

The 4front system

Enables you to grow more pasture
and reduce N loss and GHG
emissions.



What do you want your farm system to look like in three years?

Farm system changes are complex. It helps to understand:

- the principles behind your changes
- how to capture the new gains
- what management changes are needed to make it all work

In this guide, we have concentrated on the pasture principles underlying The *4front* System.



In a nutshell

We constantly focus on achieving consistent pasture residuals for good reason – pasture eaten is the #1 profit driver in our systems.

Mostly we sow diploid ryegrass-based pastures, and graze them at the 2 - 2.5 leaf stage (or 2 - 2.5 leaves/tiller) because it's the easiest way to maintain good residuals.

Tetraploid-based pastures like *4front* change the equation. They hold quality longer, and still graze well at higher covers. This creates cascading benefits in efficiency, photosynthesis and pasture growth.

Plus potentially less N leaching and GHG emission, key outcomes our industry is seeking.

Your cows will love you too, as tetraploids like *4front* are easier to graze.



4front/Maxsyn pasture at Lincoln University Dairy Farm – tetraploid/diploid mixes have been key in growing more, plus increasing cow intakes.

The science behind the 4front system

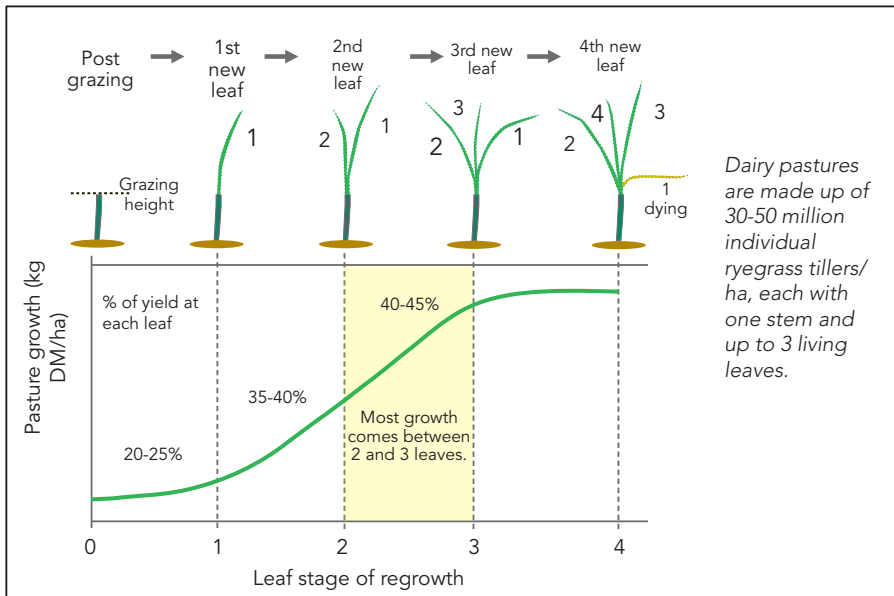
Principle ①: Growing more

Tetraploids can grow more DM because you can run them at higher covers, and capture more energy from the sun via the natural magic of photosynthesis.

"The same amount of pasture with 100kgN/ha less N – where do I sign!?"

For LUDF, this adds up to around +1.2 t DM/ha/year. Alternatively you could grow the same amount of DM for 100 kg/ha less N fertiliser (based on a growth response of 12 kg DM/kg N).

LUDF grazes longer covers, at about 3500-3600 kg DM/ha. This sounds like a small change, but it compounds to return big dividends, as shown below. Pasture growth accelerates over time, so if we typically graze around 2 - 2.5 leaves/tiller, we lose the fastest growth that comes with the growth of the third leaf, which is 40-45% of the total growth available. This is the basis of the adage 'grass grows grass'.



The reason we typically graze around 2 - 2.5 leaves/tiller is that diploid ryegrass becomes chewy for cows when it reaches >3000 kg DM/ha, or even less with old pastures. But modern tetraploids like 4front have softer stems, and stay palatable at higher covers. So we harness the sun's energy more efficiently.

Principle ②: Better balanced grass

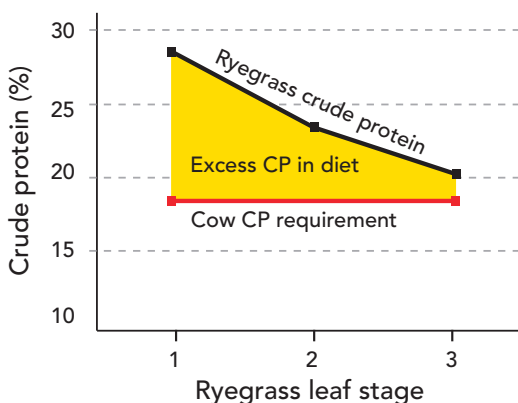
As ryegrass regrows after grazing, the crude protein (CP) or N content in the plant drop, as shown below.

"If you graze ryegrass later, animal excrete less N."

Lactating cows in spring need around 18% CP in their diet, so a pasture with 22% protein at that time supplies 4% too much. This excess protein, excreted as urine and dung, is what causes problems with N loading of soils. Grazing 0.5 leaf/tiller later may reduce CP by 1.5%, dropping excess protein by over 30%.

Currently this effect is not recognised in Overseer. Hopefully it will be in time, as it is significant.

Crude protein (CP) in ryegrass at each leaf stage vs cow requirement



Principle ③: Fewer grazings = better N efficiency (easier management too)

Higher pre-grazing covers mean a longer grazing round, more time for the plant to respond to N fertiliser, and a proportionately higher N response.

"30% more for your N fertiliser spend."

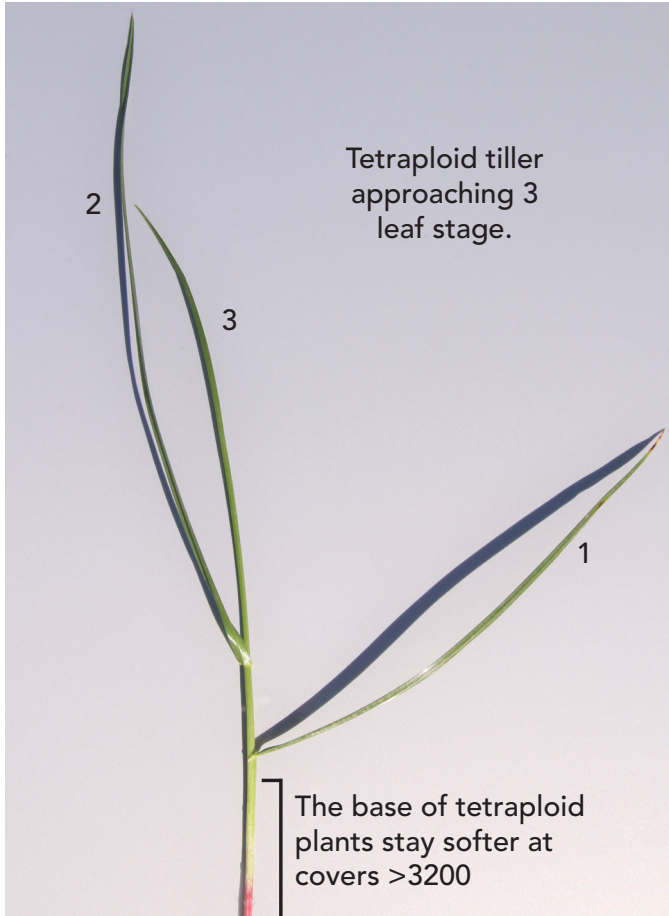
At LUDF, changing the system to graze at covers 300 kg DM/ha higher than previously – thanks to tetraploid based pastures – lengthened the grazing round by 4 days from October to May, and improved N response by 30%.

This also reduced the number of times each paddock is grazed, by an average 1.7 grazings a year, making grazing management easier.

Principle 4: Higher cow intakes

Tetraploid ryegrass can increase cow production by around 10%. A key reason is that their basal leaves and leaf sheaths remain softer and are lower in fibre.

"When a cow takes 25,000 bites a day, softer grass is good."



Animals work hard when grazing a pasture diet – a lactating cow takes 25,000 bites a day, so softer leaves and stems to bite of the likes of 4front must make a big difference to their quality of life!

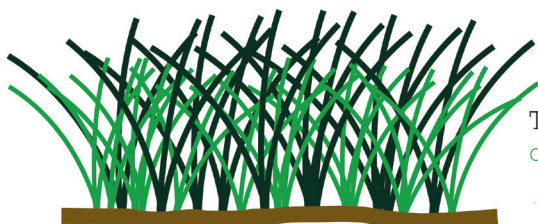
At LUDF peak cow intakes have climbed from 17-18 kg DM/day to 19-20 kg DM/day, and tetraploids have helped with this, while post-grazing residuals have been kept at a similar level.

Management tip: Tetraploid/diploid mix works well too

A high performance cultivar like *4front* can be sown as your sole ryegrass (typically mixed with clovers or plantain), but most of the ‘tetraploid effect’ can be gained mixing *4front* with a diploid perennial ryegrass like *Array* or *Maxsyn* – and this extends tetraploid benefits to a wider range of farm systems.

We know some of you have tried, and struggled, to avoid over grazing straight tetraploid pastures, so don’t get the persistence you want. They are more open, more susceptible to treading damage in the wet, and can easily be overgrazed. When done repeatedly, this weakens persistence.

Adding a denser, finer diploid ryegrass to the mix makes it more robust. Diploid plants protect the tetraploid.



Pre-grazing

Tetraploid plants (dark green) & diploid (light green) are mixed up.



Post-grazing

Tougher diploid stems help protect tetraploid plants from over-grazing.

On many high performing farms, tetraploid/diploid perennial ryegrass pasture is the norm (15 kg/ha tetraploid seed with 10 kg/ha diploid and clovers). This has allowed the high pre-grazing cover, growth and cow intake advantages over standard diploid pastures.

Typical seed mix	kg/ha
<i>4front</i> perennial ryegrass	15
<i>Array</i> or <i>Maxsyn</i> perennial ryegrass	10
<i>Kotuku</i> white clover	2
<i>Ruru</i> white clover	2
Total kg/ha	29

The LUDF experience

Lincoln University Dairy Farm (LUDF) is a great example that illustrates some of these changes. It's not the same as your farm, but the principles behind what has been achieved there are applicable to all dairy farms. And the great thing about LUDF is everything is measured and recorded, so we can speak with confidence about the outcomes.

LUDF isn't the same as your own farm, but you can borrow, adapt and benefit from what has been learned there.

LUDF decreased N leaching by 40% and GHG production by 22% between 2011-13 and 2014-17. All but one of its paddocks is either tetraploid ryegrass, or a diploid/tetraploid ryegrass mix. This has been a key catalyst of the new system, because these pastures can be grazed later, at higher covers. Higher covers mean more pasture is grown (+1.2 t DM/ha/year).

To reduce the farm footprint, LUDF cut cow numbers and N fertiliser applications. Doing this lowers many costs including fertiliser, animal health, wintering, and rearing replacements.

Note that tetraploid ryegrass-based pastures aren't as dense or robust as diploid pastures, so using them across your farm takes some thought to get the best from them. Their palatability means they are easier to overgraze so moving stock on at the right time is important, and you need a good wet weather plan. But if you can harness them in your systems there are significant growth, cow intake and environment benefits available.



LUDF		2011-13	2014-17	Change
Overseer estimates	N loss	45 kg N/ha	29 kg N/ha	↓ 40%
	GHG production	63,400 CO ₂ eq/ha/year	51,800 CO ₂ eq/ha/year	↓ 22%
Systems changes	N fertiliser	345 N/ha	175 N/ha	↓50%
	Cows	630	555	↓ 12%
	MS/cow	474	500	↑ 5%
	kg MS/ha	1870 kg MS/ha	1781 kg MS/ha	↓ 5%
Pasture facts	Extra growth from higher cover		+1.2 t DM/ha	
	Pre-graze cover	3200-3300 kg DM/ha	3500-3600 kg DM/ha	
	Residual	1600-1700 kg DM/ha	1600-1700 kg DM/ha	
	Purchased supplement	1.5t DM/ha	0.9t DM/ha	↓ 40%
	Days grazing Oct-May	22-23 days	26-27 days	↓ 1.7 grazings a year
	N efficiency	16 kg DM/kg N	21 kg DM/kgN	↑ 30%