MALLEE CATCHMENT
TECHNICAL BULLETIN

Technical Bulletin # 19

Grazing Cereals in the Victorian Mallee 2010

Above: Sheep grazing a barley demonstration Photo: BCG.

This technical bulletin summarises the findings of field research conducted to evaluate the suitability of different wheat and barley cultivars for both grazing and grain production, when sown as part of the normal cropping program.

The identification and validation of strategies that improve livestock management and provide soil health benefits is an ongoing priority for the low rainfall Mallee environment. This project assessed the ability of current cereal varieties to recover from grazing; and in doing so provide a dual purpose crop to address late autumn/early winter feed gaps without compromising grain production.

Background

In the Victorian Mallee it can be a challenge to feed sheep in late autumn/ early winter, when stubble has been consumed or lost nutritional value and before pastures have become established for grazing. If rain falls in March and April, oats and barley are commonly sown to generate early feed. The crops' fate is opportunistic; usually grazed more than once and then sprayed out for fallow, cut for hay or harvested for grain, depending

At a glance

- The suitability of different wheat and barley cultivars for both grazing and grain production was evaluated over two seasons (2009 & 2010);
- Dry matter, feed value, grain yield and grain quality were assessed to determine the impact of grazing on grain production and income;
- Results showed that success of grazing crops (feed value and their ability to recover and maintain yield and quality) relies on an early sowing opportunity and a good spring;
- Grazing cereal crops in low rainfall environments is risky, but can provide other systems benefits towards maintaining livestock numbers and health, pasture establishment, weed control, reducing lodging and stubble loads, and providing back-up fodder banks.

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Above: Ungrazed (top) and grazed (bottom) plots at Culgoa, 2010. Photo: Birchip Cropping Group (BCG).

on the season. Alternatively, stock may be supplementary fed or put into containment.

Farmer experience and research from grain growing regions with higher rainfall (e.g. south-east NSW, south-west VIC) have shown that cereals can be successfully grazed prior to the end of tilling (GS30) without compromising grain production. The success of dual purpose crops in these regions has driven interest in assessing the suitability of grazing cereals in low rainfall areas such as the Mallee, where currently there are very little grazing of crops intended for grain production (sown late April onwards), particularly wheat.

This project aimed to address this information gap by evaluating the practice of grazing cereal crops on fodder value and grain production to assist landholders to identify options suitable to their environment and management system.

Two variety evaluation trials (one in 2009 at Woomelang and one in 2010 at Culgoa) and six farmer demonstration sites (four in 2009 at Rainbow and two in 2010 at Nullawil and Jil Jil) were conducted as part of the project.

Variety evaluation trials

In 2009, the Woomelang trial site was sown on 7 May, grazed from 23-27 June at GS14 with 67DSE/ha, and received 209mm growing season rainfall (GSR).

The 2010 Culgoa trial site was sown on 23 April. Extensive locust damage however meant the site had to be resown on 2 June, six weeks after the initial sowing date, losing the early sowing benefits. The site was grazed from 6-9 July at GS13 with 98 DSE/ha, and received 248mm GSR, of which 71mm was in October.

Sites were grazed down to the 'white line' (the point on the stem where the tissue turns from green to white). Once sheep were removed, crops were grown through to harvest, and harvested with a small plot harvester.

Feed value

In both seasons all barley and cereal varieties provided nutritious fodder, meeting the minimum metabolisable energy (above 11MJ kg/DM), crude protein (above 16%) and digestible fibre (above 75% of DM) requirements of pregnant or lactating ewes and lambs. Barley produced more dry matter than wheat, giving it greater feed value overall (Table 1).

In 2009, Hindmarsh and Buloke were standout barley varieties for feed value, but in 2010 Hindmarsh barley performed poorly while Buloke did well. For wheat, Correll, Axe and Yitpi provided similar feed value in 2009, and in 2010 Yitpi was the best.

Table 1: Comparison of grazing days for barley and wheat varieties, at GS14 for Woomelang 2009 and GS13 for Culgoa 2010.

Variety	DSE Grazing Days*	
	2009 - Woomelang	2010 - Culgoa
Hindmarsh	252	11
Buloke	234	95
Gairdner	-	22
Correll	160	53
Axe	162	41
Yipti	165	85
Gladius	-	22
Derrimut	109	17
Lincoln	-	27
Wyalkatchem	141	-
Young	87	-
CLF-STL	114	-

*Grazing days calculated prior to grazing at GS13, using dry matter measurements and feed tests for metabolisable energy, assuming 1 DSE consumes 8MJ/day

Grain yield and quality

In 2009, a drier season with a poorer finish, yield penalties were incurred by Hindmarsh, Axe and Young wheat, the earliest maturing varieties (Table 2).

Protein was unaffected but screenings increased for several grazed treatments (Table 3). Hindmarsh barley, Wyalkatchem and Derrimut wheat were the best cereals to graze in 2009.

In 2010, above average rainfall in spring extended the growing season, allowing the grazed barley and wheat varieties to recover and maintain yields (Table 2) and quality (Table 3), regardless of variety or maturity in 2010. For both barley and wheat varieties, grazing increased protein, while screenings were unaffected (Table 3). Buloke barley and Yitpi wheat had the highest feed value and gross income in 2010.

Table 2: Comparison of grain yield performance for ungrazed and grazed barley and wheat varieties, Woomelang 2009 and Culgoa 2010.

Variety	2009 - Woomelang			2010 - Culgoa		
	Grain yield (t/ha)		Yield penalty (t/ha)	Grain yield (t/ha)		Yield penalty (t/ha)
	Ungrazed	Grazed		Ungrazed	Grazed	
Hindmarsh	2.29	1.97	0.32	4.96	4.77	ns
Buloke	1.73	1.75	ns	4.62	4.67	ns
Gairdner	-	-	-	4.60	4.67	ns
Correll	1.80	1.69	ns	3.40	3.44	ns
Axe	1.70	1.55	0.16	3.62	3.25	ns
Yipti	1.58	1.48	ns	3.24	3.43	ns
Gladius	-	-	-	3.08	3.09	ns
Derrimut	1.83	1.76	ns	3.28	3.21	ns
Lincoln	-	-	-	2.72	2.95	ns
Wyalkatchem	1.88	1.74	ns	-	-	-
Young	1.88	1.59	0.29	-	-	-
CLF-STL	1.40	1.48	ns	-	-	-

ns – not significant

Variety	2009 - Wommelang				2010 - Culgoa			
	Protein (%)		Screenings (%)		Protein (%)		Screenings (%)	
	Ungrazed	Grazed	Ungrazed	Grazed	Ungrazed	Grazed	Ungrazed	Grazed
Hindmarsh	13.6	14.5	1.9	2.5	9.7	10.2	2.3	1.9
Buloke	14.0	14.4	2.5	5.8	9.4	10.5	3.0	2.5
Gairdner	-	-			9.7	10.5	2.4	3.0
Correll	13.5	12.8	5.3	9.4	9.4	9.7	2.7	2.6
Axe	13.2	12.6	3.5	4.2	9.8	10.4	1.4	1.8
Yipti	13.6	14.1	4.7	5.2	9.8	10.0	1.2	2.3
Gladius	-	-	-	-	9.8	10.5	1.7	2.0
Derrimut	12.5	12.5	5.5	5.8	9.8	10.1	3.7	4.3
Lincoln	-	-	-	-	9.5	9.7	4.6	4.3
Wyalkatchem	13.1	13.0	1.8	2.1	-	-	-	-
Young	12.7	12.6	3.6	5.6	-	-	-	-
CLF-STL	14.9	14.4	1.0	4.2	-	-	-	-
Sig. diff LSD (P<0.05) CV%	**ns**		**P<0.001 1.3 21.4%**		**P(B)=0.002 P(W)=0.003 0.47 0.24 5.4 4.2**		**P(B)=0.014 0.25 13.9**	**P(W)=ns**

ns – not significant (B) – barley (W) – wheat

NB. 2009 Barley and wheat data was analysed together, and used variety (which included grazed and ungrazed) for treatment
2010 Barley and wheat data was analysed separately, and used grazing*variety for treatment
2010 Culgoa protein stats are for 'grazing effect' only, screening statistics are for 'grazing*variety' effect

Farmer demonstrations

Farmers chose paddocks out of their normal cropping programs, in which 1ha areas were fenced off and grazed. Sites were grazed between GS13-15, down to the 'white line'.

Once sheep were removed, crops were grown through to harvest, and grain yields estimated using DM cuts in 2009, and with a small plot harvester in 2010.

Feed value

In 2009, crops were sown within a few days of each other, with feed values ranging between 143-189 grazing days.

In 2010, an early sown crop, on a very good paddock produced 799 DSE grazing days worth of feed at GS15. In contrast, a late sown crop (followed by little rainfall for June) at Jil Jil produced a lot less feed by GS15; a similar amount to the Culgoa replicated trial sown on 2 June.

Grain yield and quality

In 2009 at Rainbow, there were no yield penalties from grazing. Protein changes were variable between demonstration sites, but there was a trend towards higher screenings.

In 2010, later grazing (GS15) of an early sown broadacre demonstration maintained production, while a later sown crop suffered reduced feed value and a protein increase that cost the grazed crop malt grade. This was the second season for this farmer that grazing had reduced the value of this farmer's crop, which was not countered by the livestock income.

The grazing strategy, either crashed grazed or lightly stocked, did not make any difference to crop recovery.

Participating farmer observations

- In-crop herbicide application had to be delayed until after stock were removed because of chemical withholding period;
- Crops grew back very well after grazing, but were a few days behind in maturity at flowering time compared with ungrazed crops;
- There was lower vetch contamination in the grazed area (the ewes may have grazed them down or pulled them out);
- There was reduced amounts of straw where crops were grazed which will make sowing easier (better trash flow) next season;
- Several already sow paddocks to cereals (barley, barley/vetch, or oats/medic mixes) each season for early feed.

Key findings

- Barley produced more feed than wheat, but both barley and wheat crops provided adequate energy, protein and fibre for pregnant and lactating ewes and their lambs;
- The success of grazing crops (feed value and their ability to recover and maintain yield and quality) relies on an early sowing opportunity and a good spring;
- In 2009 and 2010 (average and well above average spring rainfall seasons respectively) grain yield and quality

Above: Variety evaluation trial at Culgoa, 2010. Photo: BCG.

responses of early and mid maturing barley and wheat to grazing were variable;

- In 2009, grain yield of grazed crops was compromised for earlier maturing varieties, screenings increased, but protein did not change. In 2010, grain yield and screenings were maintained in grazed crops, but protein increased (potentially detrimental to malting barley);
- Early sowing (from late April to the first week of May), early grazing (before GS30) and use of mid maturing varieties will enhance early feed value and the ability of the crop to recover from grazing;
- In general, it is risky grazing crops intended for grain in this low rainfall environment due to variable seasons and the potential threat to yield and quality which can quickly change the value of the crop;
- However, grazing a cereal crop also offers other systems benefits towards maintaining livestock numbers and health, pasture establishment, weed control, reducing lodging and stubble loads, and providing back-up fodder banks.

Further Research

Grain & Graze II will use this 2009 and 2010 data in a national project to calibrate Agricultural Production Systems Simulator (APSIM) to model the response of crops to grazing. It will also continue to assess and communicate the potential of grazing cereal crops through evaluations of varieties (shorter season and dual purpose), time of sowing and time of grazing.

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Further Information

The information for this bulletin has been taken from: *Grazing Barley and Other Cereals in the Mallee – Birchip Cropping Group 2010* and *Communicating Best Practice of Grazing Cereals – Birchip Cropping Group 2010.*

Copies of these reports can be downloaded from the Mallee CMA website: **www.malleecma.vic.gov.au**

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