

USING PASTURE SMARTER (GETTING MORE WITH LESS WORK)

Graham Kerr, Janet Montgomery
Agriseeds Ltd, 2547 Old West Coast Road, Courtenay, Canterbury

Summary

This paper covers five tips for ‘Controlling the Controllable’ that will help you harness more from pasture. These can make you A LOT of money (\$145k/year on offer in Tip 1!) and for most there is nothing to buy; all that’s needed is some thought and time.

Pasture is the key feed for the NZ dairy industry, and analysis repeatedly shows it is a major driver of farm profit and also improves the resilience to the volatility of payout.

The way we manage pasture varies greatly between farms and there is potential for improvement. It is not a simple resource as its growth and quality are ever-changing, however these tips will help you to manage it well. So take up the challenge and improve your business!

Tip #1: Consistent residuals day-in day-out (except when wet)

This may sound pretty simple, but achieving consistent post-grazing residuals is hugely valuable. Around \$145,000/year extra income is on offer from a small increase in feed quality measured in metabolisable energy or ME (+0.3 MJ ME) and feed eaten (+3%) on a 200ha farm with pastures producing 15,000 kgDM/ha/year as shown in Table 1.

Table 1: The value of improved grazing residuals on a 200ha dairy farm.

Benefit	Amount	Pasture grown	Extra	Extra MS*	Value
Increase in ME	Extra 0.3MJ ME/kgDM	3,000,000 kgDM (=200ha x 15,000kgDM/ha)	900,000 MJME (3,000,000 kgDM x 0.3 MJ ME)	11,250 kgMS	\$67,500 @ \$6/kgMS
Increase eaten	Extra 3% eaten	3,000,000 kgDM	90,000 kgDM (3,000,000 kgDM x 3%)	12,938 kgMS	\$77,628 @ \$6/kgMS
Total income for extra ME + eaten =					\$145,128

* ME converted to milksolids at 80 MJME/kg MS. Assumed ME of extra pasture eaten of 11.5 MJ ME/kgDM.

Notes:

Is this level of increase possible? Yes, the Lincoln University Dairy Farm (LUDF) increased production by 273 kgMS/ha from 2002/03 to 2003/04, over two seasons with similar conditions, mainly through focusing strongly on pasture management and in particular on residuals.

Pasture management is simple, in theory. There are only three rules:

1. Graze a pasture at the right time with the right stocking rate
2. Take animals off the pasture when the desired residual is attained
3. Repeat steps 1 and 2.

These rules apply in dry conditions. In wet weather the aim should shift to protecting the soil and pasture from damage (see Tip #4). Pasture management is also a cycle (Figure 2), with interdependent steps. Improved pasture quality (ME) is a result of good residuals, which you capture at the following grazing.

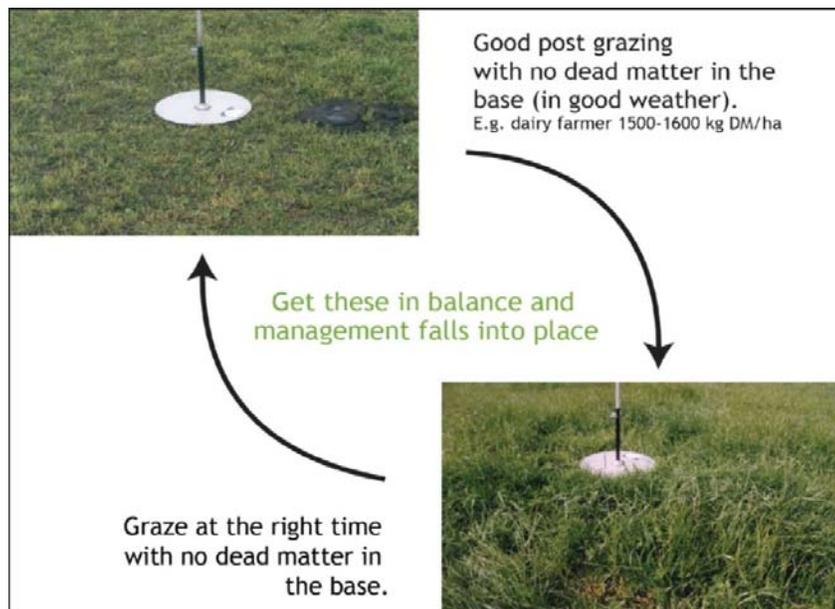


Figure 2: The grazing cycle: the quality of a pasture is the result of the previous grazing.

The key to post-grazing residuals is **consistency**. Some farmers aim to graze to 1500 kgDM/ha, some 1600, others 1700. All these options may be fine, based on the farm system. The correct thing to do is to be consistent, so cows are eating the high quality plant leaf *above* the same residual each grazing.

Tips for smarter residual management:

1. Define target residual – Does your whole farm team know what the target residual is? This needs to be clear so it can be consistently achieved by whoever is moving the cows.
2. Have a photo of right residual – This is the easiest way to remember it. Have it in the lunch room, but also on everyone's phones to use in the paddock.

3. Use a plate meter – These are a great way for your team to objectively discuss a residual, (avoiding the “I think it’s 1500. No, I think it’s 1700” discussions.) Measure it with a plate meter, and then decide what to do.
4. Use 24 hour grazings – Only half as many residuals to get right as 12 hour grazings, reducing the number of decisions and potential for error by half. The science shows milk solid production is equal for 12 versus 24 hour grazings.
5. Have residual as a KPI for those shifting cows – having it as a key performance indicator (KPI) in a job description or contract means it’s non-negotiable for staff to achieve.
6. “What if” options – residuals aren’t always achieved (e.g. old pastures of browntop and cocksfoot make it difficult). Have your options to reset residual when required.
7. Act quickly – If residuals aren’t achieved act quickly to reset them. This might include putting cows back into the paddock, or pre-graze mowing next round.

Tip #2: Smarter pasture renewal

In our opinion many paddocks on New Zealand dairy farms aren’t producing to their potential. The farms we analyse show there is **significant** potential for improved profitability from smarter investment in pasture renewal.

Currently there is little analysis of pasture performance occurring on-farm to look at what the right amount of investment in renewal should be. The smart way to determine this is to compare the difference between paddocks on the farm within the same productive area - such as soil type or irrigation type (Figure 3). In this example the darker soil type has paddocks ranging from 18 t DM/ha/year (paddock 5) to 12 t DM/ha/year (paddock 3), showing a potential 6 t DM/ha/year gain for paddock 3.

This paddock data comes automatically from farm walk pasture assessments through software such as ‘Pasture Coach’, ‘AgriNet’ or ‘Minda Land and Feed’.

Notes:

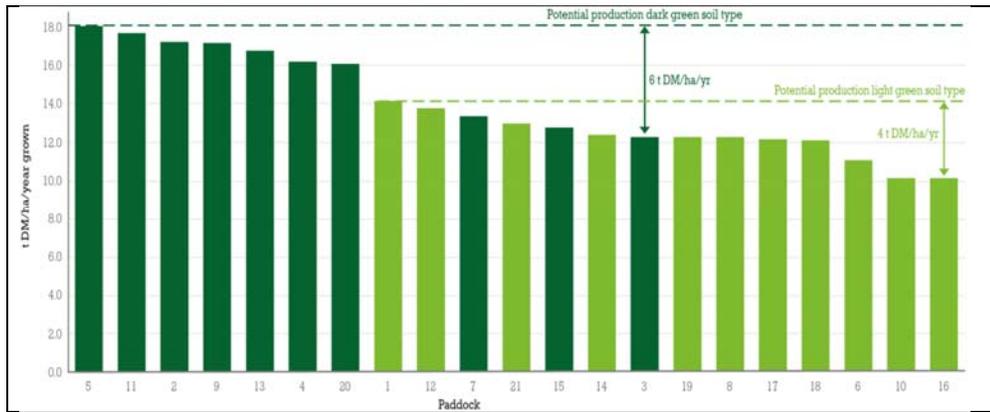


Figure 3: Annual yield of paddocks across a farm with a dark (better) soil & light (poorer) soil.

The second step is looking at the reasons for the differences in paddock performance, which may be driven by plant species, but there may equally be other factors that need to be addressed such as soil fertility, compaction, drainage or insect damage.

The third step is looking at the cost/benefit for renewal which comes from comparing the cost of doing nothing (not renewing) versus the potential higher DM yield, pasture quality (ME) and better utilisation of new pasture. Just looking at extra yield, new pasture can cost 7c/kgDM if an extra 3 t DM/ha/year can be achieved for a \$900/ha investment (Figure 4).

Extra grown (t DM/ha/year)	Do nothing	1 t	3 t	5 t
Extra growth over 5 years	0	+5 t DM/ha	+15 t DM/ha	+25 t DM/ha
DM lost during renewal	0	-1.5 t	-1.5 t	-1.5 t
Net increase	0	3.5 t DM/ha	13.5 t DM/ha	23.5 t DM/ha
Cost of renewal \$/ha	0	\$900/ha	\$900/ha	\$900/ha
Cost c/kg DM	n/a	25 c/kg DM	7 c/kg DM	4 c/kg DM

Figure 4: Cost (c/kg DM) of new pasture for 1 tDM/ha vs 3 tDM/ha vs 5 tDM/ha per year extra growth.

New pasture at 7c/kgDM is very attractive when imported feed such as PKE costs 30c/kg DM (based on \$240/t, 90% DM plus handling costs of 3c/kg DM).

Tips for smarter pasture renewal

1. Assess the performance of individual paddocks – this varies greatly. In analyses we have undertaken, there is typically a 100% yield difference between poor performing and high performing paddocks (e.g. 9 t DM/ha to 18 t DM/ha).
2. Look at similar parts of farm – some parts of the farm may be better than others (e.g. soil or irrigation type). Compare paddocks within these parts.
3. Look for low hanging fruit – spend money on the paddocks that are cheap to improve, and potential gains are large.
4. Keep assessing paddock performance – to assess results from renewal. Smart renewal is about repeating what gives a very good return on investment (and not repeating things that don't work as well).

Tip #3: Keeping cover in the 'sweet spot'

Ryegrass-based pasture has a natural range where it performs best, and we can harvest the most ME/ha from it in our grazing systems. Our role is to keep pasture within this optimal range as in Figure 5. While the ideal range for a diploid perennial ryegrass might be 1500 kgDM/ha to 3200 kgDM/ha, tetraploids keep their palatability up to 3500 kgDM/ha due to their softer stems.

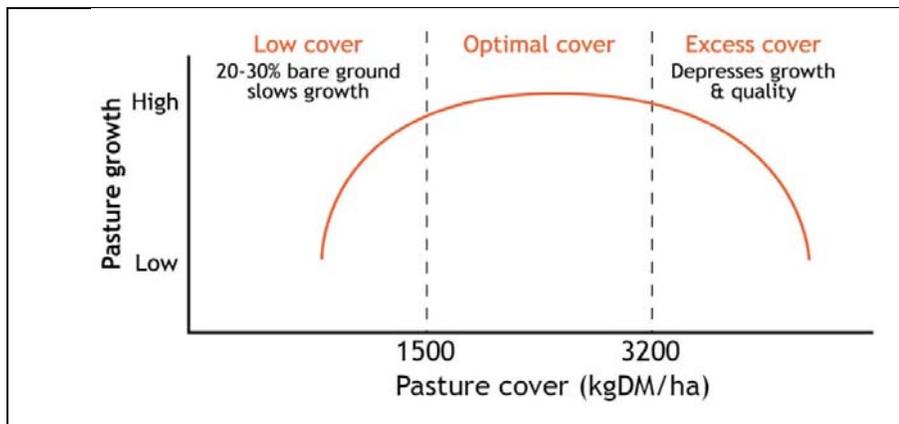


Figure 5: The optimal pasture cover for diploid perennial ryegrass.

Notes:

To keep pasture in this range we need to set targets for average cover through the year, and then monitor against these. Pasture growth rates vary so the key is continually adapting your management to these changes, and handling surpluses (see Tip #5) and deficits. DairyNZ has introduced a 'Pasture Road Map' concept as a visual way of setting targets (Figure 6).



Figure 6: Average pasture cover (APC) from autumn to spring (DairyNZ 2017).

Tips for keeping cover in the sweet spot

1. Set targets for cover through the year – The DairyNZ Road Map is a good tool for this, and can be put somewhere handy for continual reference.
2. Monitor regularly – there is nothing surer than that pasture growth rates will vary, and regular cover assessment allows you to identify and react to this more quickly. Do a farm walk at the same time each week so it becomes a habit.

Tip #4: Have a wet weather plan

Tip #1 mentioned achieving consistent residuals in dry conditions, but when it's wet the aim is to look after your soils and pasture - while feeding stock as best you can.

Damage from pugging, pasture compaction and consolidation is one of the key reasons for poor pasture persistence in the South Island. Treading damage can decrease regrowth by 44% (Pande *et al.* 2000) and severe pugging can kill a pasture completely (Figure 7).



Figure 7: A pasture three months after pugging behind a break fence.

Tips for smarter wet weather pasture management

1. Have a plan that everyone knows – Wet weather will happen, so talk about how to handle it. Have the plan on the wall for everyone to refer to.
2. Day to day is important – Stock management (e.g. spreading stock out, on/off grazing) is important to get right. If you must damage a paddock(s), limit it to poorer paddocks planned for renewal or crop.
3. Wet weather management as a KPI – having it as a key performance indicator (KPI) in a job description or contract means it's non-negotiable for staff to achieve.
4. Infrastructure? If damage is on-going, would investment into drainage or a feeding pad be warranted?
5. Repair damage quickly – Fixing pugging is a race with the weeds. There is a window of opportunity to fix damage and keep the weeds out and maintain productivity (Figure 8). The solution might be as simple as marking area(s) on a farm map and getting a contractor to under-sow them.

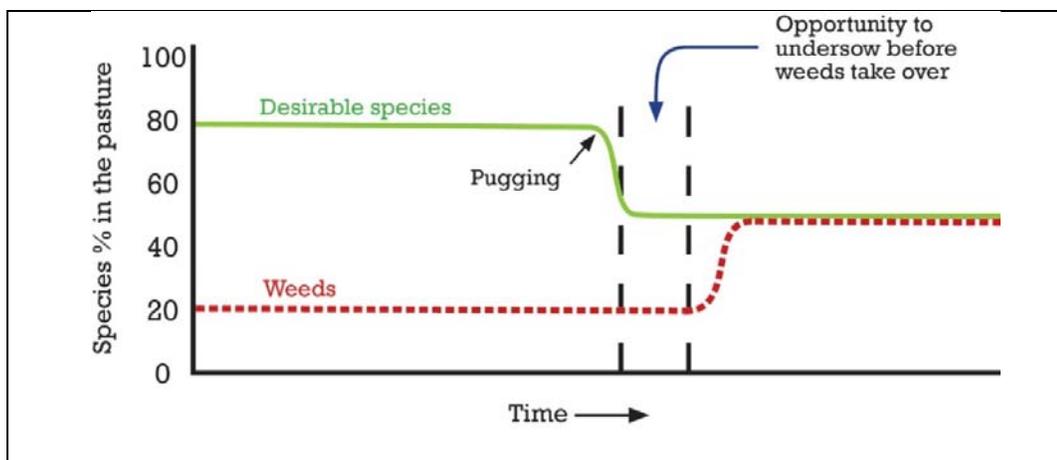


Figure 8: Pasture composition over time - before and after a pugging event.

Notes:

Tip #5: Identify surpluses & act quickly

Probably the most common issue in pasture management is a surplus, due to a growth rate higher than animal demand. In these cases we need to act, as pasture *doesn't keep in the paddock*. Ryegrass tillers keep on growing, older leaves die, daughter tillers are shaded out and ME drops, as does cow intake and milk production. This was well covered at SIDE last year by Donaghy & Clarke (2016).

The aim is to identify a surplus quickly through monitoring (see Tip #3) and act in one of three ways: *Do nothing* – a good option if you believe growth rates will drop, and pasture quality is still okay so you can graze your way through the surplus. *Make silage/baleage* or *pre-graze mowing*.

Make silage/baleage

Making supplement is a good way to remove surplus feed, and to maintain the quality of pastures across the farm. Also the supplement has value to feed out during feed deficit periods.

There is a direct relationship between the yield of pasture and its feed quality (ME) as in Figure 9. Cutting pastures before they reach a yield of 4 t DM/ha (i.e. harvest about 1.5-2.5t DM/ha) produce better feed quality, and baleage of ME 12 can be achieved in good weather. After this, pastures can lose 1 ME unit every 2-3 weeks, as stems, seed heads and dead matter increase.

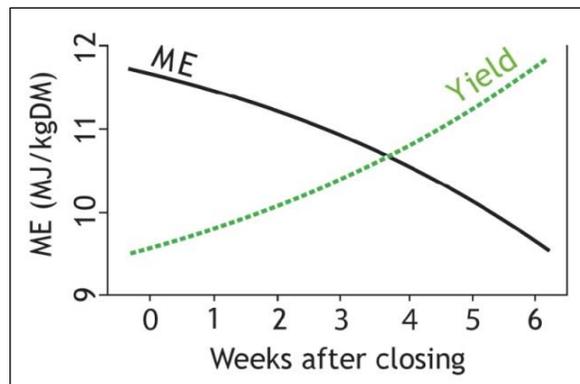


Figure 9: The relationship between increasing yield and feed quality in a pasture silage crop.

It is often said that “light crops are expensive in c/kgDM to make”, but we would argue that often it is the heavy crops that cost dairy farm systems, as they make money by getting high quality pasture into cows to optimise conversion to milk solids.

This is illustrated in Figure 10 which shows there may be little difference in total yield between heavy versus light silage crop. Where you make heavy silage there is typically less pasture grazed and pastures are slow to recover - potentially causing of feed deficit.

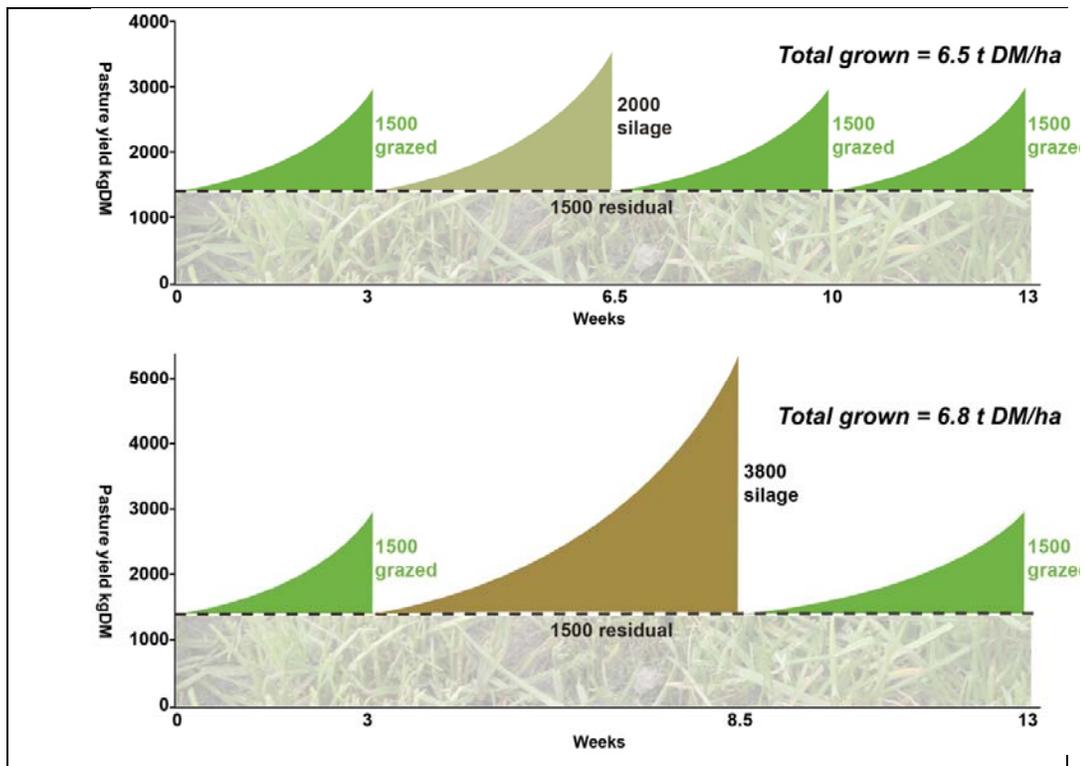


Figure 10: A light versus heavy silage crop – which is smarter in terms of making money?

Tips for smarter silage/baleage

1. Light crops = fast regrowth – often in dairy systems we can be in surplus one week and two weeks later be in deficit (and looking to feed out). Light crops mean paddocks are back into the grazing round quickly, in case we need them.
2. Light crops = high ME silage – high ME silage can be used at any time of year, including peak lactation. Its utilisation tends to be very high compared to poor silage improving its efficiency.
3. Have a good contractor relationship – if you are reliant on a contractor turning up when you need them, keep a good relationship with that person.

Notes:

4. When in doubt book the contractor – silage isn't silage until it is baled, and you can cancel the contractor and open the paddock up and graze it.

Handle a surplus by pre-graze mow

There has been a lot of publicity around pre-grazing mowing, and its effect on milksolids' production, particularly around the LUDF. It is unclear whether making silage or pre-graze mowing are more profitable, as each has pros and cons.

How the LUDF implements pre-graze mowing is covered in Figure 11, where it used as a way to maintain quality during periods of smaller feed surplus.

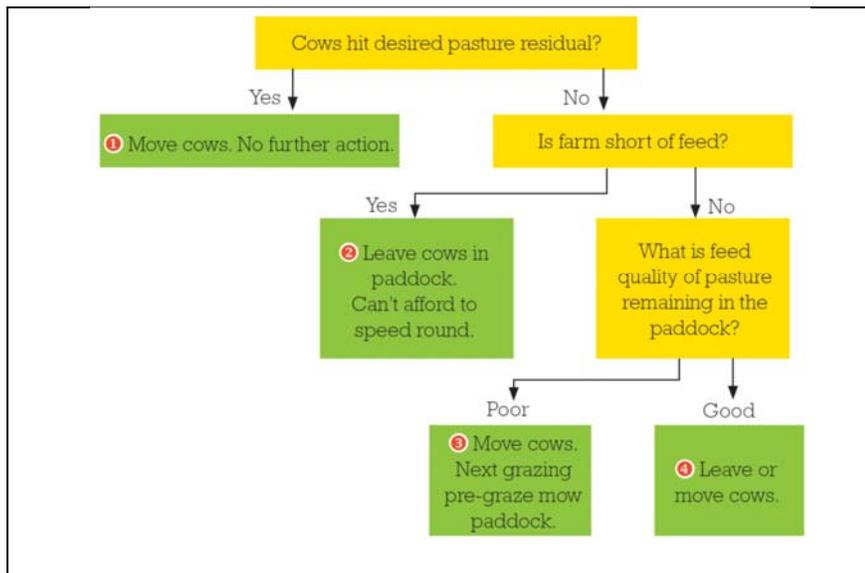


Figure 11: The typical decision process for pre-graze mowing.

Smarter pre-graze mowing tips

1. Use in times of pasture surplus – pre-graze mowing speeds the grazing round (the worst thing to do in a feed deficit).
2. Mower leaves the paddock as cows arrive – don't let the grass wilt for too long, as cows like freshly cut grass.
3. Mow to residual height – at the following grazing, cows will only graze to the mowing height, so mow to your normal grazing residual. Heavy rolling paddocks, to level them, may be needed to achieve this.

References

- DairyNZ. 2017. *Pasture road map*. <https://www.dairynz.co.nz/farm/tactics/pasture-road-map/>
- Donaghy D, Clarke B. 2016. The grass whisperers - making pastures perform for you!
Proceedings of SIDE: 1-14.
- Kerr G A, Brown J, Kilday T, Stevens D R. 2015. A more quantitative approach to pasture renewal. *Journal of New Zealand Grasslands* 77: 251-258.
- Pande T N, Valentine I, Betteridge K, Mackay A, Horne D. 2000. Pasture damage and regrowth from cattle treading. *Proceedings of the New Zealand Grassland Association* 62: 155-160.

Notes: