

Landmark pasture trials 2013

Background

A relatively well drained site was selected on the property of J & R Bell, Rose Cottage Rd. It previously had a crop of canola followed by wheat, which lowered the nitrogen levels of the soil. This helped to more accurately evaluate Nitrogen (N) efficiency as the majority of N would come from applied sources rather than existing soil N.

The site was sprayed twice to reduce annual ryegrass volunteers from contaminating the sowing strips. All trials were sown on the 5th June. Topdressing/foliar treatments were applied on the 24th July, a weed spray of Kamba® M combined with MancozinTM was applied on the 24th August. The final hay cuts were conducted on the 25th October. It received approx. 600mm of rain for the whole season of 2013.

Trial 1. Evaluating the performance of ESN on annual Ryegrass

ESN (Environmentally Smart Nitrogen) is a polymer encapsulated urea with an analysis is 44% Nitrogen vs Urea 46%. It releases the urea dependent upon soil moisture and temperature. The trial was to evaluate the effectiveness of this product to determine if it would be suitable as slow release nitrogen for Kangaroo Island growing conditions.

This product has been utilised in North America for broad-acre and horticultural uses. It offers several advantages over standard urea. It is safe to sow with seed at high rates, it can be pre-drilled in dry soil, and the pattern of release typically aligns with crop nitrogen demand and is designed to prevent a leaching event of nitrogen into local estuaries.

This creates the potential for a one pass system for nitrogen in a season where traditionally it is difficult to time nitrogen inputs at the ideal stages. This could be a vastly more efficient tool for crops and increase hay/pasture production.

What was done:

The trial consisted of 4 treatments replicated 4 times. The sown strips were 8m x 2.2m of Vortex annual ryegrass with Awaken® ST seed treatment.

The control treatment consisted of:

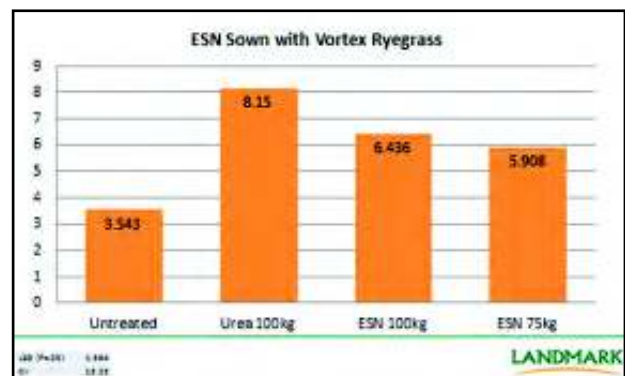
Vortex sown @ 25kg/ha + 75kg of Zincstar® (10:22:0:1 + 1%Zn), with a weed spray of Kamba® M @ 1L/ha + MancozinTM @ 1L/ha.

The ESN treatments were sown with the seed and starter fertiliser compared to the top dressing of Urea approx. 6 weeks later. The yield data is a dried sample weight converted back to tonnes of DM/ Ha. The results are typically higher than a traditional hay cut as there is no wastage of cut material at any stage.

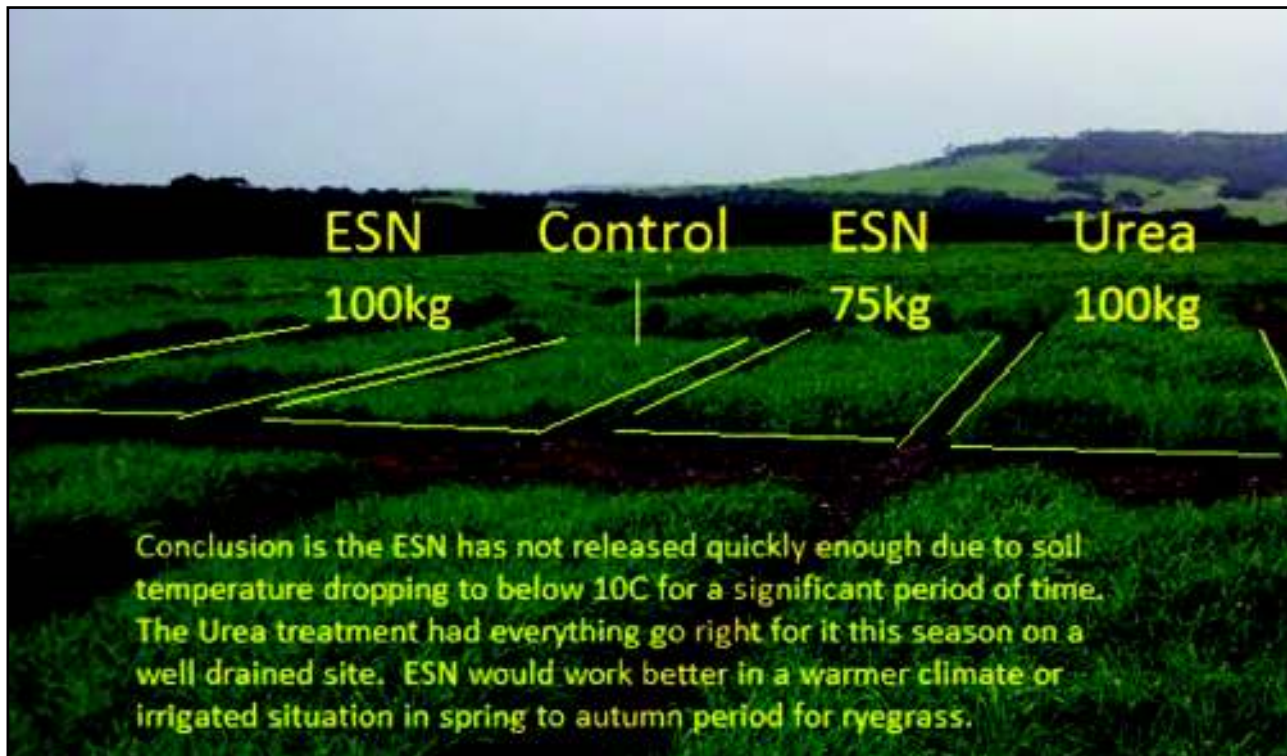
The plots were a double strip to help take out edge effect of the nitrogen treatments. Each plot in a replicate had 3 cuts taken to get a better average and stronger statistical result.

Results:

FIGURE 1: Average yield of DM t/Ha of Vortex Ryegrass.



The conclusion to this is the ESN requires greater soil temperature to release the urea at adequate levels to meet the demand of the crop on KI – the technical guides indicate soil temperature above 15°C are ideal and below 12°C it almost stops completely. This would explain the observations during the season: early the ESN treatments were not displaying any nitrogen deficiency and had greater tillers than the control & designated top dressing plots. After the topdressing occurred, these plots over took the ESN treatments quickly and then appeared to stall towards the last month with the ESN plots making up some of the difference, but never reaching the bulk of the traditional top dressing treatment.



Trial 2. Evaluating Awaken® ST as a seed dressing on Ryegrass

Awaken® ST is a new release from Loveland with a key ingredient Zinc Ammonium Acetate. Commonly referred to as ACA technology the key feature is for it to stimulate greater Auxin production within the plants resulting in much greater root and shoot mass. As a seed dressing it is acknowledged to enhance germination and extraction of nutrients from the soil. It is used commonly in North America on Cereal and canola crops. Work conducted in Australia has highlighted these benefits with greater results on less favourable soils.

Awaken® ST is able to be ordered on Ryegrass seed upon request for a minimal extra cost approx. 20c/kg. The aim was to determine if it provided a significant benefit to annual ryegrass production on KI soils which are traditionally viewed as less favourable than other regions.

What was done:

4 treatments were replicated 4 times on single sowing strips of Vortex Annual ryegrass. The control treatment was:

Vortex ryegrass sown at 25kg/ha + 75 kg/ha of Zincstar®. All plots received a Kamba® M @ 1l/ha + MancozinTM @ 1L/ha.

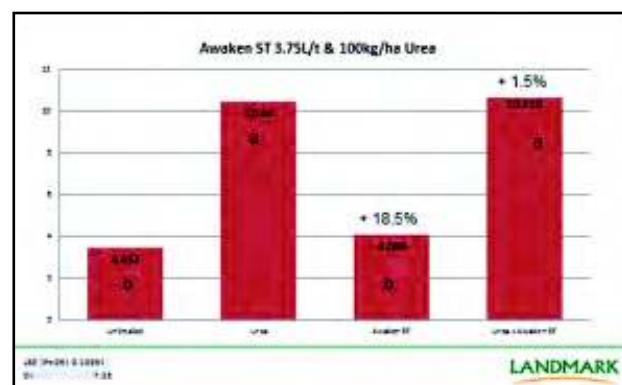
The Awaken® was applied to ryegrass seed several days before sowing @ 375ml/100kg. The urea was applied 6 weeks after sowing.

Hay cuts were taken on the 25th October with 3 cuts per plot of treatment.

Results:

It is quite obvious the benefit of topdressing Hay crops with a nitrogen based fertiliser. The timing of this application is important to the end result as early nitrogen promotes and supports extra tillers of Ryegrass.

FIGURE 2: Average yields of hay (tonnes DM/ha) for Awaken® ST and Urea treatments



The result of the Awaken® ST over the control is impressive with an extra 18.5% increase in DM. This was less pronounced once Urea is applied – indicating that Nitrogen is most likely the most limiting factor in this trial. It is still a cost effective treatment even with only a difference of 176kg/ha of DM – it cost \$5/ha for a return of \$25/ha (DM is valued at \$150/T).

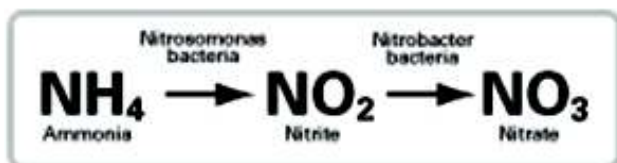
My conclusion is that Awaken® ST can be an enhancement to ryegrass production due to the relatively low cost. It will never replace good fertiliser decisions, but allow better utilisation of the fertiliser applied.

Trial 3. Sungrazer T cross sowing demonstration with Awaken® and eNtrench™

Sungrazer T is an annual tetraploid ryegrass bred for greater early production distributed by PGG Wrightsons. It is not traditionally utilised for hay production due to its maturity been much early than the traditional varieties utilised. Getting the most out of a ryegrass depends upon sowing rate for it to be beneficial over standard pastures. And there is often confusion over what rate to sow just for hay as the guidelines vary according to rainfall zones.

Awaken® is similar to the seed dressing in previous trial, but formulated to be safe as a foliar spray with the same ACA technology. It is unclear which one would provide a greater benefit to hay production. It is reputed to help stimulate photosynthesis when plants are "sluggish", resulting in more growth and biomass. This then could help winter growth when feed supply is often below demand.

eNtrench™ is a Nitrogen Stabiliser utilised in cropping systems across North America. In Europe it is also applied to pastures to help limit nitrogen escaping into waterways and atmosphere. Nitrapyrin the active ingredients primary function is to inhibit the Nitosomas spp, of bacteria in the soil which are responsible for the conversion of Ammonium Nitrogen into Nitrate. Nitrate Nitrogen is highly mobile in the soil solution – this is what leaches past root zones and into water ways. Ammonium nitrogen is bound to clay particles in the soil profile and slowly utilised by plants if nitrate is limiting. The end result is a reduction of Nitrogen losses from the soil root zone – better availability over the season, (mimic of slow release). This then could allow much greater flexibility of Nitrogen applications to crops/pastures in wet areas on Kangaroo Island.



What was done:

A cross sowing demonstration was set up with various sowing rates of ryegrass and across these a treatment was applied. From the visual assessments dry matter cuts were taken on any treatment that appeared significant (there were many other foliar treatments applied, but no data was obtained).

Each plot had 3 cuts taken to allow a reasonable set of data to be presented.

Again all plots were sprayed with Kamba® M @ 1L/ha + Mancozin™ @ 1L/ha

Results:

TABLE 1: **DM cuts t/ha of ryegrass treated with Awaken® or eNtrench™**

Sowing rate	100kg/ha Urea	Awaken® 1.5L/ha + 100kg/ha Urea	eNtrench™ 2.5L/ha + 100kg/ha Urea
Sungrazer T 15kg/ha	13.131	12.366	15.182
Tetila 20kg/ha	9.244	12.642	11.325
Sungrazer T 20kg/ha	10.193	12.703	16.253
Sungrazer T 25kg/ha	11.264	12.825	14.631
Sungrazer T 30kg/ha	11.172	12.458	15.090
Total DM production t/ha	55.004	62.994	72.481
% Gain in DM	Control	+14.5%	+31.7%

How quickly can your N be lost?

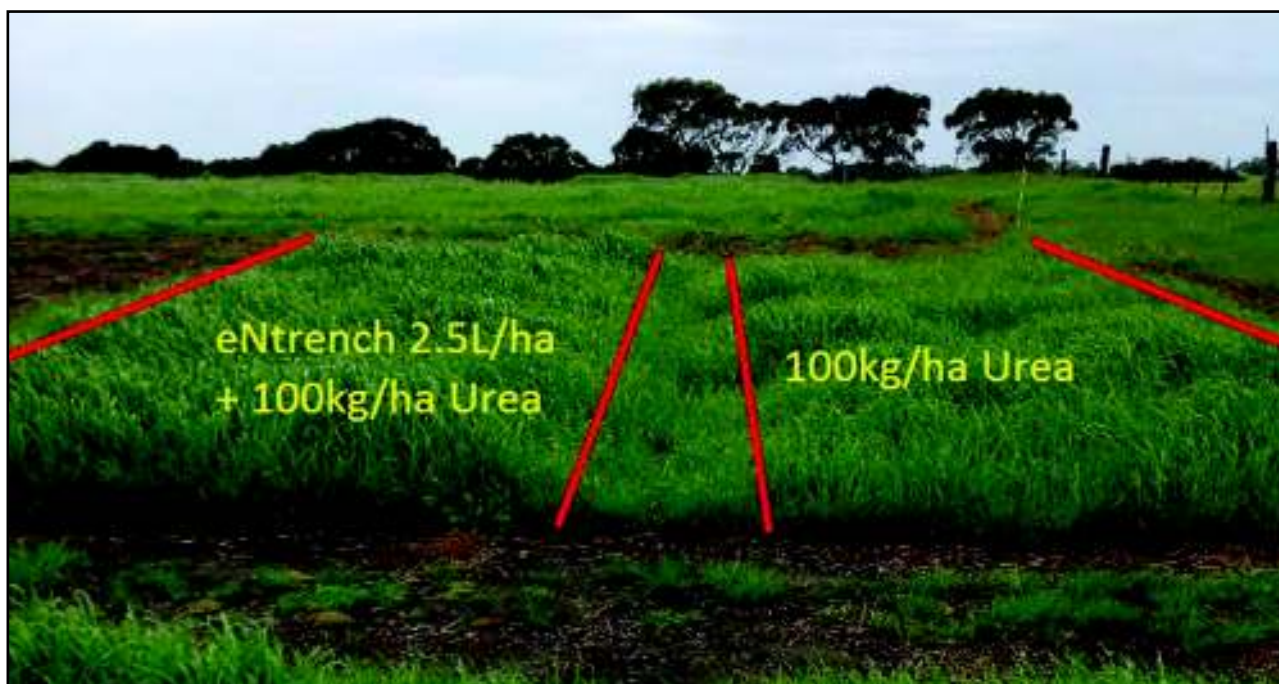
Most yield reductions come from one or two nitrogen-loss events pertaining to:

Denitrification

- 10 percent lost in three days of saturated soils
- 10 percent lost each additional day that soils stay saturated (i.e. 20+ percent lost in four days of wet soils)

Leaching

- Heavy soils: lose NO_3 nitrogen with tile-line flow (7 to 23 Kgs/year)
- Sandy soils: 22 mm of rain may move NO_3 - nitrogen down 30 cm in the soil profile.



These are very significant results for the investment involved. A Quick calculation with Hay worth \$100/T Awaken® \$10/L & eNtrench™ \$10/L: It would only require an extra 250-350kg/ha of hay to cover cost even with an extra spray application.

The eNtrench™ treatment was visually significant about one month after application and continued to stay greener right through to cutting. The Awaken® treatment was not visually different to the straight Urea at most stages.

eNtrench™ can be applied at any stage before a nitrogen application – the opportune time(s) would be with a bare earth treatment straight after sowing in with an Insecticide prevention or with an early weed spray as the ryegrass starts tillering. This allows much greater flexibility with nitrogen applications as leaching is no longer a major concern. This should allow growers to increase overall fertiliser inputs on a smaller area to produce hay and get a better return on investment. The big opportunity is in grazing with no WHP except lactating dairy animals. Getting nitrogen on before deficiencies appear should result in much greater feed supply during winter where growth is at its lowest.

Awaken® appears to offer a similar benefit to Pro Gibb and is worth exploring more for pasture growth as it works on all plant species, not just grasses. The benefit should be greatest when the feed slows down in growth during winter. If it can be incorporated with other operations it a very beneficial investment to a grazing enterprise.

Sponsors and contributors

- Impact fertilisers
- Dow Agrosiences
- Loveland Proprietary Products Group
- Ashley Pilkington - Landmark
- Keith Bolto
- PIRSA - Lyn Dohle
- John & Rosalie Bell
- Heritage seeds
- PGG Wrightsons seeds

For further information contact

Daniel Pledge
Branch Manager / Agronomist - Landmark
Ph: 08 8553 2082 | Mobile: 0428 810 224
E: daniel.pledge@landmark.com.au