Long Season Grazing Trial

KEY POINTS

- Kokoda triticale is the highest performing dual-purpose crop because of high grain yield.
- Earlier sowing of grazing mixes can capitalise on early dry matter production during common autumn feed gaps.
- Terminating a mix to harvest grain did not compromise yield on canola but did impact wheat.
- Higher dry matter production from annual ryegrass will mean that feed quality is reduced.

Project title	Long Season Grazing Trial
Project partners	FarmLink, Hart Bros Seeds
Funding partners	FarmLink, Hart Bros Seeds
Trial Site Locations	Junee Reefs, NSW
Report author	Hayden Thompson

INTRODUCTION

FarmLink together with Hart Bros Seeds, have been running a long season grazing trial since 2020. The objective of this work is to compare a range of crop types and mixes in relation to biomass production, feed quality and grain production. The trials throughout the seasons, have featured a range of dual-purpose crops such as canola and wheat, mixed species pastures and single species annual pastures such as annual ryegrass. These are all evaluated based on their production and quality.

There has been a widespread adoption of both dual-purpose cropping and annual pastures throughout southern NSW. This has been driven by the benefits of operating livestock enterprises together with cropping. Annual pastures are not used to replace perennial pastures such as lucerne but can complement them by filling a feed gap when perennial pastures are not productive or just allowing the pastures time to recover from grazing during dryer periods.

Previous trial results have proven how productive annual pastures can be and the potential high return that a dual-purpose crop offers though both livestock and grain income. However, there are key management decisions that need to be made each year to drive the higher returns. These include time of sowing, identifying the end use of the pasture and the most suitable variety, and managing feed quality. Therefore, the focus of the 2022 trial is to develop results that will help growers in making these key management decisions.

METHODOLOGY

The 2022 grazing trial had three main questions that were to be answered through the trial results. These were time of sowing, different options for end use of grazing mixes and the effect of grazing management on single species pastures.

Time of Sowing

The trial had three times of sowing which were 28th February, 18th March, and 19th April. Grazing mixes and dual-purpose crops were sown in all three times of sowing and annual ryegrass (single species pasture) was sown in time of sowing two and three. Multiple dry matter cuts were taken from each time of sowing whenever they reached a level of biomass that would have been suitable for grazing in a paddock situation.

Dual Purpose Crops vs Mixes

The grazing mixes used in the trial had either a dual-purpose canola or wheat species in them. This means that during the year the other companion species in the mix could be terminated and the dual-purpose crop could be taken through to grain harvest.

Grazing Management of Single Species Pasture (Annual Ryegrass)

Because annual ryegrass can have very rapid growth during certain parts of the season, it can be difficult to capture the quality of the pasture because it can quickly start to decline as the fibrous content of the plant increases. To demonstrate this, two species of ryegrass had two different grazing treatments. The first treatment was a more frequent cut aimed to keep the grass short and presumably higher quality. While the second treatment was not frequently cut and was instead left to grow a high amount of dry matter, which presumably would result in lower quality feed. Feed quality testing was used to determine the difference between the treatments.

RESULTS

Time of Sowing

As a measure of the effect of time of sowing, dry matter production and grain yield were recorded from the range of treatments across the different sowing dates. There were 4 different grazing mixes used in the trial across all sowing dates and these mixes were:

1. Canola, oats and vetch
2. Wheat, vetch, tillage radish and purple top turnip
3. Ryegrass, triticale, canola, vetch, clover, tillage radish and purple top turnip
4. Field peas, vetch, clover and oats

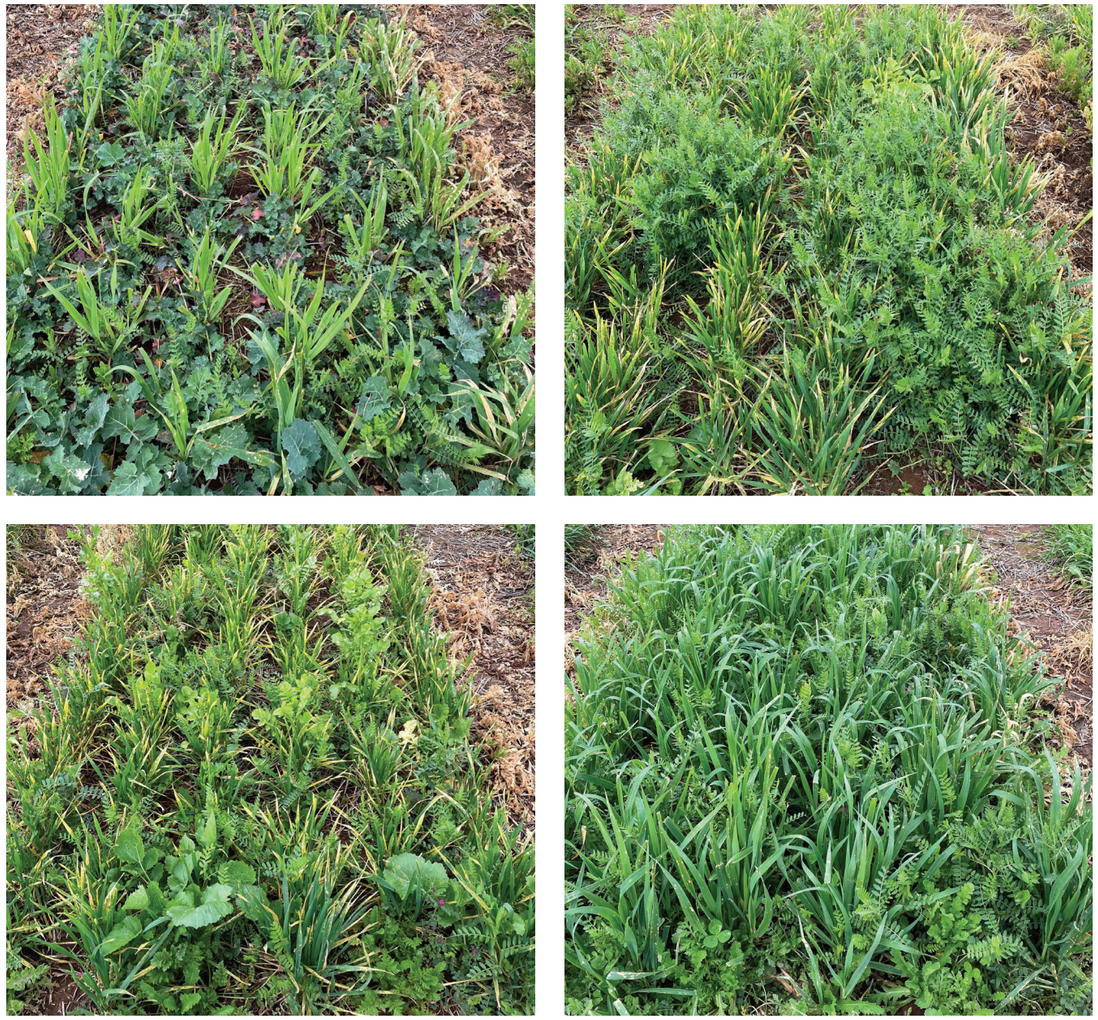

Figure 1 – Grazing mixes 1,2,3 and 4 from left to right, top to bottom

RESULTS

Time of Sowing

The first species listed for each mix above is the most dominant species in the mix and if the treatment was harvested, all other species in the mix were terminated. An issue that quickly developed in the trial, however, was that canola sown on the first two sowing dates did not establish. It is believed that the reason for this was that 2,4-D herbicides were used during summer as a fallow spray and residues from this application may have impacted the February and March sowing times. A disc seeder was also used for these two sowing dates which meant that the residues would not have been moved away from the seed like they normally would with a tyne seeder. There were no issues with establishment in the April sowing time when a tyne seeder was used.

The purpose of having multiple sowing dates was to highlight that grazing mixes can be sown earlier if the season allows, which can maximise dry matter production during autumn. The results in Figure 2 successfully show that having cutting dates in May and June meant that the overall production was generally increased for the first two sowing dates compared to the final sowing date. This was evident even with the poor canola establishment in the first two sowing dates. Mix 4 however, was a standout treatment with the highest dry matter production across all sowing dates and the April time of sowing being the highest overall. It was observed that the broadleaf component of this mix was very high producing, and the field peas were more suited to a later sowing time which is reflected in the results.

Other than Mix 4 in the April sowing, there was no significant difference between treatments within a sowing date. Therefore, the composition of the mix does not affect the overall dry matter production in the earlier sown treatments and would suggest that the number of species used doesn't impact production. This highlights that mixes do not need to be complicated, and a three-way mix can achieve the same as a seven-way mix.

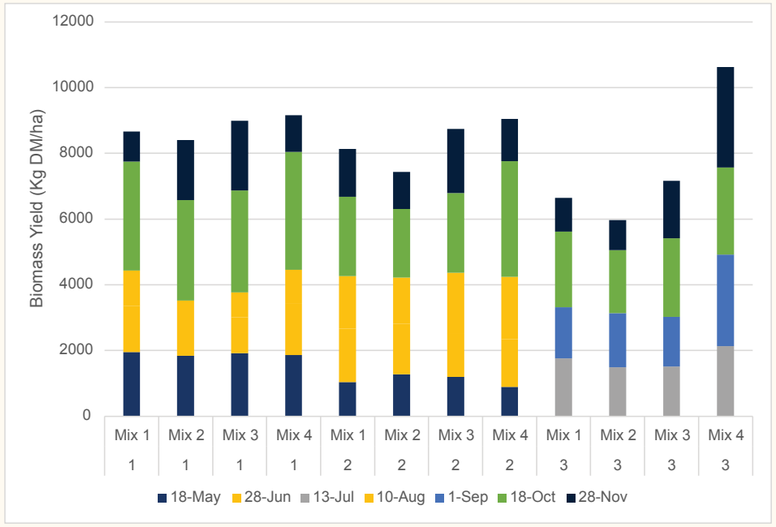

Figure 2 – A summary of all dry matter production across all sowing dates from the 4 grazing mixes. The numbers along the x axis represent the time of sowing with 1) 25th Feb 2) 18th Mar and 3) 19th Apr. The colours in the bars represent different cutting dates.

RESULTS

Time of Sowing

GRAIN YIELD

A clear outlier which showed significantly higher grain yield across all sowing dates was Kokoda triticale as seen in Figure 3. Although Kokoda slightly increased in yield with a later sowing date, it was generally consistent, which seems to indicate that its sowing date is more flexible than the wheat treatments. Newton and Pixel which are winter-type barleys have a similar consistency whereas Illabo and Bennett wheat are more variable and highlight the impact that sowing date can have on yield. The cereal mix, comparatively, showed a significantly lower yield.

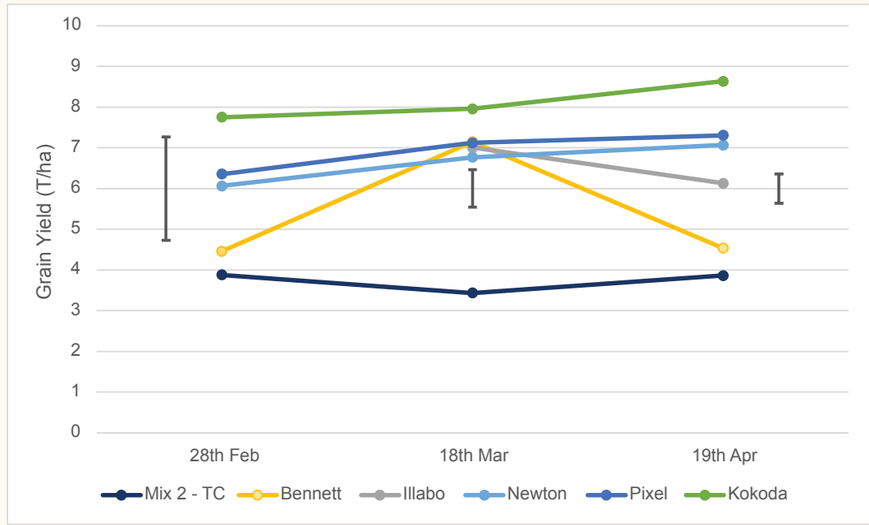

Figure 3 – Cereal grain yield results across all sowing dates. The sowing dates are along the x axis and y axis shows the change in grain yield for each variety. The vertical bars represent the least significant difference (P<0.05) for each sowing date.

RESULTS

Dual Purpose Crops vs Mixes

There are two mixes that have a dual-purpose crop control as comparison. These are a canola-based mix with 970CL canola (Mix 1) and a wheat-based mix with Bennett wheat (Mix 2). Both these mixes had a graze only treatment where continuous grazing cuts were taken until the treatment was brown manured in November.

A terminated companion treatment was also used where all companion species were terminated once the canola or wheat reached a critical growth stage when grazing would start to compromise grain yield. Standalone canola and wheat treatments were also grazed with multiple cutting dates until the same 'lock-up' date.

CANOLA COMPARISON

Figure 4 - A plot of Mix 1 (left) and standalone dual purpose crop (right)

The comparison between the canola treatments and the mix, in Figure 5, was only conducted on the third time of sowing as the first two sowing dates, canola was severely affected by poor establishment. There was no significant difference between treatments for grain yield which means that while the terminated mix shows a slightly lower grain yield, it is not significantly lower than 970CL canola or even the newer varieties of Clavier and Feast CL. However, there was almost double the dry matter production from the mix compared to 970CL and higher dry matter production than the other varieties. This means that having a grazing mix which was also harvested for grain, did not compromise on grain yield but was able to improve dry matter production during the grazing period. This would increase the carrying capacity of a paddock and therefore, potentially increase overall profitability.

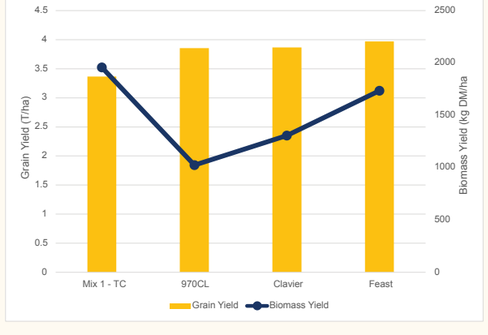

Figure 5 - Biomass (line) and grain yield (columns) on all canola treatments including the terminated mix and standalone dual-purpose varieties.

RESULTS

Dual Purpose Crops vs Mixes

WHEAT COMPARISON

Figure 6 - A plot of wheat in Mix 2 before termination (left) and a standalone wheat crop (right)

The wheat comparison in Figure 7, had a different result to the canola as it appears, especially in the second time of sowing, the mix did compromise on grain yield compared to the standalone wheat. Both the mix and standalone wheat did not reach a desired yield, and this is because the Bennett wheat was more greatly impacted by stripe rust than other wheat varieties. Fungicides controlled the disease pressure better in the second sowing date compared to the others due to the timing of the fungicide application in relation to both plant growth stage and disease development.

Biomass yield was also higher in the standalone wheat compared to the mix. This suggests that this mix was a compromise on total dry matter and even if it improves the overall feed quality of the paddock to be grazed it could result in less yield.

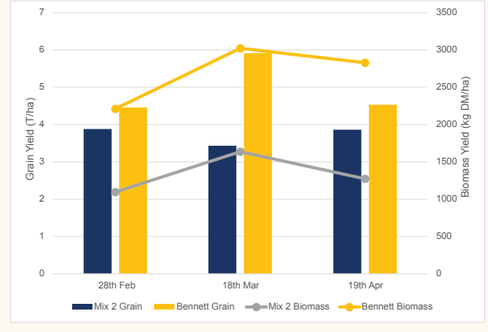

Figure 7 – Biomass (line) and grain yield (columns) of both Mix 2 and Bennett wheat across all sowing dates.

RESULTS

Grazing Management of Single Species Pasture (Annual Ryegrass)

To demonstrate the importance of capturing feed quality in annual ryegrass, two different hybrid ryegrass varieties were used with differing season lengths. These were Phantom and Torpedo which are both commercially available varieties from Upper Murray Seeds. Each variety was replicated in the March and April sowing dates and duplicated so that one treatment could have multiple dry matter cuts and one only had two cuts.

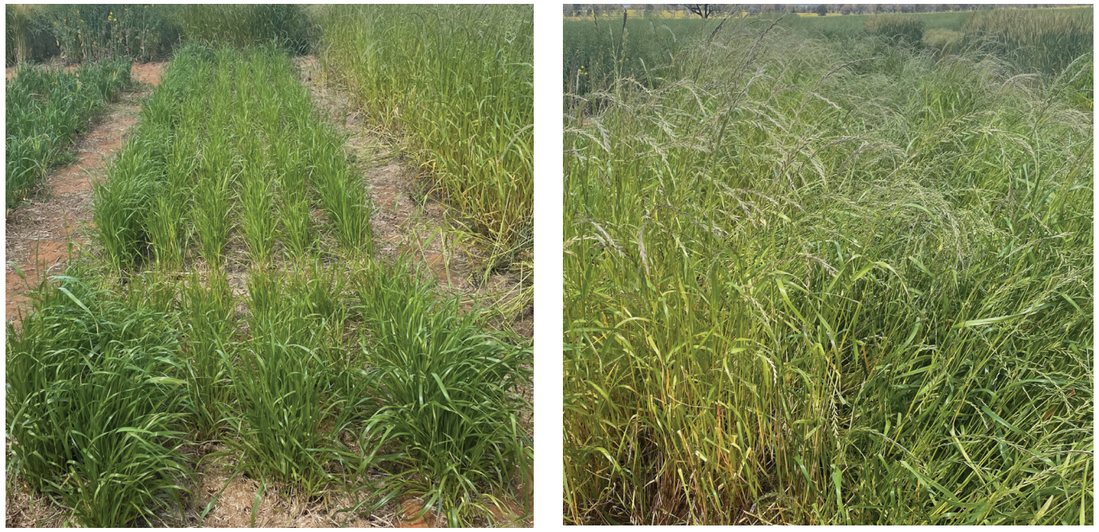

Figure 8 - A plot of annual ryegrass that has had 5 cuts through the season (left) and left to maximise dry matter with only 2 cuts (right)

As demonstrated in Figures 8 and 9, leaving the ryegrass to have only 2 cuts during the season will increase overall dry matter production. This is evident for all treatments except for Torpedo sown in April with the bulk of the production coming from the cut taken on 8th November. However, from the 2 cutting dates taken in the poorly stocked treatments, a feed quality test was performed on both the poorly stocked and well stocked treatments. The results of these tests are shown as metabolisable energy which is a calculation based on the fibre, protein and carbohydrate levels of the plant material. It is evident that with the increasing amount of dry matter production, there is a decrease in feed quality. This is supported by the 8th November cut with higher dry matter is more substantially lower quality than the 10th August cut.

This highlights that there is a trade-off between quality and production and although less dry matter more often does not reach the same overall yield, it may be more suitable to a livestock enterprise targeting high weight gain. This would also mean that because a species such as annual ryegrass is very productive if left without grazing, it is important to manage stocking rates accordingly to ensure a higher quality pasture. This can be difficult to achieve in larger paddocks and may mean that using techniques such as electric fencing may be necessary to achieve the right stocking rate per area.

RESULTS

Grazing Management of Single Species Pasture (Annual Ryegrass)

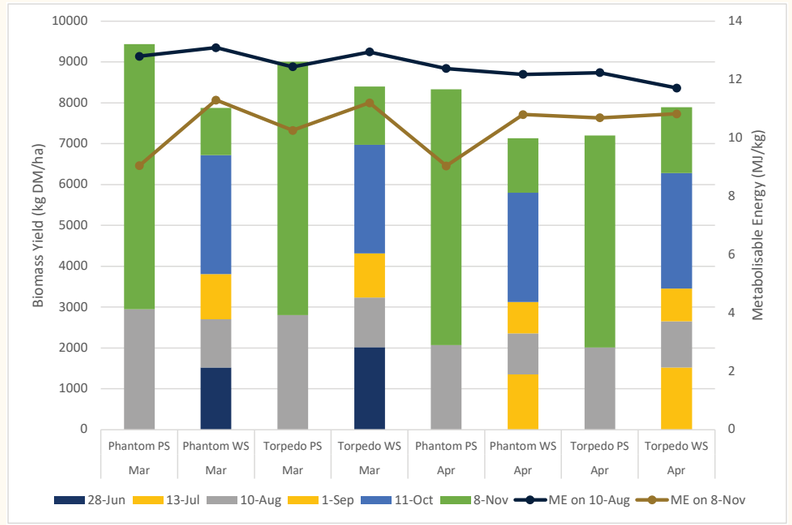

Figure 9 – Biomass yield (columns) and metabolisable energy (lines) of two annual ryegrass treatments across the March and April sowing dates. PS represents poorly stocked (2 cuts) and WS represents well stocked (5 cuts).

CONCLUSION

The trial results that were recorded from the 2022 season have highlighted considerations for making key management decisions for growing annual pastures and dual-purpose crops. Earlier time of sowing was found to improve dry matter production, especially during autumn which can help to fill feed gaps that often exist at this time of year. Having a grazing mix could also improve dry matter production compared to a single-species dual-purpose crop, and both could be taken through to grain harvest. However, this may compromise on grain yield depending on the species used and further work needs to be completed to identify if this would be seasonal dependent.

Managing feed quality was demonstrated in the trial by comparing more regular grazing cuts to less cuts. This proved that regular grazing may reduce overall dry matter production, but feed quality can be improved. This may be of more benefit to mixed farmers if it can result in faster liveweight gain. Overall, it is proven that these key management decisions will determine how valuable that dual-purpose crops and annual pastures are in a mixed farming operation.