy production was 350kg MS/cow/year and 950kg MS/ha and the farm reared its own replacements.

In Overseer the risk of nitrate leaching from the farm in the base year (2013) was calculated to be 45 kgN/ha. In the consent application this could be reduced to 39 kgN/ha by:

- Changing the effluent application area to reduce the use of high risk soils and minimise possible runoff into a nearby farm drain. This did not involve any capital change and was estimated to make only a minor reduction in the nitrate leaching risk.
- Avoiding winter applications of urea, i.e. during the months with the lowest pasture growth rate responses. This combined with not applying urea to the effluent block, reduced the nitrate leaching risk by 3 kgN/ha, although the total amount of urea applied could remain the same. To make this work for him the farmer will have to carefully monitor feed budgets over the autumn and winter as there are only limited feed alternatives available in a poor winter growing year. On average providing these changes are made to his management there is expected to be little financial cost to him from making this change.
- Increasing the proportion of milking cows on the farm and grazing cows off during the winter will maintain livestock stocking rates but increase dairy production by about 5%. Replacement heifers can be reduced from 20% to 18% of the herd and the herd increased by the same number. That has the effect of increasing the overall farm stocking rate, countered by grazing over half the herd off the farm for 6-8 weeks.

  This strategy requires that high reproductive rates continue to be achieved and that herd testing is maintained to achieve high levels of genetic gain from the reduced replacement rate.

  Late winter and early spring pasture covers must be carefully monitored. If there are no cows on the farm for eight weeks and early spring pasture cover increases unexpectedly, this could result in feed quality dropping in late spring and poor regrowth in early summer.

  All going well, a large increase in annual income is possible from this change and the nitrate leaching risk goes down by 2 kgN/ha.

- Improving stock water and modifying fencing to increase annual pasture utilisation. On the farm, 16ha are poorly fenced and have inadequate stock water. Increasing subdivision and putting in a new reticulated water supply is likely to cost over $2,000 per hectare and could increase pasture utilisation by over five percentage points with a small reduction in conserved feed costs. If this is included in the Overseer calculations it reduces the risk of nitrate leaching by 2 kgN/ha over the whole farm. Making these changes may increase the capital value of the farm.

In summary therefore, this farmer chose a management strategy that over a 5 year period could reduce the risk of nitrate leaching annually from 45 to 38 kgN/ha. The changes were not enough to meet the requirements for a controlled activity consent (which would have

required estimated leaching going below 26 kgN/ha) and so the farmer applied to the Regional Council for a restricted discretionary consent.

The farmer chose these strategies to reduce his environmental impact, despite one of the changes being unable to generate measureable improvements in his Overseer results. Another part of his strategy involved capital expenditure of over $30,000 on fencing and water supply with minimal decrease in annual costs. Grazing cows off the farm over winter is only an option while such grazing remains available at a reasonable cost. Each of his strategies carries associated risks with it, but possibly the greatest change for this farmer is the increase in feed budgeting and management capability required.

What did the farmer say when it was concluded? "Well this wasn't as traumatic an experience as I thought that it would be, I think that we got somewhere that I can make work."

Example Farmer Limiting Inputs With Farming System Changes

This farming couple are in their early 50's and they have a strongly held philosophy about looking after the sustainability of their farm's environment and their business. They purchased a new farm in the Tararua district and started milking on it in the 2013/14 season. The new farm was 200ha of which 180ha was effective and there was a 60ha runoff associated with the farm. The majority of the farm was a Dannevirke Silt Loam - a well-structured free draining allophanic, brown soil producing 12,500 kgDM/ha annually. All the water ways on the farm had been fenced to dairy company and regional council standards.

The previous owner of their new property had milked around 2.8cows/ha, producing 436 kgMS/cow and 1,211 kgMS/ha. Replacement heifers were grazed at the runoff until they were ready to calve. For the base year for consenting under Horizons One Plan, the farm had an estimated leaching level of 47kgN/ha and needed to get this down to 20kgN/ha for a controlled consent..

The new owners when they took over the farm immediately began making changes in the farming system with a drive to see the farm perform both financially and physically while reducing its risk of nitrate leaching. The farmers are putting in place the following changes to reduce their estimated risk of nitrate leaching down to 41 kgN/ha (13%):

- Cow numbers are being increased by over 5%, and dairy production has already increased by almost 15%
- Nitrogen fertiliser use has been decreased from 107 to 74kg/ha mostly by decreasing the amount applied in Autumn
- Supplements imported onto the milking platform have been increased from 780 to 1,280 kgDM/cow (around 20% of the cow's diet), mainly this is as maize silage for the feed pad and crushed grain in the dairy shed.
- A summer turnip crop of 20ha that was grown each year has been replaced with a policy of renewing pastures by going directly from grass to grass
- The previous owner stored farm dairy and feed pad effluent in an unlined pond and then it was spread over 40ha. A new larger lined effluent pond is being built and the effluent area is being increased by over 50%. This is a major capital investment to enable deferred effluent application to be introduced.

The new owners of this farm aim to feed their cows well with a focus on pasture management to maximise pasture growth and its utilisation by the cows. While the total numbers of cows and feed supplements are being increased, the farmers have been reducing their actual costs of production per unit of milk solids. To achieve good cost control in the new farm system they are maintaining a continually updated financial budget and a good cash flow.

What has led to the 13 percent reduction in N leaching on this property despite the increased stocking rate and production? It has been a combination of factors including, nitrogen fertiliser timing and decreased use, the removal of the summer crop, increasing of the effluent area and the increased use of low protein supplements. In addition, the construction of a lined effluent pond to minimise effluent entering the groundwater and enable deferred irrigation to be practiced has been a major consideration in the Manawatu-Whanganui Regional Council issuing them with a restricted discretionary consent under the One Plan.

Conclusions and Discussion

The One Plan requires most of the dairy farmers and other intensive agricultural enterprises in the Manawatu-Wanganui Region to develop farm plans that can support an application to the Council for landuse consents. In particular, each farm plan has to contain a farm system strategy that addresses the nitrogen target for their catchment. Working together with affected farmers and local consultants, DairyNZ and MWRC have piloted a programme preparing farm plans that implement the rules in the One Plan and still provide opportunities for industry and community development in the region.

In this paper, the two example farmers have been able to identify ways of reducing the physical inputs into their farming systems and use resources more efficiently. This has enabled them to plan on increasing their production profitably while reducing their environmental impact. Not all the farmers in the programme have been in a position to do this for their own structural and/or personal reasons. The changes anticipated by the example farmers will require more intensive management of their farming systems particularly of feed quality and feed flow. However, they have been motivated to participate in the programme by wanting their communities and the public to be more positive about the contribution of dairying to the economy, New Zealand's way of life and our national environmental stewardship.

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