Barley agronomy, grazing and annual ryegrass

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Key findings

- Simulated grazing significantly reduced grain yield.
- Non-grazed controls were more competitive with annual ryegrass (ARG) reducing the ARG population by 58% compared to the grazed treatments.

Why do the trial?

To compare the grain yield and quality of barley varieties with grazing and annual ryegrass (ARG).

How was it done?

A replicated trial was conducted at the Hart field site assessing 4 barley varieties, Flagship, Hindmarsh, Maritime and Urambie which differ in growth rate and habit. ARG was sown at a rate of 25kg/ha. Grazing treatments were simulated using a mower, at the beginning of stem elongation (GS30).

Seeding rates were adjusted according to grain weight and germination to produce target plant populations of 145 plants/m^2. The trial was sown using chisel points and press wheels.

Plot size 1.5m x 10m **Fertiliser rate** DAP @ 70kg +2% Zn

Sowing date 30th April 2009

Barley and ARG plant counts were carried out four weeks after sowing to measure establishment. ARG populations were re-scored on October 14th to assess ARG survival. Dry matter production was recorded at stem elongation when the plots were mowed to simulate grazing. Trials were harvested on the 9th of November. Grain quality was assessed for retention with a 2.5 mm screen, protein (% dry basis), screenings with a 2.2 mm screen and test weight (kg/hL).

Results

Hindmarsh was the highest yielding variety (2.92 t/ha), however analysis of grain yields indicated no significant differences between the barley varieties (Table 1). Comparison of dry matter production showed no significant differences between tested varieties. Similarly, no differences in ARG establishment or survival populations were recorded between varieties.

Table 1. Grain yield, dry matter production, ARG establishment and survival averaged across grazing treatment for variety at Hart in 2009.

Variety	Grain yield (t/ha)	Dry matter (kg/ha)	ARG establishment (plants/m²)	ARG survival (plants/m²)
Flagship	2.58	986	29	23
Hindmarsh	2.91	1129	35	29
Maritime	2.79	915	39	16
Urambie	2.75	860	34	16
LSD (0.05)	ns	ns	ns	ns

The presence of ARG did not influence grain yield or dry matter production (Table 2).

Table 2 also shows that there was a background population of ARG (15 plants/m^2) and the plots that were sown with ARG had a population of 53 plants/m^2. By the 14th October populations were reduced to 8 and 34 ARG plants/m^2 in the minus and plus ARG treatments respectively.

Table 2. Grain yield, dry matter production, ARG establishment and survival averaged across variety for grazing treatment at Hart in 2009.

ARG	Grain yield (t/ha)	Dry matter (kg/ha)	ARG establishment (plants/m²)	ARG survival (plants/m²)
Minus ARG	2.67	946	15	8
Plus ARG	2.84	999	53	34
LSD (0.05)	ns	ns	32	16

Grain yield was not significantly affected by grazing at Hart in 2009 for any variety.

No significant differences were observed in early establishment of ARG between the grazed and non-grazed treatments (Table 3). However, non-grazed treatments consistently produced significantly lower ARG numbers (12 plants/m^2) compared to the grazed treatments (30 plants/m^2), for ARG survival.

Table 3. Grain yield, ARG establishment and survival averaged across variety and ryegrass treatment for grazing treatment at Hart in 2009.

Grazing treatment	Grain yield (t/ha)	ARG establishment (plants/m²)	ARG survival (plants/m²)
Graze	2.69	35	30
Un-graze	2.82	33	12
LSD (0.05)	ns	ns	17

All barley varieties produced high grain protein levels, which were all statistically similar averaging 13.3% (Table 4).

Differences in screenings and retention were also not significant averaging 8.6% and 57.1% respectively.

Flagship produced the lowest test weight (65.3kg/hL) compared to the other 3 varieties with an average of 68.5%.

Table 4. Protein, screenings, retention, test weight and receival grade averaged across grazing and ryegrass treatments for variety at Hart in 2009.

Variety	Protein (%)	Screenings (%)	Retention (%)	Test weight (kg/hL)	Receival grade
Flagship	13.9	12.4	47.6	65.3	Feed 1
Fleet	12.9	5.3	64.4	68.9	Feed 1
Hindmarsh	12.9	7.3	62.2	68.7	Feed 1
Maritime	13.4	9.4	54.1	67.8	Feed 1
LSD (0.05)	ns	ns	ns	2.1	

The presence of ARG had no impact on grain quality characteristics grain protein, screenings, retention, test weight or grain quality receival grade (Table 5).

Table 5. Protein, screenings, retention, test weight and receival grade averaged across variety and grazing treatments for ARG treatment at Hart in 2009.

ARG presence	Protein (%)	Screenings (%)	Retention (%)	Test weight (kg/hL)	Receival grade
Minus ARG	13.4	10.5	52.9	66.9	Feed 1
Plus ARG	13.2	6.7	61.3	68.5	Feed 1
LSD (0.05)	ns	ns	ns	ns	

As observed with the presence of ryegrass, simulated grazing treatment had no impact on grain protein, screenings, retention, test weight or grain receival grade.

Table 6. Protein, screenings, retention, test weight and receival grade averaged across variety and ARG treatments for grazing treatment at Hart in 2009.

Grazing treatment	Protein (%)	Screenings (%)	Retention (%)	Test weight (kg/hL)	Receival grade
Graze	13.6	9.0	55.7	67.5	Feed 1
Un-graze	12.9	8.2	58.4	67.9	Feed 1
LSD (0.05)	ns	ns	ns	ns	

Discussion

The trial was sown on the 30th April to maximise potential for early dry matter production to best suit simulated grazing. Good early rainfall enabled excellent crop establishment at Hart. Rains throughout winter allowed outstanding biomass production with crops setting high grain yield potential.

ARG establishment was not influenced by grazing, as this treatment was applied after the ARG emergence which was shortly after seeding. However, when ARG survival populations were measured, 14th October, the un-grazed treatment had significantly lower ARG numbers than the grazed treatment. The competition from the un-grazed barley exceeded that of grazed treatments and the surviving ARG population of the un-grazed treatment was 58% lower than the surviving population of the grazing treatment. This most likely occurs because whilst grazed plants are recovering from defoliation they are unable to maintain a high level of competition. As a result it is possible that grazing under high ARG pressure can lead to higher surviving populations and potential ARG problems in future years.

Grazing treatments significantly reduced grain yield across all varieties. However, a recorded reduction of just 130 kg/ha meant the benefit of feed value increased the overall return of this treatment. Overall value of the grazing treatment was able to result due to favourable seasonal conditions after the de-foliation event, allowing the grazed treatments to recover well.

No varietal interaction was identified for grain yield, dry matter production or ARG establishment and survival, meaning that all varieties responded alike to both, grazing and ARG treatments.

It is important to remember that grazing was simulated in this research and factors such as preferential grazing, timing of grazing, stocking rate, row spacing and trampling could also impact on results.

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