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Bay of Plenty Regional Council

Dear Gemma

Questions relating to changes in NDA allowances

The following are my comments relating to the questions you raised in your email of 20 December 2016. Please note that the comments are general in nature, given the absence of any detailed information on actual leaching rates and cost abatement curves associated with any reductions in nitrogen leaching levels.

Farming systems at an individual farm level vary significantly, depending very much on the skill of the farmer, and in that sense it is difficult to give definitive yes/no type answers – it all depends!

Question 1.

Will the existing dairy farms that could continue at 72.8kg /ha still be able to operate if their NDA was reduced to 65.2(S9, S12), 68.2kg (S10), 71.4kg (S13), or 70kg (S14)? Could dairy farms remain viable? What types of mitigations would be required to achieve these levels? Are you able to say anything about the profitability of farms at these levels? What sort of dairy system could be run under an upper limit of 71.4kg, 70kg, 68.2kg or 65.2kg?

- (i) While the proposed reductions in the NDA relative to the originally proposed 72.8kg N/ha/yr seem small in themselves (see Table 1), the impact is much more related to the increase at the margin; having reduced down to the 72.8kg N/ha/yr NDA, what does the increased reduction require. The level of these reductions is shown in Table 2.

Table 1: Percentage reduction from original NDA target

Target NDA level (kg N/ha/yr)	% reduction
72.8	
71.4	2%
70.0	4%
68.2	6%
65.2	10%

Table 2: Percentage decrease in N leaching to achieve the target NDA

Target NDA level (kg N/ha/yr)	Existing leaching level (kg N/ha/yr)*				
	80	100	120	140	160
72.8			39%	48%	55%
71.4			41%	49%	55%
70.0			42%	50%	56%
68.2		32%	43%	51%	57%
65.2		35%	46%	53%	59%
54.6	32%				

*Derived from Perrin Ag report to BoPRC January 2016: Update of the 2014 NDA Impact Analysis

In the absence of any mitigation strategies being employed, most dairy farms can achieve reductions in N leaching of 5-10% relatively straightforwardly by introducing a range of good agricultural practices, e.g. good effluent management, good nitrogen fertiliser practices. Beyond this, further reductions become increasingly more difficult (and costly) involving a number of strategies such as; changes in grazing management, infrastructure (feedpads/wintering barns), and reduced stocking rates.

As Table 2 illustrates, those blocks leaching over 80kgN/ha/yr will be required to reduce N leaching by a minimum of 32%, meaning that the farmers will need to undertake some significant adjustments, particularly around farm systems, in order to meet the required leaching levels.

Similarly, for farms currently leaching above 100kg N/ha/yr, a significant change in farm system would be required to achieve the originally proposed NDA level, with much greater effort required to achieve the potentially lower NDAs.

- (ii) Would the farms remain viable? This is a complex question, as it depends very much on the current financial situation of the farm, particularly its capital structure (i.e. debt levels). It also depends on the abatement costs the farm faces relative to the degree of N leaching reduction required, which tends to increase steeply (usually in a curvilinear fashion) the greater the reduction required.

With respect to the reductions indicated in table 2 above, I would say that;

- (a) For farms currently around the 80-100kgN/ha/yr level, most probably would remain viable, but some would not. Would depend on a number of factors, not least the farmer's management skills, and debt levels.

The extra reduction mooted for farms at 100kgN/ha (down to 65.2kgN/ha) just means that the effort required becomes slightly harder, and more expensive.

- (b) For farms above the 100kgN/ha/yr level (i.e. 120+), the percentage reduction required is much higher, meaning continued viability would be much more problematic. Some of the more heavily indebted farms may have to sell up – the

purchaser would most likely buy in at a reduced price and hence lower debt level, in which case they would be more viable.

This situation also needs some discussion around the situation where a number of farmers have reduced stocking rate (usually by 5-10%) plus reduced the level of bought-in supplementary feed, resulting in a reduction in N leaching, and either a minimal reduction in profitability or an improvement in profitability. This can be illustrated via results from a Dairy NZ trial investigating this issue.

Table 3: Dairy NZ low stocking rate trial; 3-year average of 5-year trial

	Current	Low SR	Difference
Stocking rate (cows/ha)	3.2	2.6	-19%
N Fertiliser applied (kgN/ha)	137	46	-66%
Supplements fed (T/ha)	2.2	2.1	-5%
Milksolids production (kg/cow)	367	442	20%
Milksolids production (kg/ha)	1,186	1,158	-2%
Days in milk	239	260	9%
Operating profit (\$/ha)	4,310	4,083	-5%
N leached (kgN/ha)	59	30	-49%

Note:

- (i) This trial utilised a wintering barn for on/off grazing over the late summer/autumn period, which is a key mitigation strategy for reducing N leaching.
- (ii) The operating profit shown does not take into account the capital cost of the wintering barn, or depreciation.

While this scenario is a real option for some farmers, I would caution in seeing this as a panacea for all farmers. In particular it requires a high level of skill in maintaining pasture quality with a reduced stocking rate (see comments on Q 5). For most farmers, the reduction in N leaching under this scenario is of the order of 5 –20%

In addition, there are systems that can reduce N leaching significantly; a farm at (say) 160kg N/ha/yr could possibly meet the NDA targets by moving to a fully housed system with a cut and carry system for harvesting the pasture. This system though requires a high level of capital input, and only tends to be financially viable at a high milksolids payout.

- (iii) A full suite of mitigation practices would be required to achieve the reductions indicated in table 2; an excellent level of effluent management, a very good/reduced (if not nil) nitrogen fertiliser system, the use of facilitated/constructed wetlands, the replacement of nitrogen fertiliser with low-N supplementary feeds (e.g. maize silage), and on/off grazing over the late summer/autumn period, most probably requiring a feedpad or wintering barn to hold the cows during the “off-grazing” component.

In addition, given the level of reductions indicated, and notwithstanding the possibility of housed/cut and carry systems, most farmers would need to de-intensify their systems by reducing stocking rates and reducing the level of bought-in supplements.

- (iv) The profitability of the farms would depend very much on the skill of the farmer, and the current capital structure of the farm. I would think that most would be profitable in the sense that gross revenue would be greater than operating costs, but whether there would be sufficient funds after this to cover the farmers' living costs, debt servicing, capital replacement costs and further farm development would be very problematic.
- (v) There could be a range of farm systems operated, depending again very much on the farmers' skills. Given the N leaching levels indicated by the proposed NDAs, the assumption is that the farms are on free-draining soils under high rainfall levels. In this case the generalisation would be that they would need to be relatively low stocking rate systems with minimal inputs such as supplements and nitrogen fertiliser.

Question 2

What are the effects on small block (under 40ha) drystock farms from a decrease in NDA from 25.45kg to 25 (S13), 24.5(S14), 23.9kg (S10) or 22.40kg(S11, S12)? Can you add anything to your previous email comments? "The non-benchmarked drystock could be more promising. I would think that only dairy support & intensive beef operations (+ possibly intensive horse operations?) would be above the ~25kg N original NDA, and a reduction down to 22-23kg is reasonably realistic for many small blocks. But difficult to be too definitive until you know their current N leaching levels".

Table 2 in the Perrin Ag report show a range of N leaching for drystock farm systems varying from 15.8 – 38.0 kg N/ha/yr, with an average of 25.5 kg N/ha/yr. The farms at the higher end were the ones involving dairy heifer grazing.

I would suspect that most small blocks would also fall within this range, and it would be the ones with a high proportion of cattle that would be at the higher end. At the high end of the above range (38 kg N/ha/yr), the reduction to the originally proposed 25.45kgN/ha/yr represents a 33% reduction. Reducing the NDA to 22.4kg would represent a 41% reduction. Achieving this would require a reduction in stocking rate and/or a reduction in the proportion of cattle.

For most of the small blocks however, assuming they are in the above range, the reduction required would be relatively small.

Question 3

How would a percentage drop affect the lower NDA dairy farms and the upper drystock (including dairy support) farms? Are current dairy farms with a future NDA of 54.6kg/ha likely to be able to operate at that level? A dairy support farm may go from an NDA of 54.6kg/ha to 53.56kg/ha (1.9% drop) or 52.5kg/ha (3.8% drop). What mitigation measures might be to achieve these N levels?

This is difficult to answer, as the crucial factor is not the NDA per se, but the degree of reduction required to meet the NDA. In Question 1 above, the original NDA proposed was 72.8kg N/ha/yr. so presumably the blocks that are required to meet this are currently leaching above this level. The

blocks required to meet the 54.6kg N/ha/yr NDA are currently leaching up to 78kg N/ha/yr. At a current level of 60kg N/ha/yr, the reduction to 54.6 kg N/ha/yr represents a 9% reduction, which is quite achievable. At a currently leaching level of 70kg N/ha/yr the reduction is 26% - still achievable, albeit requiring a greater range of mitigations to do this. At a currently leaching level of 78kg N/ha/yr the reduction is 30% - again achievable, but requiring a significant effort.

While the proposed reductions in the dairy support NDAs are relatively small, again it depends on the marginal effect; currently leaching levels vary between 70 – 127kgN/ha (as indicated by Council) and hence the reduction down to 53.6 or 52.5kgN/ha/year represents a drop of between 23 – 59%.

This level of decrease would represent a significant challenge to most farmers and would require a full suite of mitigations as outlined in Question1 (iii), and most probably a reduction in stocking rate.

Question 4

Could you comment on your answers to the above questions in relation to output prices. i.e. are these levels achievable when output prices are high etc

High output prices do not lessen the physical or management issues involved in reducing N leaching.

The main impact of high output prices is that;

- (i) The profitability of low intensity farm systems is improved, which increases the acceptability to move to such a system (in the sense that if a low intensive system is unprofitable it hardly incentivises a farmer to move to it), and/or
- (ii) With improved profitability, the ability to service the cost of infrastructure such as feedpads or wintering barns is enhanced.

Question 5

What role do farmer skillsets and adaptability play in achieving these limits?

This has an absolutely crucial role in achieving NDA limits.

While biophysical factors such as soil type (particularly drainage) and rainfall have a major influence on N leaching potential, it is the way the land is managed (i.e. the farming system) which will determine the actual amount of N leached.

In this respect, therefore, a farmer's skills/expertise/experience is critical in the way they operate their business and in how they may achieve the required NDA. As part of this, access to information and advice is also a crucial aspect.

Within farming, as in any other profession/trade/job, there is a distribution of ability; any effort to shift the distribution to the right (i.e. move average towards good) usually requires significant time and resources. There are a 1001 factors which influence farmer decision making and adaptability to change, and these all influence any programme to achieve change.

There is a large amount of literature on this issue, which is somewhat outside of the scope of this letter. But as noted above – skillsets and adaptability are crucial to achieving change, particularly significant change inherent in meeting the NDA limits.

Question 6

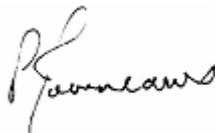
Is there a scenario that looks best to you in terms of reducing the impacts on existing farms in the catchment e.g. % reduction vs combined upper dairy/ave. non-benchmarked drystock reduction?

No.

There is seldom any “best” solution in these situations – usually it is a matter of determining what is least worst.

Happy to discuss any of the above.

Yours sincerely

A handwritten signature in black ink, appearing to read 'P. Journeaux', written in a cursive style.

Phil Journeaux
Consulting Ag Economist