


T PRANCE RURAL CONSULTING

Goolwa cereal dry matter trial

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Summary

- Moby, Barque and Buloke barleys had the best combination of early vigour and high emergence

- Barque was the most productive cultivar at the early-mid tillering stage, followed by Outback oats, Moby barley, Hindmarsh barley then Wintaroo oats. Estimated growth rates from emergence to late tillering (75 days) varied from 38 kg/ha/day for Barque and Hindmarsh barleys, 37 kg/ha/day for Wintaroo oats, 35 kg/ha for Outback oats and 33 kg/ha/day for Moby barley

- At late tillering, Hindmarsh barley produced the highest significant amount of dry matter at both sites, followed by Barque barley, Wintaroo oats, Southern Green ryecorn, Moby barley, Buloke barley and Outback oats all close together.

- At stem elongation (GS 35-39) Moby, Hindmarsh and Barque barleys produced the largest amount of dry matter.

- Total dry matter production (to end September) **didn't vary a lot between cultivars** but tended to favour later maturing cultivars such as Buloke barley and Tetila annual ryegrass. Agronomic factors such as seeding rate and N application rates were not assessed in this trial and may have as big an impact on total dry matter production as cultivar selection.

- Both triticale's and ryecorn were disappointing, and had no advantages over either barley or oats.

- Companion species for Italian annual ryegrass. Hindmarsh barley and Outback oats are options to consider with a combination of good early vigour and lower competition with the ryegrass in late winter/early spring.

- On the other hand, Barque barley was highly competitive with Wimmera annual ryegrass, and consequently expected to out-compete Italian ryegrass.

Aim of trial.
Measure early vigour, winter and spring dry matter production from a range of cereal cultivars (oats, barley, triticale and cereal rye) in two sites in the Goolwa area, with an average annual rainfall of 470mm and April to October average 360mm (77% annual average).

Locations.

1. **David Skewes** property. 32 ha paddock located near 1507 Goolwa Road, Currency Creek, belonging to Jim Whiting (Jim's paddock) and leased by David Skewes. Undulating well drained loamy soil over red clay. Paddock had not been recently cropped, and was spray topped September 2013, then spayed again twice with glyphosate during summer/autumn to control couch. Site selected contained no couch, was slightly heavier soil than the paddock average, and located near an old stock camp with capeweed residues. Paddock was hard grazed at time of sowing (no residues present) to about 500 kg/ha FOO. No pre-sowing herbicide sprays were applied, but 3 l/ha Sprayseed® 250 was applied May 11th (5 days post sowing) to control capeweed and geranium.

   This paddock had not been soil tested, but nearby paddocks had a pH 5.5_{water}, marginal soil P and S, with moderate K levels

2. **Tony Skewes** property**.** 22 ha East Line paddock (adjacent Kessel Road, Goolwa). Shallow brown sandy loam over brown clay, subject to waterlogging. Paddock had been regularly cropped in previous years including 2013. Site selected was mostly bare at sowing apart from small areas of loose cereal residues, including header chaff rows, ranging from 0-2 t/ha (average 0.8 t/ha). Heavier stubble patches were raked off by hand before sowing. The paddock was sprayed with glyphosate, oxyfluorofen (Goal®) and dimethoate on May 4th and 50 kg/ha MAP fertiliser broadcast just before sowing.

   Soil test results March 2010 showed pH_{CaCl2} 5.5, $P_{colwell}$ 38 mg/kg, S 10 mg/kg, $K_{exchangeable}$ 330 mg/kg and organic matter 3%

The following cultivars were sown at each site. Tetila Italian ryegrass, Moby, Buloke, Hindmarsh and Barque barley, Outback and Wintaroo oats, Southern Green ryecorn, Monstress and Rufus triticale.

Seeding rate of each cultivar 120 kg/ha, except Tetila Italian ryegrass 20 kg/ha.

Seed kindly supplied by Seed Distributors (Moby barley and Outback oats), PGG Wrightson Seeds (Southern Green ryecorn and Monstress triticale) and David and Tony Skewes (Tetila Italian ryegrass, Wintaroo oats, Bulloke, Hindmarsh and Barque barley and Rufus triticale)

Both sites were sown on **May 6th 2014** with **90 kg/ha DAP** by Greg Mitchell, Agricultural Consultant, GJ and HK Mitchell, using the FP Ag cone seeder with knife points**.** There was minimal soil disturbance. Tetila Italian ryegrass and Southern Green ryecorn were drilled with 12-25mm soil cover whilst all other cultivars were drilled with 40-50mm soil cover.

Plot size. 1.5m x 10m x 4 replicates

Management

1. **David Skewes site**. First grazed July 14th to July 25th 2014 (11 days) with ewes and lambs at 40 dse/ha pressure

   Sprayed with 5 g/ha Ally + Kamba for guildford grass and other broadleaf weed control on August 6th.

   Grazed again from August 28th to September 24th 2014 (27 days) with 430 large dry ewes (645 dse) = 20 dse/ha pressure

Entire paddock sprayed with 1.5 l/ha glyphosate 540 on October 9th to prevent weeds producing seeds. However the trial site was also accidently sprayed, so no further observations were possible.

2. **Tony Skewes site**. The only grazing during the trial observation period was from June 11th to June 18th 2014 (7 days) with young ewes (dry) at 38 dse/ha pressure. 50 kg/ha urea applied July 20th 2014.

   Paddock was chopped for silage September 5th and yielded 2900 kg/ha dm.

   Following the silage cut, the paddock was grazed with 34 dse/ha ewe weaners for 9 days in early October. The paddock was then spray-topped with 800 ml/ha gramoxone 250 on October 18th, before being grazed again with 30 dse/ha ewe hoggets for 10 days in mid-November to remove any remnant dry feed.

Observations
Actual rainfall for Goolwa April to October 2014 294 mm (average 360mm)

May 16th and 24th 2014 by Tim Prance.

- **David Skewes** site. Emergence occurring with significant galah damage along northern side. Damage not related to cultivar. No insects.

- **Tony Skewes** site. Even emergence occurring. No insects. Significant emergence of annual ryegrass (Wimmera type)

June 10th 2014 by Simon Ellis, Ellis Farm Consultancy.
Assessed vigour (1 = poor to 5 = excellent) and **emergence** (1 = 10% plants along row emerged to 5 = 100% plants along row emerged) both sites.

Dry matter was also assessed at **T Skewes** site using a rising plate meter. There was a high level annual ryegrass throughout this site, but variable across plots. Also variable amounts of marshmallow.

No dry matter assessment at **D Skewes**, due to insufficient dry matter. Bird damage still obvious at D Skewes site. No insects. Weed free apart from some patches of Guildford grass

July 4th 2014 by Simon Ellis
Assessed dry matter at **D Skewes** site using a rising plate meter. Observed moderate level of Guildford grass over most of the site, but otherwise weed free.

Tony Skewes June 10th 2014 showing annual ryegrass (between plots).
Photo Simon Ellis

Note: *Significantly higher early dry matter production at Tony Skewes (top of page) compared to David Skewes (below). Same cultivars, same sowing date and same seeding rate. Tony Skewes site plate metered June 10th where there was approximately 700 kg/ha dm on offer whereas David Skewes site did not have enough dry matter to be assessed until July 4th.*

Reasons? *Speculate additional annual ryegrass (Wimmera) and/or extra N mineralisation (cropped previous few years) and/or the additional 50 kg/ha MAP before sowing.*
Other ideas?

David Skewes June 10th 2014 showing some of the galah damage. These areas subsequently appeared to recover.
Photo Simon Ellis

July 30th and August 25th. Dry matter assessed at both sites by Tim Prance using rising plate meter

Tony Skewes trial site July 30th 2014 (last grazing mid June) note Wimmera ryegrass
Front left to right. Outback, Rufus (tall and thin), Tetila, Moby (partly obscured)

David Skewes site August 3rd 2014. Ten days after first grazing.
Front left to right. Buloke, Barque, Tetila, Outback (partly obscured)
Next row left to right. Rufus, Outback, Southern Green, Moby

Tony Skewes site August 25th
Front, left of finger to right, Moby , Wintaroo, Barque

David Skewes site August 25th
Front left to right. Buloke, Barque, Tetila, Hindmarsh

Final assessment September 26th 2014

Tony Skewes site September 26th 20 days after chopping for silage. Tetila regrowth (~ 500 kg/ha) in front centre. Left of photo (outside plots) is Wimmera annual ryegrass, right of Tetila is Moby (competitive no Wimmera), right of Moby is Wintaroo (less competitive = more Wimmera)

David Skewes site. Photo taken day of assessment and day after 27 days of paddock grazing.

Results

Establishment and vigour. Assessments made by Simon Ellis June 10th were analysed statistically by Tim Prance using STATISTIX v10. There were significant differences between all cultivars.

The most **vigorous cultivars** (to the three leaf stage) at both sites were Moby and Barque barley, followed by Outback oats and Buloke barley. Hindmarsh barley was the most vigorous cultivar at David Skewes site (very slow early dry matter production site), whereas it only seventh most vigorous at Tony Skewes site for reasons unknown. The differences did appear to be significant.

Rufus and Monstress triticale and Tetila ryegrass were consistently least vigorous, whilst Southern Green ryecorn and Winteroo oats were intermediate.

There were **significant emergence differences** between all cultivars. There did not appear to be any galah impact on emergence of individual cultivars, because the emergence differences were significant.

In **summary**, Barque, Buloke, Moby and Hindmarsh barley had highest emergence at both sites, whereas Monstress, Tetila, Southern Green and Rufus had the poorest emergence. Winteroo and Outlook were intermediate.

Early dry matter assessments June 10th (T Skewes) and July 4th (D Skewes).
Dry matter assessments made by Simon Ellis were analysed statistically by Tim Prance using STATISTIX v10. The actual dry matter levels were difficult to quantify because there were no plate meter readings taken on bare ground, so the raw plate meter readings included the height of ridging along the rows. Also there were no dry matter calibration cuts taken for these early assessments to calibrate the plate meter, and the meter readings from Tony Skewes included a significant amount of annual ryegrass.

Following an adjustment made by T Prance for bare ground (deducting 1100 kg/ha from each plate meter reading at David Skewes and 600 kg/ha for Tony Skewes), there were significant differences in dry matter production between cultivars at these assessments on June 10th (Tony Skewes) and July 4th (David Skewes).

In summary, Barque was the most productive cultivar at the early-mid tillering stage, followed by Outback oats, Moby barley, Hindmarsh barley then Wintaroo oats. Tetila and Monstress triticale were clearly least productive at this stage with Buloke barley, Southern Green ryecorn and Rufus triticale intermediate.

Subsequent plate meter assessments.
Once the ground was covered, the impact of ridging on plate meter readings was much less. In addition, there were dry matter calibration cuts taken for the subsequent assessments. However, once plants started to "run up" (Zadocks GS 40+) the plate meter overestimated dry matter kg/ha. These trials were grazed, so no cultivars reached GS 40 except for Rufus on July 30th and Monstress on August 25th (refer tables 2 and 3)

Dry matter assessments July 30th (both sites) late tillering.
Assessments made by Tim Prance using a rising plate meter were analysed statistically using STATISTIX v10. There were significant differences between all cultivars.

In summary, Hindmarsh produced the highest significant amount of dry matter at both sites, then followed by Barque, *(Rufus*),* Wintaroo, Southern Green, Moby, Buloke and Outback all close together.
**(Rufus) dry matter overestimated by plate meter as it was at GS 40+ when assessed*

Annual ryegrass contamination at Tony Skewes site.
After July 30th no further assessments were made at Tony Skewes site, as Wimmera annual ryegrass contamination became too great. There were however significant differences in dry matter productivity between cultivars upto, and including, this date.

August 25th there were noticeable differences in Wimmera annual ryegrass contamination between cultivars, which enabled conclusions to be drawn as to which cultivars might compete with annual ryegrass from a weed control point of view, and conversely, which cultivars might make a suitable companion crop for Italian ryegrass such as Tetila.

The assessments were **visual** and were made by Tim Prance and Tony Skewes on August 25th, and were not analysed statistically.

- Barque was very competitive with Wimmera, with hardly any annual ryegrass compared to other cultivars. Moby barley was moderately competitive, followed by Buloke and with Hindmarsh least competitive. **Hindmarsh barley may be an option as a companion barley species for Tetila**.

- Oats were less competitive than any barley, with Outback less competitive than Wintaroo, so **Outback is another option as a companion species for Tetila** given it also scored highly for early winter production.
- Rufus, Monstress and Southern Green were uncompetitive, whist Tetila was moderately competitive.

Dry matter assessments August 25th at David Skewes site only. **All stem elongation (GS 35-39), except Monstress and Rufus (GS40+)**

Assessments made by Tim Prance using a rising plate meter were analysed statistically using STATISTIX v10. There were significant differences between all cultivars.

In summary, Moby, Hindmarsh and Barque barleys produced the largest amount of dry matter, followed by Monstress * triticale, then Outback, Buloke, Wintaroo, Southern Green, Tetila and Rufus*

**Monstress and Rufus dry matter overestimated by plate meter as they were at GS 40+ when assessed*.

Assessment September 26th at David Skewes site only.
This assessment was made immediately following 27 days grazing with mature ewes at 20 dse/ha grazing pressure. Visual assessment was used, calibrated with dry matter cuts (R^2 = 0.79), for cereals and a rising plate meter for the Tetila ryegrass.

I believe these dry matter assessments are an indication of the **potential value** as a standing crop, plus a reflection of dry matter on offer before grazing. Cultivars with the least amount of feed on offer before grazing (Monstress and Rufus) tended to be grazed harder, and had significantly less dry matter on offer at September 26th.

In summary, Buloke, Moby, Tetila, Barque and Hindmarsh had significantly more dry matter on offer at September 26th following the last grazing than other cultivars.

Planned **actual dry matter assessment as a standing crop** in November/December 2014 was not possible because the trial plots were sprayed with glyphosate, along with the remainder of the paddock, on October 9th 2014.

Estimated dry matter growth rates. David Skewes site (kg dry matter/ha/day)

	emergence to 30/7/14 75 days	**30/7/14 to 25/8/14** 26 days	**Estimated total kg dry matter emergence to 26/9/14** 133 days
Barque	38	61	4690 kg/ha
Buloke	32	58	5240 kg/ha
Hindmarsh	38	65	4540 kg/ha
Moby	33	87	4980 kg/ha
Outback	35	54	4040 kg/ha
Wintaroo	37	45	4300 kg/ha
Southern Green	30	67	3900 kg/ha
Tetila	22	74	4950 kg/ha

Monstress and Rufus DM growth not calculated as GS 40+ making plate meter readings unreliable

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- Tony and David Skewes for providing the paddocks for trial sites, managing the sites and helping with trial assessment.
- Greg Mitchell and FP Ag for sowing the plots.
- Simon Ellis for undertaking assessments on June 10th and July 4th.
- Seed Distributors, PGG Wrightson Seeds and Tony and David Skewes for providing trial seed

TABLE 1

	Emergence *(5 = 100% plants emerged along row and 1= 10%)*			**Vigour** *(5 = excellent and 1 = poor)*		
	D Skewes	**T Skewes**	**Mean**	**D Skewes**	**T Skewes**	**Mean**
Barque	4.1	3.8	4.0	3.5	4.4	4.0
Buloke	3.9	3.3	3.6	3.8	4.1	4.0
Hindmarsh	3.6	3.8	3.7	4.0	3.6	3.8
Moby	3.6	3.3	3.5	3.5	4.6	4.1
Outback	3.3	3.9	3.6	3.5	4.1	3.8
Wintaroo	3.4	3.3	3.4	3.0	3.8	3.4
Monstress	2.3	2.1	2.2	2.5	2.4	2.5
Rufus	3.0	2.5	2.8	2.4	3.1	2.8
Southern Green	2.8	3.6	3.2	3.3	3.8	3.6
Tetila	2.3	3.5	2.9	2.1	2.9	2.5
LSD 5%	**0.4**	**0.5**		**0.8**	**0.5**	

TABLE 2

	Early dry matter production (early tillering)			**Mid dry matter production** (to late tillering)		
	D Skewes 4/7/14	**T Skewes 10/6/14**	**Mean**	**D Skewes 30/7/14**	**T Skewes 30/7/14** *(inc annual ryegrass)*	**Mean**
Barque	3090 ^{A}	800 ^{AB}	1950	2410 ^{A}	2370 ^{BCDE}	2390
Buloke	1140 ^{CD}	710 ^{AB}	930	2000 ^{BC}	2110 ^{DEF}	2060
Hindmarsh	1660 ^{BC}	890 ^{AB}	1280	2400 ^{A}	3160 ^{A}	2780
Moby	1890 ^{BC}	840 ^{AB}	1370	2010 ^{BC}	2130 ^{CDEF}	2070
Outback	2290 ^{AB}	1030 ^{A}	1660	2200 ^{AB}	1800 ^{F}	2000
Wintaroo	1480 ^{BC}	800 ^{AB}	1140	2330 ^{AB}	2010 ^{EF}	2170
Monstress	610 ^{DE}	580 ^{BC}	600	870 ^{D}	**2130 ^{CDEF}	1500
Rufus	1300 ^{CD}	630 ^{BC}	970	*1830 ^{C}	*2680 ^{AB}	2260
Southern Green	1110 ^{CD}	630 ^{BC}	870	1780 ^{C}	2530 ^{BCD}	2160
Tetila	110 ^{E}	290 ^{C}	200	1170 ^{D}	2610 ^{BC}	1890
LSD 5%	**840**	**370**		**360**	**490**	

Cultivars with different letters are significantly different

* Rufus GS 40+ so plate meter overestimated actual dry matter
** Monstress at T. Skewes significantly contaminated with Wimmera annual ryegrass.

TABLE 3

** This column is residual dry matter immediately following last grazing

	D Skewes 25/8/14	D Skewes 26/9/14 **
Barque	3990 ABC	3722 AB
Buloke	3520 CD	4250 A
Hindmarsh	4090 AB	3500 ABC
Moby	4280 A	4030 AB
Outback	3610 BC	2760 CD
Wintaroo	3510 CD	3330 BCD
Monstress *	3615 BC	1540 E
Rufus *	2910 E	840 E
Southern Green	3510 CD	2630 D
Tetila	3090 DE	3970 AB
LSD 5%	**490**	**740**

Cultivars with different letters are significantly different

* Rufus and Monstress GS 40+ so plate meter overestimated actual dry matter.