Grain and Graze – who, what, when, where, why, how?

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EXTENSION

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Location:
Minnipa Ag Centre

Rainfall
Av. Annual: 325 mm
Av. GSR: 241 mm
2012 Total: 253 mm
2012 GSR: 185 mm

Yield
Potential: 1.2 t/ha (W)

Paddock History
2011: Barley
2010: Canola
Pre - 2010: Varied

Soil Type
Red sandy loam

Plot Size
2.7 ha x 4

Environmental Impacts

Soil Health
Soil structure: Stable
Compaction risk: None
Perennial or annual plants: Annual

Water Use
Runoff potential: Low

Resource Efficency
Energy/fuel use: Standard
Greenhouse gas emmisions (CO_2, NO_2, methane): Cropping

Social/Practice
Time (hrs): No extra
Clash with other farming operations: Standard practice

Economic
Cost of adoption risk: Low

Key messages

- **The decision of whether or not to grain and graze ultimately is an evaluation of a range of factors including seasonal influence and an assessment of the potential crop penalty of grazing against the grazing value for livestock and overall system benefit.**
- **A late seasonal start with subsequent poor early growth supported the decision not to graze the canola crop in 2012.**

Why do the trial?

The concept of using cereal and oilseed crops for early season grazing and subsequent grain production, also known as growing dual purpose crops, has been demonstrated successfully throughout Southern Australia for a number of years. Dual purpose crops can increase total profitability on mixed farms by providing a source of high value feed during the autumn/winter feed gap, while giving pastures a chance to establish.

However, grazing crops has always been considered too great a risk by many farmers. One of the major issues is that grazing a crop requires a decision making process that can be clouded by too much, or not enough information, which leads the concept to be put in the 'too hard' basket. It is perceived that grazing crops for feed requires substantial technical knowledge, but once the interactions between the crop and livestock are taken into consideration, it is simply a process of understanding who, what, when, where, why and how.

How was it done?

The 4 x 2.7 ha Minnipa Agricultural Centre 'competition paddocks' (refer to EPFS Summary 2010, pg 103 and EPFS Summary 2011, pg 141 for previous records and trial design) were sown with canola @ 3 kg/ha and Angel medic @ 6 kg/ha on 2 May 2012. Four permanent sampling points were marked in each paddock (each paddock representing 1 of 4 replicates) with plans to split plots for plus and minus grazing. The aim of the trial was to provide a dual purpose crop with a grazing opportunity during the autumn/winter feed gap when the canola was well anchored and at approximately the 6-8 leaf stage (with biomass of 1.5 t/ha) and for livestock to be removed after buds had elongated no more than 10 cm. A grain yield was subsequently to be harvested.

Plant counts and biomass samples (dry matter (DM)) were taken for the canola and medic from 10 x 0.1 m^2 quadrats across each sampling point and dried at 70°C for 48 hours on 13 July (to assess biomass available for grazing), 30 August and on 5 October (to assess biomass available for a 'hay-cut'). A feed test was taken from the 13 July biomass samples to assist with calculating stocking rates for grazing. Canola grain harvest was undertaken on 31 October 2012.

What happened?

The 13 July feed test reported acceptable levels for grazing all sheep types at a production level (e.g. for young, quick growing lambs or lactating ewes) with 86.8% dry matter, 31.7% crude protein (target is 16% for production), 25.4% neutral detergent fibre (target over 30%, fibre would increase as plants matured and hay supplemented at grazing), 84.8% DOMD (digestibility) (75% required for production feeding) and 13 MJ /kg DM (11 MJ/kg DM required for production). Although canola and medic plant densities were acceptable, 34 and 100 plants/m^2 respectively, the amount of biomass in July was not adequate to support any useful grazing (Table 1). Data presented for each treatment are a mean of the four selected permanent points in each single treatment (paddock).

Table 1 Established canola and medic plant numbers (plants/m²) total canola, medic and weeds (tDM/ha) and canola grain yield (t/ha) in the competition paddocks for the 2012 season

Paddock	13 July (plants/m²)	13 July DM (t/ha)	30 August DM (t/ha)	5 October DM (t/ha)	Yield (t/ha)
A	40	0.15	1.6	2.3	0.23
B	40	0.12	1.0	2.5	0.16
C	34	0.08	1.2	2.7	0.25
D	32	0.16	1.9	1.7	0.18

Each of the four replicates had varied paddock history that impacted on the results shown in Table 1 and the lack of biomass was integral in the decision to not graze the crop early. The low canola yields measured suggested that the paddocks could have been used for sacrificial grazing (during the mid to late reproductive phase of the crop where there is a no likelihood of reaping a significant yield, to fill the feed gap or short supply over summer).

What does this mean?

The decision making process, which resulted in not grazing the trial in 2012, was a procedure that must take all factors of the system into account and can be broken up into the sections below:

Who

Livestock that have no previous grazing experience or are new to the particular paddock (e.g. weaners) are the best type of animal to use as they will graze the entire paddock more evenly and tend not to camp or rest in the same location. Another consideration is to avoid stock that may be vulnerable to stress or can be difficult to move to another paddock (e.g. ewes in late pregnancy or during lambing). Stocking rates can be calculated according to the Feed on Offer (FOO) by taking biomass samples and using a tool such as the MLA stocking rate calculator[1]. Alternatively, any number of livestock can simply be used until an even and sufficient grazing has been achieved, as long as the animals are not damaging the plant's structure. Higher stocking rates for a shorter amount of time will result in a more even grazing.

What

Most cereals and oilseeds can be grazed successfully if managed correctly (e.g. livestock may require supplements such as magnesium or sodium on certain crops). It does make sense to graze the crops with more biomass and vigour (e.g. barley) due to more feed being available at the early time of grazing and a faster recovery. A specific forage variety does not have to be chosen to grain and graze - crops that are chosen for grain quality are fine, though some varieties are superior in response and recovery from grazing and do have better grazing traits such as early vigour and more biomass (refer to EPFS Summary 2010, p 136). Early sowing of crops for the purpose of grain and graze and selecting longer season varieties are wise choices as it gives plants an extended recovery period.

When and How

Cereals: graze crops during early tillering at growth stage 18-22 (also known as jointing) when plants are well anchored, which can be measured using the pinch and twist test (pinch the top of the leaves upwards while twisting, if the leaves break and the plant does not pull out of the ground, the crop can be grazed). Take the livestock out when the crop is approaching growth stage 30 (stem elongation) and before boot formation to avoid compromising yield (use a stock exclusion area such as weldmesh to monitor crop stage).

Canola: grazing can commence at the 6-8 leaf stage when plants are well anchored. Livestock need to be removed from the paddock when buds have elongated no more than 10 cm. Grazing past this point can delay flowering and potentially reduce yield and oil content. Blackleg severity can be increased through grazing; therefore selecting a variety with a high resistance rating is necessary. Nitrate poisoning can occur if soil N levels are high and livestock are introduced to the paddock too quickly or when they are hungry. Therefore, avoid this situation by gradually introducing stock and providing roughage.

[1]MLA Stocking Rate Calculator can be found online at http://www.mla.com.au/Publications-tools-and-events/Tools-and-calculators/Stocking-rate-calculator

For both cereals and oilseeds ensure that sufficient biomass is available prior to grazing (seeding rates can be higher to increase plant density and early biomass), the timing of grazing allows for optimal crop recovery (choose to graze early-sown crops) and chemical withholding periods are adhered to. Consider applying more nitrogen at seeding and/or topdressing after stock removal to maximise plant regrowth and yield potential if conditions are suitable.

Where

The best paddocks to select are ones that are clean and do not have a grass weed issue (as livestock can exacerbate the problem due to reduced crop competition), although grazing canola crops may allow better exposure of target weeds for chemical control. Select paddocks that were sown early and with sufficient watering and/or feed points (such as lick feeders or hay racks) which are spread out to ensure an even grazing. Electric fences are worthwhile if available to force higher stocking rates and promote even grazing.

Why

Grain and graze is an opportunity to benefit both the livestock and cropping enterprises. Grazing crops helps fill the feed gap between the times of poor nutritive value of stubbles and while annual pastures are still establishing, and reducing supplementary feeding. Crops can also be used specifically to feed sheep in spring if adverse conditions prevent sufficient grain yield due to drought or frost. Grazing an early sown crop can also reduce the risk of frost damage by delaying flowering.

The decision of whether or not to grain and graze ultimately is an evaluation of the above factors, seasonal influence and an assessment of the potential crop penalty of grazing against the grazing value for livestock and overall system benefits.

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