Grazing Crops at Dudinin

Company/Organisation **DAFWA**
Contact: Jonathan England – jonathan.england@agric.wa.gov.au

AIM **To demonstrate the impacts of degree and timing of grazing of crops on yield.**

TRIAL DETAILS

Property:	**Kolindale (ave 325mm rainfall)**
Plot size & replication:	**5 varieties planted in 16.5m wide strips. Each treatment cut was 4 rows wide and 2m long. Replicated uncut control plots.**
Soil type:	**Medium loam**
Crop Variety:	**Buloke, Moby and Urambie barley, UA47 wheat, Yallara oats**
Application Date:	**Cuts were taken 31 May, 11 Jun, 20 Jun, 6 Jul, 16 Jul, 25 Jul, 10 Aug and 28 Aug (Urambie only)**
Cutting heights:	**Handcuts included Ground Level (GL), Leave 5 cm, Leave 10 cm, Leave 20 cm and Take 5 cm depending on crop height at time of cutting. Cuts were not taken unless at least 5cm would be removed.**
Seeding Rate:	**70 kg/ha**
Fertiliser	**5 May – 60 kg DAP/ha**
Paddock rotation:	**2011 clover pasture prior/wheat/clover/wheat**
Sprays (rate/ha):	**5 May – 500 mL roundup, 2 L triflurian, 300 g Diuron, 0.7 L Chlorpyrifos, 0.7 L Alphacypermethrin 15 July – 400 mL Amine, 60 g Lontrel, 40 mL Brodal**
Post Grazing Fertiliser:	**4th July 40 kg/ha Urea**

BACKGROUND

Previous grazing crop work showed that if crops are grazed after they cannot be easily pulled-out (pinch and twist test) and before stem elongation (Z30) that:

1. there will be little or no yield difference at harvest.
2. there is the opportunity to provide valuable feed for stock at a time when pasture is limited.

Work has also shown that maintaining early leaf area is important to capture light to support early plant growth. If defoliation occurs around the commencement of elongation (Z30), rapid growth for recovery depends on leaf area, water and nutrient availability. Grain yield then requires sufficient time for recovery and grain fill.

However, work from the eastern states has considered only grazings before Z30, and grazing usually is to the white line or no more than 5 cm remaining. It is recognised that grain yield is associated with residual biomass and time to senescence. Therefore, we should be able at Z30 to clip graze up to 10 cm from the top of 30 cm high plants and have limited effects on yield - unless we damage the developing ear.

METHODOLOGY

On 1st May 2012, five cereal varieties were sown side by side in 16.5 m wide airseeder strips 300 m long. The perimeter of the area was then fenced and marked into 40 m long blocks for the grazing demonstration with electric fencing. The intensive time x height cutting experiment was in the first block with a sheep grazing demonstration in the remaining area.

The time x height cuts were taken at approximately 10 day intervals to a range of heights determined by the canopy. The example layout can be seen in Figure 1. At each time of cutting, 4 x 2 m rows were cut to the specific height then left to recover for harvest. The biomass from each cut was collected, dried and weighed. Growth stages were recorded and photos of dissected plants were taken.

On 28th August, stems were collected from each plot and dissected to compare recovery from grazing.

At harvest, cuts 1m long and 2 rows wide were taken from the plots, removing all biomass. These were weighed for total biomass and threshed for grain yield.

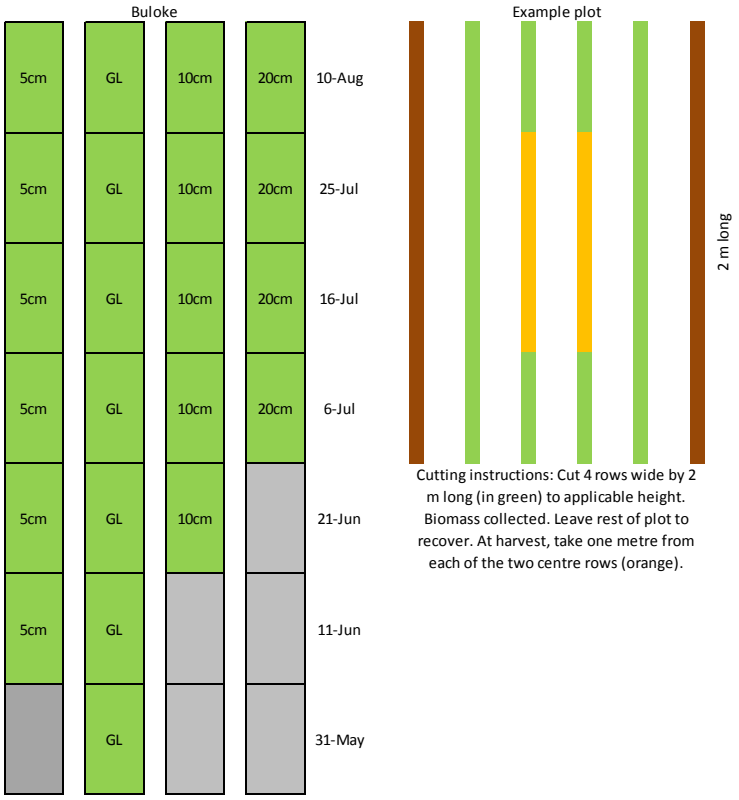


Figure 1. Layout of time x height cutting plots

RESULTS & DISCUSSION

It is important to note that this trial was partially replicated, and was part of a larger investigation at a number of sites into trends associated with timing and degree of crop grazing. Buloke is discussed here as it was the most suitable variety for the low rainfall zone of the five trialled at Kolindale in the 2012 season. The other varieties were chosen for vigour or as winter varieties to compare against spring varieties.

Figure 2 shows Buloke accumulated the most biomass of all crops trialled and had the highest growth rates, which are important for early grazing and for the ability to leave sufficient residual for recovery. The ungrazed Buloke controls in Figure 3 also out-yielded the other varieties tested.

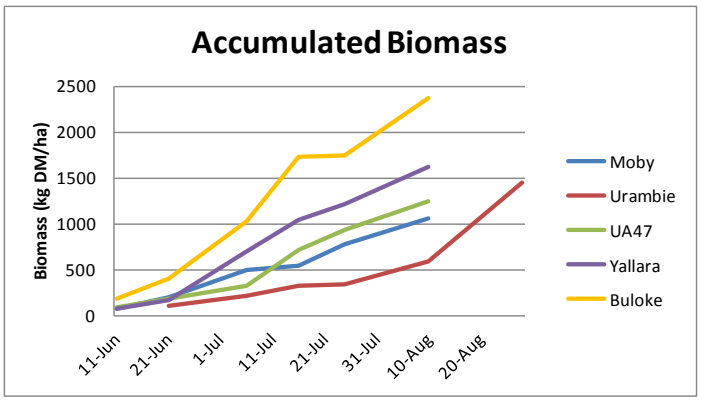


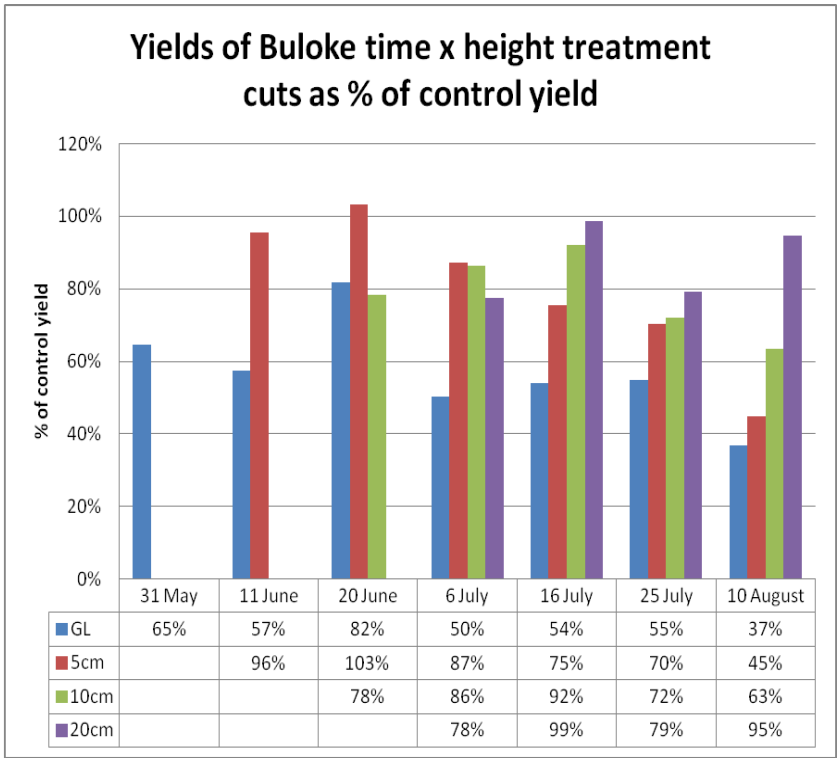
Figure 2 Accumulated biomass of varieties

Variety	Average Yield of Controls (t/ha)
Moby	0.85
Urambie	1.86
UA47	1.55
Yallara	2.02
Buloke	2.43

Figure 3 Average variety yields

The average ungrazed yield of Buloke was 2.43 t/ha, with variation between the yields of the five Buloke control cuts indicating a standard error of 9%. As the time by height cuts were not replicated due to the massive number of cuts required, treatment yield differences of less than 20% of control will be treated as not significant.

Figure 4 represents the yields of each different time x height treatment as a percentage of the average control yield. They are grouped by date of cutting, but yield trends for each height can also be compared over time. It is important to remember that Z30 is currently the recommended end of grazing. Growth stage Z30, was reached by the 16th July cut, Z33 was around the 10th August . Heads had emerged by 28th August.



	31 May	11 June	20 June	6 July	16 July	25 July	10 August
GL	65%	57%	82%	50%	54%	55%	37%
5cm		96%	103%	87%	75%	70%	45%
10cm			78%	86%	92%	72%	63%
20cm				78%	99%	79%	95%

Figure 4 Impact of time and height of yield of Buloke

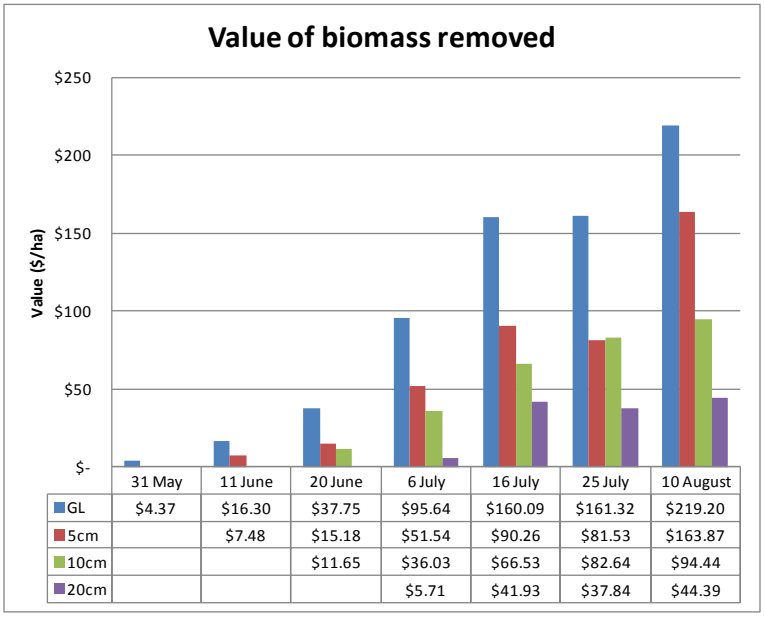
Impact of cutting height on yield.

Ground Level. The results indicate that removing all biomass above the ground has a significant impact on yield. Early cuts are likely to have impacted on the crop's ability to capture light for photosynthesis, and with little stored energy, regrowth and final yield were impacted. Cuts taken later to ground level, removed the developing heads, requiring new

tillers to be grown, severely impacting yield. While the Ground Level biomass removed for grazing is greatest, the advantage is likely outweighed by yield loss.

5 cm. It appears that leaving some green leaf area allows the plant to recover more quickly after defoliation. As such yield was not significantly impacted until Z30 was reached. However cutting to 5 cm after elongation (16th July) caused the developing head to be removed, significantly affecting yield.

10 cm. Grazing to 10 cm has the disadvantage of delaying time to grazing. Figure 4 indicates that significant yield losses are not experienced until after Z30. Grazing to 10 cm after this point is likely to have some impact on leaves associated with the flag, and while the head is not removed, photosynthetic efficiency may be reduced, in turn reducing the yield.
20 cm or 'clip grazing'. Trends show that grazing the top off the plant prior to flag emergence does not have a significant impact on yield. The challenge is getting the sheep to eat just the top 5 or 10 cm of the canopy as the demonstration showed them selecting the youngest tillers.



	31 May	11 June	20 June	6 July	16 July	25 July	10 August
GL	$4.37	$16.30	$37.75	$95.64	$160.09	$161.32	$219.20
5cm		$7.48	$15.18	$51.54	$90.26	$81.53	$163.87
10cm			$11.65	$36.03	$66.53	$82.64	$94.44
20cm				$5.71	$41.93	$37.84	$44.39

Figure 5 Value of biomass removed (if agistment @50c/dse/week)

In terms of grazing, it is obvious that heavier grazing later will see greater returns from grazing, but will also have a more significant impact on yield. Figure 5 highlights that while grazing to ground level early allows feed to be provided when pastures are limiting, the $ value is low. But the value to the system may be high for lambing twin bearing ewes or finishing early lambs. Light to moderate impact late grazing could return $50-100/ha in addition to grain yield, but a crop focussed enterprise would need to minimise yield loss.

CONCLUSION

Moderate grazing up to Z30 and clip grazing after Z30 did not appear to have significant impacts on yield in 2012 when compared to early sown crops.
However assessing the value of grazing to the farm system is complicated as grazing can affect time of flowering and frost impacts. It can also increase water use efficiency, allow pasture paddocks to be deferred, reduce the need for supplementation and allow increased stock numbers and/or crop area.

ACKNOWLEDGEMENTS

Jonathan England and Rodger Bryant, DAFWA in Narrogin with assistance from Sarah Hyde, Facey Group managed the time x height of grazing. Thanks to Andrew Sutherland and his team, DAFWA Perth for threshing the hundred odd time x height harvest cuts. Luke Ledwith and family managed the grazing demonstration and bulk crop yield measurements.