Dual Purpose long season winter wheats to improve Productivity in Western Australia

Mohammad Amjad[1], DL Sharma[2], Ben Curtis[3]and W.K. Anderson[4]

[1] The Centre for Cropping Systems, DAFWA, PO Box 483, Northam WA 6401 Australia, Email mamjad@agric.wa.gov.au
[2] The Centre for Cropping Systems, DAFWA, PO Box 483, Northam WA 6401 Australia
[3] DAFWA, Esperance WA 6450 Australia
[4] DAFWA, 444 Albany Highway, Albany WA 6330 Australia

Abstract

Long season winter wheat trials were established in the south coast environments of Western Australia (at Gibson and Jerramungup) to demonstrate opportunities for cereal growers to improve green feed availability for livestock (in late autumn to early winter), then to harvest for yield and premium grain quality.

Dry matter of 1.4 t/ha (1.0 – 1.6 t/ha for the first grazing) and 2.2 t/ha (1.8 – 3.0 t/ha for the second grazing) was removed in late June and July by simulating grazing. Grazing generally delayed the flowering by 1 to 2 weeks compared to ungrazed.

Dual purpose wheats (EGA Wedgetail and Wylah, which are winter types with good grain quality) have shown the potential to benefit both livestock and crop production by spreading extreme climatic risks (eg. frost, drought, waterlogging) through delayed maturity with early sowings. Both dual purpose wheats yielded in the range of 4 t/ha at Gibson and 2.6 t/ha at Jerramungup, providing the additional benefit of grazing. Grain quality (including screening, fungal staining and low falling numbers) was the major problem with all long season wheat varieties due to weather damage and the late harvest after mid December and early February. The small grain screening was comparatively lower for the dual purpose wheats. Similar results were found in a variety by time of sowing trial in the central wheatbelt at Merredin.

Key Words

Dual purpose wheats, variety evaluation, grazing and grain, wheat biomass, grain yield and quality

Introduction

Whole-farm benefits of including grazing wheat in high rainfall areas were assessed and advocated by Dove and Salmon (2005). At Ginninderra (near Canberra, Australian Capital Territory), they studied the impact of growing a forage crop between the pasture and winter wheat phases, on soil water and livestock production. The liveweight gains for sheep on dual purpose wheat were about 300g/day.The gross value of the liveweight gain varied from $843/ha to $1003/ha when crop production costs were taken out. The limited trial data in our trials have previously indicated that the dual purpose winter wheat varieties (such as EGA Wedgetail and Wylah) could better be suited to Esperance environments if an early sowing opportunity exists in the season (Amjad et al. 2005). Trials were conducted during 2005 to highlight and demonstrate the importance of dual purpose wheats to improve the grain feed availability for livestock (in late autumn to early winter), spread frost and drought risks and increase production of premium grains.

Methods

Grazing wheat trials were established in 2005 at Gibson and Jerramungup. Long season wheat varieties including Wylah and EGA Wedgetail (the dual purpose grazing and premium grain wheats) were sown on both locations (Table 1). The trials were mowed or slashed and the cut biomass was removed from plots to simulate grazing at bout 6-8 weeks after sowing. Samples (1m x 2 rows per plot) were collected to

assess green biomass, dried and weighed. Flowering dates were recorded at both locations. Trials were mechanically harvested and grains were sampled for grain quality analyses.

Winter wheats trial at Gibson

Trials were sown at Gibson on 12th April (1st time of sowing) and 5th May (2nd time of sowing) on sandy soils after canola in 2004. Plots were sown 20 m long with 6 rows spaced at 240mm. There were three replications and half of the sown plots (10 m) across each replicate were randomly grazed (cut) in time of sowing blocks. The grazing was simulated on 9th June for the 1st time of sowing and on 8th July for the 2nd time of sowing.

Winter wheats trial at Jerramungup

The trail was sown on 8th April at Jerramungup (Paul Barrett's property) after pasture in 2004, and grazing was simulated twice (two times of grazing) on 30th June (in front half of the plots) and 27th July in (in back half of the plots. Plots were sown 20m long with 7 rows spaced at 220mm. Further treatments of date of harvest (1st harvest in December 2005 and the 2nd harvest in late January 2006) were imposed on the ungrazed plots to study the weather damage susceptibility of these long season wheats. The 2nd time of harvest is not yet completed and data are not available at reporting.

Table1. Long season winter wheats and dual purpose wheats tested during 2005.

S. No.	Variety	Test location	Comments
1	Currawong	Gibson	Winter wheat, Feed quality
2	EGA Wedgetail	Gibson and Jerramungup	Dual purpose - graze and premium grain wheat, Hard in NSW but APW in WA
3	IWWCAN5-6	Gibson and Jerramungup	Canadian winter wheat. Quality unknown.
4	Lorikeet	Gibson and Jerramungup	Winter wheat, ASW in NSW but feed in WA
5	Marombi	Gibson	Winter wheat, ASW in NSW but feed in WA
6	Thornbill	Gibson and Jerramungup	Winter wheat, soft biscuit quality in NSW but AGP in WA
7	WAWHT1282	Jerramungup	Longer season cultivar but not a winter wheat
8	Wylah	Gibson and Jerramungup	Dual purpose - graze and premium grain wheat. Prime Hard in NSW but APW in WA.

Results

2005 was a comparatively wet year with a very early break providing an opportunity to sow early. However, this resulted in severe waterlogging both at Gibson and Jerramungup followed by devastating

frosts in August and October. The softer finish of the season resulted in average to above average yields at Gibson and Jerramungup. No major foliar disease was detected in 2005 in either trial.

Grain quality data for both trials are being measured and not yet available. Based on previous research and field experience with EGA Wedgetail and Wylah on the South Coast, they are likely to produce premium quality grains (with high falling numbers) when sown at the same time as spring wheats.

Winter wheat biomass and flowering dates

At Gibson, 1.0 t/ha (0.9 – 1.1 t/ha) of dry matter was removed by simulating grazing. At Jerramungup, 1.4 t/ha (1.0 – 1.6 t/ha for the first sowing) and 2.2t/ha (1.8 – 3.02 t/ha for the second sowing) of dry matter was removed by simulating grazing. The trial site was heavily waterlogged throughout the season.

Grazing generally delayed the flowering by 1 to 2 weeks compared to ungrazed at both locations (Table 2).

Grain yield results

At Gibson, the grazed wheats yielded significantly better (on average 1 t/ha) for most varieties compared to ungrazed when sown in April but there was no difference in yield when sown in May (Figure 1). April sowing yielded up to 1 t/ha more than the May sowing.

In case of dual purpose wheats at Gibson, the time of sowing and grazing had no effect on the yield of EGA Wedgetail but Wylah yielded significantly better when sown in April and grazed. There was no difference in yield with grazing when sown in May.

At Jerramungup, the grazed wheats yielded on average 2.3 t/ha compared to the ungrazed wheat of 2.9 t/ha, but there was no yield difference between two times of grazing (Figure 2).

In the case of dual purpose wheats at Jerramungup, EGA Wedgetail and Wylah yielded 4 and 8 % better than the site average of 2.5 t/ha.

Table 2. Flowering dates of long season wheats and dual purpose wheats at Gibson and Jerramungup.

S No.	Variety	Gibson (April sowing)		Gibson (May sowing)		Jerramungup (April sowing)		
		Ungrazed	Grazed June	Ungrazed	Grazed July	Ungrazed	Grazed June	Grazed July
1	Currawong	19-Sep	27-Sep	4-Oct	11-Oct	?	?	?
2	EGA Wedgetail	19-Sep	27-Sep	27-Sep	4-Oct	20-Sep	30-Sep	6-Oct
3	IWWCAN5-6	27-Sep	4-Oct	11-Oct	19-Oct	30-Sep	6-Oct	14-Oct
4	Lorikeet	19-Sep	27-Sep	27-Sep	4-Oct	21-Sep	22-Sep	23-Sep

5	Marombi	27-Sep	4-Oct	4-Oct	11-Oct	?	?	?
6	Thornbill	19-Sep	27-Sep	4-Oct	11-Oct	30-Sep	6-Oct	14-Oct
7	WAWHT1282	?	?	?	?	15-Sep	20-Sep	14-Oct
8	Wylah	19-Sep	27-Sep	4-Oct	11-Oct	30-Sep	30-Sep	6-Oct

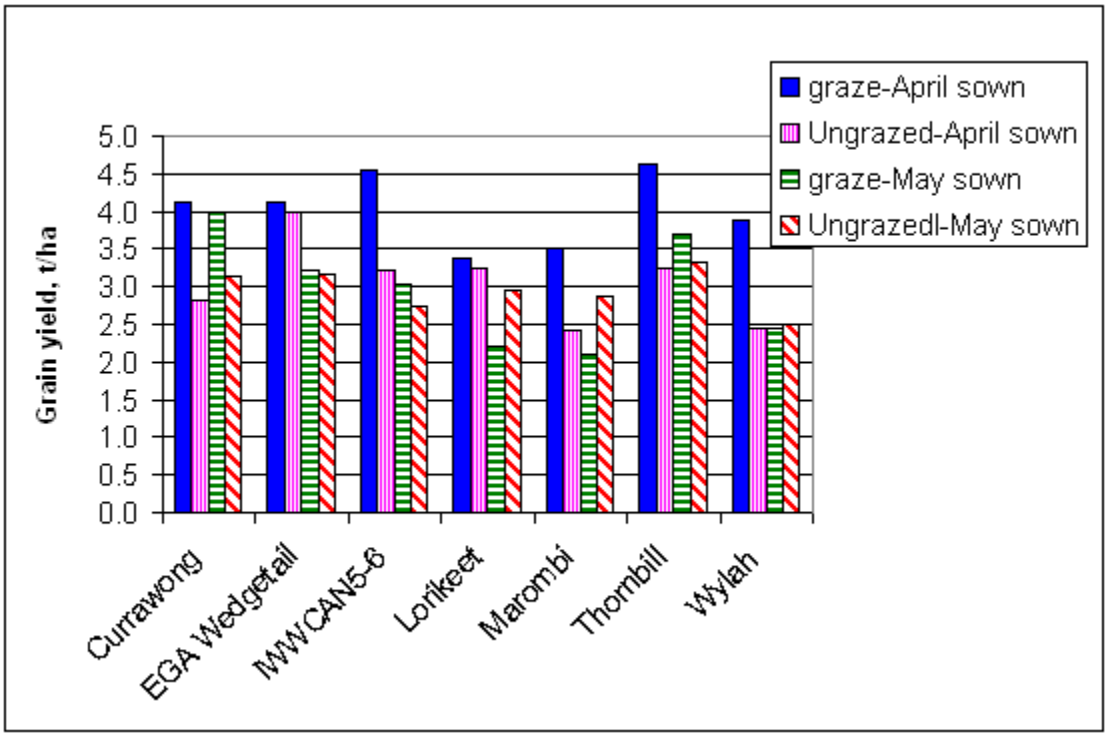

Figure 1. Grain yield of grazed and ungrazed winter wheats sown in April and May at Gibson (lsd for grazing treatment: 0.38 t/ha P<0.05)

Grain quality

Grain quality was the major problem with all long season wheat varieties due to weather damage and the late harvest after mid December and early February. Grain quality results including protein, screening, hectolitre weight and falling numbers are presented in Table 3. Dual purpose wheats (EGA Wedgetail and Wylah) produced comparable or better grain quality compared to other long season wheats. The small grain screening was comparatively lower for the dual purpose wheat. Similar results were also found in a variety by time of sowing trial in the central wheatbelt at Merredin in 2005.

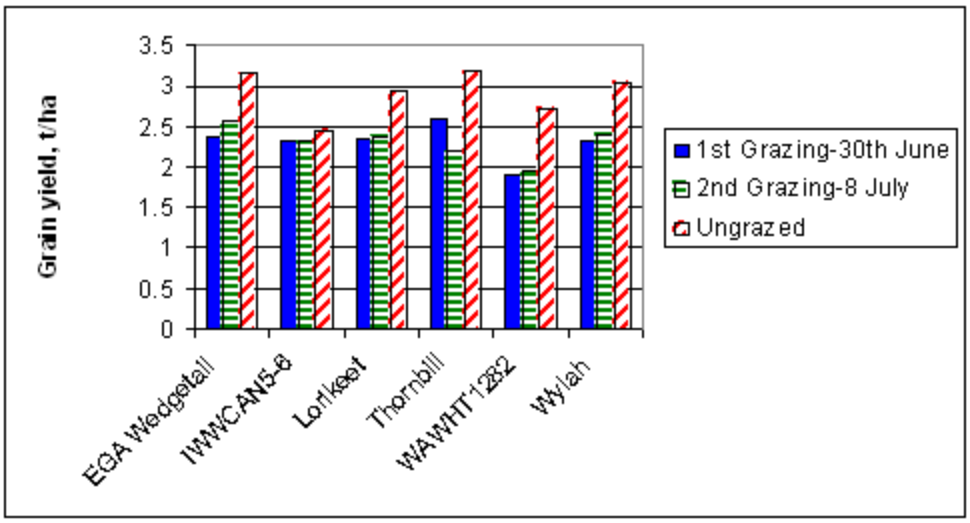

Figure 2. Grain yield of grazed and ungrazed winter wheats at Jerramungup in 2005 (lsd for grazing treatment: 0.28 t/ha P<0.05)

Table 3. Grain quality results of grazed and ungrazed winter wheats at Jerramungup in 2005

?	Grain quality (harvested on 21/12/06)			Ungrazed (harvested 6/2/06)
Variety	1st Grazing-30th June	2nd Grazing-8 July	Ungrazed	
?	Grain protein (%)?		?	?
IWWCAN5-6	8.2	8.3	8.0	9.9
Lorikeet	9.0	8.5	8.8	10.4
Thornbill	7.7	8.3	7.4	9.6
WAWHT1282	8.5	8.2	9.4	10.6
EGA Wedgetail	8.9	8.6	9.1	10.3
Wylah	8.7	8.4	8.2	9.9
?	Small grain screening (%)?		?	?
IWWCAN5-6	12.6	10.9	14.5	8.8

Lorikeet	9.7	12.1	5.7	11.7
Thornbill	9.2	22.3	9.0	13.8
WAWHT1282	9.6	11.4	9.8	7.3
EGA Wedgetail	6.5	8.3	4.9	5.1
Wylah	10.4	6.9	6.2	7.4
?		Hectolitre weight (Kg/hl)		?
IWWCAN5-6	72.3	69.8	72.0	59.2
Lorikeet	73.4	76.7	74.7	62.2
Thornbill	73.5	71.8	73.2	60.0
WAWHT1282	69.5	72.4	68.1	58.7
EGA Wedgetail	69.8	70.3	71.6	57.2
Wylah	70.4	73.1	75.8	62.2
?	**Falling numbers**	?	?	?
IWWCAN5-6	244	231	159	62
Lorikeet	261	238	170	62
Thornbill	306	279	151	61
WAWHT1282	272	255	78	62
EGA Wedgetail	287	239	158	62
Wylah	171	221	187	62

Conclusion

The trials results of 2005 indicate that dual purpose wheat varieties (such as EGA Wedgetail, and Wylah) are potentially better suited if an early sowing opportunity exists in the season.

Both dual purpose wheats not only yielded better but also provided an additional benefit of grazing.

Potential advantages of dual purpose wheats

- Premium grade wheat, not feed
- Potential to benefit both livestock and crop production
- Good resistance to rusts and weather damage (some data available on Wylah and EGA Wedgetail from the Esperance region)
- May help to reduce frost risks due to delayed maturity when sown early.
- Might help to produce better yield after grazing if a dry spring occurs (experience from eastern states in 2003/2004)
- Produce better yield and grain quality when sown compared with normal wheats (Eg. Wylah in 2001 SEPWA trials)

Management of dual purpose wheats

- Sow before late April if possible, particularly in low lying areas
- Split application of nitrogen is needed at sowing and then after grazing
- Graze stock (sheep or cattle) at the tillering stage, about 6 – 8 weeks after sowing
- De-stock before stem elongation to prevent head removal by grazing
- Wheat can cope well with grazing pressures of 25 DSE/ha without affecting grain yield (Dove and Salmon, 2005)
- Avoid grazing during very wet periods to avoid bogging and compaction
- If you don't intend grazing, manage as a normal wheat crop and harvest premium quality grains.

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