FarmLink
Research Report 2012

05

# Disc vs Tyne Seeder Demonstration 2012

## 2012 Demonstration Site


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# *Disc vs Tyne Seeder Demonstration 2012*

## Preamble

Grenfell based farmer initiated demonstration is comparing the whole farm impacts of farming systems based on no-till (knife points) and zero-till (discs) seeders, over a long term timeframe. The site is additionally examining the impact of 100% un-grazed standing stubble against the common practice of lightly grazing livestock during the summer fallow period. Following the ongoing interest and weight this demonstration site is generating, below are the results, discussion and key points out of the 2012 season.

Importantly, once again this is one of the very few replicated long term data sets that exist for evaluating different tillage systems in our southern NSW farming environments, helping farmers make informed assessments in their decision making processes.

This is a farming systems demonstration, and this paddock scale site aims to highlight the advantages and disadvantages of each system, whilst assessing any subsequent impact on farming businesses.

## Key Messages

- Both the grazed disc and grazed tyne treatments yield the same.
- In contrast to one of the initial years where the tyne treatments saw greater Patterson's Curse density, there have not been any further or continual patterns of weeds within the site.
- Disc seeder saw limitations in ungrazed stubble, when stubble lodged along with soft wet soil. Solutions will include reducing stubble harvest height, to lower risk of post harvest lodging, However, even spread across header width will be essential.
- Addition of "residue managers" to brush material aside from path of disc openers would reduce level of poor establishment and ensure discs continue to roll and cut.
- Poor establishment means that it is behind on tiller density and ultimately head density. This is the basis of building yield potential and water use efficiency. Focus on maximum and consistent establishment to efficiently use nutrient and moisture resources.
- Tyne seeder is more "forgiving" in troublesome conditions, as there are fewer variables to manage.
- To date, total yields are virtually level, signifying there is no silver bullet to seeding machine or stubble management. To manage the variables which pose risk to any such system will be the key to limit downfalls (as seen this year with the ungrazed disc) and maximize profitability. This is the silver bullet!

The important aspect to this is that this data set allows us to understand both systems better and these key differences are heavily influenced by management.

## Aim

To assess the differences between disc and tyne seeding systems in commercial practice.

## Method

RTK inter-row sowing was used on the 1st June to sow the treatments this past season, with the standard practice of placing each treatment in the same location from the previous years. The site saw half of each plot lightly grazed over summer by sheep, leaving the balance with ungrazed standing stubble. In contrast to the previous year, there was one extra summer spray applied to the ungrazed plots.

The usual two seeders were used in 2012:

- 10m Horwood Bagshaw with knife points and press wheels on 350mm (14") spacing behind a Case IH 305 Magnum.
- 10.5m Daybreak with 26" single disc openers on 381mm (15") spacing behind a Case IH 335 Magnum.

Crop Details:

- 45kg/ha Spitfire Wheat (on Livingston stubble)
- 70kg/ha MAP and Impact in Furrow
- 80kg/ha Urea at early tillering (06/07/2012)

## Observations

First and foremost, sowing the treatments in 2012 was challenging to say the least. With large stubble loads remaining, particularly on the ungrazed plots, both seeders had a challenge in front of them. Discussion was undertaken between the cooperators and advisors involved, as to whether burning was required to allow ease of sowing. It was concluded that to really test the systems at hand, retaining the stubble was of importance. Despite having wide rows and RTK inter-row sowing, both the tyne and disc machines had complications with conditions at hand. High levels of summer moisture had led to lodging of stubble across the inter-row, obstructing the ideally "clean" inter-row.

The grazed stubble plots experienced no issues, with generally seamless sowing. Whilst the stubble was across the inter-row, the trampling and grazing had reduced the length and amount of material, enabling the tyne to push through easily. As the livestock increase to bulk density on these plots, the soil is firmer allowing the disc to easily cut through any residue in its path.

The ungrazed plots however, with their softer/lower bulk density soil surface and higher stubble loads brought things undone. The lodged stubble (as seen in Photo 1), saw the tyne experience occasional blocking. The operator then was required to lift up and turn around to release all the material.

The disc machine really had problems in these conditions, as its cutting ability was severely hampered by the moist soft soil. As a result, the discs at time "stalled" and started to bulldoze. This led to no furrow closure and poor seed placement. This, along with some hair pinning resulted in erratic and poor establishment on the ungrazed disc plots, as is evident below in Photo 2. On the other hand, the tyne seeder which still blocked up, saw a more consistent establishment along the row lengths, once again, as is seen below. This had flow on effects for both machines which will be discussed on the next page

**Photo 1:** Standing Stubble Plots (22nd May, 2012).

**Photos 2 and 3:** Figure 2: Patchy Establishment. (LHS – ungrazed Disc, RHS – ungrazed Tyne)

Examination of the biomass production between the treatments was not conducted with NDVI satellite imagery, as it was in the previous year. Visually however, the trend of the disc seeded plots showing lower early biomass production from emergence through to late tillering was evident. Again, as per the long term trend at this point on, the crop development evened up.

**Plant, Tiller & Head Counts**

On initial inspection of Table 1 below, we can see some trends in plant establishment. Establishment was more consistent and even across both machines in the grazed plots. In comparison, the standing stubble plots were not as successful for both machines, the disc in particular. As was previously discussed, the lodged stubble and wet/soft soils saw the disc struggle with cutting of debris, leading to hair pinning and poor seed placement (this can be seen in the 17% drop in establishment compared to the tyne).This difference has then had a significant flow on effect to tiller and head density, which reduced yield significantly, by 9.2% (279kg/ha).

Assessing the plant to tiller ratio, it could be argued that the figure is reasonably low when compared to 2011. This makes sense when considering the high yields achieved in 2011, along with removal from summer weeds during the fallow period leading into 2012. This saw a drop in soil nutrition status, possibly restricting tillering capacity early in the 2012 season.

**Table1: 2012 Plant Establishment and Yield Data.**

| | | Grazed Stubble | | | | Ungrazed Stubble | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **Plant/m²** | **Tiller/m²** | **Heads/m²** | **Yield (kg/ha)** | **Plant/m²** | **Tiller/m²** | **Heads/m²** | **Yield (kg/ha)** |
| **2008 Wheat** | **Disc** | 84 | 454 | 323 | **2935** | All the site was grazed prior to 2008 season | | | |
| | **Tyne** | 105 | 499 | 368 | **2720** | | | | |
| **2009 Wheat** | **Disc** | 91 | 410 | 312 | **1934** | 90 | 359 | 269 | **1882** |
| | **Tyne** | 71 | 341 | 280 | **1513** | 89 | 336 | 303 | **1418** |
| **2010 Canola** | **Disc** | 23 | - | - | **1572** | 26 | - | - | **1390** |
| | **Tyne** | 21 | - | - | **1570** | 22 | - | - | **1290** |
| **2011 Wheat** | **Disc** | 57 | 508 | 489 | **4367** | 67 | 542 | 477 | **4877** |
| | **Tyne** | 62 | 458 | 441 | **4541** | 61 | 443 | 423 | **4777** |
| **2012 Wheat** | **Disc** | 77 | 350 | 270 | **2846** | 57 | 299 | 287 | **2735** |
| | **Tyne** | 74 | 339 | 263 | **2837** | 69 | 365 | 327 | **3014** |

* Note that for comparison purposes, the grazed treatments planted with the tyne system are used as benchmarks, and all replications are recorded over a calibrated weighbridge.

As the season progressed further into the dry conditions of spring, the treatments all dropped +/- 10% of tillers prior to head emergence. At this point of the season, with minimal rainfall events, stored soil moisture was of great importance to filling grain. Looking at the tyne treatments, an extra 6% yield advantage was seen through maximum stubble retention (and not grazing during the fallow period). This difference was expected to be larger, as indicated by the soil moisture probes on the site. The probes had some maintenance issues throughout the season, however were trending towards the ungrazed plots having greater infiltration and greater moisture stored at depth. Without generating a large yield advantage from this moisture at depth, it suggests that soil N status could have played a limiting role in restricting possible rooting depth.

Head counts were in line with the old rule of thumb "100 heads/m equals 1t/ha", after the plants had built potential for 3-4t/ha, only to be restricted by the spring finish to the results at hand. Come harvest time, it was a smooth and seamless operation yielding surprisingly low protein figures, which however were in line with those throughout the district.

## Yield and Gross Margin Discussion

The trend in 2010 was that the grazing actually had a positive impact on yield for both machines; this however was not been continued in 2011 and 2012. Seeing the yield increase in the ungrazed tyne treatment in 2012, this suggests there may have been potentially more plant available moisture late in the season to boost yields. This can be explained by the lower soil bulk density improving infiltration and storage of moisture deeper in the soil, away from the evaporation zone. It would have been interesting to see how the disc machine would have performed, with more consistent emergence/tiller and head number.

Examining the yield performance to date, there have been obstacles for nearly each treatment over the last five years, revealing that no one machine or system is the "silver bullet". Ignoring any financial impacts, the cumulative grain yield is of interest:

- Disc Grazed 10,719kg
- Tyne Grazed 10,461kg
- Disc Ungrazed 10,884kg
- Tyne Ungrazed 10,499kg

In the initial years of the site, there were large differences between practices, however it can be seen that at this point in time results have tightened up, with only 423 kg variability between the four treatments. Taken over the 4 years in question, we are looking at just above 100kg/ha each year. This is now generating some interesting thoughts, confirming initial belief that yield potential is governed by management decisions more so than specific machines etc.

With industry continuing to question the impact of grazing stubble on long term crop yield potential, it can be seen that the Grenfell Seeding Systems site has in 2012 shown that it appears a light summer grazing (9.8 DSE for 72 days) revealed a slightly negative impact on the level of infiltrated and stored soil moisture of both seeding systems.

Analyzing this demonstration as a gross margin analysis, the agistment value of running the sheep on the grazed half during the fallow period has added $50.39/ha to the gross margin of the grazed treatments. As can be seen in figure 3, the gross margins for the treatments do not show a great deal of variability aside from the poor result from the ungrazed disc plots. As a consequence, it appears any large differences between any treatments are becoming less likely.

When taking a different perspective, and examining the cumulative gross margin numbers for each treatment over the last 4 years, some very interesting trends are revealed.

| | | | |
|---|---|---|---|
| Disc Grazed | $1842/ha | Disc Ungrazed | $1644/ha |
| Tyne Grazed | $1774/ha | Tyne Ungrazed | $1547/ha |

On initial analysis, the site reveals a $295/ha variation in profitability between the highest and lowest treatments. Whilst this is significant, when compared to the cumulative yields mentioned on the previous page, it can be seen that the grazing component is boosting returns. Whilst this is only a budgeted agistment value, and not a direct income source, acknowledgement needs to be given and understood for how each enterprise contributes to farm profit. It could be argued for example, that to truly assess the profitability of any grazing enterprise, costs need to be allocated towards paying agistment over summer to source extra grazing capacity over permanent pastures. Similar to allocating weight gains and value from grazing dual purpose crops to the cropping enterprise.

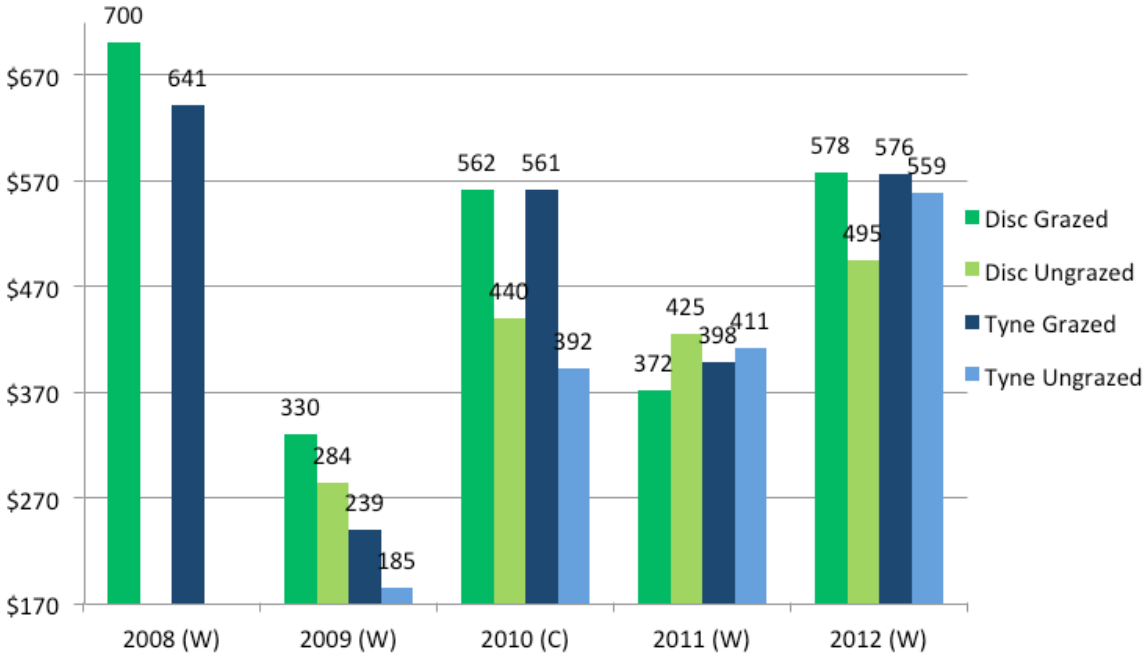


**Figure 1.** Seeding Systems Gross Margin Analysis ($/ha).

Once again, management needs to cautiously approach and manage strict grazing techniques, to ensure livestock compaction does not degrade soil surface structure significantly. This comparison site, as previously mentioned, has a light and brief stocking density, to minimize any negative effects on soil structure. If this procedure was to be managed less ideally, the outcomes presented here would very well differ considerably.

The heavy influence on this being a systems demonstration means exactly that; for a grower to change their seeding system, many other dynamics that are related in the whole system will change as well. This includes; fuel use, plant establishment, early vigour, weeds, soil structure, ground cover, livestock impact and water use efficiency. By all means, let this valuable data sink in, but ensure it is used as part of a decision making process when analyzing the whole farming system. Failure to do so will limit the associated benefits, and potentially compromise the success of the system itself.

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