## 8.7 Evaluation Of Dual Purpose Cereal Varieties - Bairnsdale, Vic

**Location:**
Bairnsdale Trial Site, Victoria

**Acknowledgements:**
Trial Site Committee (Murray Stewart, Trevor Caithness, Tony Murray, Rick Frew, Rowan Paulet, Andrew Sheridan, Simon Hunt and Brian Fairhall), Rose Maher, John Chester, Frank Mickan, Chris Bluett, Wes Arnott, Gary Sheppard, Sam Cockayne and the East Gippsland Shire.

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**Rainfall (mm) March to October:**
546mm in total with 323mm falling in June resulting in flood damage. There were four relatively minor frost events during the growing season. The worst, occurring on the 23rd September reaching -0.1°C

**Summary of Findings:**

The results of Trial 1 (forage and grain) have shown that Yerong Barley, 5092 Barley and Monstress Triticale produced the most dry matter (DM/Ha) up to GS30 for grazing. Amarok and Wedgetail produced the most dry matter of the wheat varieties. For Hay production (GS85), Wedgetail produced the most dry matter followed by Rudd and the HRZ03.1010.3 wheat variety. In total (Grazing and Hay), Wedgetail outperformed all varieties producing the most dry matter.

Of the selected varieties tested for nutritional quality, Wedgetail produced the greatest amount of energy (MJ/Ha) as hay and in total. However, Monstress and Yerong produced substantially more energy (MJ/ha) than the wheat varieties at the grazing stage (up to GS30). Amarok performed the best of the wheat varieties at this stage.

Trial 1 produced significantly less grain than Trial 2. It appears that the earlier sowing time or grazing (or both) in Trial 1 has impacted on the cereals capacity to produce grain. On average Trial 1 yielded 33% less grain than Trial 2. Protein levels were poor across both trials and all varieties. This can be attributed to flood damage experienced during the season and the likely loss of Nitrogen trhough leaching and volatilization..

It should be noted that most of the Bairnsdale trials were affected by a significant waterlogging period during the growing season which will have impacted on the trial outcomes. This indicates that similar work needs to be done in the future to document the outcomes in a more 'normal' season.

**Background:**
Grain and forage crops have been grown in Gippsland for many years. However, dual purpose grain and forage cereal varieties needs to be assessed to determine the best varieties for the Gippsland climate.

**Trial Objectives:**
To determine:

- Which dual purpose cereal varieties respond favorably to Gippsland's climatic conditions.
- Which new varieties may have commercialization potential.
- Which varieties are best suited to forage and grain production.

**▼ Table 8.32: Trial inputs**

| | |
|---|---|
| **Pre sowing:** | Treflan® @ 1.4ltrs/ha and Roundup® @ 1ltr/ha |
| **Sowing rates:** | All varieties were sown @ 100kg/ha |
| **Fertlisier @ sowing:** | All varieties were sown with 100kg/ha DAP |
| **Top dressing fertiliser:** | All varieties were top dressed with 100kg/ha Urea 10/09/07 |
| **Harvest:** | 15-17/12/07 |

**Trial Design:**
Eleven dual purpose cereal varieties were selected for the following two trials.

**Both trial methodologies included:**
Plots were 20m x 2m (raised beds) with 4 replicates per variety.
Plots were harvested and yields recorded. Grain samples were obtained for analysis including: Moisture %, Corrected yield (according to moisture content), Screenings %, Protein %, TGW.

**Trial 1 (Forage and Grain) Sown on the 28th March 2007 (Early Sown)**
2 x 1m$^2$ plant quadrat cuts were taken from each variety on the 4th June prior to GS32. The samples were weighed to determine production per hectare, while sub samples were taken for DM analysis and Feedtest® analysis. The analysis was to determine the grazing value of the varieties at this stage.

The trial plots were then grazed for 3 days pre GS32 by 350 ewes and lambs.
2 x 1m$^2$ plant quadrat cuts were again taken from each variety on the 22nd October near flowering. The samples were weighed to determine production per hectare, while sub samples were taken for DM analysis and Feedtest® analysis. The analysis was to determine the potential hay value of the varieties at this stage

**Trial 2 (Grain only) Sown on the 8th June 2007 (late Sown)**
No grazing and basic methodology as described above.

**Trial Results:**

Results show that the two Barley varieties and the Monstress Triticale produced the greatest quanitites of DM/ha for grazing. Of the wheat varieties, Amarok produced the most DM/ha for grazing followed by Wedgetail. The wheat varieties HRZ 03.1010.3, Rudd and Wedgetail all out performed the Barley and Tritcale varieties for DM/ha of Hay. These wheat varieties also out produced the Triticale and Barley varieties in total Dm/ha.

**▼ Table 8.33: Trial 1 – Average Dry Matter and Energy Production at two growth stages (Trial 1 only)**

| Variety | Grazing[1] kgDM/ha | Grazing[1] MJ/ha | Hay[2] kg/DM/ha | Hay[2] MJ/ha | Total kgDM/ha | Total MJ/ha |
|---|---|---|---|---|---|---|
| Amarok | 1792 | 22395 | 9826 | 96294 | 11618 | 118689 |
| HRZ 03.1010.3 | 1340 | NA | 12173 | NA | 13513 | NA |
| Rudd | 1506 | 18375 | 12972 | 132314 | 14478 | 150688 |
| Wedgetail | 1639 | 19664 | 13273 | 134061 | 14912 | 153725 |
| HRZ 95102 | 1289 | NA | 10106 | NA | 11395 | NA |
| MacKellar | 1505 | 18959 | 10345 | 106553 | 11850 | 125512 |
| Marombi | 1530 | 18358 | 11550 | 110879 | 13080 | 129237 |
| CSIRO 170 | 1118 | NA | 11033 | NA | 12151 | NA |
| Yerong Barley | 2339 | 25025 | 10909 | 116726 | 13248 | 141750 |
| 5092 Barley | 2702 | NA | 9642 | NA | 12344 | NA |
| Monstress Triticale | 2528 | 30331 | 10160 | 101604 | 12688 | 131936 |
| **Average** | **1753** | **21872** | **11090** | **114062** | **12843** | **135934** |

[1] Samples taken prior to GS30
[2] Samples between GS65 and GS85

The selected varieties had moderate DM% levels ranging beween 13.9% and 18.6% for grazing. ME levels for grazing were relatively consistant averaging 12.24, while Crude Protein levels were quite high averaging 25%. DM % levels more than doubled for hay to an average of 46.4%, ME decreased 2% on avergage while Crude Protien levels fell considerably. Neutral Detergent Fibre (NDF) levels increased moderately between grazing and hay.

▼ **Table 8.34: Feedtest Analysis Results at two growth stages (Trial 1 only)**

| | DM % | | ME(MJ/kgDM) | | CP% | | NDF% | |
|---|---|---|---|---|---|---|---|---|
| **Variety** | **Grazing[1]** | **Hay[2]** | **Grazing[1]** | **Hay[2]** | **Grazing[1]** | **Hay[2]** | **Grazing[1]** | **Hay[2]** |
| Amarok | 17.9 | 44.8 | 12.5 | 9.8 | 26.6 | 7.8 | 43.7 | 51.3 |
| Rudd | 17.9 | 40.3 | 12.2 | 10.2 | 26.9 | 7.0 | 42.9 | 48.0 |
| Wedgetail | 16.7 | 48.7 | 12.0 | 10.1 | 25.1 | 7.4 | 45.5 | 48.8 |
| MacKellar | 17.7 | 44.9 | 12.6 | 10.3 | 27.8 | 8.2 | 42.0 | 49.4 |
| Marombi | 18.6 | 46.5 | 11.8 | 9.6 | 24.6 | 6.8 | 44.7 | 50.9 |
| Yerong Barley | 13.9 | 56.5 | 12.6 | 10.7 | 21.9 | 8.5 | 44.1 | 48.8 |
| Monstress Trit. | 15.3 | 42.9 | 12.0 | 10 | 24.0 | 8.1 | 45.5 | 50.2 |
| **Average** | **16.86** | **46.37** | **12.24** | **10.10** | **25.27** | **7.69** | **44.06** | **49.63** |

[1] Samples taken prior to GS30
[2] Samples taken between GS65 and GS85

Results in Table 8.35 show that Trial 1 had signicantly lower grain yields than Trial 2 for all varieties. On average Trial 1 yields were 33.6% lower than Trial 2 yields. Amarok, CSIRO 170 and 502 Barley were significantly higher in yield compared to all other varities in trial 2. For trial 1, only Mackellar at the highest yield and Monstress at the lowest yield were significantly different from the other varieties.

▼ **Table 8.35: Trial 1 & 2 – Grain Yields & Protein Levels**

| Variety | Average Yield (t/ha)[1] Trial 1 | Average Yield (t/ha)[1] Trial 2 | Yield Reduction T 1 / T 2 % | Average Protein % Trial 1 | Average Protein % Trial 2 |
|---|---|---|---|---|---|
| Amarok | 2.65ab | 4.11a | 35.5 | 9.8 | 9.8 |
| HRZ 03.1010.3 | 2.40abc | 3.46 bc | 30.4 | 10.2 | 10.1 |
| Rudd | 2.57ab | 3.43 bc | 25.1 | 9.9 | 10.2 |
| Wedgetail | 2.40abc | 3.43 bc | 29.9 | 10.2 | 10.3 |
| HRZ 95102 | 2.56ab | 3.95ab | 35.2 | 9.5 | 9.2 |
| MacKellar | 2.79a | 3.01 cd | 7.3 | 9.6 | 9.9 |
| Marombi | 2.27 bc | 2.87 d | 20.9 | 9.8 | 10.2 |
| CSIRO 170 | 2.58ab | 4.05a | 51.4 | 10.1 | 9.7 |
| Yerong Barley | 2.08 cd | 3.41 bcd | 38.8 | 10.8 | 10.2 |
| 5092 Barley | 2.24 bc | 4.16a | 46.3 | 10.4 | 9.5 |
| Monstress Trit. | 1.73 d | 3.39 cd | 48.8 | 10.2 | 10.0 |
| **Average** | **2.39** | **3.57** | **33.6** | **10.0** | **9.9** |
| **LSD (p=0.05)** | **0.452** | **0.558** | | | |

[1] Means followed by the same letter do not significantly differ

Table 8.36 indicates little change in the Average Test Weights between Trials. The greatest variation occurred in the Yerong Barley where the Average Test Weight changed by 11.2 kg/hl. On average screenings were higher in Trial 2 compared to Trial 1. However, the wheat variety Mackellar and the two Barley varieties had higher screenings in Trial 1. There is very little difference in TGW between the two trials on average. Amarok showed the greatest difference of 4.7g followed by 5092 Barley with 4.3g.

▼ **Table 8.36: Trial 1 & 2 – Grain weights, screenings & TGW**

| Variety | Average Test Weight (kg/hl) Trial 1 | Average Test Weight (kg/hl) Trial 2 | Average Screenings % Trial 1 | Average Screenings % Trial 2 | Average TGW (g) Trial 1 | Average TGW (g) Trial 2 |
|---|---|---|---|---|---|---|
| Amarok | 73.6 | 72.7 | 1.4 | 2.3 | 31.4 | 36.1 |
| HRZ 03.1010.3 | 67.8 | 67.8 | 1.9 | 1.9 | 31.8 | 28.9 |
| Rudd | 68.5 | 63.1 | 0.9 | 2.4 | 33.7 | 33.3 |
| Wedgetail | 67.6 | 69.2 | 1.6 | 2.1 | 30.8 | 30.1 |
| HRZ 95102 | 71.7 | 68.2 | 1.8 | 3.4 | 35.2 | 33.3 |

| *Table cont…* Variety | Average Test Weight (kg/hl) Trial 1 | Average Test Weight (kg/hl) Trial 2 | Average Screenings % Trial 1 | Average Screenings % Trial 2 | Average TGW (g) Trial 1 | Average TGW (g) Trial 2 |
|---|---|---|---|---|---|---|
| Marombi | 71.7 | 71.4 | 1.3 | 1.8 | 31.3 | 32.8 |
| CSIRO 170 | 71.8 | 68.1 | 1.2 | 2.3 | 34.7 | 32.3 |
| Yerong Barley | 44.6 | 55.8 | 5.3 | 3.6 | 33.6 | 32.7 |
| 5092 Barley | 49.4 | 52.1 | 5.0 | 4.4 | 28.8 | 33.1 |
| Monstress | 65.2 | 62.9 | 2.3 | 2.5 | 31.2 | 33.4 |
| Average | **65.4** | **65.3** | **2.4** | **2.6** | **32.2** | **32.9** |

**Trial Discussion:**

The results suggest the two Barley varieties and the Triticale are the preferred varieties for Dry Matter Production for grazing. Of the wheat varieties, Amarok produced the most DM for grazing followed by Wedgetail. Wedgetail produced the greatest amount of DM for hay and in total, outperformed all other varieties including the Triticale and Barley varieties.

Of the wheat varieties sampled for Feedtest, Wedgetail appears to be the most promising, producing more energy (MJ/ha) in Hay and for total energy production. For grazing purposes only, Amarok is the best of the wheat varieties. The Barley and Triticale varieties produce the most MJ/ha for grazing of all the cereals and performed comparitively well for hay production as well.

Grain yield for Trial 1 are significantly less than those achieved in Trial 2 for all varieties. On average Trial 1 yielded 33% less than Trial 2. The reduced yields in Trial 1 could be attributed to the flooding rains experienced soon after the varieties were grazed. However, Trial 2 expereienced the same conditions soon after seeding. This suggests perhaps that grazing in trial 1 left the cereals more vulnerable to the water logged conditions compared to the recently emerging cereals of Trial 2. Perhaps also the livestock were left on for too long in Trial 1, which may have reduced the head numbers.

Of the wheat varieties, MacKellar produced the most grain on average for Trial 1. In Trial 2, Amarok and CSIRO 170 were the best performing lines. Across both trials Amarok appears to have performed the best on average. Of the two Barley varieties 5092 performed better across both trials. Protien levels are low across both trials, suggesting nitrogen was difficient post grazing and is likely a result of flood damage.

**Trial Observations:**

- Not all the varieties in Trial 1 were sent off to Feedtest for analysis. This limited the trials ability to compare all varieties equally.
- Flood damage has without question affected the trial results. An assessment of the damage to each plot was not recorded at the time and is unlikely to have affected all plots equality.
- The different sowing dates would also have had an impact on the subsequent yields obtained with the later sown (non grazed) trial 2 likely to have experienced a yield reduction compared with a longer growing season.
- Rust is likely to have reduced the yield of the less resistant cereal varieties. Resistance potentially resulting in improved yields for some varieties.
- There were a number of minor frost events during the season, but these are unlikely to have impacted on the trial significantly.
- This analysis is incomplete in that an estimate of the grazing value obtained in trial 1 needs to be calculated so that a comparative gross margin for each trial variety can be established. The difference on average of around 1.5 tonnes/ha between the yields for trial 2 and trial 1 would require a grazing value of around $500/ha for comparative gross margins to be achieved.