



# Economic Comment on the 'Low Input Farming'

This Study has been commissioned by the Hart Field Site Group Inc. and funded by the Grains Research Development Corporation (GRDC)

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## Introduction

This research program ran at the Hart Field Trial as two identical trials but was conducted over two separate years:

- The seasons of 2005 and 2006 (Trial 1)
- The seasons of 2006 and 2007 (Trail 2)

As it turned out, these seasons were very poor and so the results provide a valuable insight into the risk of farming in poor seasons.

There were two components to this project:

- Assessing three input levels: low, strategic and high
- Assessing six, 2-year rotations:
  - wheat/wheat
  - barley/wheat
  - canola/wheat
  - peas/wheat
  - fallow/wheat
  - oats vetch/wheat

The input levels were selected to provide guidance on what provided the best economic returns during these challenging seasons being experienced through the 2000's in Southern Australia. There were low and high input levels, which reflected changes in fertiliser levels. There was also a strategic level which meant the researchers were guided by the season before making input decisions, and this level was between the low and high input levels.

The following were the two major questions to be investigated:

- Were there economic responses to applying higher input costs?
- Which 2-year typical rotation provided the best financial reward?

## Assumptions

The following assumptions were used to guide the analysis:

- The input levels and yields were valued using 2008 expected prices and costs.
- The inputs and yields used were directly derived from the trials.
- To complete the gross margins, typical farmer costs were used for fuel and oil, repairs and maintenance, and crop insurance.
- When hay was harvested, a local hay-making contract rate of \$121.27 /ha was used
- When canola was harvested, it was assumed windrowing was used at a local contract rate of \$29.64/ha.
- The oats and vetch enterprise has been assumed to be either:
  - harvested for hay - in this case the dry matter results were used as a proxy for hay yields; or
  - grazed by a self-replacing merino flock where it was assumed that the first 500kg/ha dry matter was needed for ground cover (not

grazed by stock) and that 400kg dry matter was needed per DSE. A local sheep gross margin of \$31.19/dse was used.

An Excel spreadsheet has been built to assess the economic answers from this trial, and all initial assumptions can be changed to assess sensitivities.

### **Economic Methodology**

A gross margin analysis was used, which in the case of this trial, provides appropriate indications of which application rates and rotations have provided the best financial rewards.

In the case of the Oats Vetch phase of the rotation, the dry matter yield was used as an estimate of either hay production, or the dry matter available for the grazing of a self-replacing merino flock.

Farmers wishing to adopt the input levels and rotations indicated as being the best from this trial would also need to consider the impact of machinery requirements, loans, labour and business profitability before making their final decision.

### **The Gross Margin Results**

The Trial 1 gross margin results are shown in Table 1 and Trial 2's result in Table 2.

**Table 1: Gross Margin Results for Trial 1**

Trial 1 : \$/ha		2005			2006	Total
wheat	Low	478	wheat	Low	-134	344
	Strategic	472		Strategic	-125	347
	High	497		High	-207	290
Barley	Low	637	wheat	Low	-65	572
	Strategic	690		Strategic	-59	631
	High	690		High	-147	543
Canola	Low	160	wheat	Low	-77	83
	Strategic	185		Strategic	-98	87
	High	175		High	-177	-2
Peas	Low	563	wheat	Low	-50	513
				Strategic	-41	522
				High	-120	443
Fallow	Low	-81	wheat	Low	69	-12
				Strategic	57	-24
				High	54	-27
Oats and Vetch	Low	399	wheat	Low	-56	343
Hay				Strategic	-89	310
				High	-80	319
Oats and Vetch	Low	249	wheat	Low	-56	193
Sheep				Strategic	-89	160
				High	-80	169

**Table 2: Gross Margin Results for Trial 2**

Trial 2 : \$/ha		2006			2007	Average
wheat	Low	0	wheat	Low	261	261
	Strategic	-27		Strategic	171	144
	High	-79		High	89	10
Barley	Low	-190	wheat	Low	138	-52
	Strategic	-137		Strategic	57	-80
	High	-229		High	1	-228
Canola	Low	-266	wheat	Low	168	-98
	Strategic	-308		Strategic	102	-206
	High	-336		High	25	-311
Peas	Low	-255	wheat	Low	126	-129
				Strategic	78	-177
				High	124	-131
Fallow	Low	-67	wheat	Low	159	92
				Strategic	129	62
				High	46	-21
Oats and Vetch	Low	24	wheat	Low	78	103
Hay				Strategic	3	28
				High	-26	-1
Oats and Vetch	Low	70	wheat	Low	78	148
Sheep			4	Strategic	3	74
				High	-26	44

## Major Observations

### 1) In poor seasons, there is no positive economic reward for high inputs.

In all the treatments, there were **no** positive responses to increasing input levels. Figure 1 shows the gross margin response to Wheat/Wheat in Trial 1, where there was a neutral response to input levels.

**Figure 1: Gross Margin Response**

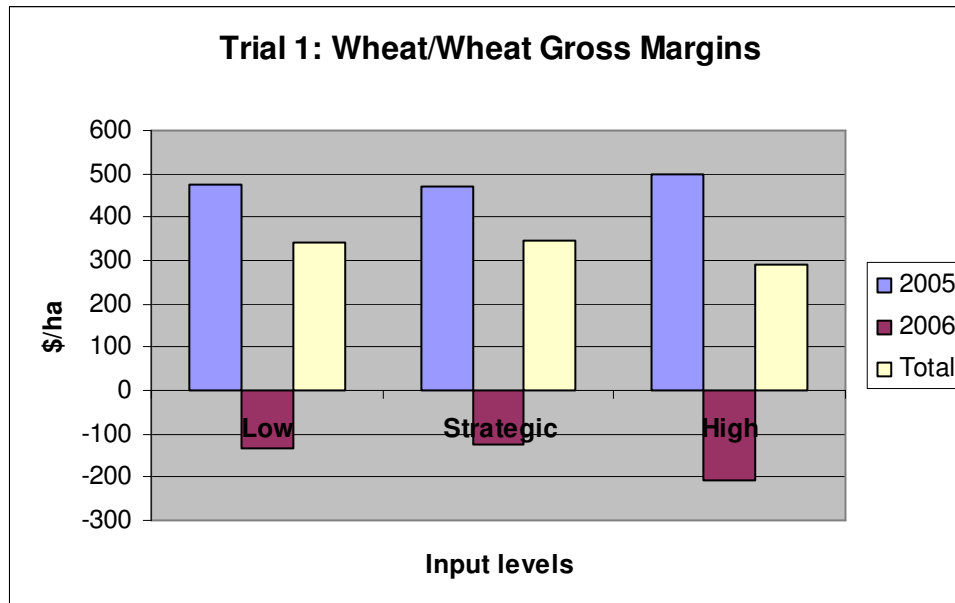


Figure 2 indicates the negative response in Trial 1 for Canola/Wheat.

**Figure 2: Gross Margin Response**

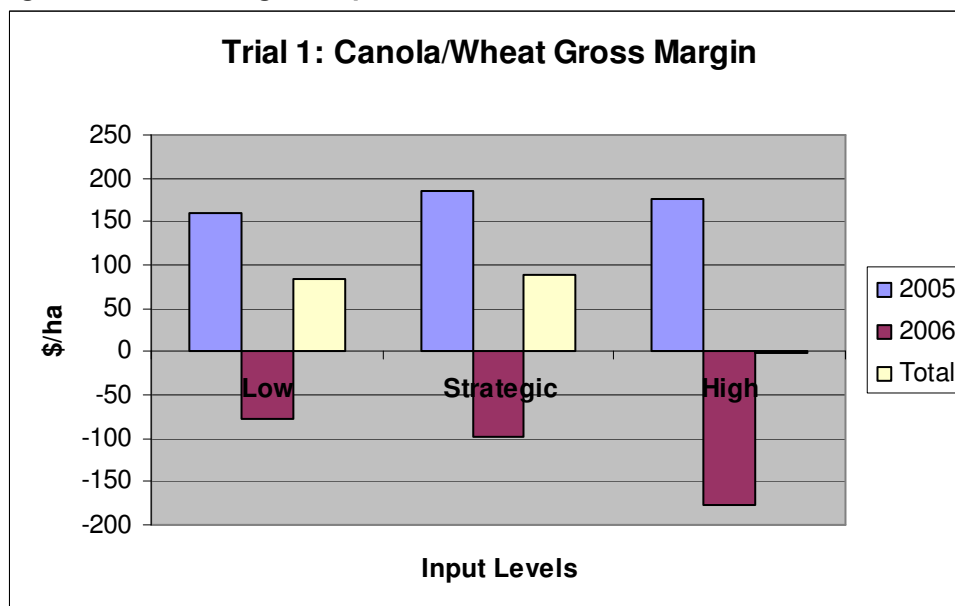
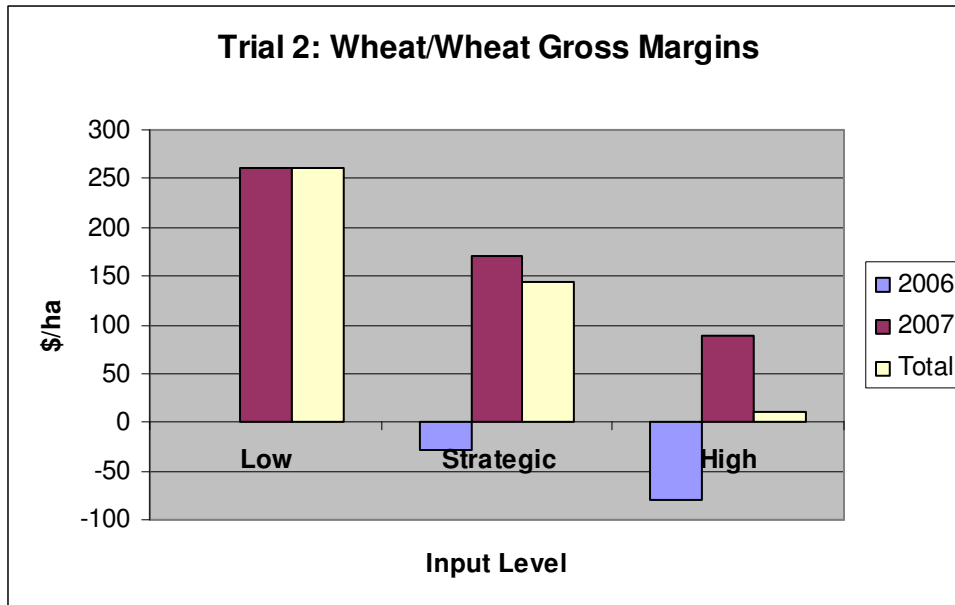


Figure 3 indicates the negative response in Trial 2 for Wheat/Wheat.

**Figure 3 Gross Margin Response**

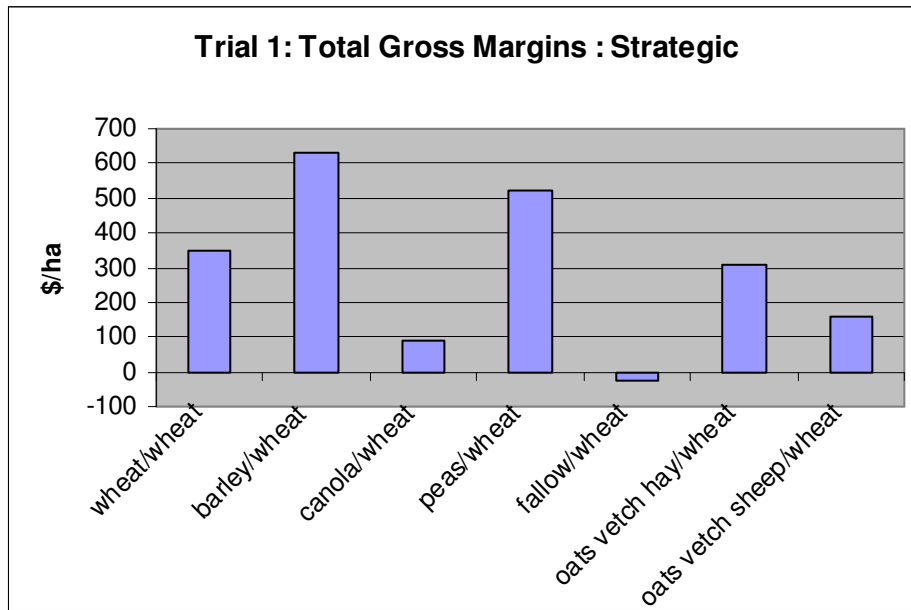


These results indicate very clearly that in poorer seasons such as South Australia has been experiencing in the 2000's, there is significantly higher risks in chasing maximum production by applying high input levels. The strategy of high inputs in poor seasons has a double impact in that costs are higher and yields are poorer, resulting in very poor economic returns for the higher input strategy.

**2) The continuous cropping rotations provided the best financial rewards of all rotations assessed**

In poorer seasons, it appears that on all the rotations assessed, continuous cropping (non-fallow rotations) provided the best gross margins. Figure 4 indicates the total gross margins for the low input level for Trail 1 (years 2005 & 2006). It appears that the Barley/Wheat, Pea/Wheat, Wheat/Wheat and Oats Vetch/Wheat were ahead of the other rotations tested.

**Figure 4: Total Rotation Gross Margins**

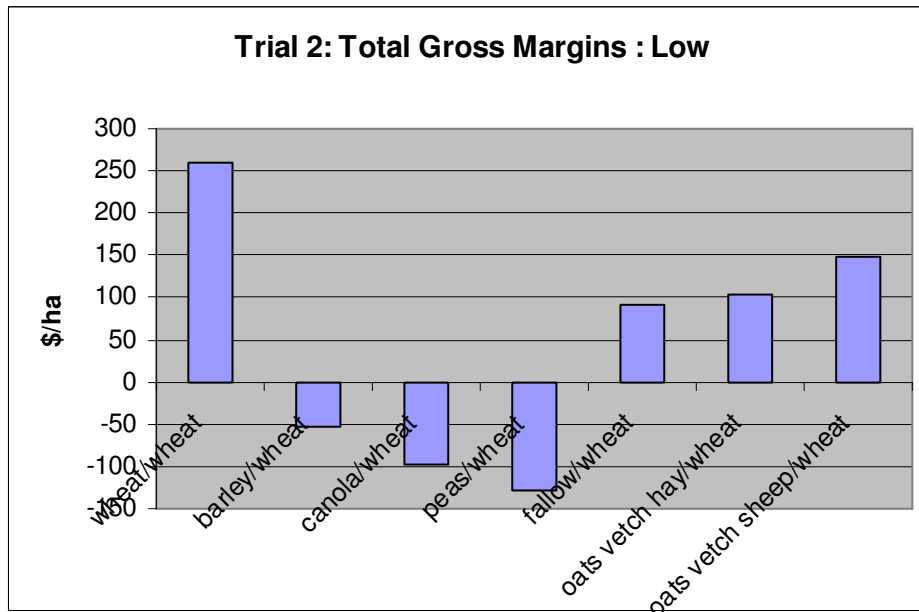


Trial 2 results clearly indicated the wheat/wheat rotation provided the highest total gross margin, as shown in Figure 5.

It was interesting that fallow performed better in Trial 2 (years 2006 & 2007) as indicated in Figure 5. These results occurred because fallow provided the least losses in the poor season of 2006 and because wheat responded well in the following year.

It is also interesting to note that Oats Vetch performed relatively well in 2006, providing a positive total gross margin when either harvested for hay or grazed. This season obviously provided better dry matter production than grain production, which is evident in the better than total gross margins,

**Figure 5: Total Gross Margins from Trail 2 (2006 & 2007)**

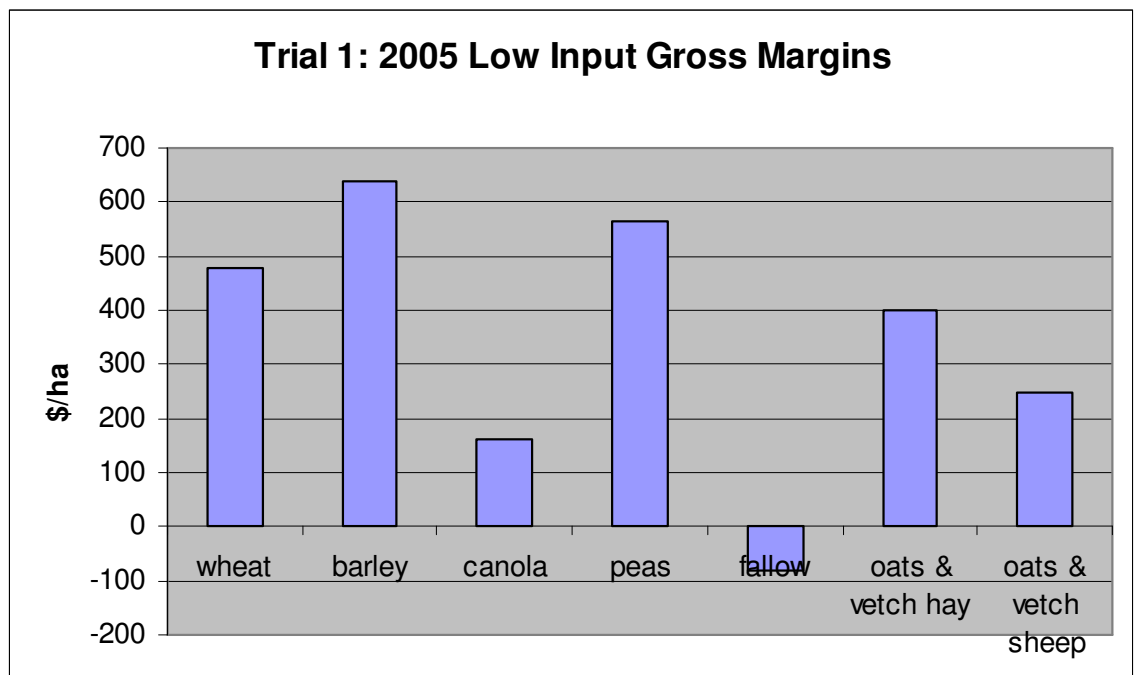


Interestingly, it is a timing issue with fallow, as the results of Trial 2 were not replicated in Trial 1, where fallow/wheat was one of the poorest economic performers.

**3) Fallow can be a low financial risk option in poor seasons but not all poor seasons**

The economic challenge with fallow is that no income is earned in the fallow season. In fact, the costs are negative as indicated in Figure 6.

**Figure 6: Enterprise Gross Margins in Trial 1 using low input levels**

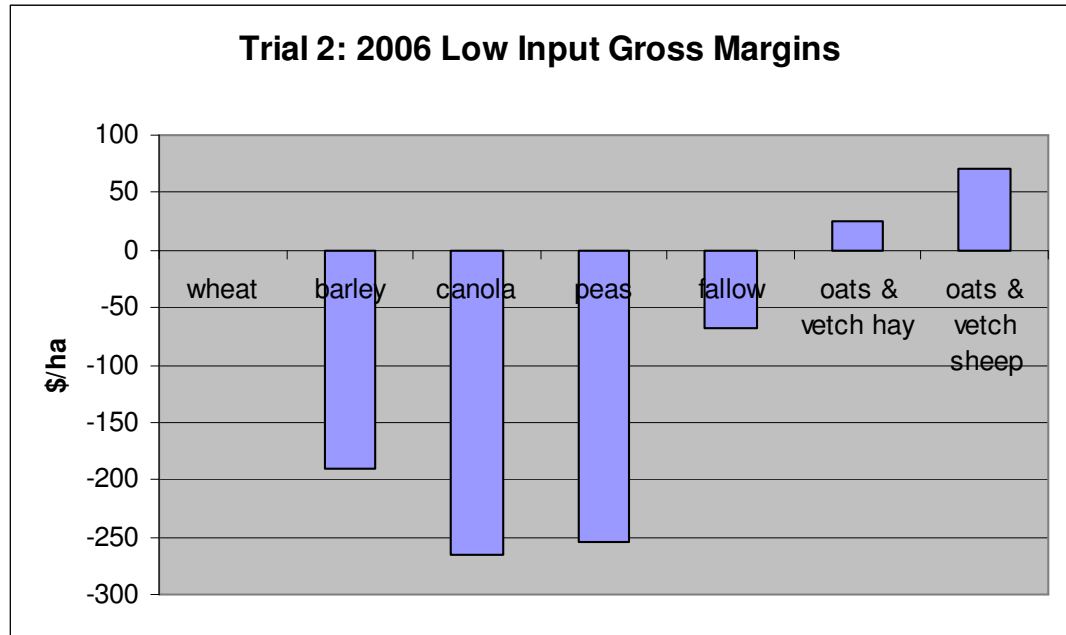


Two observations are made with the use of fallow in the trial:

**a) Least loss in a drought**

In times of very poor conditions, fallow provides an enterprise that minimises losses as indicated in Figure 7. So when calculating the results of a 2-year rotation, minimising the losses in one season will help achieve a better total over two seasons. Also note how well oats and vetch performed in this season.

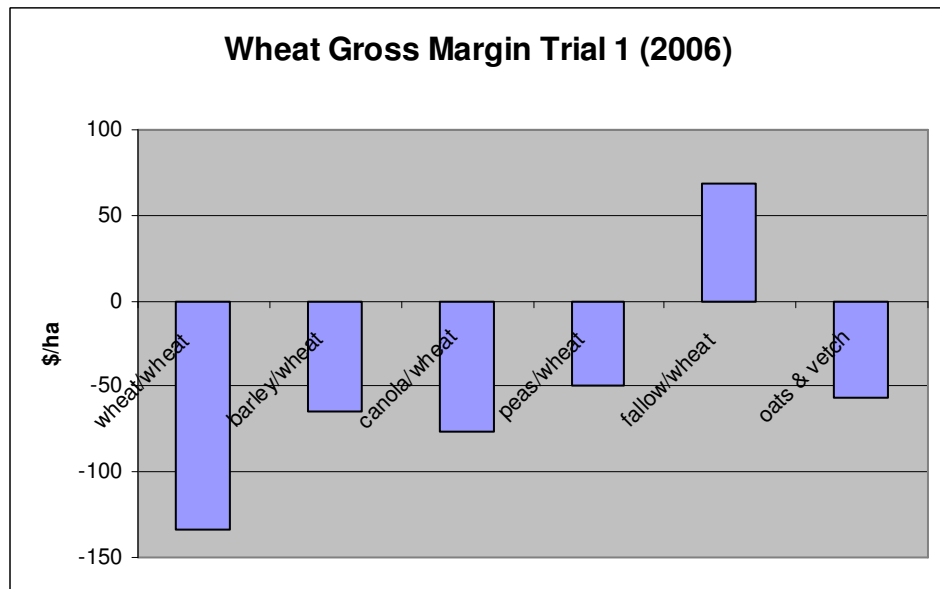
**Figure 7: Enterprise Gross Margins for Trial 2**



**b) In very poor seasons, the following wheat crop can provide a positive economic return.**

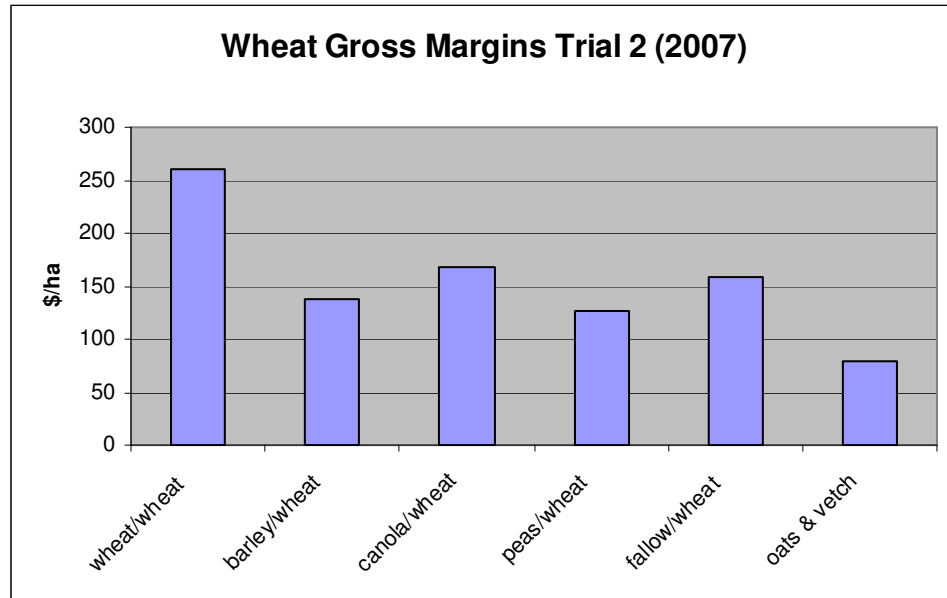
Figure 8 indicates the wheat gross margins of 2006, following the very poor season in 2005. These results indicate that wheat after fallow responded the best of all the rotations tested.

**Figure 8: Wheat Gross margin in Trial 1 (2006)**



Interestingly, these results did not occur after the poor season of 2006, as indicated in Figure 9. In this season, wheat after wheat provided the best gross margins.

**Figure 9: Wheat gross Margins in Trial 2 (2007)**

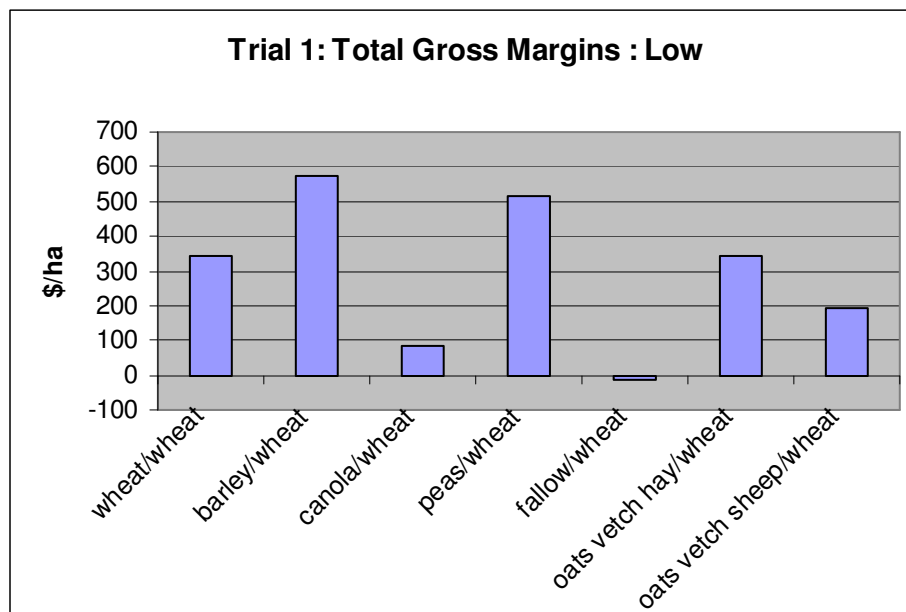


The risk management challenge is to remain viable through these poorer seasons, so while fallow assists in minimising risks, the following crop needs to earn significantly higher gross margins for fallow to outperform continuous cereals, as clearly indicated in the results of Figures 4 and 5.

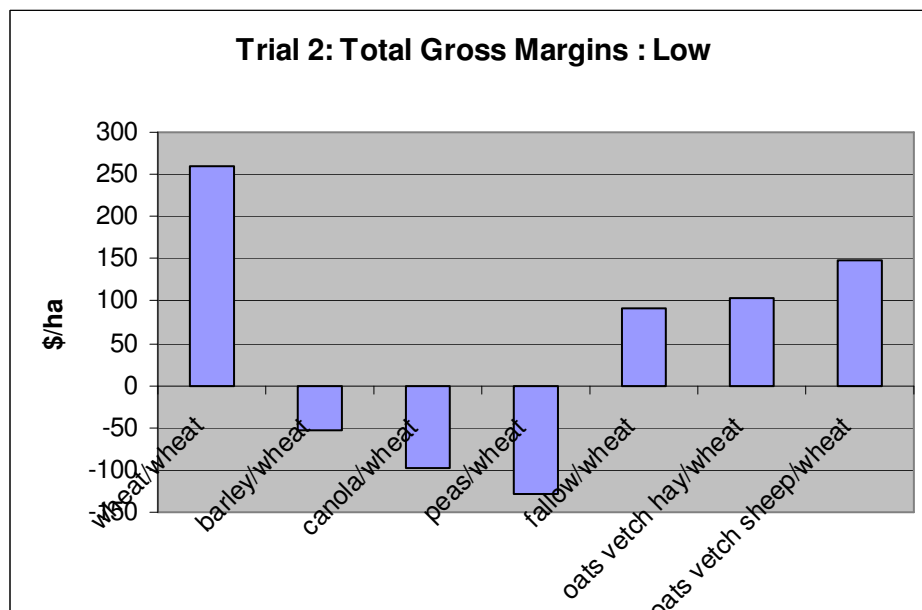
#### 4) The use of sheep vs hay

The oats vetch crop was harvested as dry matter to assess whether hay or grazing was the best option for this enterprise. With the economic assumptions used (page 2) Figures 10 and 11 indicate mixed results, where Trial 1 shows that oats vetch used for hay production provided an improved gross margin over grazing. In Figure 11, this ranking was reversed where grazing the oats vetch provided an improved total gross margin. However, this was a promising result as the oat vetch/wheat rotation provided a positive total rotation gross margin in both Trial 1 and 2, indicating the robustness of oats vetch, whether grazed or harvested for hay.

**Figure 10: Total Rotation Gross Margins in Trial 1 (2005 and 2006)**



**Figure 11: Total Rotation Gross Margins in Trial 2 (2006 and 2007)**



## Conclusion

While initially it may seem that the results from this trial were poor due to the run of poor seasons, it is these seasons we need to understand more with the advent of climate change and farmers will need to improve their management of these types of seasons. One of the advantages of this project is that it was undertaken over two trials which saw different sequence of seasons: Trial 1 over 2005 and 2006; and Trial 2 over 2006 and 2007. These three seasons provided relatively poor grain and hay yields

The main economic findings from this trial were:

- In time of poor seasons it did not pay to apply high rates of fertiliser. This caused two problems for economic efficiency:
  - a) it provided higher costs and
  - b) produced poorer yields which resulted in poorer gross income. In every rotation tested, the high input treatment produced the poorest gross margin.
- The best economically performing rotations did vary between the trials. The best economic rotation in Trial 1 was Barley/Wheat followed by Peas/Wheat. In Trial 2, the best economic rotation was Wheat/Wheat followed by Oats Vetch/Wheat, where the dry matter was grazed by a self-replacing merino flock.
- The performance of fallow was mixed. In Trial 1, it performed the poorest because it only provided costs in year 1 and the wheat crop did not respond in year 2. However, in Trial 2, Fallow proved to minimise losses in year 1 and the wheat crop responded well in year 2. Thus, this rotation was the third best performing rotation in Trial 2.
- Interestingly, when managing oats vetch for either hay or grazing, it appears that they both provide positive gross margins in these poorer seasons. Trial 1 showed that hay provided the best gross margin over grazing and Trial 2 showed that grazing provided a better gross margin over hay production. From a risk perspective, it was difficult to select one over the other.