

Waituna Fine Particle Application (FPA) Demonstration Update 1 - October 2017



What is FPA?

Fine Particle Application (FPA) is an alternative distribution system for solid fertilizer. It is not a fertilizer product or additive, but rather a fertilizer application technology designed to improve fertilizer application efficiency and thereby fertilizer performance. This is achieved through a more even distribution pattern resulting in better surface coverage compared to the distribution of granular fertilizer, which tends to result in more variation of fertilizer distribution.

Benefits of FPA

In a recent review of experimental trials in New Zealand, FPA was found to provide numerous benefits. These are as follows:

- ✦ Fertilisers applied in FPA form performed better by producing significantly more pasture dry matter and exhibiting higher N response and response efficiencies compared to their corresponding treatments applied in granular form.
- ✦ Cumulative NO₃ leaching losses during the 63 days were significantly reduced when urea was applied in FPA form compared with granular form.
- ✦ Total N uptake by the herbage was also significantly greater when herbage was supplied with N in FPA form rather than in granulated form.
- ✦ Total N recovery was significantly greater when urea was applied in FPA form than in granular form.
- ✦ FPA results in uniform distribution of applied urea on a per plant basis, with a significant proportion of the applied urea seen in small particles on pasture leaves during the first 12 hours of application. These deposited urea particles may enable pasture plants to absorb urea directly through their leaves/cuticles and this facilitates efficient conversion of urea into plant protein.
- ✦ There were significant environmental benefits noted in the papers reviewed. Two main benefits were a reduction in nitrate leaching as well as the reduction in volatilisation of N.

Studies have been collated in a Literature Review which is available at www.livingwater.net.nz/awarua-waituna-lagoon-catchment-reports

The Waituna demonstration

The demonstration aims to show nitrogen fertiliser is utilised more efficiently by plants if it is applied more uniformly using FPA spreading technology. The outcome expected is a similar amount of pasture dry matter will be grown by applying 30kg of Urea/ha in FPA form as what would be grown using 60kg of granular Urea/ha.



Preliminary results from the Waituna demonstration

Treatments are as follows:

Treatment	Kg Urea/ha	grams Urea/ha equivalent
FPA 60	60	27.6
FPA 30	30	13.8
G 60	60	27.6
G 30	30	13.8
Control	0	0.0

The table below provides cumulative data for each treatment over the four cuts carried out to date:

Total Cumulative growth per treatment				
	26/04/17	1/06/17	10/08/17	7/09/17
FPA 30	1,872	3,380	4,836	5,536
G 30	1,766	2,812	3,967	4,502
C	1,558	2,305	3,136	3,563
G 60	1,918	3,049	4,450	5,083
FPA 60	1,827	3,647	5,284	6,129

At this stage, FPA60 has grown the most in total and G30 the least. This is expected. On a cumulative basis, FPA30 is growing marginally more than G60. FPA30 is growing 22.9% more than G30, while FPA60 is growing 20.5% more than G60.

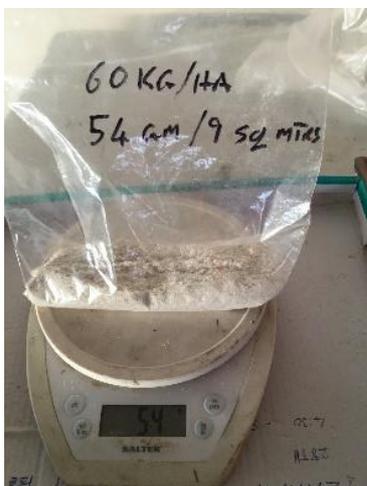
Approach to the demonstration

It is important to note that this is a demonstration exercise and not a scientific trial. However, the utmost care is taken when cutting pasture off the plots, measuring the pasture cut, calibrating the FPA spreading truck and weighing the fertilizer collected off the plastic covers to confirm the correct calibration of the truck.

To ensure the FPA spreading truck is properly calibrated, covers are laid down to protect the plots that do not require FPA treatment. These covers (including the FPA30 plot covers) are carefully lifted and taken to the workshop to be dried out. Once dry, the fertilizer is swept up and weighed to measure the weight of the fertilizer applied.



The FPA truck applying FPA60 over the demo plots showing covers in place to shield the remaining plots



Confirming the calibration of the FPA spreading truck



Fertilizer on pasture following FPA application



Mowing each plot and collecting the respective plots pasture grown.

Preliminary Economics

FPA grown over granular	G30	F30	G60	F60
kg Urea/ha	30	30	60	60
Cumulative kgDM grown/ha to date	1501	1845	1694	2043
Cumulative kgDM grown/ha to date less cumulative Control growth	1189	1189	1189	1189
KgDM/ha grown from applied N	311	656	505	854
Total Units N applied	55.2	55.2	110.4	110.4
Response ratio/kg N	5.6	11.9	4.6	7.7
Total Spreading Cost \$/ha 4 applications	\$44	\$118	\$50	\$150
Cost Urea applied \$/ha @\$476/ton	\$57	\$57	\$114	\$114
Cost of N/ha applied (\$N/ha)	\$101	\$175	\$164	\$264
Cost \$/kgDM grown	\$0.325	\$0.267	\$0.324	\$0.309

The results above were achieved from late March 2017, when the demonstration plots were set up, until early September 2017, which is the colder period of the year resulting in low growth rates. The table below indicates the actual growth rates through winter in kgDM/ha/day.

	KgDM/day
FPA 30	6.93
G 30	5.50
C	3.96
G 60	6.67
FPA 60	7.79

What next?

The FPA demonstration will continue until May 2018. Further open days will be held so that people can stay up to date with how the demonstration is progressing and see the results for themselves.

To find out more or to register your interest in getting updates about the demonstration contact Chris Crossley on 027 706 5261, chris.crossley@afic.nz or Cain Duncan on 027 703 1743, cain.duncan@fonterra.com