Nitrogen Use Efficiency trial on irrigated kikuyu and ryegrass pastures

Bega, New South Wales South Coast 2015/17

Cut Report 2

(Milestone Report 3)

Bega Nitrogen Use Efficiency Project – Milestone 3, prepared by Hayden Kingston, Land Services Officer, South East LLS

Milestone 3 – Completion of 3 ryegrass harvests and cut report prepared

The final kikuyu harvest was completed on April 1 2016. Deep soil N sampling was completed on April 4. The kikuyu was allowed to grow for 7 days before being sprayed with Sprayseed to reduce competition prior to oversowing. The trial site was oversown on April 14 with a mix of 25 kg/ha Jivet Italian rye and 50 kg/ha of Eurabbie oats. Phosphorus and potassium were applied to all plots after oversowing.

Initial nitrogen fertiliser applications were applied to ryegrass treatments on May 9 when ryegrass and oats had emerged and good establishment was confirmed.

Dr Richard Eckard drew a large audience at the Field Day held in July 2016.

Key messages for your farm

- Apply nitrogen when the pasture is responsive and moisture is adequate
- In spring when ryegrass was growing actively responses were from 10 – 40 kg DM / kg N applied
- Nitrogen applied in warm, dry conditions in May without adequate irrigation and in June when weather was cold gave responses less than 10 kg DM/ kg N applied
- The 30 kg N/ha rate after each cut gave the most efficient response

Results and discussion

Results have not been analysed statistically so the following comments are made on general observation of the averages of four replications.

Ryegrass yields

Ryegrass N rates Kg N/ha/cut	Cut 1 10/6/16 Kg DM/ha	Cut 2 28/7/16 Kg DM/ha	Cut 3 5/9/16 Kg DM/ha	Cut 4 7/10/16 Kg DM/ha	Total Kg DM/ha
0	454	631	738	1158	2981
30	518	956	1247	2382	5103
60	515	1018	1388	2792	5713

After sowing seasonal conditions were very warm and dry until early June when 356 mm was recorded over 2 days, these dry conditions lowered early yields as we had some difficulties maintaining irrigation applications during this period. The irrigation system has been upgraded to improve the performance and reduce labour inputs.

Nitrogen response

Ryegrass N rates Kg N/ha/cut	Total Kg DM/ha	Nitrogen response Kg DM/kg N applied
0	2981	
30	5103	17.7
60	5713	11.4

Ryegrass N rates Kg N/ha/cut	Cut 1 10/6/16 Kg DM/kg N	Cut 2 28/7/16 Kg DM/kg N	Cut 3 5/9/16 Kg DM/kg N	Cut 4 7/10/16 Kg DM/kg N	Total Kg DM/kg N
30	2.1	10.8	17	41	17.7
60	1	6.5	10.8	27	11.4

These results highlight the importance of applying the right rate of nitrogen at the right time and under the right conditions to maximise the response to applied nitrogen and improve nitrogen use efficiency and returns. Applications under dry conditions early in the season or cold winter temperatures gave poor responses. The results also demonstrate the responsiveness of ryegrass to nitrogen in spring.

Impact of kikuyu N rate on ryegrass performance

Kikuyu season N rates Kg N/ha	Cut 1 10/6/16 Kg DM/ha	Cut 2 28/7/16 Kg DM/ha	Cut 3 5/9/16 Kg DM/ha	Cut 4 7/10/16 Kg DM/ha	Total Kg DM/ha
0	488	937	1203	2400	5028
150	500	945	1349	2598	5392
300	535	1036	1345	2637	5553

As the kikuyu was suppressed by spraying prior to sowing, any impacts of higher nitrogen rates and more vigorous kikuyu growth on the establishment and early growth of the ryegrass and oats has been minimal.

Feed quality and nitrate

Feed test data is only currently available for the first two ryegrass cuts.

Cut 1

Ryegrass N rates Kg N/ha/cut	Crude protein %	Metabolisable Energy Mj/kg DM	Nitrate
0	27.4	10.4	844
30	28.9	10.6	1175
60	28.7	10.6	1315

Cut 2

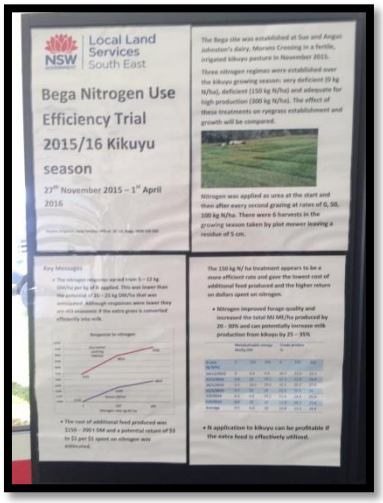
Ryegrass N rates Kg N/ha/cut	Crude protein %	Metabolisable Energy Mj/kg DM	Nitrate
0	21.6	12.6	83
30	23.5	12.8	174
60	25	12.6	473

Crude protein levels were all higher than the cows requirements and were higher when nitrogen had been applied as expected. Metabolisable energy was also generally higher on the nitrogen treated plots.

For Cut 1 nitrate levels were highly variable particularly on the higher nitrogen level and did increase as nitrogen rate increased but were on average below levels that would cause potential animal health problems. Low growth rates at Cut 1 may have resulted in an accumulation of nitrate, levels were much lower at Cut 2 when growth rates were better.

Extension activities

Over 70 farmers and service providers attended the Nitrogen Use Efficiency Field Day with Richard Eckard in July.



A poster on the trial was prepared for the South East Local Land Services display at the **Bega Cheese Dairy Expo**, August 2016

An article on the trial was published in South East Local Land Services September edition of *"South East Circular*" and distributed to landholders across the region:

> "A nitrogen fertilizer application rate trial site was established in November 2015 at Sue and Angus Johnston's dairy, Morans Crossing via Bemboka, in a well-established, fertile, irrigated kikuyu pasture. This trial replicates the Manning nitrogen rate trial established in December 2014 at James Neal's dairy, Oxley Island, Taree.
>
> The trials have been developed, established and funded in a partnership between South East and Hunter Local Land Services, Dairy Australia and Far South Coast Dairy Development Group.

The objective of the trial is to establish three nitrogen regimes over the kikuyu growing season: very deficient (0 kg N/ha), deficient (150 kg N/ha) and adequate for high production (300 kg N/ha) and to then compare the effect of these treatments on ryegrass establishment and growth after the kikuyu growing season."

Read the full article: **Nitrogen use efficiency in kikuyu/ryegrass pasture systems**

Presenting results and discussing nitrogen use on farm and the economics of nitrogen fertiliser at the Bega Cheese Discussion Group, September 2016.

Nitrogen use efficiency in kikuyu/ryegrass pasture systems

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