final report

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Mansfield Grass Growers

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Applying Nitrogen to Increase Beef Produced/ha

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Contents

1 What did the group set out to do?

The group wanted to determine whether the use of nitrogen fertilizer (urea would increase the amount of Beef produced per hectare. In recent years the main fertiliser message has been to increase Olsen P. But members of the Mansfield grass growers group wanted to find out if less was spent on phosphorus and more on nitrogen would there be greater benefits.
Other questions the group wanted answered were:

- What were the most cost effective application rates
- How much feed could be grown at different times of the year
- How much feed could be grown by 1 kilogram of nitrogen
- What was the affect on feed quality
- What was the affect on pasture composition

How the project was done?
The project began with three group members trailing 3 different nitrogen applications rates in paddocks that had been subdivided into three sections. Nitrogen was applied after each grazing at a nil, moderate (50kg urea/ha) and high (100kg urea/ha) application rates.

The trial was carried out in the Mansfield area of north east Victoria. The long term average rainfall varies between 600 and 750mm. The shout tern average has been significantly less. The farms were all over 200ha with the paddocks sizes in each trial being approximately 10ha. Stock grazed on the trial paddocks varied from cows and calves, trading steers and merino ewes

The aim at the start of the trial was to graze the pasture when the grass was at the 3 leaf stage and grazed down to 1000kg DM/ha. Following grazing the amount of feed eaten was estimated and the paddocks were re-fertilised with the same amount of urea. A further aim of the trial was to measure animal performance on the fertilised pastures. However not all went to plan. 2006 was a drought year and it affected how the trial was run and how long it was to run

Drought
The drought year of 2006 affected the group's plans. Less urea was applied than initially expected. It was felt no point in applying nitrogen if there was no rain.

As paddock feed was in short supply, paddocks were grazed earlier than the 3 leaf stage and with different classes of stock. It was very difficult to accurately measure stock performance. The initial farmers decided to discontinue the trial after the first year. As Mark Holcombe one of the trial farmers said *"The benefits of using urea are so obvious I don't need to spend 3 years doing a trial"* See Photo 1.

The trial in the first year had been done on predominantly rye grass pastures. There was an attempt made to continue the trial on another farm in 2007. The aim was to examine the response of mainly phalaris pastures to urea however this was discontinued due to concerns about nitrate poisoning.

Photo 1 Taken in October 2006 on Farm A
The nil urea treatment (left) compared to the high urea treatment (right)

What the group learnt

Despite the setbacks the group learnt a lot from the trial. The number of ha treated with urea increased from 1075 ha in 2006 to 1570 ha in 2007. In 2003 only 360 ha were treated. The trial showed group members the following benefits of urea:

- It will grow extra feed at the start of winter to help build a feed wedge
- It will improve pasture growth and quality into late spring
- It will improve pasture composition – reducing undesirable species and increasing perennial grass species.
- It is important have the right species at a high density to get the best response.
- It is important to graze the pastures at the three leaf stage and leave a good residual so pasture grow is maximised
- Losses due to volatilization are not as high as previously thought.

These results are discussed below

The cost of urea

When the trial was conducted the cost of urea spread was approximately $550/tonne. All the results use this cost as the basis for determining the cost of extra feed eaten. To make these results relevant to the cost of urea in 2008 I have included an extra column valuing the extra feed grown with the cost of urea at $1000/tonne spread.

How much feed was grown and what was its cost

All farms grew extra feed and ate extra feed with the added urea. The results for the three farms are found in Tables 1, 2 and 3. There were differences in the response to the urea and

participants felt it was more to do with different species the density of the perennial grasses and grazing management rather than soil fertility. Soil nutrient levels for the 3 trial sites are found in Appendix 1.

The cost of the extra feed grown was in all cases (except the 50kg treatment on farm A) less than $171/tonne. This compares favourably with feeding bought in hay and grain

It is interesting to note that the more nitrogen that was applied the cheaper the extra feed eaten.

Table 1. Extra feed eaten and its cost (Farm A)

Urea application Rate (kg/ha)	**Extra feed eaten (kg DM/ha)**	**The cost of extra feed grown with the cost of Urea at $550/tonne spread** (2 applications) **($/tonne DM)**	**The cost of extra feed grown with the cost of Urea at $1000/tonne spread ($/tonne DM)**
0	**0**		
50	**500**	**$125.40**	**$212**
100	**1400**	**$81.71**	**$143**

Table 2. Extra feed eaten and its cost (Farm B)

Urea application Rate (kg/ha)	**Extra feed eaten (kg DM/ha)**	**The cost of extra feed grown with the cost of Urea at $550/tonne spread** (2 applications) **($/tonne DM)**	**The cost of extra feed grown with the cost of Urea at $1000/tonne spread ($/tonne DM)**
0	**0**		
50	**200**	**$313**	**$530**
100	**1050**	**$108**	**$191**

Table 3. Extra feed eaten and its cost (Farm C)

Urea application Rate (kg/ha)	**Extra feed eaten (kg DM/ha)**	**The cost of extra feed grown with the cost of Urea at $550/tonne spread** (3 applications) **($/tonne DM)**	**The cost of extra feed grown with the cost of Urea at $1000/tonne spread ($/tonne DM)**
0	**0**		
50	**550**	**$171**	**$289**
100	**1300**	**$132**	**$231**

Pasture quality

Pasture quality improved as the rate of urea increased on two of the three trial sites as the level of urea increased. See the Tables in Appendix 2. Where quality did increase the metabolisable energy, crude protein and digestibility increased and the neutral detergent fiber decreased.

This was seen as an added advantage by the group members as increased digestibility should increase intake and animal performance.

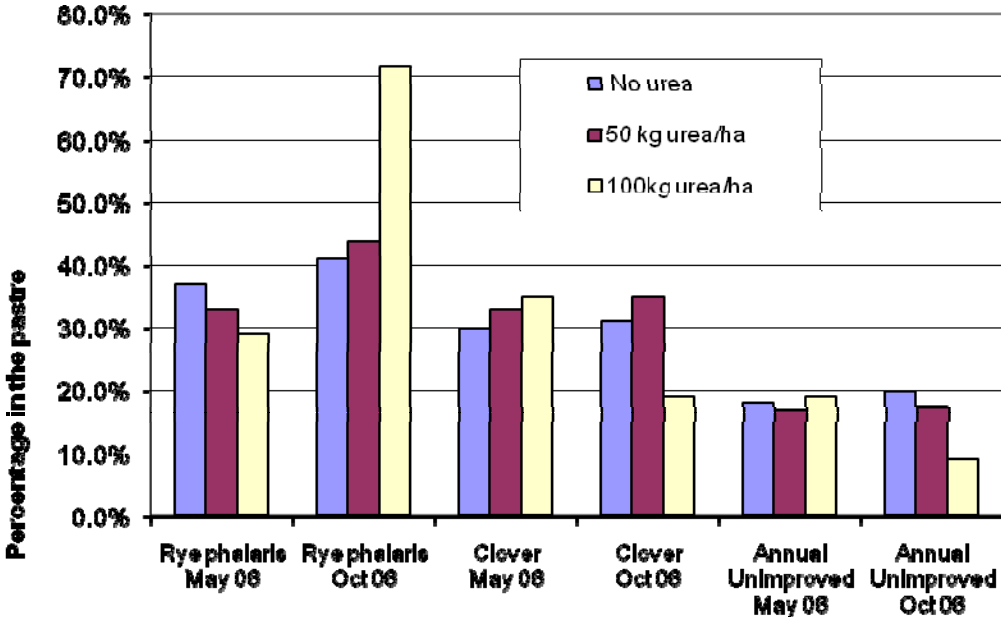
Pasture Composition

Pasture composition comparisons were only available form one of the trial sites. See Graph 1. Below

Following three applications of urea:

- There was an increase in the percentage of perennial species in all treatments but the increase was greater in the 100 kg/ha treatment
- There was a decrease in the percentage of clover in the 100 kg/ha treatment plot.
- There was a decrease in the percentage of annual and unimproved species in the 100 kg/ha treatment plot.

Graph 1. Pasture composition changes on Farm 3 from May to November after 3 applications of urea.



2 What the participants thought and said

The benefits

Most group members saw that urea would enable them to grow more winter feed at lower cost than buying supplementary feed. However they are now concerned they may not get a cost effective response as the price of urea has risen. While some have said they will not use it this year other group members are more certain with decision making regarding urea. They know that more feed is grown per kg of urea in warmer months compared to colder months. So with the higher cost of nitrogen it may not be as effective to use it to grow more winter feed. Participants discussed the need to do budgets to compare the cost of feed grow from urea and the options of buying in feed or reducing stocking rates.

Some quotes

"Nitrogen has real value in providing extra feed. Comparisons in paddocks where I've used nitrogen and where I haven't are quite noticeable"
Mark Holcombe one of the farmers involved in the trial.

"Urea can not only improve dry matter production but also the quality of the extra feed grown. This is a huge benefit - more quantity and more quality".
***Mark Ritchie Trial Participant**.*

"It helps fill the winter feed gap and it will give a high quality feed at the end of spring." If it is not used this year it will be available for next year.
Group Member

I learnt that using urea will boost pasture growth and over the long term improve the pasture – that is species and density.
Group Member

The pitfalls

Nitrate poisoning was a real concern particularly after the drought. It is also important to keep stock off the paddocks for a period of time after application.
"Using urea after a dry spring could increase nitrate levels in the soil and pasture to the level where nitrate poisoning occurs. There were a lot of deaths in the Mansfield area from nitrate poisoning during

Group Member
In a dry year like 2006' you struggle to get a decent return from your investment. And if the moisture isn't there it can stress the ryegrass plant to the point where the rye grass dies out!"
Mark Ritchie Trial Participant

3 Publicity

The results have been presented to the 4 farmer groups below as part of presentations on pasture improvement.

1. Holbrook BeefCheque
2. Euroa Grazing group
3. King Valley Beef group
4. Benalla Pastures for Profit

See the attached power point presentation found in Appendix 3.
While it as originally planed to have a field day this was seen as not relevant given the price of urea and current lack of rain fall. A press release was not issued for the same reason

4 Feed back from the group

Here are some comments from members of the group about the PIRD

Was the group satisfied with the results of the project?
Yes (10)
Not really (1)
Yes but not consistent enough to be meaningful.
Yes except weather conditions restricted the project

How could you have done the project better?
Drought messed up data collection
Drought had an effect on the project
Drought – limited management reasonable seasons would make it better to manage
No. Weather conditions a critical factor
Probably not, more rain would have helped
Only if it had rained
Done as well as possible
Rain was a big issue – or lack of it in 2006
All was well
Project severely disrupted by the drought
Drought condition made it difficult

Is the group interested in doing another project?
Yes it is of benefit though the workload involved in a PIRD needs to be taken into account
Yes if it seems right
Yes (3)
If possible
Not sure
Yes if pertinent to our business
Yes if worthwhile
I don't think so
Yes it's of great benefit

Would you recommend other groups run their own PIRDS?
Yes (6)
Yes though they should understand the workload
Yes Gives involvement of all members
Some indirect benefits to all members.
?
No

Can you comment on the organization and management of PIRDS?
Too much data collection, meant the group lost it's focus.
Too much work
Apart from drought I saw no problems
Well Managed
Managed well from our groups side
No (2)
Tim ran it well, especially collecting the information and putting the report in.
East to do
Well coordinated by Tim Ekberg
Outcome still meaning full despite dry conditions

Criteria set by PIRD very rigid made data analysis in dry conditions very difficult
Drought made things difficult
There was a large commitment required by host farms which could not be met in the middle of the drought.
It worked well

5 Appendix 1

The soil fertility of the three trial farms

Soil Fertility Farm A

	Nil urea	50 kg /ha	100 kg/ha
P (Olsen)	15.4	11.6	18.4
K (Colwell)	184	156	133
S (KCl 40)	11	13	11.7
pH	5.1	5.1	4.7

Soil Fertility Farm B

	Nil Urea	**50 kg/ha**	**100 kg/ha**
P (Olsen)	**17.6**	**14.3**	**15.6**
K (Colwell)	**115**	**141**	**127**
S (KCl 40)	**16.4**	**17.6**	**17**
pH (CaCl2)	**4.4**	**4.4**	**4.6**

Soil Fertility Farm C

	Nil Urea	**50 kg/ha**	**100kg/ha**
P (Olsen)	**21.2**	**18.1**	**18.3**
K (Colwell)	**205**	**165**	**172**
S (KCl 40)	**22.3**	**19.8**	**19.8**
pH (CaCl2)	**4.8**	**4.7**	**5.6**

6 Appendix 2

Pasture quality changes from May to October on the three trial sites

Farm A

	0 kg/ha	50 kg/ha	100 kg/ha
Metabolisable Energy MJ ME/kg DM	9.9	9.7	9.5
Neutral Detergent Fibre NDF %	51.5	57	57.9
Crude Protein %	19.3	16.5	15.8
Digestibility %	66.7	66	64.6

Farm B

	0 kg/ha	50 kg/ha	100 kg/ha
Metabolisable Energy MJ ME/kg DM	11.2	11.8	11.9
Neutral Detergent Fibre NDF %	46	42.1	42.1
Crude Protein %	17.6	12.3	14.7
Digestibility %	70.2	73.1	73.6

Farm C

	0 kg/ha	50 kg/ha	100 kg/ha
Metabolisable Energy MJ ME/kg DM	11.3	11.6	12.3
Neutral Detergent Fibre NDF %	43.7	41.3	36.1
Crude Protein %	22.3	24.7	25.6
Digestibility %	75.3	76.7	80.9

7 Appendix 3

Powerpoint presentation see next page

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Results of Nitrogen PIRD 2006

Mansfield Grass Growers

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Quote

"The benefits of urea are so obvious I don't need to spend three years doing a trial"

Farmer A

Fertility Farm A 30.05.06

	Nil urea	50 kg /ha	100 kg/ha
P (Olsen)	15.4	11.6	18.4
K (Colwell)	184	156	133
S (KCl 40)	11	13	11.7
pH	5.1	5.1	4.7

2

6/26/2008

Fertility Farm B 13/06/06

	Nil Urea	50 kg/ha	100 kg/ha
P (Olsen)	17.6	14.3	15.6
K (Colwell)	115	141	127
S (KCl 40)	16.4	17.6	17
pH (CaCl2)	4.4	4.4	4.6

Fertility Farm C 6.06.06

	Nil Urea	50 kg/ha	100kg/ha
P (Olsen)	21.2	18.1	18.3
K (Colwell)	205	165	172
S (KCl 40)	22.3	19.8	19.8
pH (CaCl2)	4.8	4.7	5.6

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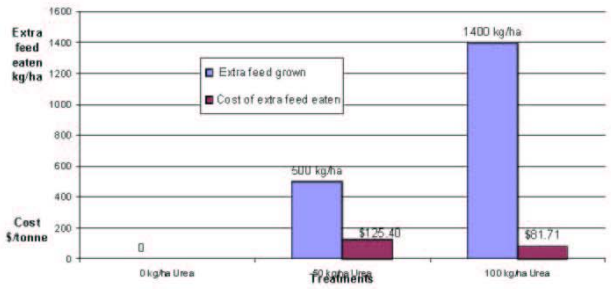
Extra feed eaten and its cost Farm A 2006



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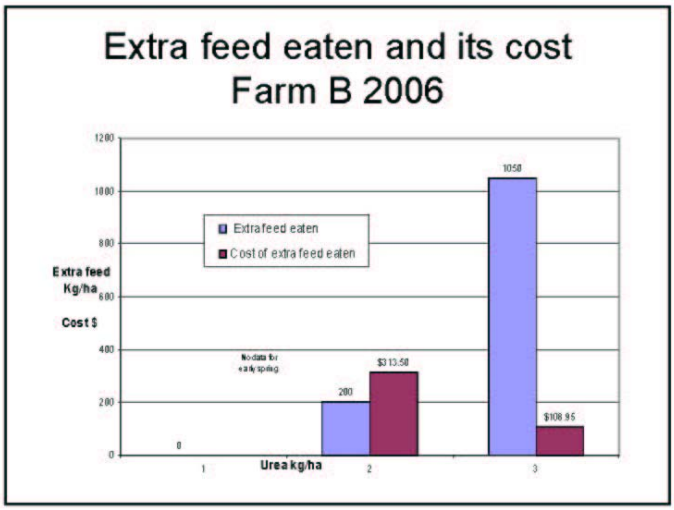
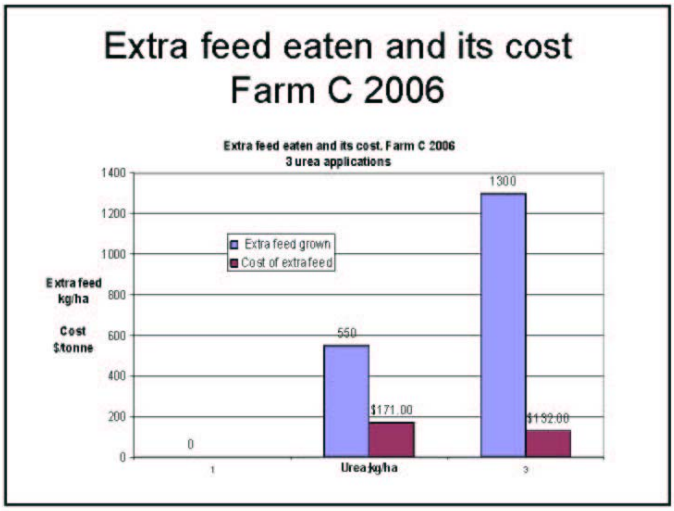

Extra feed eaten and its cost
Farm B 2006
1200
1000
800
600
400
200
0
Extra feed Kg/ha
Cost $
Extra feed eaten
Cost of extra feed eaten
1058
280
$313.58
$108.95
0
1
2
3
Urea kg/ha


Extra feed eaten and its cost
Farm C 2006
Extra feed eaten and its cost. Farm C 2006
3 urea applications
1400
1200
1000
800
600
400
200
0
Extra feed kg/ha
Cost $tonne
Extra feed grown
Cost of extra feed
1300
550
$171.00
$132.00
0
1
3
Urea kg/ha

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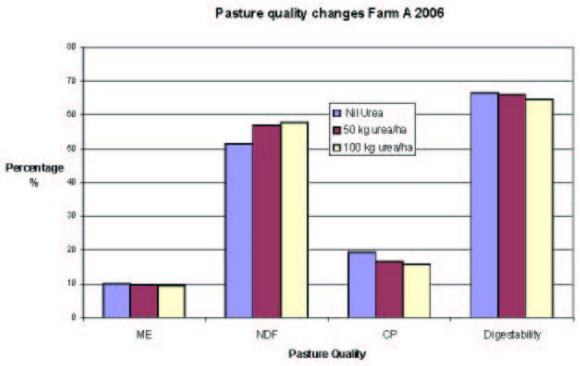
Average feed costs/tonne over three winters Stratford

(2001 to 2003)

	50kg/ha	100kg/ha
Average	$ 158.34	$ 138.79
High Dry June	$ 477.00	$ 477.00
Low	$ 38.00	$ 28.00

Pasture Quality Farm A



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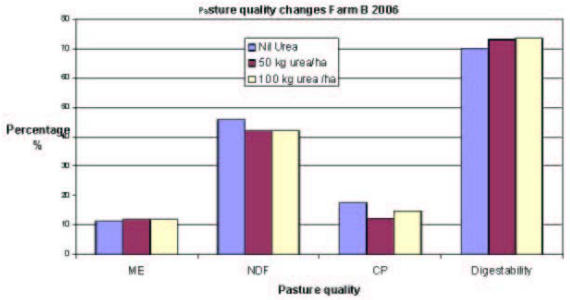
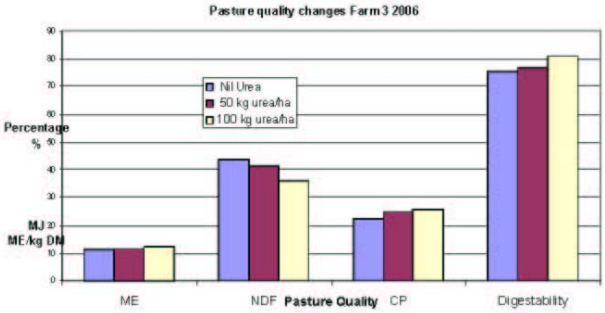
Pasture quality Farm B



Pasture Quality Farm C



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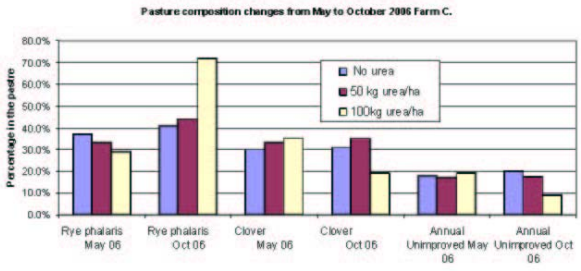
Pasture composition changes



The benefits of N

- More winter feed
- More early spring feed
- Better quality late spring feed

HOWEVER

There are 2 ways to do it!!!!!

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Tips for effective urea use

- High soil fertility - P K S pH
- High percentage of grass
- Actively growing (warm and wet)
- Loses in wind more than heat
- Leave a residual of 1000 to 1200kg/ha

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Tips for effective urea use cont..

- Don't graze from 4 to 20 days after application
- Rotation length is very important
- Winter up to 50 days for ryegrass
- Longer for phalaris

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