5. GRAZING TRIALS

5.1 Barley grazing trial - Inverleigh, Vic

Location:
Inverleigh Research Site.

Researchers:
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Background/Aim:
Work conducted in 2008 by Southern Farming Systems as part of the Grain & Graze programme, showed that grazing of barley can have an impact on grain protein levels and may make the difference between a barley crop being accepted as malt grade or feed grade. This finding may provide some real benefits to growers who are growing barley on high nitrogen paddocks and may provide rotation alternatives.

GrainSearch Pty Ltd has a number of barley lines, both feed and malt quality types where the response to grazing in terms of grain quality is unknown. The trial is designed to assess the effect of an early grazing on grain quality parameters.

Take home messages:

- Early grazing negatively impacted on grain yields, decreasing yield by approximately 200 kg/ha
- Grazing had no significant effect on grain protein
- Grazing significantly reduced grain test weights and grain retention
- Grazing delayed the time taken to reach 50% heads visible by approximately 3 – 4 days
- Grazing may be useful in decreasing barley scald innoculum pressure, however the impact on yield and grain quality was minimal
- GS5092 had the highest grain yield of the varieties when ungrazed, however was most affected by grazing in terms of grain yield and grain quality. This variety produced more dry matter than any other, so this may have resulted in less moisture available for grain fill.
- There was not much difference between the performance of the other varieties in test

Trial Design:
A replicated (4 rep) split plot trial was established with 5 barley lines (GS1234, GS5092, Westminster, Fairview and Gairdner) being sown. Each variety was sown in 2 plots side by side, with 1 plot being "grazed" and the other plot being left ungrazed.

The trial was sown on 4/6/09 using 100 kg/ha MAP. Grazing was undertaken on 18/8/09 and was achieved by cutting with a lawn mower when the varieties were at approximately GS30. Each variety was cut to approximately 70mm from ground level. Only approximately 10 - 15 cm of leaf was cut, given that the press wheel groove prevented from cutting any lower. For Reps 1 and 2, the cut material was carted off the plots, whereas for Reps 3 and 4 the cut material was not removed.

Figure 1.
Paired plots of each variety with one plot being cut to approx. 70 mm and the other left uncut.

Fungicides:
Tilt was applied on 29/9/2009 to control barley scald

Grain Yield:
Calculated from plots 1.45 metres in width and 13 metres in length

Protein:
Calculated as a percentage of grain contents

Grain Test Weight:
Test weight of grain expressed as kg/hl (kilograms per hectolitre)

Grain Retention:
The % of grain that is above a 2.5 mm sieve

Grain Screenings:
The % of grain and husk that falls below a 2.2 mm sieve

Maturity:
The time taken from sowing to 50% heads visible

Fertiliser:
Nitrogen was applied at the rate of 30 kg/ha (65 kg/ha Urea) on the 14th August just prior to cutting.

Discussion/Conclusions:
This was a well conducted trial that achieved some interesting outcomes. There can be possibly only one criticism and that is the trial was sown 2 weeks later than desirable. This had an impact on early forage production and the dry finish to the season caused difficulties during grain fill. Most varieties were flowering around mid October and this was when we had the onset of the dry weather. The site also experienced some extremely hot conditions during November, with several days over 35 degrees Celcius.

Despite the tough conditions, GS 5092 was still able to produce in excess of 6 T/ha ungrazed (Table 1). This yield was not significantly better than Westminster or Gairdner.

Table 1: Grain Yield Grazed vs Ungrazed (analysed as a complete data set)

Trt	Variety	Ungrazed Yield T/Ha	Sig	Grazed Yield T/Ha	Sig	Grain Yield Depression from Grazing T/Ha	Grain Yield Depression %
1	GS1234	5.695	b	5.603	bc	-0.092	-1.6
3	GS5092	6.175	a	5.608	bc	-0.567	-9.2
5	Westminster	5.830	ab	5.788	ab	-0.042	-0.72
7	Fairview	5.633	bc	5.232	c	-0.401	-7.1
9	Gairdner	5.878	ab	5.948	ab	+0.07	+1.2
LSD (P=.05)		**0.4513**					
Standard Deviation		**0.2995**					
CV		**5.22**					
Grand Mean		**5.74**					

Grazing did have a small negative and significant impact on grain yield – refer Table 2. Grazing reduced grain yield on average by approximately 200 kg/ha. The effect of grazing was different across the varieties, with GS5092 and Fairview being the most negatively affected, down by 9.2% and 7.1% respectively. On the other hand, grazing had a positive impact on the grain yield for Gairdner, increasing grain yield by a small 1.2%, the only variety to have its yield improved by grazing. I suspect that this could have been due to a reduction in the scald infection in the grazed Gairdner plots, compared to the ungrazed. There was a noticeable difference in scald levels within Gairdner at the end of October, whereas there was no discernable difference observed within the other varieties.

Table 2: Overall Effect of Grazing on Grain Yield (across all varieties)

Treatment	Grain Yield T/Ha
Ungrazed	5.842
Grazed	5.635
LSD (P=0.05)	0.202
Prob (F)	0.0456

Table 3: Grain Protein Grazed vs Ungrazed (analysed as a complete data set)

Trt	Variety	Ungrazed Grain Protein %	Sig	Grazed Grain Protein %	Sig	Grain Protein Depression from Grazing %
1	GS1234	13.68	a	13.03	a	-0.65
3	GS5092	12.18	a	12.80	a	+0.62
5	Westminster	13.15	a	13.13	a	-0.02
7	Fairview	12.75	a	12.38	a	-0.37
9	Gairdner	12.68	a	12.30	a	-0.38
LSD (P=.05)		**1.051**				
Standard Deviation		**0.698**				
CV		**5.45**				
Grand Mean		**12.80**				

Table 4: Overall Effect of Grazing on Grain Protein (across all varieties).

Treatment	Grain Protein %
Ungrazed	12.89
Grazed	12.73
LSD (P=0.05)	0.47
Prob (F)	0.4794

Table 5 : Grain Yield and Grain Protein averaged across grazed and ungrazed for each replicate**.**

Replicate	Grain Yield	Grain Protein
1	5.508	12.59
2	6.232	11.89
3	6.016	12.99
4	5.199	13.75

Table 6: Grain Test Weight Grazed vs Ungrazed (analysed as a complete data set).

Trt	Variety	Ungrazed Grain TW (kg/Hl)	Sig	Grazed Grain TW (kg/Hl)	Sig
1	GS1234	62.95	b	62.45	ab
3	GS5092	58.38	c	55.68	d
5	Westminster	64.03	ab	62.65	b
7	Fairview	63.55	ab	63.68	ab
9	Gairdner	64.98	a	65.18	a
LSD (P=.05)		**2.008**			
Standard Deviation		**1.332**			
CV		**2.14**			
Grand Mean		**62.35**			

Table 7: Overall Effect of Grazing on Grain Test Weight (across all varieties)

Treatment	Test Weight (kg/Hl)
Ungrazed	62.78
Grazed	61.93
LSD (P=0.05)	0.19
Prob (F)	0.4672

Table 8: Grain Retention Grazed vs Ungrazed (analysed as a complete data set)

Trt	Variety	Ungrazed Grain Retention %	Sig	Grazed Grain Retention %	Sig
1	GS1234	64.13	ab	59.25	ab
3	GS5092	39.00	c	17.00	d
5	Westminster	65.75	a	56.25	ab
7	Fairview	57.50	ab	51.75	bc
9	Gairdner	57.25	ab	52.50	b
LSD (P=.05)		**13.135**			
Standard Deviation		**8.717**			
CV		**16.75**			
Grand Mean		**52.04**			

Table 9: Overall Effect of Grazing on Grain Retention (across all varieties)

Treatment	Grain Retention %
Ungrazed	56.73
Grazed	47.35
LSD (P=0.05)	5.87
Prob (F)	0.004

Whilst there was a small decrease in grain protein caused by grazing (Table 3), this difference was not significant (Table 4). Hence the main objective of the trial to look at the possible effect of grazing on grain protein did not give any conclusive results. It should be remembered however that with reps 1 and 2, the cut material was removed from the plots, similar to a forage harvesting operation. With reps 3 and 4, the cut material was not removed, simulating a grazing operation. Table 5 tends to suggest that grain protein could have been higher where the cut material was left on the plots, however the data is not conclusive. Further work needs to be undertaken.

The effect of grazing did however significantly lower grain test weights (Table 7). GS5092 had low test weights for both the grazed and ungrazed (Table 6).

One of the major impacts of grazing was to significantly lower grain retention, dropping the average retention from 56.73% to 47.35% (Table 9). The variety GS 5092 was significantly worse than all other varieties for grain retention and was impacted most by grazing (Table 8).

One significant effect of grazing was to delay the maturity by on average of 3 – 4 days (Table 10). That is the time to reach flowering was delayed by around 3 – 4 days. This could have been significant with the dry finish and could explain why the yield and grain retention were adversely affected.

Figure 2. Centre plot Westminster grazed, plot to the left Westminster ungrazed. Taken 23/9/2009

Table 10: Varietal Maturity (days from sowing 4/6/09 to 50% heads visible)

Variety	Maturity Ungrazed	Days	Maturity Grazed	Days	Difference
GS1234	7/10/2009	125	12/10/2009	130	5
GS5092	4/10/2009	122	6/10/2009	124	2
Westminster	7/10/2009	125	10/10/2009	128	3
Fairview	5/10/2009	123	9/10/2009	127	4
Gairdner	6/10/2009	124	9/10/2009	127	3