3.2 Rural Finance wheat challenge - Mininera, Vic

Location:
Mininera Research Site

Funding:
This trial was sponsored by Rural Finance.

Researchers:
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Take home messages:

- The Wickliffe Hillbillies team were winners of the Rural Finance wheat challenge for the Mininera site with the highest margin per ha of $948/ha. This was $133/ha more than their closest rival.
- The key to the yield and quality, for those growing white wheats was the timing and amount of nitrogen they applied. Applications at GS32 needed sufficient nitrogen to cover both yield and its effect on the dilution of protein.
- A late treatment of nitrogen at GS39 was the safest way to secure proteins levels for H2 grain quality.
- Grain quality issues also occurred due to screenings being over 5%. This caused teams to have deductions made to their final grain price.
- Trifluralin or Boxer Gold incorporated by sowing were the cheapest and most efficient technique for controlling ryegrass compared to using post emergence herbicides.
- Grain marketing only played a small part in the final result of the competition as only three teams forward sold their crop and two of the three teams sowed in late June which limited their yield potential due to the very dry spring. .
- The highest yielding crop was the Bolac grown by the Wickliffe team at 4.89t/ha
- The team with the cheapest cost of production was the Bolac grown by the Wickliffe Hillbillies at $96/t whilst the most expensive was nearly $50/t more at $145/t.
- Sowing date had a significant effect on the late sown crops of Derrimut and Bolac. The longer season length of Bolac wasn't helped by the very dry spring and it yielded the lowest at 3.84 t/ha.

Background/Aim:
The key to maximizing crop profitability is the ability to make the correct decisions, at the right time, and to deal with the various challenges that are thrown in your way throughout the season. The wheat challenge allows members to tackle these problems and come up with their own solutions.

At the start of the competition eight different teams where formed who would get together during the season and decide on crop management decisions for their own crop of wheat, which was sown as replicated trial plots to obtain accurate yield data. The teams included: a group from the local DPI, some local farmers who consider themselves old hands, some young farmers who are just starting out, researchers and members from Agribusiness.

The aim of Wheat Challenge was to see which team could produce the highest margin crop (not necessarily the highest yielding crop) against a background of uncertain input prices, potentially high grain prices and unknown growing season rainfall.

A major part of the challenge includes collectively making all of the growing season agronomic decisions from sowing until harvest as well as related grain marketing decisions. Initially teams were given two sowing dates, May and June and the choice of three wheat varieties, Amarok (a long season red wheat) and Bolac and Derrimut (two shorter season white quality wheats). They then had to decide on seed treatment, sowing rate and what, if any, pre emergence herbicides they wanted to use.

Grain marketing was also an option for all teams available from May 1st up until the day of harvest. There were two marketing mechanisms available:

- Forward pricing - based on 25% lots of the final harvest tonnage. Prices were emailed to team captains every two weeks, on a Monday and these gave prices based on three wheat quality grades: AGP, APW and H2. Prices courtesy of SQP.
- Spot price published on the day of harvest based on the quality of the sample.

Trial information:
Trial design consisted of a replicated randomised block design using 2 paired plots replicated 4 times. This enables us to statistically analyse any differences between treatments and have more confidence in the conclusions reached. Plot lengths were 12 metres long and 1.45m wide. Rainfall was highly variable throughout the season, with a wet winter, then a very dry spring (Decile 1).

Diseases:
There were low levels of Stripe Rust visible in the Bolac and Derrimut.

Tillage type:
This trial was seeded with the SFS cone seeder using 2.5cm knifepoints.

Paddock history:_2007: Canola

Soil type: Clay loam

Soil nutrients:
P = 31 mg/kg (Olsen)
K = 275 mg/kg
S = 30 mg/kg
Deep N September = 76 kg N/ha (0-30cm) + 20 kg N/ha (30-60cm)
pH ($CaCl_2$) = 4.6

Results and discussion:
The team captains supplied a worksheet at the start of the competition in May detailing variety choice, sowing rate, seed treatment and choice of sowing date. This sheet also included any seedbed fertiliser required and any herbicides to be either incorporated by sowing or applied post sowing pre emergence. A breakdown of these costs and the overall costs of production during the season are shown in table 1 below:

Table 1: Team Cost Analysis throughout the growing season

	Wickliffe	Old Hands	Girls + Vern	Tatyoon	Margin Busters	Winder' Wheaties	Bald Hill Boys	Halo Agronomics
Variety	Bolac @ 90kg/ha	Bolac @ 80kg/ha	Bolac @ 100kg/ha	Amarok @ 80kg/ha	Derrimut @90kg/ha	Amarok @ 80kg/ha	Bolac @ 100kg/ha	Bolac @ 100kg/ha
SEED	72	64	80	64	81	64	80	80
Seed Treatment	11	2	5	9	8	4	16	3
Seedbed FERTILISER	88	110	110	88	88	88	88	132
Nitrogen FERTILISER	113	118	72	99	117	72	90	144
Pre Em HERBICIDES	13	13	38	31	14	22	18	5
Post Em HERBICIDES		8	13	5		38	17	58
FUNGICIDES	6	6		10	19	6	4	14
FIXED COSTS	167	179	157	167	157	177	167	157
TOTAL COST/HA	**470**	**500**	**475**	**473**	**484**	**471**	**480**	**593**

Seed and seed treatments:
Overall there was little variation in sowing rate across all the teams with rates from 80 kg/ha up to 100 kg/ha. This amounted to an increase in costs of $17/ha and couldn't be shown to have increased or decreased yield.

Three teams chose to apply an insecticide with their seed treatment, the Wickliffe and Tatyoon teams, who sowed early in May and the Bald Hill team who sowed later in June. In trying to tease out whether this seed treatment had any significance in contributing to protecting yield potential we can compare the yield of the Wickliffe team to the Old Hands team.

Both teams sowed a similar variety, at the same time, using very similar inputs during the season and there was no significant ($P<0.05$) difference in yield between the teams plus there was no BYDV seen at this site in 2008. The Bald Hill team who sowed at the later sowing time, on the 25th June, would have had very low BYDV pressure at that time of the year and could probably have saved themselves $10/ha by applying a standard seed treatment.

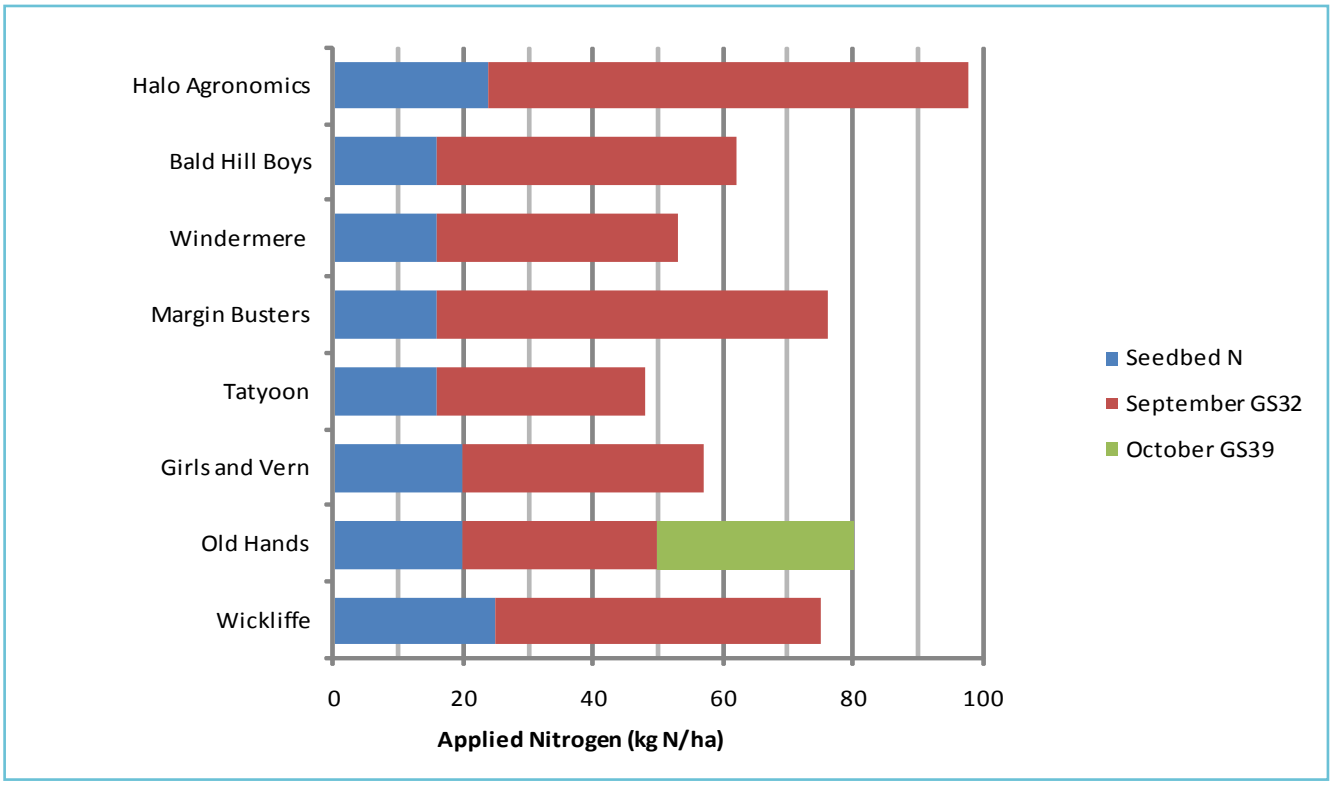
Fertiliser:

There was a variation of between 80kg/ha and 120kg/ha in the rate of MAP used by the teams at sowing, but with a soil Olsen P of 31mg/kg there was only going to be a small response to applying P. This proved to be the case but cost teams $44/ha between the highest and lowest rates. With the benefit of hindsight a rate of 80kg/ha of MAP would have supplied a maintenance rate of Phosphate sufficient to cover off take.

The nitrogen management decisions taken by the teams were made against a background of 96kg N/ha available from 0 - 60cm, at the beginning of September.

The two teams who chose to grow Amarok, the Windermere Wheaties and Tatyoon, were out to maximize yield whilst not having to worry about securing minimum grain protein levels. Both teams followed very similar amounts and timings by applying 8kg N/ha in the seedbed as MAP and approximately 35kg N/ha applied as Urea at GS32, in September. The Tatyoon team yielded 0.23t/ha more than the Windermere team and although this is not significant ($P<0.05$) the increase is likely to have come from something else they did during the year, rather than nitrogen. This could have been the trace element mix they applied in the spring or not having to apply a Group B post emergence herbicide for ryegrass. Details of the teams' nitrogen timings are shown in Table 2.

Table 2: Nitrogen timings and quantities applied, including seedbed MAP/Urea and post emergence applications in September and October



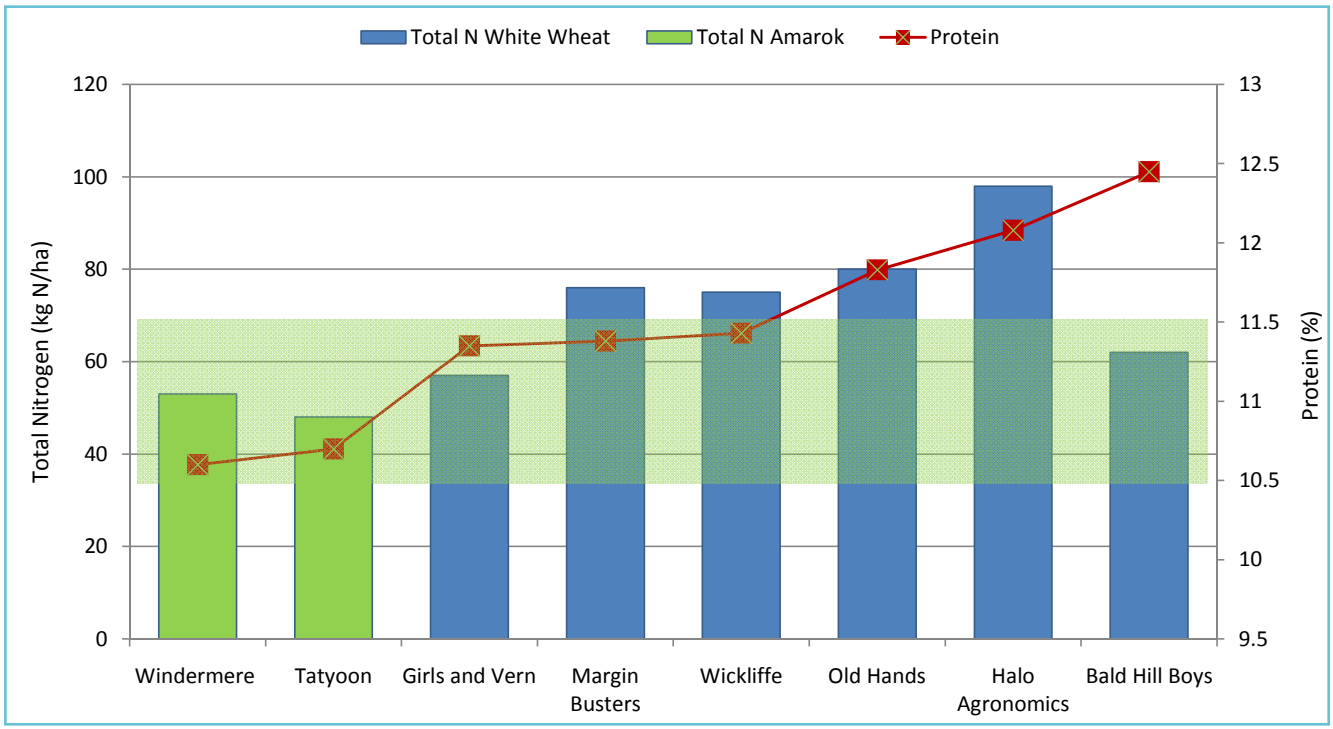
Above: Rural Finance Team; Rebecca Cullen, Claire Bibby, David Lowry & Mark Hodge

The remaining six teams all grew white wheat varieties that could, at best, be marketed as H2 so long as the grain quality was up to minimum receival standards. This meant that these teams had slightly different priorities in their nitrogen management, from the teams growing Amarok, in that they wanted to maximize yield but also achieve minimum grain proteins of 11.5% for H2 or 10.5% if they were aiming for APW. Four teams chose to sow in May and grow Bolac wheat, whilst the other two teams, the Bald Hill team and the Margin Buster team chose to sow in the third week of June and grow Bolac and Derrimut.

The two teams who chose the later sowing date of 24th June had the potential to make savings in herbicides from a delayed knockdown but were always going to struggle to match the earlier sown crops for yield, given the lack of rainfall in the spring.

This was the case with the Bolac, grown by the Bald Hill team, having the lowest yield in the competition with 3.84t/ha (88% trial average) and the Derrimut sown by the Margin Busters 4.16t/ha (95% trial average). The Margin Busters nitrogen strategy was similar in timing to the Bald Hill team except they applied 60kg N/ha as opposed to 46kg N/ha at GS31. The effect of this was they created 0.32 t/ha more yield but this diluted their grain protein to 11.38% which took it just under H2 standard, whereas the Bald Hill's Bolac yielded less but they got 12.45% protein and low screenings to be the only team to achieve H2 quality. For more information on total nitrogen applied and grain protein levels refer to results in Table 3. The shaded area in the centre of the chart is the band between 10.5% and 11.5% protein which is the minimum receival standard for APW and H2 respectively:

Table 3: Nitrogen quantities applied and grain protein for Mininera site competition



The remaining four teams grew Bolac and their post emergence nitrogen applications were all different, which resulted in very varied outcomes. All the teams applied between 20 and 25kg N/ha in the seedbed as MAP, with the Wickliffe team adding extra Urea to their slightly lower rate of MAP.

The Wickliffe team achieved the highest yield overall of 4.89t/ha with a GS32 application of 50kg N/ha, as Urea in September, which bought their total applied to 75kg N/ha. However they just failed to make H2 as their protein was diluted slightly down to 11.43%.

A similar thing happened to the Girls and Vern team who applied only 37kg N/ha in the spring and so lost nearly 0.3t/ha in yield to the Wickliffe team but also a further reduction in protein to 11.35%.

The Old Hands team applied a total in the spring of 60kg N/ha split 50% at GS32 and 50% as a late application at GS39. This resulted in a yield very similar to the Girls and Vern team of 4.53t/ha but due to the late Urea application a grain protein of 11.83%. Unfortunately, due to slightly high screenings the Girls + Vern team and the Old Hands had reductions in quality to AGP and AUH2 (=APW) respectively.

The Halo Agronomics team applied the largest amount of nitrogen in the spring at 74kg N/ha (160kg/ha Urea) bringing the total applied for the season to 98kg N/ha. Based on the information above this should have produced the highest yield but their Bolac only yielded 4.09t/ha, the lowest of the early sown Bolac by 0.44t/ha. This low yield did however mean their protein levels were high at 12.08%.

Herbicides:
The low yield from the Halo team was almost certainly due to poor levels of ryegrass control. To understand the reasons for this you need to refer to Table 1 where the individual costs are broken down. You will see that the Halo team was the only team not to apply a pre emergence herbicide, other than 0.25l/ha of Dual Gold. Even though they applied a full post emergence Group A herbicide mixed with a broadleaved weed herbicide they were unable to control the ryegrass in their plots and this ultimately cost them yield, equivalent to $130/ha.

By contrast the top four yielding teams used either Trifluralin or Boxer Gold, incorporated by sowing and then no ryegrass control was required post emergence.

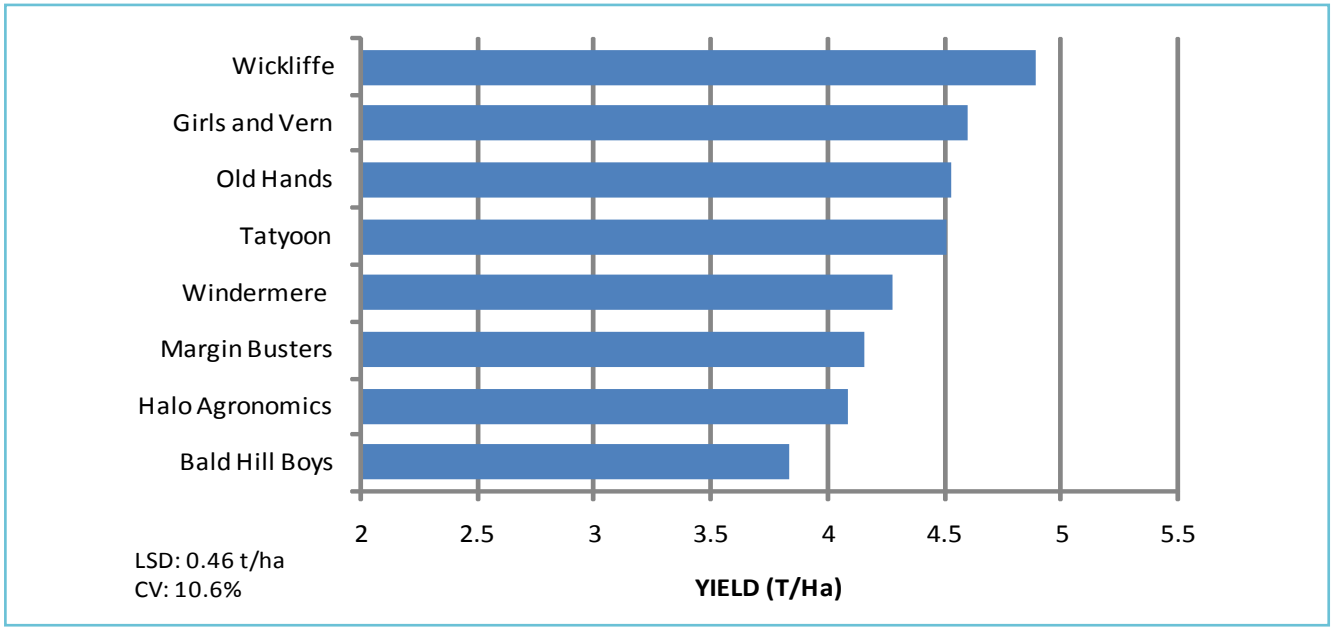
The late sowing approach taken by the Margin Busters and the Bald Hill teams certainly enabled them to save costs on expensive grass weed control but as mentioned earlier, with the benefit of hindsight, this approach was never going to out yield the earlier sown teams in a year with such a dry spring.

Fungicides:
Only the Bolac and Derrimut were showing low levels of Stripe Rust in September. All the teams, apart from the Girls + Vern team, applied a fungicide either at GS39 or as Impact on the fertiliser. Although the yield of the Wickliffe team is not significantly ($P<0.05$) higher than the Girls + Vern team yield, the addition of a fungicide have reduced their screenings to a level where they could have sold APW standard wheat.

Grain marketing:
The last part of the competition was the grain marketing where each team had two marketing options available to them:

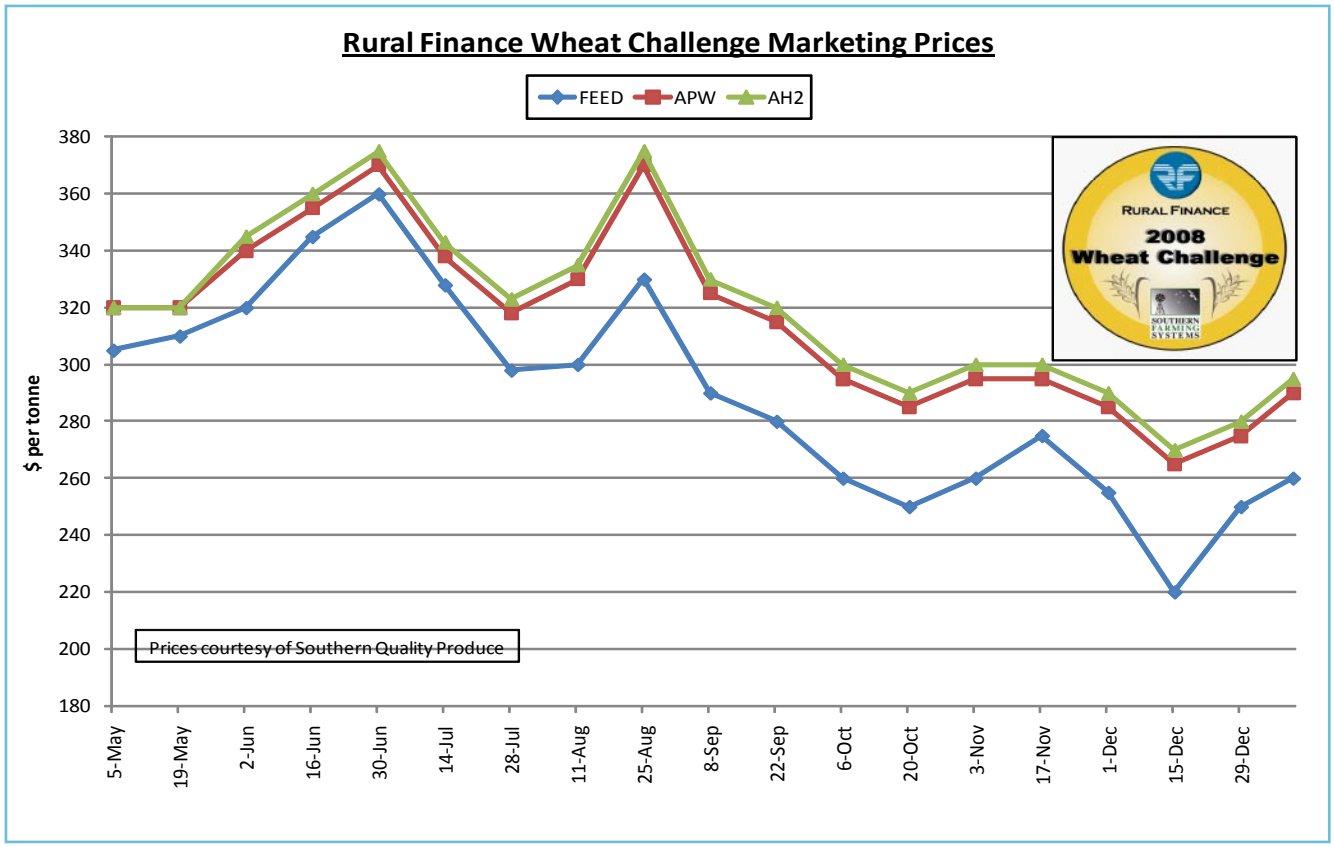
- Forward pricing - based on 25% lots of the final harvest tonnage. Prices were emailed to team captains every two weeks, on a Monday and these gave prices based on three wheat quality grades: AGP, APW and H2. Prices courtesy of SQP.
- Spot price published on the day of harvest based on the quality of the sample. Prices courtesy of SQP.

Table 4: Grain Yields (T/Ha) for Mininera teams



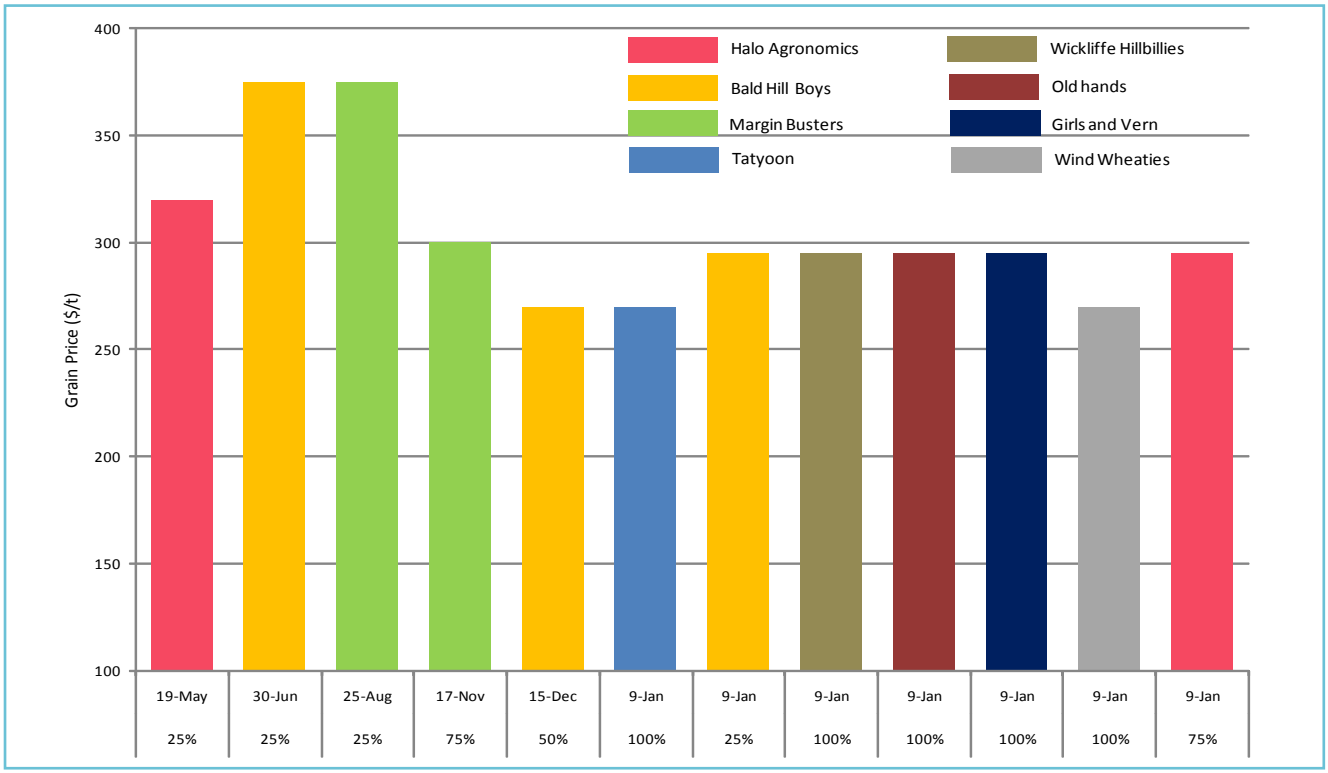
The following chart gives an indication of how the prices varied during the competition:

Table 5: Grain prices ($/t) for H2, APW and AGP from May 1st 2008 until harvest on January 9th.



There were two high points in price during the season; one on 30th June and the other nearly two months later on the 25th August and from there the prices continued to fall with a slight rally near harvest. Even with this information there were still five teams who sold nothing until the day of harvest! The table below shows the selling strategies of the eight teams including what percentage they sold, when and for how much.

Table 6: Sales pattern of the Mininera site teams from May 1st to 9th January



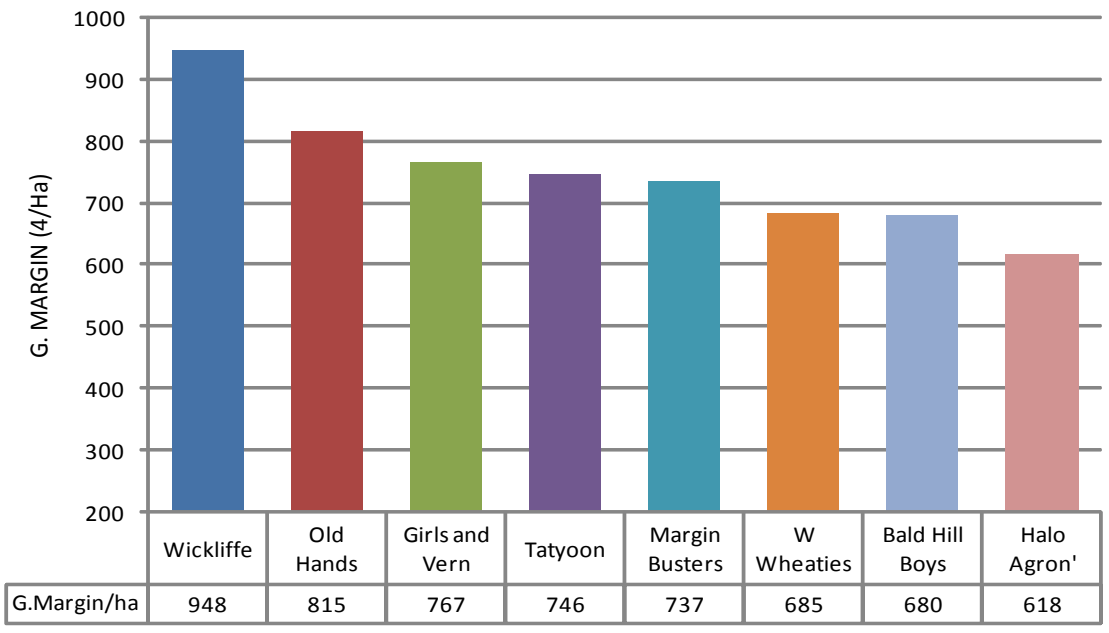
Harvest was on 9th January and from the table above you can see that there were five teams who sold nothing forward during the season. Only the Margin Busters (green bars) sold 100% of their crop before harvest and this strategy improved their margin from $640/ha to $737/ha. The Bald Hill team (orange bars) sold 75% pre harvest and this improved their final margin from $651/ha to $680/ha and they also were the only team to achieve H2 quality. The only other team to sell anything before harvest was the Halo Agronomic team who sold 25%, only two weeks after the start of the competition, but then did no more marketing for the rest of the season.

A number of the teams had the quality of their white wheat downgraded due to screenings being over 5%. The following table illustrates the quality standards and how they impacted on final price.

Table 7: Grain quality –Test weight, Screenings, Protein and Price

Variety	Team	Kg/Hl	Screenings %	Protein %	Deductions	Quality	Price ($/t)
Bolac	Wickliffe	77.9	5.0	11.43	Protein < 11.5%	APW	290.00
Bolac	Old Hands	77.6	5.4	11.83	Screenings > 5%	AUH2	290.00
Bolac	Girls + Vern	77.8	5.1	11.35	Screenings > 5% Protein < 11.5%	AGP	270.00
Amarok	Tatyoon	76.9	9.3	10.70		AGP	270.00
Derrimut	Margin Busters	79.3	6.9	11.38	Screenings > 5% Protein < 11.5%	AGP	293.25
Amarok	Wind Wheaties	77.2	8.3	10.60		AGP	270.00
Bolac	Bald Hill Boys	77.7	4.6	12.45		H2	302.50
Bolac	Halo Agronomic	74.8	5.9	12.08	Screenings > 5%	AUH2	296.25

Table 8: Gross Margins of the Mininera site teams



Above: Streatham Wheat Challenge discussion session

Above: Steve Holden and Mark Steele – aim for 10t/ha