

# Field visit to FPA demonstration site, Invercargill, April 2018

## Report for Living Water



I visited the site on 3 April for a harvest of the plots. The weather was sunny and dry but extremely windy. Although the plots could be harvested, it was too windy to apply the FPA (conditions would have affected spread pattern and therefore application rate); therefore no treatments were applied.

The site is used for demonstrating the FPA application process and comparing yields from different rates and application methods. The demonstration comprises plots 3 m x 3m, with a factorial plus control design (3 reps): 30 or 60 kg N/ha as urea granular or FPA plus a nil N control (15 plots). Treatments are repeated after each harvest (4-6 week growth period). Plot yield is assessed by plate meter and by harvesting the entire plot with a mower and weighing all of the pasture collected. Sub-samples of pasture are sent to the laboratory for analysis of dry-matter, but I understand this is not after every harvest and, when not measured, a standard 20% DM is assumed.

### My observations on the approach

- Experiment harvesting procedures follow standard practice and were well executed on the day.
- I'm not sure what the purpose of plate meter measurements are. Because the structure of the sward is different with FPA (see comments later), it is likely that a calibration to convert clicks to DM yield would also differ between treatments.

- However, the main measurement is the harvest of the plant material, which was well executed. It would be standard practice to assess DM for each treatment after each harvest but this has been done periodically and a 20% value assumed for others (is my understanding). The actual data from the lab samples should be used to assess if (a) this 20% assumed value for other harvests is about right and (b) whether there are treatment effects on DM content. I would recommend future studies use measure DM% (requires an oven and scales: most trials contractors have these facilities)
- It is probable that these DM effects are small in comparison with the observed large treatment effects on fresh harvested yield

I was unable to view the application method due to conditions. However, it was thoroughly described to me and photos and videos of the site application were shown. The challenge of course is that FPA is an application method and, as such, the commercial equipment has to be used to apply the treatments. The covering of the non-FPA plots and subsequent collection of the fertiliser trapped by the covers is an excellent way of checking the application rate. I understand that these samples have been stored, which provides opportunity for further audit of the methodology and proof of application rates. Granular urea is weighed and hand spread, so we know exactly this application rate. Hand application of small rates is challenging and I was not able to see this in action. However, it is clear that the staff undertaking the experiment are experienced operators.

#### **Observations on the day around results**

- Dry matter measurements from the mowing on the day showed clear and large differences between treatments
- It was easy to visually differentiate each treatment before harvest as the FPA method affected both colour and structure of the sward
- Much was made of the increased tillering of the FPA-treated sward in the literature review and this was clear to see on the site; the pasture appeared denser in the FPA treatment and I observed outside the trial area that urine patches were easier to see in granular urea treated areas of the paddock compared with where the FPA method had been applied.
- Other points that came up in conversation with the operators:
  - A large number of demonstration sites have been undertaken in Southland (76) and Nationally (c. 400). This represents a tremendous resource for future analysis and publication
  - My assessment of the literature review alluded to the point that the main fertiliser companies should be asked why they had not considered FPA as a solution to increasing fertiliser efficiency and whether they had investigated it. One suggestion from the site visit was that the fertiliser company business model was based on volume of fertiliser sold, which – if proven successful – FPA would disrupt.
  - There is still an assumption that FPA will have environmental benefits (though this was not the reason it was developed). While intuitively this seems correct – reducing N fertiliser inputs for the same yield (potentially) – this does need to be proven. A clear benefit would be on carbon footprint since fertiliser manufacture is a major source of CO<sub>2</sub>. However, implications for urinary N production and leaching still have to be assessed – as explained in my assessment of the literature review. It would also be good to assess longer-term effects of repeated FPA use

on N cycling and I understand that a number of sites have been using the technology of 10+ years. These would be a valuable resource.

### Conclusions

- This appeared to be a well-executed demonstration site
- A large number of other demonstrations have also been completed
- Two main suggested actions:
  - Investigate the potential of all of the demo sites to be amalgamated and analysed for a journal paper; there is a lack of peer reviewed evidence for FPA (as noted in the comments about the literature review)
  - Living Water to act as a broker in discussions with fertiliser companies to further understand why they are not looking into adopting the technique. Is it because they have trialled it and have not reproduced favourable results? Or is it some other reason?

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