Wire, water and grazing management in dual purpose crops

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Key words

Paddock layout, fencing, water, dual purpose crops

Take home messages

- Paddock size, or available grazing area, is key to maximise grazing efficiency
- Strip fencing may be necessary to 'create' the required stock density
- Water sources must be of good quality and well located within each paddock
- Identify the class of stock and their indicative weight and consumption needs before sowing to determine the likely area of grazing crop needed (use regional dry matter crop growth rates to assist)
- Increased profitability per hectare gross margin by comparison to crop only situations.

Introduction

Dual-purpose crops offer great opportunities for farmers with livestock in their system (their own or via potential agistment income) to utilise early-season sowing opportunities, spread risk, and increase per hectare (ha) returns. Critical to gaining the most from these opportunities, is getting much of the logistics right, and applying sound grazing management. Cropping machinery (in general) over the last 20 – 30 years has been getting larger and more efficient. As a consequence, livestock infrastructure has been reduced, and in many cases, removed. So, what does this mean for dual purpose crops? In short, many paddocks are now too large to graze efficiently. Water points are often minimal and of lesser quality and quantity, or the number of stock required to provide efficient grazing can be very large - creating its own sub-set of management issues.

Kirkegaard et al. (2016) reported that with good management, the period of grazing can increase net crop returns by up to $600/ha and have a range of system benefits including widening sowing windows, reducing crop height, filling critical feed gaps and spelling pastures. However, achieving this grazing return relies heavily on 'good management', with time of sowing, stock number, grazing management, crop growth (both pre grazing and recovery), water supply and other factors all critical to a successful outcome. The indicative stock density used to achieve the above profit was approximately 2000 dry sheep equivalent (dse) grazing days/ha. Put simply, it may be 40 dse/ha for 50 days of grazing.

Paddock infrastructure

There is no 'ideal' paddock size, or available grazing area. My experience is that smaller paddocks/areas (<40 – 50 ha) are likely to be far easier to manage and have more manageable water points than much larger paddocks. Getting the most from the grazing dry matter (DM) requires eating more of what is on offer, over a shorter period of time, and leaving a critical residual biomass to allow significant crop regrowth before the second (and potentially third) grazing. Understanding crop growth rates, and what drives them, from planting to first graze (autumn) and into winter, enables farmers and advisors to predict likely stock numbers and DM production. Stock number and predicted consumption determines how long a set amount of DM will last. Using the grazing day information from Kirkegaard et al (2016), a 40 ha paddock would require approximately 1600 dse (potentially 2000 lambs (or 230 - 250 weaner steers depending on size)) for two 25 day grazings. A paddock larger than this will proportionately increase the stock number needed to optimise grazing efficiency.

A significant limitation to larger paddocks (and by default mob size) is water. This is usually the most difficult infrastructure to accommodate in the dual purpose crop system. Many issues surround good stock water supply. Distance to, temperature and cleanliness of water, dam vs trough, and other factors all impact on animal intake and performance.

The Dept. of Primary Industries and Regional Development WA (2020) publication 'Water quality for livestock', guides farmers in the water needs of livestock. Stock avoid warm water, so deeper or shaded water sources will generally be preferred. Pipes carrying water above ground to moveable troughs may deliver hot and undrinkable water (pending time of the year and location). Similar outcomes can also occur in shallow troughs in full sun. While trough systems have many benefits, if mob size is too large or inflow rates too low, stock will walk off with less (and sometimes nil) water intake. Allowing at least one metre of trough per 130 sheep is their advice. Further, sheep not used to water troughs, and particularly young sheep, may take time to learn to drink from them, so always push them onto water in a new paddock.

Dams are still very valuable, and often the only option for many. If there has been a benefit of the recent drought and dry dam situation, it is the opportunity provided to clean out those dams that farmers will benefit from most into the future. Stock will always decrease the quality of dam water, often by urine and faeces contamination and most commonly just by mud and foot disturbance. If water quality is poor, livestock may drink less than they need, or rarely, may stop drinking altogether. Lower water intake decreases DM intake, thus resulting in decreased animal performance. Many experiments have demonstrated the benefits of cleaner trough water over dam water, but it is not available to all. Lardner et al (2005), in their study of cattle performance, showed that by improving water quality with pumping and aeration to a trough, weight gains of 9 – 10% were achieved over the control mob over a 90 day grazing period in most years.

Dry matter, grazing management and stock density – the numbers

Kirkegaard et al. (2016) expressed DM production in terms of dse days/ha. They write that "early-sown, slower-maturing crops have the longest vegetative period and provide the most grazing potential, but typical grain-only spring crop varieties can also be sown early and provide useful grazing without significant yield loss following the same principles – but the potential grazing is much reduced, and closer management of lock-up timing is required". Further, when it comes to planning, preparation and sowing (i.e. all key management activities), they quote that "each week delay in sowing wheat after early March, reduces grazing potential by 200-250 dse.days/ha and yield by 0.45 t/ha".

So, the challenge is to convert this DM into red meat as best we can, without penalising ourselves in grain yield. Again, I refer you to Kirkegaard et al. (2016) for a very explicit description of that critical time to destock, or "shut the gate" so that little or no grain penalty occurs. You will note that this decision is driven by the plant, through its stage of growth and critical residual biomass needs and not by a date on a calendar. If maximising grain yield is a key target, it is imperative to get this destocking decision right.

Understanding plant growth, time to first graze and regrowth rates enables us to predict how many stock, of what class, will be required during the season. In the late 2000's, working with a grower at Cumnock (Central West Slopes), we aimed to get 60 – 75 days grazing from the early sown cereals. This was usually achieved in two or three grazings but required good estimations of DM prior to and during grazing, and what growth rate could be expected during the 'rest or recovery period'. Figure 1 provides DM growth rates for the Central West Slopes (NSW DPI – Prograze, 2000), for a range of pastures species, with oats included as a reference. The oat growth curve line is 'indicative' of a cereal crop's daily growth rate (kg DM/ha/day) in this region, and while I accept that wheat may be slightly lower or it may be sown slightly later, it can be used to estimate a potential grazing situation. There are good data sets of DM rates available from more recent NSW DPI/GRDC trials should you wish to fine tune your future DM estimates for areas closer to home.

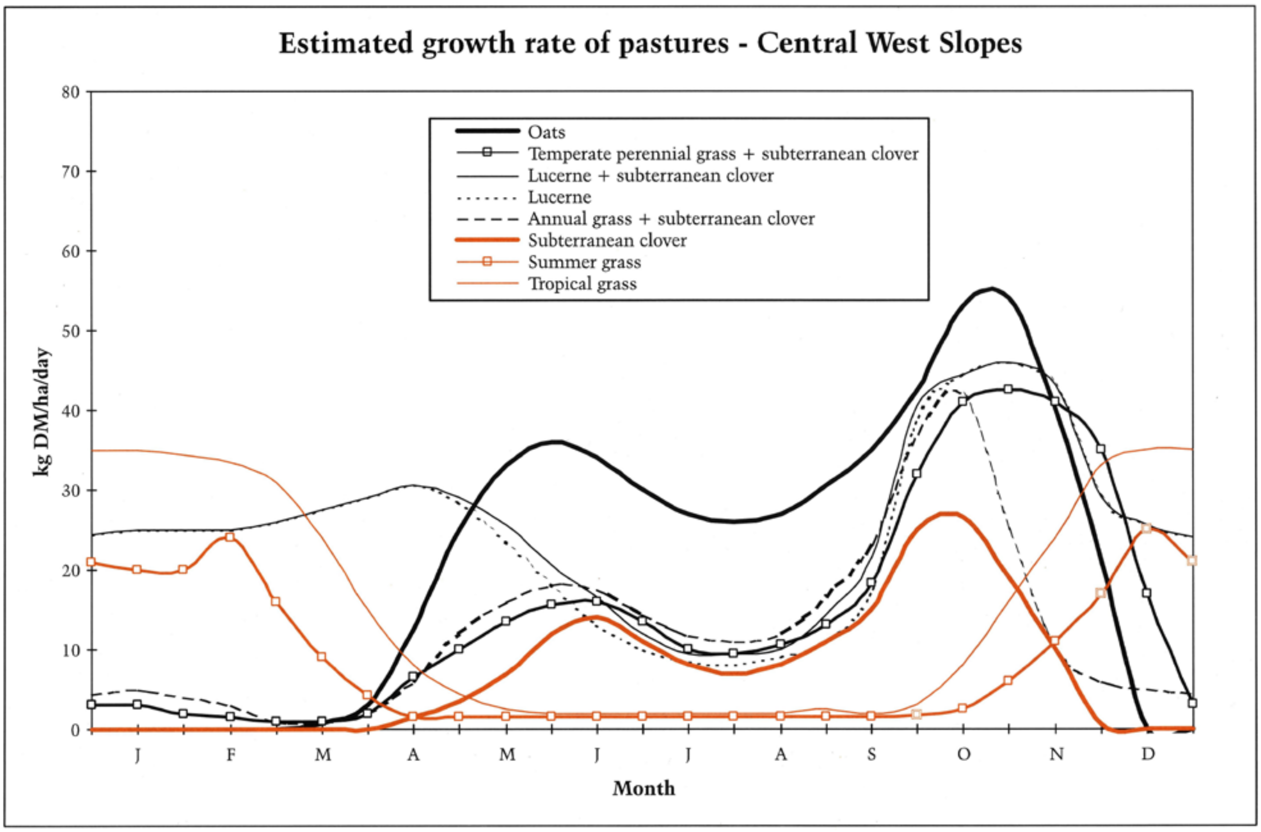

Figure 1. Estimated growth rate (kg Dry Matter/ha/day) of pasture species on the Central West Slopes of NSW (Source NSW DPI - Prograze)

By providing a working example of DM utilisation, it may make the following numbers more understandable. Using the oat growth rate line (the top thick black line from May to October) from Figure 1 as a guide (and knowledge of more recent wheat DM growth rates from various locations), one can estimate how much DM could be on hand by a certain point in the growth cycle. By sowing early (March 1) into a well prepared and planned paddock, one could estimate DM by mid-May to range from 1800–3000 kg DM/ha pending species/varieties/growing conditions. If sowing date was a month later (April 1st), this same DM is likely to be achieved by mid to late June. So how do we use it?

DM utilisation is the amount of DM consumed by the animal as a % of total on offer. For cereals, I estimate 60 – 70% utilisation pending row spacing, and I am aware of data showing higher utilisation rates in canola. The caution here is not to over-estimate potential DM on offer, as running out of crop DM is far worse than having more left in the paddock than first planned. It takes experience, and lots of it, as no two seasons are the same, and growth rates can change rapidly in response to dry spells, frosts and nutrient deficiencies to list a few. The second variable to consider before stocking is how much residual DM to aim for to enable speedy recovery/regrowth. Best regrowth occurs when there is 1000 – 1400 kg DM remaining (typically 10 – 12 cm high in cereals). Eating below this range restricts regrowth rates for a period, thus decreasing overall DM available for consumption during the season. As Kirkegaard et al. highlight, “not leaving enough residual biomass after the last grazing is very damaging in terms of grain recovery”.

So, for the first grazing, if we average possible DM on hand (2400 kg/ha), and likewise average what residual DM we want left (1200 kg/ha), we can determine there to be 1200 kg DM/ha that we have available to eat. If this is consumed at 65% utilisation, then we eat 780 kg DM. Now the stock class and size and continued crop growth comes into play. Using a 35 kg lamb (0.8 dse), one estimates they will consume 3-4% of their body weight a day (1.05 – 1.4 kg DM/day, average 1.2 kg DM/day), while from figure 1, growth rate of the crop will continue at say 30 kg DM/day. So just to "hold" the crop where it is, one needs to eat the daily growth (30 kg DM @ 65% = 19.5 kg) which will require 16 lambs/ha. Should we wish to eat the available 780 kg DM over the next 3 weeks, then 780 kg DM /21 days = 37 kg DM/day is further required to be eaten. Again at 1.2 kg DM/day eaten by each lamb, this existing DM needs another 31 lambs/ha. Multiply this by grazable crop area, and this is where paddock size and water source(s) become critical to total stock number required. This above example indicates more than 45 lambs per ha (at a point in time) could be required to get the best grazing efficiency, and thus productivity and profit.

The balancing act of having this amount of quality feed on offer for an extended period means that usually three paddocks or areas of similar size will be required so a 21 day rotation as indicated in the above example can be practiced. This allows approximately 42 days between grazings, enough for significant DM growth if good grazing management principles are applied, and minimum DM limits obeyed.

Similar calculations can be run for grazing crop situations, it just requires DM estimates and predicted DM growth rates, keeping in mind that when the crops near 'lock up' time, these stock, if not ready for sale, need to go somewhere else! As noted earlier in this paper, additional gross margin returns of $600/ha are quite achievable in the current livestock market, with a significant range, pending crop season length, from $300/ha to more than $1000/ha.

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