

5 years of paddock rotations in medium rainfall WA

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Key messages

- All paddocks measured by the profitable crop and pasture rotations project were profitable when averaged over the 4 year period. \$268/ha/yr the average gross margin.
- Rotations which have heavy cereal components, 3 or more years being either wheat or barley were consistently among the most profitable
- 61% of paddocks used Canola as a break at least once in the last 5 years. 20% of paddocks used a rotation which consisted only of Canola and Wheat

Aim

The Focus Paddock project aimed to assess the benefits of breakcrops used in West Australian broadacre farming systems

Introduction

The focus paddocks project ran from 2010-2015 and monitored 184 paddocks across the wheatbelt, the majority of which were situated in the medium rainfall zone. These paddocks and the rotations being used on them have been assessed on gross margin performance over the past 4 years, along with a combination of weed, disease and bio-physical attributes which may help explain the performance differences.

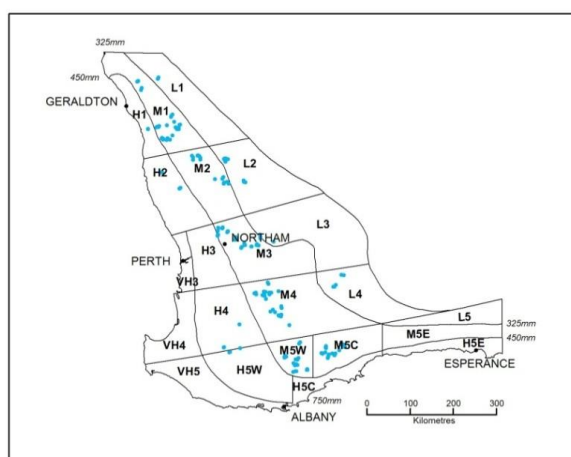


Figure 1: Focus Paddock locations

After 5 years of data there are insufficient rotations of exact same order to allow for reliable statistical inferences to be made. As a result all rotations were assessed based on their composition rather than order, ie Wheat, Wheat, Canola, Wheat, Wheat was grouped with Wheat, Canola, Wheat, Wheat, Wheat.

Assumptions

It is assumed that any crop other than Wheat is the break-crop in the data collected for the focus paddock project, whilst this is the most common scenario in broadacre cropping in Western Australia, strong canola prices over the 2010-2015 period have seen a number of rotations heavily feature canola crop. In situations where canola profitability outstrips cereals, wheat may actually be the disease control break for a canola cash crop, rather than the other way around.

This study is constrained by time frame and assumes that the rotations over the 5 years are repeated. This will be almost certainly incorrect for a number of paddocks, specifically those who switch between long term pasture and long term crop rotation over a 10 year period.

Data

It is important to note that the rotations being assessed in this are not being judged on average prices, but on the actual input, crop and livestock prices that were applicable in each of the 5 years. It is also important to remember that the wheat price over the past 5 years has largely hovered between \$250 and \$350/t, with the average price from September 2010 to September 2014 being \$302/t. Canola has had similarly strong prices averaging around \$550/t for the last 5 years. These prices are significantly higher than the long term average and as thus may not be indicative of the expected performance in another set of 5 years. Likewise livestock prices have varied significantly over the same period with future projections suggesting prices that will be higher on average than those experienced over the past 5 years.

Results

All paddocks monitored in the focus paddocks project returned positive gross margins over the 5 year period. Whilst there was a significant range of results, 50% of the paddocks returned gross margins of between \$170/ha/yr and \$350/ha/yr.

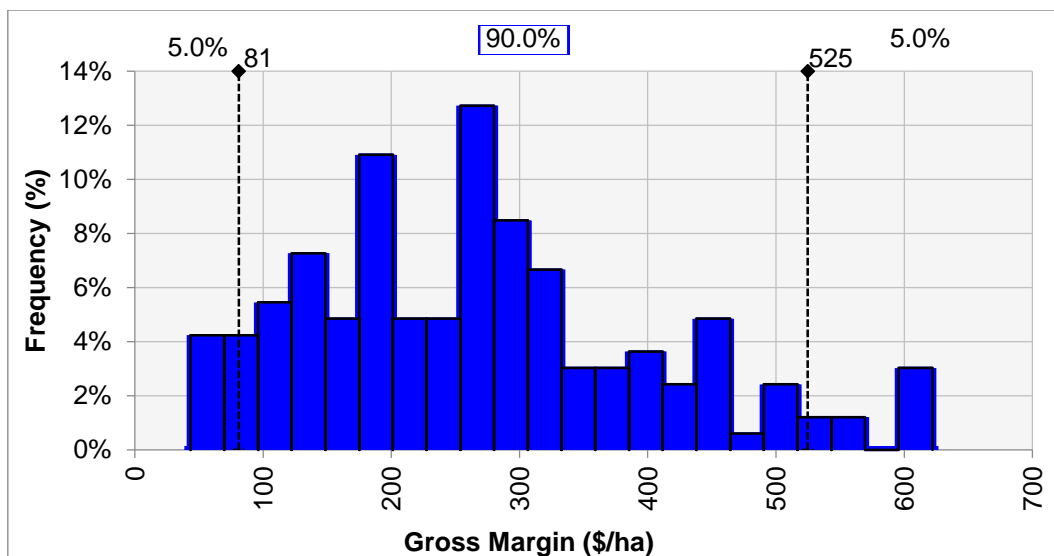


Figure 2: Distribution of Focus Paddock Gross Margins

As the project collected additional data each year the range of results has actually increased, which suggests there is significant variability within the system. Approximately 5% of annual results were negative, whilst at the upper end 5% of results exceeded \$744/ha, 50% of results were within the range of \$150 and \$350/ha, as illustrated in Figure 3.

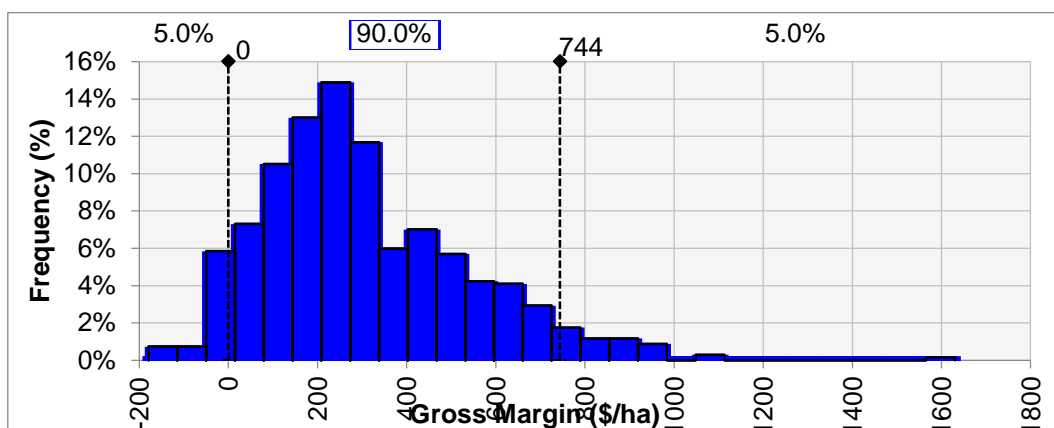


Figure 3: Distribution of all annual Gross Margins (2010 – 2014)

Yields

A major factor driving this gross margin performance is yield achieved, and whilst barley and wheat did show higher variability in yield compared to Lupins or Canola, a significant portion of this variability was due to high upper end yields achieved.

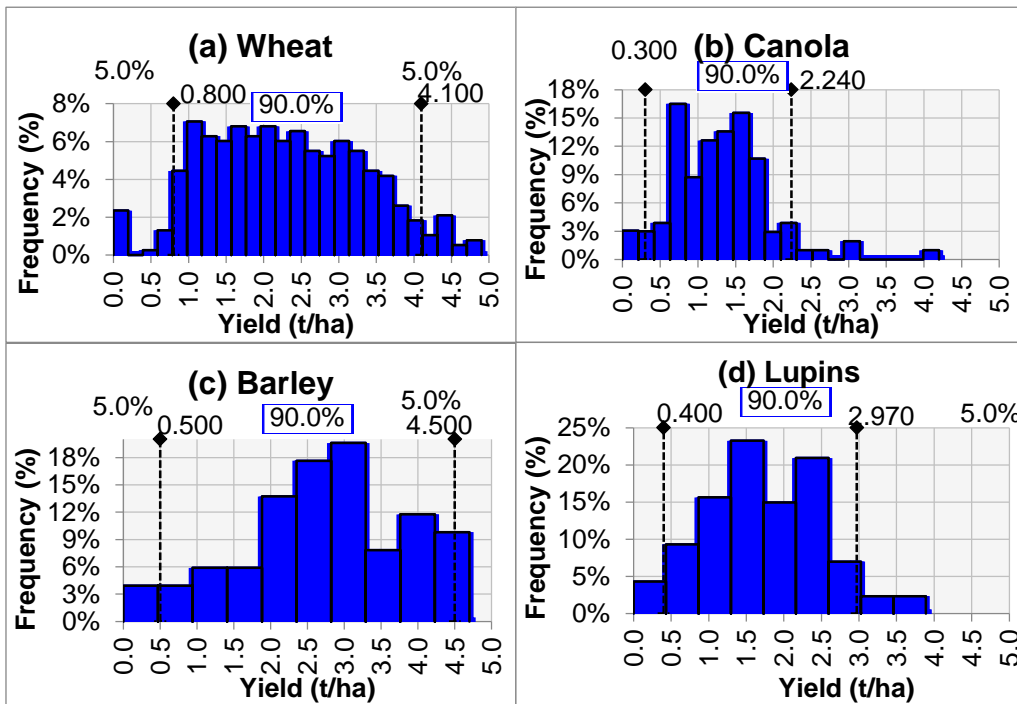


Figure 3:Yield Distribution by Crop Species in Focus Paddocks

Wheat justified its crop of choice status with 95% of crops achieving yields above 800kg/ha, which after accounting for input cost and price differences between species results in the highest return at the 5th percentile. This performance is impressive as all paddocks started in wheat in 2010. Large portions of the sample area had well below average yields in 2010.

Sequences

Cereals had a high level of inclusion in rotations, with 28% of paddocks monitored for the focus paddocks project having 4 years of cereal over the 5 years, whilst 80% had 3 or more years of cereal over this same timeframe.

Table 1: Percentage of Paddocks in which crop and pasture species were used

Crop	Percentage of Paddocks
Wheat	100%
Canola	61%
Lupins	27%
Barley	25%
Pasture	35%
Other	11%

Canola the most popular break crop was canola (Table 1), with 61% of individual paddocks using it as a break at some point over the five seasons. In fact 21% of paddocks monitored by the project had rotations which only featured a combination of wheat and canola, 15% being 4 years of wheat and 1 canola, with the remaining 6% having 3 years of wheat and 2 of canola.

A further 13% of paddock rotations included barley in addition to wheat and canola, meaning that approximately one third of paddocks monitored for the 5 years had rotations which consisted of just cereals and canola.

On average the rotations with 4 years of cereal and 1 year canola provided the highest gross margins, however a number of paddocks in the south of the state where 2 canola 3 cereals was more common also posted some exceptional gross margin results.

However there was often minimal difference between the best performing rotation and second and third best by rainfall zone, with a wide variety of rotations including all of the table 1 options being within \$20 - \$30/ha of the best performing rotations in that rainfall zone.

Lupins and Pasture were generally split along geographic lines with the majority of paddocks in pasture being located in the south of the state and lupins dominant in the north. However their use as a rotational tool differed greatly, lupins were most commonly used in a rotation including wheat and canola, with 11% of total paddocks and over half the paddocks with lupins featuring this combination, only 1.5% of rotations where pure wheat, lupin mixes.

By contrast pastures were often used as more long term rotation with 51% of pastures being found in multi-year pasture rotations of 2 or more years of pasture. Pasture was also commonly the only break from wheat used in systems, with 25% of paddocks containing pasture being used for a wheat pasture rotation.

Interestingly while less than 4% of total paddock use was not one of the 4 main crops or pasture, 11% of paddocks actually used a break which was not one of these options, suggesting a wide area of interest in these other options. The more common “other” crops included Oats, Oaten hay, Chickpeas, Field peas, and Vetch.

There is insufficient data to conduct any in-depth analysis on the performance of less common crops, they have each produced gross margins comparable with more dominant break crop choices.

Costs

The distribution of chemical costs were not vastly different by crop species, with the majority falling within a very similar range. The exception to this was pasture which had a significant number of paddocks where chemical costs were between \$0 and \$20/ha, i.e. used as a very low cost break option.

Similarly fertiliser costs for cereals and canola follow fairly similar cost distributions, with \$30 to \$100/ha covering a significant portion of results with a normal distribution. Lupins and pasture by contrast are heavily weighted towards lower fertiliser costs with over half of the results for both being between \$0-\$20/ha.

These combined facts suggest that pastures overall were not being managed for peak productivity, with very low fertiliser and chemical usage associated with the choice. The implication arising from this is the potential for profitability improvements on the basis of more productive pasture management.

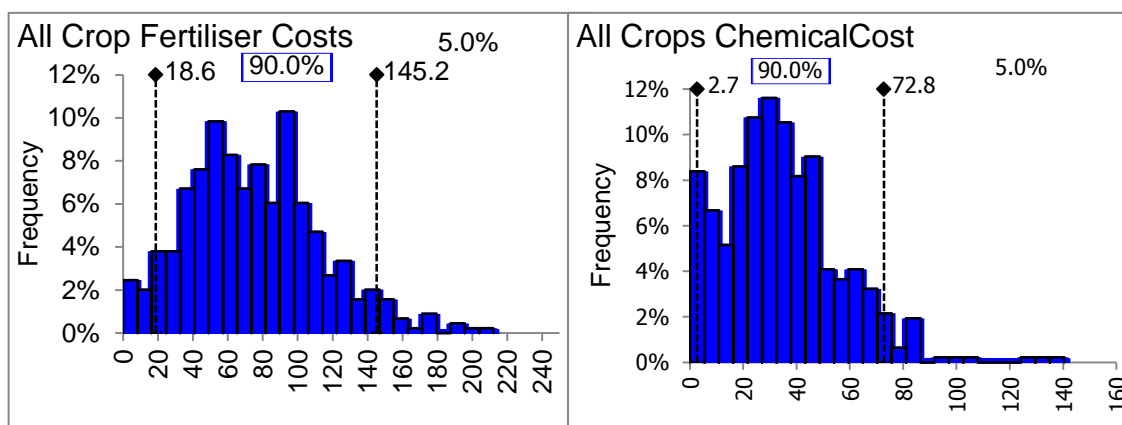


Figure 4: Distribution of Fertiliser and Chemical costs across focus paddocks

Break Crop Drivers

One of the more interesting findings was the lack of any strong correlation between weed or disease numbers and the choice of break crop the following season. However further investigation of the data suggests that this is due to the very low level of disease or weed burden across the focus paddocks sample. Despite a number of large outliers, which are quickly brought under control the following years, 75% of paddocks have weed numbers below 20 plants per m², whilst 50% of paddocks were below 5 weeds per m².

Likewise 90% of paddocks surveyed had either no detectable or very low levels of disease, and in general remained fairly constant over the 5 years of monitoring. However, detection rates of root lesion nematodes increased over the 5 years, which may threaten canola’s increasingly dominant position as break crop of choice.

Conclusion

The data gathered in the focus paddocks project suggests that farm businesses in the medium rainfall zone are currently generating strong gross margins. There is a strong reliance on 4 primary crops, and pasture, with 96% of paddocks in the sample using one of these options, however it appears that these rotations are currently able to keep disease and weed pressures under control.

Despite canola increasingly becoming the break crop of choice for many in Western Australia, strong returns were generated by a large variety of crop rotations, both with and without canola. Pastures appear to have room for improvement with extremely low fertiliser and chemical usage currently.

Key words

Crop Rotations, Gross Margins, Focus Paddocks, Medium Rainfall WA

Acknowledgments

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