Less N Pasture Growth Response Trials in the Waikato Region, Summer, 2011.

Donaghys Industries Ltd

Christchurch

Martin Hawke

Bay of Plenty Farm & Pastoral Research

23, Glenroy Place,

RD 4

Rotorua

October, 2011

This report is prepared for Donaghys Industries Ltd (attention: Nigel Johnston).

Table of Contents

1. Executive Summary

Two pasture response trials were laid down during the summer on dairy properties in two districts of Waikato Region. Each trial compared the same range of Nitrogen products that included LessN in one of the treatments. There were five treatments, replicated eight times with a plot size generally of 30m X 3m.

Two production cuts were taken at each trial to align with the farmers grazing rotation. Pasture yields were measured with a lawn mower taking cuts from each plot prior to grazing and pasture probe measurements were taken at the commencement of the trial and before and after the first grazing and prior to the second grazing.

Results suggested that harvested data gave some significant responses to the 80kg urea/ha treatment and the probe results gave significant responses to the LessN40 and 80kg urea/ha treatments. There were variable results according to location and N efficiency favoured LessN40 on the probe readings. The 40kg/ha urea and liquid urea treatments were generally intermediate in their responses

Pasture trials conducted during the summer months can show variable results and it is recommended that if further trials are conducted, spring applications should be considered.

I confirm that these trials were conducted independently of Donaghys staff (but with their assistance) and that the protocol was followed as far as was practical.

2. Introduction

Donaghys LessN is a natural microbial based nitrogen utilisation enhancer, formulated specifically for use in combination with dissolved urea fertilisers. Independent and in-house trials have been conducted in both Islands and results have shown economic responses. Further independent pasture trials have been requested. A very detailed protocol was set up for the conduct of these trials.

3. Trial Details and Methods

Two pasture trials were set up in districts representing Cambridge and Ohaupo (Table 1). Soil samples were taken from each site for MAF QT analysis before or at laying down (Table 2).

Each site was selected by Donaghys staff based on nitrogen history, pasture composition, grazing management and terrain. Spraying equipment, mower cuts, pasture probe measurements and urea granule spreading were calibrated prior to trials being laid down. The granule spreader was modified for the Cambridge and Ohaupo trials to give a more accurate spread of urea.

The trials consisted of 5 treatments, 8 replications as a randomised block design plot size 30m X 3m.

Once the plots at each site were measured and pegged, 30 probe readings were taken down the middle of each plot. These readings were repeated prior to and post grazing for the first grazing and prior to the second grazing. Mower cuts were taken prior to the first and second grazing in each plot (10m length X 0.45m width, at a height setting of '11'- approx. 3.5cm) in the middle area of the plot, but at different sites within the plot at the second grazing. Green yields were weighed in the field and a sub sample taken for drying. A 150g sample was dried using a Clayson forced draught drying oven for 11 hours at 85°C.

Table 1: Site Details

Location	Date laid down	Plot length(m)	Number plots	Cut 1 date	Cut 2 date
Cambridge	2/2/11	30	40	23/2/11	18/3/11
Ohaupo	1/2/11	30	40	25/2/11	22/3/11

Table 2: QT soil analysis

Location	Soil Group	pH	Olsen P	K	Ca	Mg	Na	$S(SO_4)$	IncN
Cambridge	Peat	5.7	70	6	13	39	4	8	204
Ohaupo	Volcanic	6.3	60	13	12	31	7	9	232

Table 3: Treatments

1. Control	200l water/ha
2. Urea Solid 40	40kg urea/ha as prills
3. Urea Solid 80	80 kg urea/ha as prills
4. Urea Spray 40	40kg urea/ha dissolved in water for 200l /ha
5. LessN 40	40kg urea/ha dissolved in water for 200l/ha + 3l LessN/ha

Results were analysed using Genstat analysis of variance (ANOVA) by Dr. John Waller, AgResearch

4. Results:

The following tables detail the Dry matter (kg/ha) and pasture Probe data by site and treatment with LSD's (5%).

Table 4: Cambridge

		DM(kg/ha)			Probe(kg/ha)	
Treatment	**Cut 1**	**Cut 2**	**Total**	**Cut 1**	**Cut 2**	**Total**
1	1297	329.2	1626	1018	684.5	1702
2	1451	320.8	1772	1115	731.5	1847
3	1580	333.6	1914	1261	704.2	1965
4	1489	325	1814	1120	750.5	1870
5	1440	316.6	1757	1367	726.6	2093
LSD (5%)	*206.5*	*105.4*	*232.2*	*188.7*	*128.6*	*237.3*

At cut one and in total, only the 80kg/ha urea treatment was significantly better than control. There were no differences at cut two. The probe data showed the 80kg Urea and the LessN treatments to be significantly better than control at cut 1 and in total. There were no differences at cut two.

Table 5: Ohaupo

		DM(kg/ha)			Probe(kg/ha)	
Treatment	**Cut 1**	**Cut 2**	**Total**	**Cut 1**	**Cut 2**	**Total**
1	1222	466.3	1689	982	944.2	1926
2	1445	506.3	1951	1264	1017.3	2281
3	1732	542.2	2274	1278	1084.5	2362
4	1592	460.3	2053	1216	943.5	2159
5	1627	474.1	2101	1239	996.4	2236
LSD (5%)	*237.5*	*126.6*	*260.3*	*194.1*	*129.4*	*234.8*

At cut one, treatments 3, 4 & 5 were significantly better than control and all treatments were better than control in total DM. There were no differences at cut two. Probe data showed all treatments to be significantly better than control at cut one and in total, but only the 80kg urea was significantly better than control at cut 2.

Table 6: Summary of significant (LSD 5%) responses

A) Dry Matter Cuts

	Cambridge			Ohaupo		
	Cut 1	Cut 2	Total	Cut 1	Cut 2	Total
Tr						
1						
2						Y
3	Y		Y	Y		Y
4				Y		Y
5				Y		Y

Note: Y =significant. Blank = not significant

B) Probe Data

	Cambridge			Ohaupo		
	Cut 1	Cut 2	Total	Cut 1	Cut 2	Total
Tr						
1						
2				Y		Y
3	Y		Y	Y	Y	Y
4				Y		Y
5	Y		Y	Y		Y

Note: Y =significant. Blank = not significant

Table 7: Efficiency of N application.
Kg N response on total yields harvested and probe data (kg DM/ha) minus control

Treatment	Cutting	N response/kg N applied	Probing	N response/kg N applied
		Cambridge		
80 kg Urea/ha	288	7.8	263	7.1
LessN 40	131	7.1	391	21.3
		Ohaupo		
80 kg Urea/ha	585	15.9	436	11.8
LessN 40	412	22.4	310	16.8

This data illustrates that pasture responses/kg N applied were quite variable with some excellent responses, but also some very poor ones. The harvested yields showed that the high rate of granular urea was marginally more efficient than the LessN treatment at Cambridge. At Ohaupo, LessN was more efficient. For the Probe data, LessN was more efficient than 80kg urea/ha at both sites.

5. Discussion

There was a very detailed protocol as set out by Donaghys. As a document to follow, it was comprehensive. However, field trials of this nature are subject to management and biological changes and events that require changes to be made. Examples of these were: the granule spreader being modified to give an improved spread and the earthquake in Christchurch precluding Donaghys staff not being able to attend one field measurement. The pasture composition was variable and not ideal in all trials e.g. the Ohaupo and Cambridge trials were estimated to have 10 - 20% weeds. The timing of the preliminary soil

tests precluded any remedial fertilizer application, should it have been required.

Grazing and weather: The grazing was very even on all trials and a similar residual dry matter was achieved. Weather conditions for the duration of the trials were excellent – little or no wind when the trials were sprayed and adequate rainfall without the need for irrigation.

Rust was observed on the ryegrass at both sites. It did not appear to affect the pasture yields and its presence was most probably due to the humid conditions during February and March.

For the spraying, a third observer is recommended to check that nozzles are all working on the sprayer unit behind the vehicle (blind spot to the driver and passenger).

The farmers at all locations were extremely co-operative and there were no problems with access to the trial sites.

6. Conclusions

Responses were variable, but at no sites were there any visual responses to the different nitrogen treatments. The most consistent yield response (by DM cuts) was to the 80kg/ha urea treatment in cut one and this was generally carried over to the total yield. Residual responses were virtually non- existent. For the probe data, the LessN 40 treatment gave similar significant responses to the 80kg Urea/ha treatment (Table 8). This response result may be explained by the length of the whole plot being measured, rather than 10m (1/3) of the length with the mowing.

In terms of N efficiency, the harvested data showed the 80kg urea/ha to be slightly more efficient than the LessN 40 treatment, but the probe data showed the opposite. This is a concern when results are published as there could be several explanations for this result, which are not part of this report.

Responses to applied N were variable, suggesting perhaps that localized climatic effects may have been implicated in the response patterns. Also, visual

pasture composition suggested that poorer pasture species at that time of the year did not respond as well as ryegrass/W. clover swards.

7. Acknowledgements

The farmers for their co-operation and my technical assistant, Sarah Anderson.