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MEMORANDUM

TO: Stakeholder Advisory Group
FROM: Lee Matheson, Director, Perrin Ag Consultants Ltd.
DATE: 12 November 2011
SUBJECT: Review of BOPRC dairy support NDA allocation paper

BACKGROUND

1. Perrin Ag Consultants Ltd was engaged by the Bay of Plenty Regional Council ("BOPRC") to provide advice on the viability of the potential for the inclusion of a specific dairy support sector within the allocation framework for nutrient discharge allowances ("NDAs") for the Lake Rotorua catchment as per their draft discussion paper.

OVERVIEW OF DAIRY SUPPORT IN THE ROTORUA CATCHMENT

2. Dairy support activity is not standardised. As a result, within a dairy support sector specific NDA, there will still be properties that are immediately better or worse positioned to meet the eventual target. In our experience, there are four primary configurations of dairy support properties in the catchment.

   (i) Properties where the grazing of dry dairy cattle forms some or all of the cattle component of the sheep & cattle business in typical livestock proportions (approximately 40% of total stock units);

   (ii) Properties where the grazing of dry dairy cattle forms the predominant livestock enterprise (cattle ratio >66%);

   (iii) Properties where the grazing of dry dairy cattle forms the only livestock enterprise, potentially supplemented by the sale/transfer of pastoral forage off-farm;

(iv) Properties as in (ii) above which are integrated into existing dairy businesses ("run-off").

Each configuration will potentially have differing N loss signatures, while all could claim to be engaged in dairy support activity. Only (ii), (iii) and (iv) could probably be considered as specialist dairy support, which we anticipate is the focus of any such specific allocation. However, the precise definition of what constitutes dairy support land for the purposes of nitrogen loss allocation and whether or not this should be based on historic land use will need to be clearly thought through.

3. While our own analysis of N losses from the dairy support sector in the Rotorua catchment is limited, based on analysis from the Farmer Solutions Project, it would appear that the N losses from dairy support operations of the magnitude identified in the historic BOPRC catchment data are a function of the higher [winter] stocking rates of these properties as well as higher proportions of cattle (see Table 1 below). Case study C was the sole "dairy support property" analysed.

4. Recent analysis of our own client's systems revels that there are systems within the Rotorua catchment where dairy support grazing provides the cattle component (cf. 40% total stock units) of sheep & beef systems with annual N losses of less than 15kg N/ha, but with annual stocking rates of less than 10SU/ha.

Table 1: Summary of KPIs from drystock farmers in FSP

KPI	FSP case study		
	A	B	C
Stocking rate (SU/ha)	**9.8**	**10.8**	**22.9**
Liveweight wintered/ha	595	568	958
Feed eaten (t DM/ha)	**5.5**	**5.9**	**12.6**
Net kg product per hectare	223	277	560
Sheep %	58	58	30
Cattle %	42	42	70
Total N applied/ha	2.5	10.8	102.0
Current N loss per hectare	**10**	**11.9**	**25.9**

Note: N losses calculated in Overseer 5.4.11, which typically understate losses as assessed in Overseer v6.

5. For the purposes of this paper we modelled two representative specialist dairy support systems in FarmaxPro and Overseer v6, assuming an available area of 50ha of medium quality pasture with growth potential of 10.9t DM/ha. One consisted solely of heifer replacement grazing (135 head), with some surplus forage sold off the block (Scenario 1). The other comprised a lesser number of heifer replacements being grazed (120 head), with 7ha of winter crop being grown to support the winter grazing of 150 cows (Scenario 2). The base outputs from each of these scenarios are presented in Table 2 below.

Table 2: Summary of specialist dairy support models

KPI	Scenario	
	1	2
Stocking rate (SU/ha)	**14.1**	**15.7**
Liveweight wintered/ha	531	1,873
Feed eaten (t DM/ha)	**7.7**	**8.6**
Net kg product per hectare	445	397
Sheep %	0	0
Cattle %	100	100
Total N applied/ha	30	45.1
Current N loss per hectare	**26**	**37**

SPECIFIC ALLOCATION FOR DAIRY SUPPORT

6. In allocating a separate NDA for this activity, we suggest that the BOPRC would effectively be allocating an NDA based on both land use and land use capability. We note that many of these specialist dairy support operations operate on land that might otherwise be suitable for dairying or other intensive land use. Unsurprisingly, stocking rates are high, which combined with the predominance or exclusivity of female cattle as the livestock enterprise generates high annual N losses from the systems.

7. As can be seen in Table 2 above, Scenario 2 leaches more than the targeted dairy NDA of 35kg N/ha/year. The reality is that to operate at this level of intensity, land would be of an equivalent quality to dairy land.

8. A simplistic approach has been taken to demonstrate how the proposed (13/18kg N/ha) N loss allocation targets might be met under each scenario assuming the same area is retained in pastoral farming and in dairy support. The economic outcomes are presented in Tables 3 and 4 below. Given the potential combination of enterprise mixes are substantial, the examples below should be considered as simply possible options, rather than representative solutions.

9. The proposed solution for Scenario 1 was to reduce the number of heifers grazed and increase the amount of baleage sold to off-farm. For Scenario 2, the winter crop was replaced with a wintering facility (cf. a capital cost of $1500 per cow), heifer numbers reduced and the amount of supplementary feed cut for wintering on increased. In both cases, annual N losses were reduced to approximately 20-21kg N/ha, but Scenario 1 relied on 50% of the property being mowable and ready market for large quantities of baleage, while Scenario 2 required a capital investment of $225,000, or $4,500/ha. Scenario 1 is estimated to deliver a slight increase in gross margin (+3%), while gross margin in Scenario 2 is reduced by 20%. Wintering rates for dairy cows would need to increase to $31/cow/week, primarily to cover the additional cost of servicing the barn construction (assuming an 8 week wintering period) to avoid any reduction in profitability.

Table 3: Alternative policy for Scenario 1

KPI	Scenario 1	
	Original	Alternative
Stocking rate (SU/ha)	**14.1**	**9.4**
Liveweight wintered/ha	531	325
Feed eaten (t DM/ha)	**7.7**	**5.2**
Net kg product per hectare	445	274
Sheep %	0	0
Cattle %	100	100
Total N applied/ha	30	23.0
Current N loss per hectare	**26**	**20**
Gross margin/ha (incl. interest)	$ 1,284	$ 1,325

Table 4: Alternative policy for Scenario 2

KPI	Scenario 2	
	Original	Alternative
Stocking rate (SU/ha)	**15.7**	**13.6**
Liveweight wintered/ha	1,873	1,801
Feed eaten (t DM/ha)	**8.6**	**7.5**
Net kg product per hectare	397	336
Sheep %	0	0
Cattle %	100	100
Total N applied/ha	45.1	30.0
Current N loss per hectare	**37**	**21**
Gross margin/ha (incl. interest)	$ 1,305	$ 1,050

10. While this analysis demonstrates that both of the exemplar specialist dairy support enterprises can continue to operate in a dairy support function at annual N loss levels of 20-21kg N/ha, the reality is that they do so with a reduction in the number of heifer replacements able to be grazed and in one instance significant capital investment. It is also important to recognise the variable tolerances of dairy support systems to such proposed change depending on the ownership/business model.

11. In order to deliver further reduced N losses to achieve either the proposed 18kg N/ha/year NDA or the sector average 13kg N/ha/year, we are of the opinion that this would require further reductions in cattle numbers or introduction of male cattle, adoption of new livestock classes to the system (sheep and/or deer), retirement of land or further investment in structures/facilities that completely eliminate the overwintering of cattle on pasture. In practice this will probably be extremely difficult to achieve, as it will remove the ability for land owners to operate in a specialist dairy support function unless it is on a reduced area or accompanied by significant capital investment.

12. These conclusions appear to mirror those of the NZIER analysis referred to in the draft BOPRC paper. While significant capital investment might be feasible for a large scale farming enterprise or one integrated into a dairy unit, our expectation is that owners of smaller properties (<40ha) will be unlikely to make the inferred capital investments required to achieve the N loss levels suggested as being possible. Based on our own basic analysis in this paper, I suspect the owner of a 50ha farm property may be reticent as regards investing an additional $225,000 into land valued at $1,000,000 for an accompanying reduction in profitability.

13. In the event that a specialist dairy support NDA allocation is introduced, we suggest that any reduction from historical levels should be allocated in the same proportion across the drystock sector. As per the BOPRC paper, this would be suggestive of an NDA of 21kg N/ha/year for the specialist dairy support sector and 11.4kg N/ha/year for non-dairy support drystock sector. In saying this, we are well aware of the potential issues of some existing drystock farmers operating profitably at NDAs of 13kg N/ha/year, let alone 11.4kg N/ha/year.

HIGHER ALLOCATION TO DAIRY SECTOR

14. Allocating any dairy support allocation to the dairy sector (Option 3) to account for the higher N loss "requirements" of dairy support would be fraught with difficulty.

15. We do not know the relative balance of "in" and "out" of catchment dairy heifer/winter cow grazing. If the amount of dairy support activity in the catchment exceeds the "requirement" of the in-catchment dairy sector (which I believe may be the case), then allocating additional NDA to the dairy sector will simply provide more allowance to the dairy sector with no guarantee it will "transfer" back to economic activity on drystock properties.

16. Whether dairy replacement stock come from within or outside the catchment shouldn't matter so long as NDA targets are met. Accordingly discouraging dairy support for cows from outside of the catchment shouldn't be a factor in assessing the merits of any such policy framework. Indeed, replacement of traditional cattle policies with generally higher value dairy heifer grazing for equivalent N losses may be one mechanism by which non-dairy support drystock farms might transition to a lower NDA regime whilst minimising losses in profitability. It is likely that dairy heifers external to the catchment might be required to facilitate this.

17. There is an additional potential value transfer associated with dairy support NDA moving from dairy farms to support blocks [Option 3] in that (increased) higher value dairy support activity is facilitated by the NDA transfer. Does this have a value and how is it transacted? It is reasonable to assume that administrative costs would also need to be covered by the parties

18. Where a run-off was operated by a dairy farmer, this concept would work well from an administrative perspective, with the business as a whole able to be considered under the sum of its respective property NDAs. However, in contract grazing situations, how much NDA would be required to be surrendered to a given grazier to allow them to graze a dairy farmer's heifers or cows will vary widely based on a property's bio-physical characteristics, production system.

19. Under this second alternative allocation framework, a 600 cow dairy farm, operating on 180ha of dairy platform will have an additional 540kg NDA to allocate to graziers. Assuming a 20% replacement rate, this farmer will (likely) need to find grazing for 120 replacement heifers and, based on their current likely production system, maybe grazing for up to 300 cows over winter. If the cows could be wintered at home under the 35kg N/ha/year dairy allocation, then each heifer would have 4.5kg N/year/head to take with them to grazing. If we work on the basis of Scenario 1, with base N loss of 26kg N/ha/year, then at the assumed stocking rate of 2.7 heifers/ha, then then the 26kg N/ha losses would be reduced to 13.5kg N/ha under this transfer system – very close to the revised 12kg N/ha/year target for drystock properties.

26kg N/ha/year – [4.5kg N x 2.7 heifers/ha] = 13.5kg N/ha/year

20. This basic example demonstrates that this concept might work as regards ensuring that the young stock of the catchments dairy farmers can be grazed within catchment under an increased dairy farm average. However, as previously stated, historic dairy support activity within the Rotorua lake catchment probably exceeded the requirements of the catchment's dairy farmers. Under this mechanism, putting aside whether the NDA transfer has an economic value to the grazier and assuming dairy farmers adopt this strategy for managing their young stocks' N footprint, some existing dairy grazers (predominantly dairy farm run-off lessees and owners) would continue to have viable, possibly unchanged businesses, while the balance will have to completely change their business models.

21. The major issue that we see might arise from this mechanism is that dairy farmers choose to graze replacement stock totally out-of-catchment and utilise the additional NDA to support direct dairying activity.

CONCLUSIONS

22. The reality is that the final allocation framework is going to be considered inequitable by some or all landowners, irrespective of its final format. We are not convinced that the development of a dairy support specific NDA will significantly improve the perceived equity of the proposed allocation framework, although it certainly recognises the existence of a pastoral sector that sits in between dairying and hill country drystock farming in terms of land use intensity.

23. However, it will certainly improve the ability of pre-existing dairy support properties to meet the challenge of future N loss requirements (albeit at the expense of other drystock farmers), but may not adequately address the issues of non-benchmarked properties who currently, but maybe not historically, operate predominantly as dairy support grazing. In addition, a dairy support sector average of 18kg N/ha/year will still require significant system change beyond BAU optimisation of specialist dairy support systems to achieve.

24. Either of the two alternative options proposed by the BOPRC will introduce additional administrative costs and additional complexity as regards allocation and on-going management. Option 3, where by any dairy support allocation is given to dairy farmers to utilise, purportedly for the purposes of dairy support, carries considerable risks and will essentially result in the allocation of additional property rights to the dairy sector at the expense of the drystock farmers with little or no guarantee it will achieve the intent of a dairy support sector allocation.

25. On balance, we are undecided whether or not a specific dairy support NDA should be adopted, but if it is, then reduction from historical (2001-2004) levels should be allocated in more or less the same proportion across the two drystock sectors. As per the BOPRC paper, this would be suggestive of an NDA of 21kg N/ha/year for the specialist dairy support sector and 11.4kg N/ha/year for non-dairy support drystock sector. Pragmatically, if this was adjusted to 20kg N for dairy support, the remaining drystock allocation would be 11.6kg

N/ha for drystock (practical rounding to 12kg N/ha), which would probably be better received than 11.4kg N/ha (effectively 11kg N/ha).

Table 5: Alternative allocation

Sector	ROTAN area	Proposed NDA	N losses (kg)
Dairy support	2,750	20	55,000
Non-dairy drystock	13,375	11.6	154,481
Total expected N losses			209,481

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