BEFORE THE	Canterbury Regional Council
IN THE MATTER OF	the Environment Canterbury (Temporary Commissioners and Improved Water Management) Act 2010
AND	
IN THE MATTER OF	Submission and further submission on Proposed Variation 1 to the Proposed Canterbury Land and Water Regional Plan (2014)

STATEMENT OF EVIDENCE OF MARVIN PANGBORN ON BEHALF OF THE NORTH CANTERBURY PROVINCE OF FEDERATED FARMERS OF NEW ZEALAND

Dated 29 August 2014

Qualifications and Experience

1. My name is Dr Marvin Pangborn

2. I hold B.Sci. and M.Sci. Degrees in Dairy Production from Oregon State University and have completed a Ph.D. at Lincoln University in Agricultural Management. Prior to immigrating to N.Z., I was a Vice President in the rural lending division of Seattle First National Bank. I currently lecture in the The Department of Agricultural Sciences at Lincoln University.

3. I have read the Environment Court's Code of Conduct for Expert Witnesses, (Environment Court Practice Note 2011, Part 5) and agree to comply with it. I confirm that the issues addressed in this statement of evidence are within my area of expertise

4. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed. I have specified where my opinion is based on limited or partial information and identified any assumptions I have made in forming my opinions.

5. This evidence has been prepared at the request of Federated Farmers in relation to Proposed Variation 1 to the Canterbury Land and Water Regional Plan.

Introduction

6. At the outset I wish to be clear about my own farming interests in the district. I have been a dairy farmer in the Selwyn District since 1987. My wife and I are both third generation dairy farmers and like most dairy farmers in the Selwyn District consider ourselves to operate a family farm. We operate two dairy farms, one (515 cows) currently predicted to be leaching at 51 kg N per hectare per year and the other (630 cows) at 32 kg N per hectare per year. The second farm was formerly irrigated by border dykes and has a nitrogen baseline of 55 kg/ha/yr. The reduction to 32 kg/ha/yr was achieved through the replacement of border dykes with pivots. Recently we have purchased a 110 hectare support block. The primary reason for purchasing this property was to secure the future grazing of young stock and to provide feed to be transferred to the dairy platforms (silage and grain). This farm has a nitrogen baseline of 14 kg/ha/yr, which will be allowed to increase to 15 kg/ha/yr under the proposed plan. To optimise profitability we should over winter a portion of the herd on the property, however the proposed restrictions prevent this activity. Thus we (and others) are making investments based on risk management rather than in optimising profitability.

7. The remainder of this document considers the scenarios for dairy farming that may develop under Variation 1. The primary focus is management of Nitrogen leaching and substantial system changes required to achieve the reductions introduced through Variation 1 or the nitrogen 'targets' for the catchment . I have not discussed potential technological changes such as the re-introduction of EcoN or use of alternative pasture species because in my opinion these technologies are likely to be insufficient to achieve the levels of improvement required by percentage reductions from 'good practice'.

History and problem

8. There would be few individuals unaware of the growth of the dairy industry in Canterbury. Since 1980, cow numbers have increased from 35,000 to 825,000 and total milksolids production has increased by an average compounded rate of 10% per year. The Canterbury dairy industry has gone from having a lower stocking rate and producing less milksolids per hectare than the national average to a stocking rate that is 22% higher and production per hectare 34% greater than the national average.

9. In the June issue of Primary Industry Management, David Caygill stated *"In parts of Canterbury measured nitrate levels already exceed the New Zealand national drinking water standard of 11.3 mg per litre. Much of Canterbury exceeds the warning threshold of half this maximum acceptable value, which provides room for fluctuations between seasons as conditions such as rainfall vary."* A number of commentators have suggested that it takes decades for nitrogen to work its way through the soil to aquifers, thus these commentators propose that nitrogen levels in water will increase even further. It has also been asserted that the urine patches from cows are the leading source of the problem.

10. The model for successful dairy farming in Canterbury has been the adoption of irrigation, relatively high stocking rates (+4 cows per hectare) to promote greater levels of growth of high quality pasture, wintering of cattle on crops *in situ* and incorporating supplements in the form of grain, silage, palm kernel, etc. to the system. If this model is now considered environmentally unsustainable and staged reductions in nitrogen loss over time required beyond what is possible through 'good practice', then the industry either disappears or finds alternatives. There appear to be three possible changes, which I have classified as intensification, de-intensification and hybrid.

Intensification

11. Possibly the best example of intensification can be found in the Western United States. Originating in California, open lot dairies with herds in excess of 2,000 cows developed in the 1960s. In response to high land prices and environmental issues, a number of these operations have moved to less populated areas over the past 20 years. Last year, Professor Keith Woodford of Lincoln University and I visited large dairies (2,000 to 25,000 cows) in the Pacific Northwest and Southwest of the U.S.

12. Although the 'immigrants' to these areas followed the California model of locating in desert areas with dry lot systems, the trend is now to house the cattle in sheds. Cows spend their lives indoors and are fed through 'cut and carry' systems. These sheds allow higher levels of per cow production and control of effluent. A shed housed cow in the U.S. will produce roughly double the litres of milk compared to a pasture based N.Z. cow. Most of the farms imported over half of their feed requirements and exported the treated waste to other farms. From an economic point of view these farms are very capital efficient. Most farms operate their milking sheds 22 hours per day and are concentrated on relatively small areas of land.

13. Despite their advantages, these systems expose the farmers to considerable risk from rising feed prices due to drought, U.S. support programmes for potential feedstuffs or even the effect of feed exports to Asia. These systems work very well in the context of the U.S. where fuel, machinery, land and building costs are lower than N.Z. In addition, the Americans have a significant advantage in the cost of labour. Most farms are operated by Hispanics many of whom are paid the minimum wage of between $9.50 and $11.00 per hour for a 12 hour working day. They receive only one week of holiday per year and are not provided with housing.

14. With these economic advantages - when feed prices are low, the U.S. can produce milk cheaper than N.Z. There are a few examples of these systems currently operating in N.Z. One example is the Pannent Dairy in the Ashburton District, with early results indicating that they can produce similar financial results to pasture based systems – however the levels of nitrogen leaching are similar to current systems. In the future, this problem may be resolved by spreading effluent over larger land areas.

<u>De-intensification</u>

15. De-intensification is the process by which the inputs and possibly the outputs of the farming system are reduced. As an example, if the stocking rate of the herd is reduced from 4 cows per hectare to 3 cows per hectare, then it can be assumed that the urinary nitrogen leaching will also be reduced. Likewise, if nitrogenous fertilisers are applied in reduced amounts and/or periods of high leaching are avoided, then leaching should also be reduced. Although this seems like a simple concept, in reality it is more difficult to manage pastures at lower stocking rates and often mowing is required to insure quality in the pasture re-growth. This involves more machinery and labour. Another version of de-intensification is to reduce stocking rate over key periods for nitrogen leaching. The Lincoln University Dairy Farm (LUDF) trialled this system (NZ Dairy Exporter, June 2014) by reducing cow numbers from April so that by May there were 250 cows being milked in the pre-winter period, rather than a normal 500-550. This action reduced milksolids (ms) production by 24,000 kg and resulted in a reduction in operating profit of $90,000. If this was replicated over the catchment there would be a large effect on the economy.

16. With the help of Fonterra, Ravensdown and a Lincoln University graduate student, one of my farms was modelled under a de-intensification scenario based on the 2012-13 season (NZ Dairy Exporter, April 2014). Our farm has a lower stocking rate of 3.5 cows per hectare, but is made up of light soils. An earlier version of Overseer predicted leaching of 33 kg/ha/yr, which could be reduced to 22 kg/ha/yr by lowering the application of commercial nitrogen by 25%, and removing 20% of the herd from the farm in April and 30% in May and August. Financial modelling using the Farmax model suggested that the operating profit would be reduced by approximately $10,000. The payout in the 2012-13 season was approximately $2 per kg ms lower than in the just completed season. A more recent analysis using Overseer 6, predicts that leaching is 51 kg/ha/yr with a reduction to 39 kg/ha/yr through the management change noted above.

Hybrid

17. A number of systems incorporating structures have been suggested, with varying results.

18. Journeux established a model shed system for a 119 hectare farm in the Tararua district. The farm wintered 332 cows and produced 342 kg ms/cow and 953 kg ms/ha (far below the Canterbury average). The cows were housed for 20 hours per day from February to May and totally housed in June and July (referred to as the base scenario). Two further options involving intensification were also analysed compared to the base scenario. Journeux found that a wintering facility would reduce nitrogen leaching, however establishing the facility came at a significant cost to the system. The intensification scenarios helped to rectify the reduced profitability, but effectively increased nitrogen leaching to levels similar to those in existence prior to building the shed.

19. Recent research at Telford suggests that housing cows during the shoulders of the season reduced profitability by $200 per hectare per year. The primary cause of the loss was an inability to control pasture covers by having cows off of paddocks. As a consequence, the trial farmlet struggled to maintain pasture quality throughout the season, which resulted in the increased use (and expense) of topping and conservation.

20. Contrary findings are provided by Macdonald, Scriemegeour and Rowarth who modelled options for a 300 cow Waikato dairy farm for ‘controlled duration grazing’. Scenarios were ‘as is’, wood chip bedding and a slatted floor system. They identified the advantages of reduced pugging, less overgrazing, better supplementary feed utilisation and less nitrogen leaching through the use of the structures. They proposed that both hybrid systems returned a positive net present value (6% discount rate) over a 10 year period.

Implications of Variation 1 for economic outcomes of dairy farm businesses

21. Balancing the environmental and economic effects is challenging, with no perfect answer at the moment and questions raised over the effect on farm profitability.

22. The intensification option allows control of nutrients and higher milk solids production; however, the capital and running costs involved are an added source of risk if financed by additional debt. The system will increase the cost of production compared to traditional pasture based systems and it will mean that N.Z. dairy farmers will need to adapt their skill sets to a very different way of farming. Most importantly N.Z. does not have a competitive advantage in producing milksolids under an intensive system. Additionally, the accessing of the feed required and the export off-farm of effluent could become a problem. At the moment, the majority of N.Z. dairy farms import 20-30% of their feed. If this were to increase due to an intensive housing system, then there would be a need for greater levels of feed movement and potentially more feed imports which come with bio-security risks. The Americans deal with the effluent issue through very expensive infrastructure and utilising their desert environment for ‘drying compost’. The levels of rainfall in N.Z. would preclude this activity. There are already reports of odour pollution from N.Z. housing systems that have been established.

23. De-intensification appears from early modelling to allow the reduction of nitrogen leaching – but at a cost. The LUDF farm size is smaller than the Canterbury average, however due

to high productivity the farms milksolids production is similar to the average. If the LUDF profit reduction of $90,000 for the past season is applied to the 1,000 farms in Canterbury then total losses would be $90m. If a multiplier of 5 is applied, then the loss to the economy is $450m per annum.

24. Hybrid models come with a cost for the added infrastructure which will result in an increase in the cost of production. It appears that ‘partial housing structures’ will reduce nitrogen leaching. However, if farmers add more cows to cover the increased costs, then the reduction in nitrogen losses could be negated.

Implications of Variation 1 in an intangible or social sense

25. From a societal point of view, there are a number of outcomes from any of the proposed changes. In all scenarios there are either increased costs and/or reduced profitability. Obviously these issues will filter through to the local and regional communities. If the costs for infrastructure are financed by debt, then farmers place themselves in a more risky position financially.

26. There could be a move to the utilisation of outside equity to maintain the strength of balance sheets; however this could result in higher levels of corporate/foreign ownership. At the moment, there is an influx of ambitious young people to the dairy industry as it remains a good method for growing capital. However, it is rare to see a corporate entity or equity partnership employ sharemilkers – thus this method of succession and industry invigoration could disappear as farms become larger and incorporate outside investors. This could lead to labour shortages and the need to import labour.

27. There is already anecdotal evidence of consolidation by farmers who can afford to purchase more land to ‘spread their leaching’ over larger areas. Additionally dairy farmers are concerned about their future ability to graze replacements and winter cows, as nutrient restrictions may drive some graziers away from dairy support.

28. I am aware that the confusion over Farm Environment Plans, the Matrix of Good Management and meeting future targets has created a level of fear and uncertainty in the rural community. Several farms have been sold as the farming family does not see a future in a highly regulated environment and/or do not want to spend the time and money that will be required to meet regulations. There is a potential risk that only corporate type entities will stay in farming as they potentially will carry less debt and will employ experts to deal with compliance. This concentration of ownership could have significant sociological effects in the district.

Dr M Pangborn
29 August 2014