

# Turning sowing times on their head- spring sown winter habit canola and wheat in a mixed farming system

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## Abstract

Diversification in a farming enterprise is an essential risk management tool that has led to many cropping farmers in southern Australia high rainfall zone (HRZ) incorporating livestock into their business. With an increasing area of land being sown to canola every year, the ongoing fit for livestock is becoming a juggle. The introduction of European long season winter type canola varieties into Australia has enabled growers to take advantage of the strong vernalisation requirement in these varieties by sowing earlier, in some cases out of season and effectively getting two crops from the one sowing pass. Sowing in spring and treating the canola as a forage rape over the summer and autumn months, providing large amounts of high quality feed, before removing livestock and carrying the crop through to harvest with no yield penalty, has a niche fit in many mixed farming operations in the region. More recently, winter habit wheat has also been sown in spring, survived the summer and harvested for grain 13 months later.

## Key words

Dual purpose crops, grazing, sheep, early sowing, southern HRZ

## Introduction

Grazing cereals has proven to be a major opportunity for mixed livestock and cropping farmers in Southern Victoria. If managed correctly, the crop can provide ample amounts of forage over winter and go on to produce grain without a penalty on yield. With more and more land sown to canola in the high rainfall zone (HRZ), finding the fit of canola in a mixed farming system has been the focus of more recent research. Sprague et al (2014) reported that sowing long season winter canola varieties in early autumn and grazing into winter in southern NSW can be very successful, however in southern Victoria, dry autumns and delayed stubble burning can make an early autumn sowing difficult. It is the vernalisation requirement that prevents these winter habit crops from bolting, and essentially means they can be sown in the spring of one year and will not have their vernalisation requirement met (and will not turn reproductive) until a prolonged cold period experienced over winter.

Establishing the crop in spring, carrying it through as a forage crop until autumn before locking it up for grain harvest is proving to have many management advantages for southern high rainfall growers, particularly those who also run livestock (Paridaen & Kirkegaard, 2015). With slugs remaining a huge threat to autumn sown canola crops in the southern HRZ, having an established spring sown crop in the period of high slug pressure has great appeal to growers battling these pests. Having access to high quality green feed in the traditional 'feed gap' of perennial pastures and still being able to harvest grain is what makes this rotation of great interest to the mixed farmers in the southern HRZ.

## Method

In November 2011, a replicated field trial was sown at Dunkeld in Victoria's south west to investigate the best management for a spring sown dual purpose canola. Plots were 12m by 2m and sown into an area of failed barley (waterlogged). Treatments were replicated four times, in a randomized complete block design with factorial analysis (number of grazings x grazing intensity) resulting in three grazing durations and two grazing intensities (light and heavy). A light grazing involved the removal of newest leaves, often leaving older leaves intact. Heavy grazing was grazed down to stalks with no dry matter remaining. Grazing management of the crop is outlined in Table 1, detailing the dates of the three grazings as well as the dry matter consumed during this time. The trial was grazed for 55 days in total, with grazing commencing at the end of January 2012 and ceasing at the start of May 2012. The area was grazed by dry ewes at a stocking rate of 34 DSE/ha. After grazing was completed, the gate was closed and the trial was left to grow into a grain producing crop and direct headed at crop maturity.

November 2012 saw another trial sown at Gnarwarre, Victoria to further investigate the viability of the rotation. 12m x 1.6m plots were replicated four times using a randomised complete block design with a two way factorial analysis (variety x grazing). Grazing occurred on the grazed treatments at the end of January 2013 and the start of March with the ungrazed plots protected by exclusion cages. Forage rape variety, Winfred, was also included as a comparison for summer feed.

Four winter habit wheat varieties were sown at Lake Bolac, Victoria in November 2013 in order to test the theory that they would behave in a similar way to winter canola when sown in spring. A randomised complete block with four replicates of each treatment as a two way factorial (variety x grazing) was fenced and received a single grazing from sheep in April 2014.

## Results

Several field experiments have demonstrated that European winter canola types have suitable phenological characteristics to allow for their use as biennial spring-sown crops, providing significant forage (2500 to 4000 kg dry matter per ha) for grazing while remaining vegetative through the summer and autumn and recovering following vernalisation in winter to produce high seed yield (2.5 to 5.0 t/ha). Results for one replicated trial sown at Dunkeld in Victoria's south west are presented below (Table 1).

### *Field trial 2011/2012 Dunkeld VIC*

Grazing commenced at the end of January 2012 following some decent rainfall in the summer to enable the crop to get up and away, with 3000 kg/ha of good quality dry matter available.

**Table 1. Dry matter production and grain yield for spring sown Taurus canola at Dunkeld in 2012**

Grazing (no).	Intensity of grazing	Grazing times	Days grazed	Total dry matter consumed (kg/ha)	Grain yield (t/ha)
1	Light	31 Jan - 22 Feb	22	494	2.8
	Heavy	31 - Jan - 5 Mar	34	2316	2.5
2	Light	31 Jan - 22 Feb 29 Mar - 5 Apr	29	2763	2.9
	Heavy	31 - Jan - 5 Mar 29 Mar - 10 Apr	46	2944	2.5
3	Light	31 Jan - 22 Feb 29 Mar - 5 Apr 26 Apr - 3 May	36	3488	2.7
	Heavy	31 - Jan - 5 Mar 29 Mar - 10 Apr 26 Apr - 7 May	55	4031	2.4
		LSD <sub>(p=0.05)</sub>			NS
		Sown in Spring, ungrazed			1.9
		Sown in Autumn, ungrazed			2.3

In 2012, grazing over summer increased grain yield compared to no grazing. Sowing in spring with no grazing yielded 1.9 t/ha with optimal grazing yielding 2.7 t/ha. Taurus sown at the conventional time (April) yielded 2.3 t/ha. Observations were that plants that were grazed had branched more and produced a denser canopy with all stems producing pods for grain. Over 4000kg/ha of high quality dry matter was removed through the heaviest grazing, whilst still producing a grain yield of 2.4t/ha.

### *Field Trial 2012/2013 Inverleigh VIC*

The 2013 season was almost completely opposite to 2012, with extremely dry and hot conditions from spring sowing until the break in May 2013. Table 2 indicates that dry matter production was down on 2012 (over a tonne less feed) however the value of the green feed in 2013 would most likely outweigh the extra tonne in the favourable 2012 season.

**Table 2. Dry matter production and grain yield for several winter canola varieties sown in spring 2012 and harvested in December 2013, Inverleigh VIC**

Variety	Time of sowing	Grazing	Spring estab. (plants/m <sup>2</sup> )	Autumn survival (plants/m <sup>2</sup> )	Reduction in plants (%)	Summer dry matter (t/ha)	Grain yield, manual harvest (t/ha)
Taurus	Spring	Grazed	47	26	-43%	2.5	4.0
		Ungrazed	42	30	-29%		5.0
	Autumn			8			3.6
Hyola 971 CL	Spring	Grazed	41	28	-28%	2.4	4.6
		Ungrazed	42	28	-28%		5.2
	Autumn			14			4.4
Hyola 930	Spring	Grazed	42	26	-38%	2.2	4.9
		Ungrazed	39	36	-4%		5.2
	Autumn			11			4.1
CB 143 CL	Spring	Grazed	43	24	-44%	2.3	4.2
		Ungrazed	38	30	-18%		4.5
	Autumn			17			3.9
CB Sherpa	Spring	Grazed	38	24	-35%	2.8	4.7
		Ungrazed	43	27	-36%		5.2
	Autumn			Not sown			-
Winfred rape	Spring	Grazed	62	31	-49%	2.8	-
LSD (p=0.05)			12	7	NS	NS	0.8

*Spring sown winter wheat field trial 2013/14, Lake Bolac VIC*

Four winter habit wheat varieties were sown in order to test the theory that they would behave in a similar way to winter canola when sown in spring. Results are displayed in Table 3, showing that all varieties whether grazed or not, provided a grain harvest of 3t/ha or over as well as summer feed around 750-800kg DM/ha.

**Table 3. Grain yield, protein and dry matter of spring sown wheat varieties at Lake Bolac, VIC**

	Grain yield (t/ha)	Protein (%)	Dry matter (kg/ha)
Revenue, grazed	3.3	11.2	750.0
Manning, ungrazed	3.3	10.5	-
Einstein, grazed	3.3	12.1	793.5
Frelon, ungrazed	3.2	12.3	-
Revenue, ungrazed	3.2	10.8	-
Frelon, grazed	3.1	12.0	810.0
Manning, grazed	3.0	12.4	813.6
Einstein, ungrazed	3.0	11.4	-
LSD (p=0.05)	NS	0.9	-

Deciding how hard to push the crop at grazing depends on the value of the feed, how the season is going and an individual's attitude to risk. Every grower will have a point at which they feel the benefits and risks are balanced. We aimed to push the crop at different levels to find a 'best bet' and also have a 'worst case' scenario. In 2012, the number of times the crop was grazed had a small effect on yield. Grazing twice produced the best result, yielding 0.1 t/ha more than grazing once and 0.2 t/ha more than grazing three times. Although there was a yield penalty by grazing three times compared to two times, the third grazing supplied

an additional 1000 kg/DM/ha of high quality feed at the beginning of May. Heavy grazing reduced yield compared to light grazing irrespective of the number of times it was grazed. However the reduction in yield was small and the heavy grazing produced 4000 kg/DM/ha of feed compared to 1400kg/DM/ha when lightly grazed.

When deciding on stocking rate and grazing intensity, there can be a trade-off between the value of the feed over summer and autumn and final grain yield suggesting that attitude and preference will vary between growers. Crop stands thinned by 20 to 30% during summer, and this was exacerbated by grazing, but surviving stands of around 30 plants /m<sup>2</sup> were sufficient to support high yields.

At Gnarwarre in 2013, there were no significant differences within varieties when looking at yield under spring and autumn sowing except for Taurus which came from a seed source of very low germination. Sowing in spring, whether there was grazing or not, had no role in the final yield performance. The spring-sowing approach has potential to replace the existing forage rape-spring cereal sequence, or to add a further option to the existing autumn-sown winter canola in areas such as southern Victoria, where early autumn establishment can be problematic and spring-sown crops can better withstand attack by pests and winter water-logging that limits yield of autumn-sown crops. Spring sown canola provides an established and resilient plant stand come autumn which is a major drawback in slug prone paddocks. The plants are at cabbage stage when slug activity is at its peak and risk of plant damage or loss is very low and input costs markedly less.

Somewhat surprisingly, winter wheat behaved very similarly to winter canola when sown in spring and carried over summer with grazing occurring early autumn. Although the summer was hot and dry, the wheat managed to survive and continued to tiller once the autumn break arrived. At harvest, grain yields of the spring sown wheat averaged 3.2t/ha.

This work has seen canola and wheat withstand some of our hottest, driest summers and still perform well. Given these crops can sometimes struggle to establish and grow well in our wet cool autumns, spring sowing allows these plants to display just how tough they can be.

#### *Take home messages*

- Winter habit canola has been successfully sown in spring, grazed over summer and harvested for grain in 2012, 2013 and 2014
- Establishing canola in spring means larger, more resilient plants in autumn with less impact from slugs and waterlogging
- Forage value comparable to commercially available dedicated forage rapes over summer and autumn with added benefit of oil seed production
- Grazing management and timing of stock removal is proving to have an impact on grain yield
- Vernalisation means that winter wheats could be used in the same way

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