

Fertigation – a new tool for nutrient management?

Year 2 Summary Report



Fertigation is a new technology in New Zealand agriculture and has the potential to have environmental and production gains. Year two of the project aimed to confirm if the use of liquid/dissolved urea through fertigation could increase dry matter yield, pasture quality and clover content over traditional solid urea.

Additionally, year two aimed to i) determine if shoulder season only nitrogen treatments (i.e. strategic nitrogen application) had similar pasture quality and dry matter production as monthly nitrogen application over the season, while maximising pasture composition/clover percentage and ii) determine when maximum production was achieved without negatively affecting the dry matter production, pasture quality and clover percentage to determine the optimal fertigation rate for the area.

Method

Two replicated field trials were established at Lincoln University during the 2020/2021 season to determine if fertigation could improve pasture production and quality.

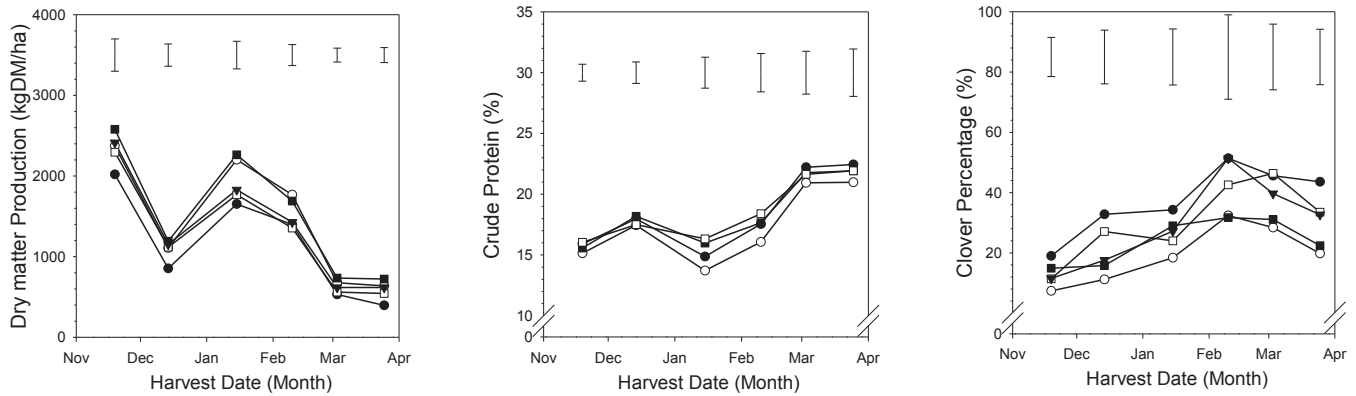
	Treatments	Sites	Pasture
Experiment 1	Control	A	Permanent ryegrass/white clover
	24kg N/ha fertigation 24kg N/ha solid urea + 2-day delay irrigation 24kg N/ha fertigation on the shoulder seasons 24kg N/ha solid urea on the shoulder seasons	B	Autumn sown ryegrass/white clover
Experiment 2	Control	A	Permanent ryegrass/white clover
	16kg N/ha fertigation 20kg N/ha fertigation 24kg N/ha fertigation	B	Autumn sown ryegrass/white clover

- Soil tests were taken prior to the trial starting and any deficient tests were corrected with fertiliser addition.
- Soil moisture was monitored using a soil moisture probe and moisture maintained at field capacity.
- Monthly pasture cuts were taken from October– April to determine pasture production and quality (dry matter (tDM/ha and %), crude protein (CP), neutral detergent fibre content (NDF), dry matter digestibility (DMD), metabolisable energy (ME) and pasture nitrogen percentage (N%)).
- Clover percentage was measured for every harvest of the season.

Results Results from Site A only are presented below, for all results see the SFF Fertigation Year 2 Report found at www.iriigationnz.co.nz/PracticalResources/SpecialistEquipment/Fertigation

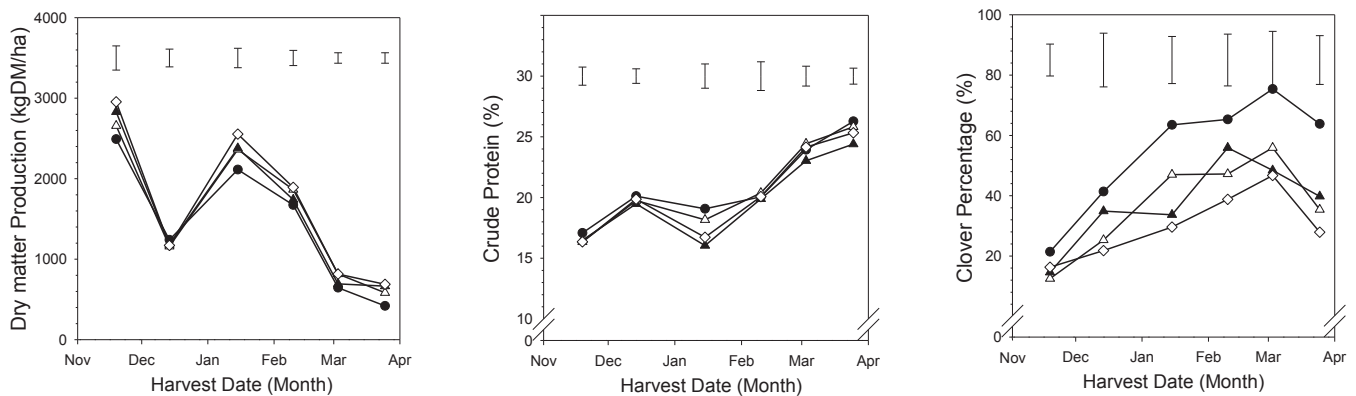
Trial 1 Site A DM production, CP and Clover percentage results

● Control ○ Fertigation 24kg N/ha ■ Solid urea, two-day delayed irrigation
□ Fertigation applied during the shoulder seasons ▼ Solid urea (24kg N/ha) applied during the shoulder seasons



Trial 2 Site A DM production, CP and Clover percentage results

● Control ▼ Fertigation 16kg N/ha △ Fertigation 20kg N/ha ◆ Fertigation 24kg N/ha



Total season DM (tDM/ha) production for trial 1 and 2 and both site A and B

Experiment 1	Total Season DM Production	
	Site A	Site B
Control	6.9 ^a	5.3 ^d
24kg N/ha fertigation	8.8 ^{bc}	8.5 ^f
24kg N/ha solid urea + 2-day delay irrigation	9.2 ^c	7.9 ^{ef}
24kg N/ha fertigation shoulder season application	7.6 ^{ab}	6.9 ^e
24kg N/ha solid urea shoulder season application	8.1 ^{abc}	6.7 ^e
Experiment 2	Site A	Site B
Control	8.6 ^g	5.8 ^j
16kg N/ha fertigation	9.4 ^h	7.6 ^k
20kg N/ha fertigation	9.5 ^h	7.7 ^k
24kg N/ha fertigation	10.1 ^h	8.1 ^k

The letters in superscript indicate whether there is a statistically significant difference between groups (a shared letter indicates no difference).

Conclusions

- Fertigation did not increase dry matter yield and nitrogen pasture content relative to nitrogen input when compared with solid urea fertiliser application. We found that the same amount of dry matter can be grown with fertigation compared to solid urea application when applied monthly over the season at a rate of 24kg/N/ha (Experiment 1).
- Shoulder treatments (strategic nitrogen application) were found to have similar pasture quality as the monthly nitrogen applications, but unlike the monthly treatments the shoulder treatments did not consistently produce higher dry matter than when no nitrogen was applied (Experiment 1).
- Pasture quality (crude protein, dry matter digestibility, neutral detergent fibre and metabolisable energy) and pasture composition/clover percentage under fertigation applied urea did not differ when compared with solid urea fertiliser application, when applied monthly over the season or strategically on the shoulder months (Experiment 1).
- The clover pasture percentage was higher when no nitrogen was applied, however this was not consistent over all of the trial harvests (for both Experiment 1 and 2).
- Different rates of nitrogen applied using fertigation produced similar pasture quality (Experiment 2).
- There was no difference in pasture nitrogen content or dry matter production between the different rates of nitrogen applied monthly with fertigation (16kgN/ha, 20kgN/ha and 24kgN/ha). Therefore, a lower rate of nitrogen could be applied (16kgN/ha) using fertigation with the same pasture production (Experiment 2).