Risk Management in Wheat

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A series of in-crop risk management plots were established at BCG's three research and demonstration sites (Manangatang, Birchip and Longerenong). Similarly to previous years, High Input, Best Bet and Low Input management strategies were employed. The likely yield response to each of these management strategies was observed and guided by the Yield Prophet model and seasonal conditions for 2007.

Take home messages

The results in this years risk management trial emphasised the importance of knowing:

1) The nutrient status of your soils prior to sowing, and

2) Potential of the soils.

The starting soil nitrogen at Birchip was particularly low (55kg/ha N) resulting in a significantly lower yield for the Low Input scenario compared to the High Input and Best Bet treatments. The Low Input scenario also resulted in significantly lower protein and significantly higher screenings. These results suggest that there was not enough nitrogen to sustain a crop even in a dry finish, eventually affecting the final gross margin of the Low Input system.

When comparing Birchip with Manangatang, which had a high level of starting N, the differences in grain yields and grain quality between the different systems were less pronounced.

It is extremely important to understand the potential of the crop and what additional inputs are required to reach target yields. It is important to watch expenditure but at the same time not to compromise economic returns.

Method

Location (sowing date):	Manangatang (8/5/2007); Birchip (24/5/2007); Longerenong (23/5/2007)
Replicates:	Four
Variety:	Yitpi
Starting soil nitrogen:	Manangatang 100kg/ha N; Birchip 55kg/ha N; Longerenong 37kg/ha N

Table 1. Three management strategies employed in the trial at each of the three sites.

Managemont strategy	Description
High Input 20% Yield Prophet probability	High sowing rate (190 pl/m^2) High P rate-SuPremeZ (14 units P = 65kg/ha) Split N (sowing + top-dress if required) Intake on fertiliser (for rust control)
Best Bet 50% Yield Prophet probability	Average seed rate (160 pl/m^2) Moderate P rate-MAP (7 units P = 32kg/ha) Split N (sowing + top-dress if required)
Low Input 80% Yield Prophet probability	Low seeding rate (100 pl/m^2) Low P rate-MAP (3 units P = 20kg/ha) Top-dress if required

Table 2. Applications of nitrogen at each site.

	Manangatang		Birchip		Longerenong	
	Pre-sow 8/5/07	**Top-dress**	**Pre-sow 23/5/07**	**Top-dress 27/7/07**	**Pre-sow 22/5/07**	**Top-dress 27/7/07**
High Input	23kg N/ha	-	50kg N/ha	60kg N/ha	50kg N/ha	130kgN/ha
Best Bet	12kg N/ha	-	25kg N/ha	30kg N/ha	25kg N/ha	80kg N/ha
Low Input	-	-	-	30kg N/ha	-	50kg N/ha

Forecast and conditions during the year

Deciles

In autumn the mood was optimistic; most of Victoria received close to or above average rainfall after what had been Victoria's third driest winter/spring period on record in 2006. As the deciles in Table 3 suggest, this was the best start to the cropping season since 2000, and was coupled with the knowledge that even if a La Niña event did not eventuate, there was at least little chance of another "drought-bringing El Niño event".

Unfortunately the rain stopped in June when a large percentage of the crop was already in the ground. The growing season decile continually dropped and finished at decile 2 or 3 across our trial sites and surrounding districts (Table 3).

Several climate anomalies have been cited as possible causes of the dry spring, the most notable being an unprecedented situation in which a positive Indian Ocean Dipole occurred at the same time as a La Niña event in the Pacific Ocean. Historically, the Indian Ocean Dipole has only ever been negative or neutral during La Niña event.

Yield Prophet - grain and hay yield predictions

To determine the potential yield of the different management systems, and therefore the potential nitrogen topdressing requirements, the Yield Prophet model was used during the season to estimate grain yields. At sowing and up until July, based on the good autumn break, Yield Prophet was predicting high yield potentials which made it difficult to scale back any sowing operations if decisions were

based solely on this model. However towards August/September – the critical time for topdressing – Yield Prophet's yield prediction had fallen, which may have assisted any decisions in cutting back urea applications at this time.

In spring when hay cutting was a hot topic of discussion, a hay yield estimate was also generated by Yield Prophet. The hay estimate added valuable information in terms of potential economic returns at a time when tough decisions were being made between cutting for hay or retaining for grain.

Table 3. Monthly deciles for 2007 at each of the three sites.

Decile	Birchip	Swan Hill / Manangatang	Longerenong
January	10	10	10
February	5	4	7
March	10	5	2
April	7	9	10
May	8	8	8
June	2	3	1
July	4	5	5
August	1	1	1
September	2	1	2
October	1	1	1
Annual	**5**	**3**	**3**
Summer*	**10**	**9**	**8**
Growing Season**	**3**	**2**	**2**

**Summer = January–March*

***Growing Season = April-October*

Table 4. Grain and hay yield estimates generated from Yield Prophet in July and again around the timing of the specific BCG Research and Demonstration Field Days.

Date report was generated	High Input 20% probability t/ha	Best Bet 50% probability t/ha	Low Input 80% probability t/ha
Manangatang			
23 July - grain	3.5	2.5	1.5
16 August - grain	2.5	1.7	1.1
16 August - hay	6.0	5.3	4.7
Birchip			
23 July - grain	4.5	3.0	2.0
11 Sept - grain	2.5	1.4	1.0
11 Sept - hay	4.2	3.8	3.5
Longerenong			
23 July - grain	6.0	4.5	2.5
18 Oct - grain	1.5	1.3	1.1
18 Oct - hay	4.7	4.7	4.7

Seasonal Climate Forecasts

Normally in our region, the rainfall pattern for the remainder of the season can be relatively predictable by the July-August phase of the SOI. However in 2007, the SOI phase in July, August and September was Rising, Falling and Rising respectively. In this case these phases did not have good predictive skill in our region i.e. they gave no indication as to whether wet or dry conditions were more likely, all outcomes were equally possible.

The Bureau of Meteorology's national seasonal rainfall outlook indicated that there was a slightly higher chance of receiving below average rainfall during winter and spring.

Results

Despite the uncertainty as to how crops were going to finish, crops yielded better than expected. Yield Prophet was reasonably accurate in its yield simulations at Manangatang and Birchip, but significantly under-predicted yield at Longerenong (Tables 6, 7 and 8). This was due to a combined underestimate of the amount of soil water that was available at the site prior to sowing, and of the amount of retained stubble from 2006.

In all systems, at all sites, the High Input system resulted in significantly higher protein and lower screenings compared to the Low Input and Best Bet systems. At Birchip, where soil N reserves were low, the difference in grain quality between the Low Input and High Input was as much as 5% for protein and up to 12% for screenings. Low protein and high screenings for the Low Input scenario at Birchip is an unusual combination which can be explained by the low nitrogen reserves. It is possible that the plants have not been able to accumulate enough carbohydrates during the season, which would otherwise be translocated at grain fill, and as a result the crop has struggled to fill.

Table 5. Actual grain and hay results at the time of harvest at Manangatang.

	Grain yield t/ha		**Hay yield t/ha**		**Protein %**
	Actual	Yield Prophet	Actual	Yield Prophet	Actual
High Input	1.6	1.0	4.8	3.8	13.1
Best Bet	1.7	1.0	4.6	3.8	12.3
Low Input	1.8	1.0	3.0	3.3	10.9
Significant Different	**NS**		**S**		**S**
LSD>0.05	**0.4**		**1.1**		**2.0**
CV%	**NS**		**14.9**		**6.1**

** screenings not available for Manangatang*

Table 6. Actual grain and hay results at the time of harvest at Birchip.

	Grain yield t/ha		**Hay yield t/ha**		**Protein %**	**Screenings %**
	Actual	Yield Prophet	Actual	Yield Prophet	Actual	Actual
High Input	1.8	1.0	5.1	4.0	14.6	4.7
Best Bet	1.9	1.0	5.0	4.0	11.6	10.1
Low Input	1.4	1.1	3.2	3.5	9.1	16.7
Significant Different	**S**		**NS**		**S**	**S**
LSD>0.05	**0.2**		**2.5**		**1.4**	**2.8**
CV%	**5.5**		**14.4**		**4.4**	**14.4**

Table 7. Actual grain and hay results at the time of harvest at Longerenong.

	Grain yield t/ha		Hay yield t/ha		Protein %	Screenings %
	Actual	Yield Prophet	Actual	Yield Prophet	Actual	Actual
High Input	2.4	1.2	7.0	4.7	15.7	4.6
Best Bet	2.7	1.2	6.3	4.7	12.6	6.3
Low Input	2.7	1.2	5.1	4.3	10.9	8.0
Significant Different	**NS**		**S**		**S**	**S**
LSD>0.05	**0.3**		**1.7**		**1.4**	**2.4**
CV%	**5.8**		**17.7**		**2.0**	**19.3**

Table 8. Gross margin (GM) figures for grain.

	Strategy	Income* $/ha	Input cost # $/ha	GM $/ha
Manangatang	High Input	560	203	357
	Best Bet	595	177	418
	Low Input	630	134	496
Birchip	High Input	630	254	376
	Best Bet	665	205	460
	Low Input	490	156	334
Longerenong	High Input	840	305	535
	Best Bet	945	231	714
	Low Input	945	155	790

** Income calculated using $350/t through the domestic market.*

 # Costs calculated from input costs and operations based on local contract rates.

The risk management trial is a great reminder of the importance of knowing the potential of your soils and crops on a paddock by paddock case. The Low Input scenario produced the best gross margins at Manangatang and Longerenong, while at Birchip the Best Bet scenario came out on top in terms of economic return. This conclusion is based on grain delivered to the domestic market. If grain had been delivered through the AWB Golden Rewards system, which takes into account protein and screening levels, results may have been different again particularly for Birchip where the high screenings in the Best Bet system could mean the difference between a decrement and an increment.

Commercial practice

Farmers can better manage climate variability and risk via, understanding soils, soil sampling prior to sowing, tailor crop choice and inputs accordingly, don't commit all inputs upfront, make use of forecasting tools and continue to monitor crops during the season.