

IN-SEASON NITROGEN

2019 and 2020 FARMER TRIALS



Knowing fertiliser returns

Many farmers are not overly concerned about fertiliser costs and what rates to use, but if you are, the best way to allay such concerns is to measure where your current returns on fertiliser are at and compare them to where they could be. This is what Laconik is helping farmers do; combining good science with farmer know-how to measure and improve fertiliser profitability.

You may think you're using appropriate fertiliser rates but until you've got the numbers, you won't actually know. It's very likely you are losing profit because fertiliser rate is both too low and too high, even within the same paddock. If the losses aren't that big, who cares! But at what point do losses become large enough for you to do something about them? The first step is knowing the size of your losses; how much money you're leaving on the table, and that means good measurements. And the best measurements are done by you, on and across your farm.

Your fertiliser returns

We all know there's variability within every paddock and that every farmer farms with different motivations, equipment, labour, etc, so it's quite astounding we've thought for so long that we can take a measurement by somebody else of fertiliser efficiency and profitability from somewhere else and somehow make it applicable to large parts of your farm.

Distant trial results, rules of thumb and fertiliser rate predictions (that are rarely tested) don't cut it any more for farmers genuinely serious about improving their fertiliser returns. These farmers know their own measurements, generated using their equipment, on their farm will always be more applicable to them than data from another place and another time. They are now combining their previously underutilised variable rate capacity with Laconik's platform to seamlessly generate their own measurements across whole paddocks and farms.

Fertiliser prices

Higher fertiliser prices always attract a lot of attention, but maybe for the wrong reasons. Higher costs are very tangible, but if fertilisers are used effectively, how much do higher costs really affect your bottom line? Do you know if and by how much a \$10 or \$100 per tonne increase in cost cuts into your profit, or do you surmise? Maybe higher fertiliser costs highlight a bigger issue that if you don't know the financial benefit of fertilisers, it's difficult to evaluate their cost effectiveness, regardless of whether costs are viewed as low or high.

Easy measurement of fertiliser returns

At Laconik, we got into helping farmers measure fertiliser profitability in a roundabout way. We had started developing our VR maps of in-season N rates, to improve returns on the last "profit maker or profit taker" N application. Our VR maps are based on a farmer's historical yield maps, the environmental and other factors that contributed to previous yield variability, and how yields affect N requirements.

We wanted to compare our in-season N rates to what farmers are currently doing, and to see how our and their rates compared to where they should be. We wanted comparisons to be authentic and relatable to farmers, done by farmers, cause no or minimum disruption to the farmers and to be grounded in the best science.

The solution was properly designed, implemented, analysed and interpreted farmer strip trials. To be very clear, these were farmer trials facilitated through the Laconik platform; they were not Laconik trials.

Using “Laconik Trials” (<https://www.laconik.com.au/our-products/#laconik-trials>), replicated trials were designed with at least four N rates (including mandatory nil) to test for responsiveness and to enable the optimum rate to be determined. The rates encompassed the farmer’s rate which was typically the rate recommended by an agronomist, consultant or fertiliser company rep.

2019 and 2020 farmer trials

The farmer trials were done on wheat and barley crops across the WA wheatbelt. N was applied in July or August, as urea or UAN, by the farmer using a prescription file within which the trial plots were embedded.

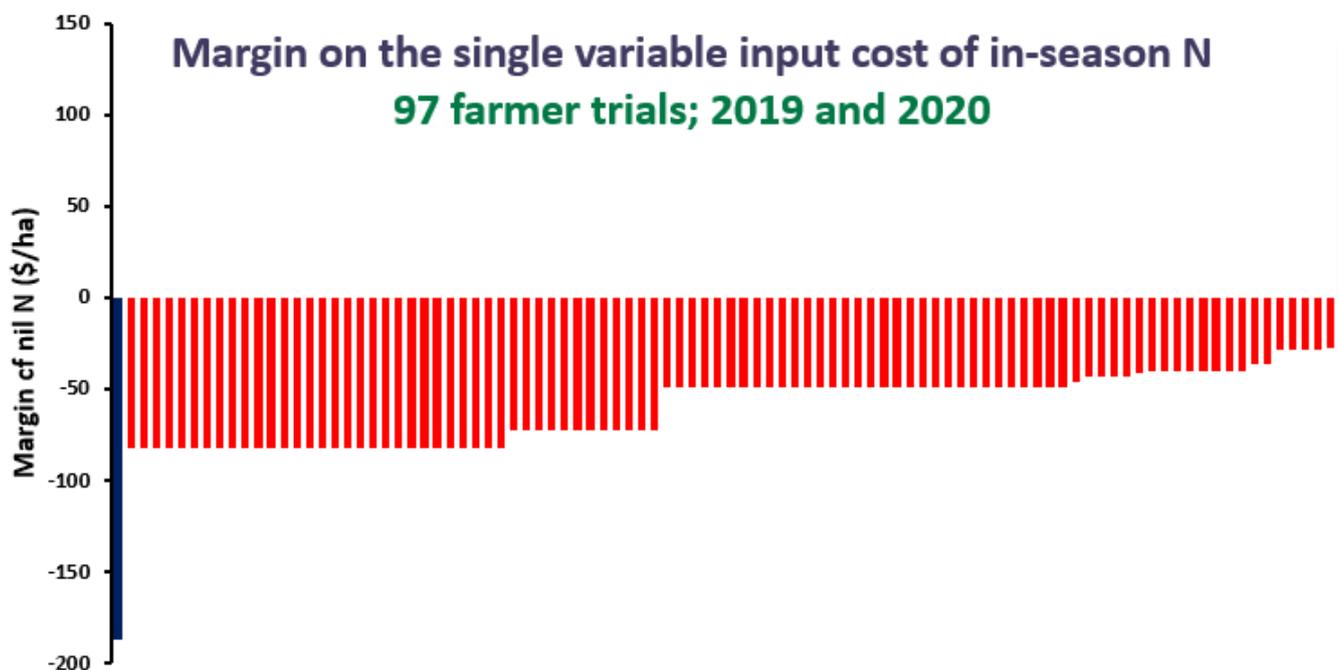
Plots were 200m long and at least one width of the applicator wide. Comparisons of target and actual rates showed actuals were in line with what the farmer intended.

The farmer harvested the crop as per normal and the yield data was used for statistical analysis of N rate effects. The Laconik platform cuts out the whole-header-width yield data within each plot; automation that helps keep the end-to-end (trial design to trial report) cost of “Laconik Trials” to \$250/trial.

Yield data from each trial was statistically analysed using the Laconik process to determine if effects of N rate on yield were real or due to chance. Then, based on that statistical analysis, economic analysis was done to calculate the margin on the farmer’s N rate.

The process Laconik uses for statistical and economic analyses is documented, fully transparent and considered industry best practice (<https://laconik.com.au/wp-content/uploads/2021/07/Good-science-good-statistics-Laconik.pdf>). Laconik is always open to suggestions on if and how its processes could be improved, and believes it’s in the industry’s best interests that Laconik’s processes be utilised more widely, especially by organisations whose current processes can generate questionable, pseudo or junk science.

The figure below shows margin on the single variable input cost of in-season N for the 97 farmer trials done in 2019 and 2020, where red columns are trials where N rate did not have a real effect on yield and blue columns are trials where N rate had a genuine effect on yield (one trial a negative effect on yield, one trial a positive effect).



Key points

These results are only for 97 paddocks, only in the WA wheatbelt and only for two seasons, so they, like any results that are foreign to your farm and farming business, should not be taken as an accurate predictor of future outcomes, nor used as a rule of thumb or guiding principle for wider adoption.

However, some general points can be drawn from the amalgamation of results:

- The results are probably not what anyone was expecting when the N was applied.
- At the time the in-season N rates were recommended and applied, there was an air of confidence about them; there were reasonable expectations the N would deliver.
- If the measurements described above were not made, many growers and their advisers would still be and always be oblivious to the success or otherwise of those in-season N investments. They would have no data upon which to improve future decisions.
- Quantification of your fertiliser responses and profitability is the best starting point and best way to improve your fertiliser returns. Gut feel is good, but not always correct and never numerical.
- Your own measurement of fertiliser returns is now cheap. If you reduce your fertiliser rate by 1 - 2 kg/ha, you won't notice the difference. If you put what you save into measuring returns across every hectare, you'll be on the pathway to big differences.