Flexibility in grazing cereals: the yin-yang effect

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DEMO

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Location:
Lock
Gus Glover

Rainfall
Av. Annual: 345 mm
Av. GSR: 265 mm
2013 Total: 385 mm
2013 GSR: 270 mm

Paddock History
2012: Mace wheat
2011: Medic pasture
2010: Yitpi wheat

Soil Type
Grey sandy loam

Plot Size
60 ha (electric fence splitting northern 35 ha and southern 25 ha)

Yield Limiting Factors
Early finish

Livestock
Enterprise type: Mixed
Type of stock/breed: First cross Dohne x White Suffolk

Key messages

- **Opportunities in grazing cereals should not be limited by deciding on the final outcome of the crop at the beginning of the season – it should be a flexible decision.**
- **Priorities need to be set according to farming system concerns (livestock production, feed availability, crop yield, weed control etc).**
- **Seasonal variability plays a major role in the successes of decisions made within mixed farming systems and outcomes can vary depending on in-season choices.**
- **Although grain yield was compromised by pasture topping in this demonstration, the dry matter remained unaffected and provided a valuable standing forage source.**

Why do the demonstration?

The common mixed farming practice of grazing cereals could be described as a physical manifestation of the yin-yang concept, whereby livestock can help, hinder or neutralize the success of a cereal crop, depending on the desired outcome. Crops and livestock can be thought of as complementary (rather than opposing) forces interacting to form a dynamic system in which the whole is greater than the parts. Of course this leads to a more complex system, which requires priorities to be made, and can often result in completely different outcomes, according to the rank of priorities and seasonal variability.

The opportunity to graze a cereal crop provides a number of options for in-season and end-use outcomes. A one year demonstration was conducted on a mixed farm at Lock on the Eyre Peninsula to show an example of the flexibility available in mixed farming systems and the interconnections that occur within a livestock and cropping enterprise relationship.

How was it done?

A 60 ha paddock was chosen east of Lock that was in the break phase of its rotation and was subsequently sown with Flagship barley @ 55 kg/ha with 40 kg/ha of DAP (18:20:0:0) on 29 April 2013. The paddock received 1.2 L/ha of Treflan, 1 L/ha glyphosate and 100 ml of Striker pre-seeding. The original intention was to use the paddock as an in-season feed source, removing livestock after a period of grazing and possibly harvesting the crop at the end of the season, however controlling grass seed set by pasture topping was required, which compromised this option.

Pre-grazing biomass cuts were taken three times with a 0.1 m^2 quadrant on 6 June at 12 sampling points in the paddock to calculate feed on offer (FOO). Collected samples were sent away for a feed test analysis. Twelve exclusion cages measuring 1 m^2 were placed at each sampling point.

On 7 June, 310 first cross Dohne x White Suffolk ewes and 360 April/May drop lambs were put in the paddock. Eleven days later an electric fence was erected to split the paddock in two with 35 ha in the northern section and 25 ha in the southern section and sheep were moved into the northern section the same day. A small fence was also built around an exposed sand hill to prevent further erosion.

On 25 July sheep were moved from the north to the south side of the paddock and biomass cuts were taken to determine feed utilisation. Three cuts x 0.1 m^2 were taken at each of the six sampling points on the northern side and a biomass cut of 0.1 m^2 was taken from inside of each exclusion cage.

On 4 August, 200 lambs were drafted off the ewes and sold averaging $130/head. The electric fence was taken down at the same time to allow sheep to graze the entire paddock. On 20 September the remaining 160 lambs were sold averaging $110/head and the ewes were removed from the paddock. The entire paddock was then spray-topped with 500 ml/ha of glyphosate 450.

On 11 December harvest index and grain samples were taken from 1 m of row inside each exclusion cage and from 2 x 1 m rows in the paddock at each sampling point on the northern side of the exclusion cage

Table 1 Dry matter (DM) and yield results (t/ha) from paddock and exclusion cage pre-grazing, post-grazing and harvest measurements in the northern area of the 2013 Lock demonstration paddock

Date	6 June	30 July		11 December			
Sample	Pre-grazing DM	Post-grazing DM		Harvest DM		Grain yield	
Area	all	paddock	exclusion	paddock	exclusion	paddock	exclusion
t/ha	0.5	1.3	3.7	5.8	6.9	0.9	1.2

What happened?

The cereal was well established when grazing began, therefore it took a substantial amount of time to graze the whole paddock evenly and this was better achieved using the electric fence to increase stocking pressure. Post-grazing biomass and harvest measurements were taken only from the northern side due to negligible biomass remaining after grazing in the southern area. Sheep tended to camp near the sand hills on the southern area when distributed over the whole paddock, resulting in poor crop recovery and some erosion, hence there was a shorter grazing period in this section.

The paddock was grazed for a total of 107 days, with sheep allowed to graze the entire paddock for 59 of these days. Grazing was rotated from the northern to the southern side according to cereal height (targeted approximately 10 cm), with the aim to achieve an even grazing whist preventing erosion on the sand hills. The northern side of the paddock had a bigger area and sand hills were less prevalent, therefore this area was grazed for a longer period of 38 days compared to 10 days in the southern side.

The pre-grazing feed test reported above adequate levels of crude protein of 34.8% (16% required) and metabolisable energy of 11.9 MJ/kg DM (11 MJ/kg DM required) for lambs and lactating ewes and acceptable levels of neutral detergent fibre, dry matter and digestibility (DOMD) with test results of 39%, 18.9% and 73.5% respectively.

At the commencement of grazing 1126 DSE were allocated to the entire paddock, calculating a stocking rate of 18.8 DSE/ha with an initial allocation of approximately 0.5 t/ha of DM (Table 1).

In Table 1, biomass samples taken from the northern area show a feed utilisation of 2.3 t/ha between 6 June and 30 July with this area having a higher stocking rate of 32.2 DSE/ha for 38 days of grazing and a lower stocking rate of 18.8 DSE/ha for 11 days over this period.

Results showed 18.5% more dry matter in the exclusion area at harvest and 31% more yield than measurements taken from the grazed area of the paddock. However, this portrays that the impact of grazing was minimal, considering the feed utilisation and other advantages (such as resting other pastures) of using this paddock for grazing throughout this period. The low harvest index in both the paddock and exclusion cages can be explained by the effect of pasture topping.

The decision to leave the northern side for hay or harvest versus leaving the crop standing for a feed source to finish lambs over summer came down to getting the most benefit from the remaining crop. In this instance the 0.9 t/ha of barley grain and 5.8 t/ha of DM was more valuable as a standing crop for lambs during a time of feed shortage.

Although using the cereal as a forage crop and to control grass seed set by pasture topping has reduced yield, the feed value over this time needs to be recognised as a profitable outcome. Grazing with livestock also provides additional advantages including delaying grass growth and the on-set of seed set, offering the opportunity to spray-top later in the season. Furthermore, this end use will provide a valuable and substantial feed source for livestock over the summer and will also prevent other stubbles from being over-grazed, thus benefits of this practice need to be understood from a whole mixed farming system perspective.

What does this mean?

This demonstration portrays the yin-yang effect of how one paddock can produce two completely separate results according to the decisions made when combining livestock and cropping enterprises. Grazing a cereal crop created a flexible farming system, however results show the importance of understanding how grazing management practices can affect the crop in both the short and long term. In order to undertake the practice of grazing crops, farming system priorities first need to be decided on (e.g. feed requirement, grass control, hay cut, crop yield etc.). With these priorities in mind a flexible approach is required during the season to produce the desired outcome.

Over-grazing can easily become an issue that is not often apparent until later in the season. Keeping track of crop recovery will determine if erosion is a concern and if it poses a threat to crop persistence. In the event of over-grazing livestock should be taken out to let plants recover and stabilize before grazing again. In this demonstration the southern side of the paddock, which was a lighter soil type, was negatively impacted by the presence of livestock in conjunction with a dry spring to the point that plant recovery was compromised.

It is also essential to be aware of groundcover over the summer period and the importance of stubble retention. Utilising electric fences to increase stocking pressure and being mindful of watering, feeding and shelter points and how this effects grazing movement can assist in achieving a more even grazing across the paddock.

Conversely, seasonal variability is the most significant and unfortunately unpredictable factor, that will contribute to the success or failure of decisions made throughout the season for grazing cereals within low rainfall mixed farming systems. The interrelation of livestock and cropping should be looked upon as a favourable opportunity to improve productivity and profitability in farming enterprises, however the key to success in this complex system is that practice makes perfect.

Acknowledgements

I would sincerely like to thank Gus Glover and his family for the opportunity to use their property to conduct the demonstration on. I also gratefully acknowledge the help of Naomi Scholz, Trent Brace and Ian Richter for their technical assistance and site management. The Eyre Peninsula Grain and Graze 2 project is funded by GRDC and Caring for Our Country (UA00117).

Treflan – registered trademark of Dow Agrowsciences, Striker – registered trademark of Nufarm Technologies.

Grazing cereals demonstration site at Lock, 2013

Livestock

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