2020 TRIAL PROGRAM

In 2020 Vickery Bros and McDonald Rural Services decided to formalise and expand on some of the trial/demo work we have done that you may have seen in the last few years. A 2ha site on the Lower Hilgay Road, before the cemetery, was selected and fenced in half to give 2 main areas to trial ideas and concepts.

The site had no preparation in the previous years, so any work done this year required flexibility to allow management of any problem weeds. With this in mind, we came up with two clover based trials for the front section and two fertiliser trials for the back section, both of which would allow us to clean the site for future programs.

Clover Trials – There have been several new sub clover varieties that have been released in the last 5 years, with some showing great promise. We have demonstrated a lot of these varieties at sites you may have seen in the Balmoral and Coleraine areas and been impressed with them. See picture 1B Yanco's superior early spring growth over Trikkala. Wanting to get some real data to confirm the benefits we have been seeing in our demonstration sites, we have planted a fully replicated trial of all the new sub clover varieties we thought had potential in our pasture systems and put them in against current benchmark varieties.

Clover Trial 1: Replicated sub clover dry matter production trial

The replicated sub clover trial in diagram 1A shows varieties we included, split into their three "sub species" groups (pardon the pun). Plots in this trial will be evaluated on dry matter production, seedling vigour, disease tolerance, seasonal growth habits and of course ability to set seed and persist.

Below is a list of the new varieties and specific traits we are hoping to investigate and compare the benefits over older benchmark varieties:

Yaninnicums: Dry matter production benefits and extended seasonal growth.

Subterraneums: New varieties insect tolerance converted into dry matter production gains.

Brachycalycinums: Dry matter production, seed burial, coupled with long term persistence.


Birdseye view of Chem matrix

Diagram 1A

MCDONALD RURAL SERVICES — **Sub Clover Trial 2020** — VICKERY BROS. THE FERTILISER PROFESSIONALS

Sown 14/05/2020 North --->

Hilgay Road

	A	B	C
1	Gosse	Trikkala	Gosse
2	**SF Yanco**	**SF Yanco**	Trikkala
3	Trikkala	Riverina	**SF Rouse**
4	**SF Rouse**	**SF Rouse**	**SF Yanco**
5	Riverina	Gosse	Riverina
6	**SF Narrikup**	**SF Narrikup**	**SF Rosabrook**
7	Leura	**SF Rosabrook**	Leura
8	**SF Rosabrook**	Leura	**SF Narrikup**
9	Benson	Antas	**SF Tarlee**
10	Mintaro	**SF Tarlee**	Benson
11	**SF Tarlee**	Mintaro	Mintaro
12	**SF Antillo**	**SF Antillo**	Antas
13	Antas	Benson	**SF Antillo**

Trikkala, Riverina & Gosse with Slimcoat <10% were sown @ 7kg/ha
Antillo Sub was sown bare @ 10kg/ha with no coating due to availability
All other clovers were Limecoated <40% and sown @ 10kg/ha
Sown 14th May
Sprayed 22nd May - 200ml/ha Dual Gold
Sprayed 18th June - 500ml/ha Platnium + 100ml/ha Firepower + 200ml/ha Spreadwett 1000
Sprayed 13th June - 750ml/ha Triathlon

Picture 1B

Contents:

Clover Trial 2: Clover chemical tolerance matrix

Linked in with the first trial we were looking to evaluate all the varieties of sub clovers and their chemical tolerances to not only commonly used chemical mixes, but also trial alternate combinations. Weed control is paramount to maintaining a profitable pasture, and off target chemical effects on clover in pasture can alter that significantly. There is limited information on the chemical tolerances on these new varieties and understanding their tolerance characteristics can better help us make informed decisions in selecting the best variety and management strategies for your pasture systems.

In this trial we sowed 1.5m strips of different varieties/species going down the paddock and then at the appropriate timing sprayed 3m strips of different broadleaf mixes across each variety/species. In addition to all the sub clover varieties we also added strips of other companion species like plantain, chicory, lucerne, white and balansa clover. Diagram 2A show varieties/species sown, chemical treatments and dates of activities.

Diagram 2A

Clover Chemical Tolerance Matrix 2020

	Plot	Purnter Chicory (A)	Palestine Strawberry (B)	Hybs Alsike (C)	Aberlasting White (D)	Nomad White (E)	Haifa White (F)	Arrotas Arrow (G)	Common Arrow (H)	Balansa Early (I)	Balansa Late (J)	Antas Sub (Brac) (K)	Trafee Sub (Brac) (L)	Benson Sub (Brac) (M)	Mintaro Sub (Brac) (N)	Leura Sub (Sub) (O)	Rosebrook Sub (Sub) (P)	Narrikup Sub (Sub) (Q)	Rouse Sub (Yan) (R)	Gosse Sub (Yan) (S)	Riverina Sub (Yan) (T)	Yanco Sub (Yan) (U)	Trikkala Sub (Yan) (V)	Tonic Plantain (W)	Sardi Graze Lucerne (X)
Hilgay Road	1	1lt/ha MCPA 750																							
	2	1.5lt/ha MCPA 750																							
	3	700ml/ha Triathlon																							
	4	1lt/ha Triathlon																							
	5	750ml/ha Legacy																							
	6	1lt/ha Legacy																							
	7	700ml/ha Legacy + 400ml/ha MCPA 750																							
	8	50ml/ha Bonanza Elite + 500ml/ha MCPA 750																							
	9	100ml/ha Bonanaza Elite + 1lt/ha MCPA 750																							
	10	200ml/ha Ecopar + 50ml/ha Bonanza Elite + 500mlha MCPA 750																							
	11	400ml/ha Ecopar + 400ml/ha MCPA 750																							
	12	600ml/ha Ecopar + 800ml/ha MCPA 750																							
	13	200ml/ha Ecopar + 500ml/ha Igran + 500ml/ha MCPA 750																							
	14	500ml/ha Igran + 500ml/ha MCPA 750																							
	15	800ml/ha Igran + 800ml/ha MCPA 750																							
	16	500ml/ha Igran + 50ml/ha Bonanza Elite + 500ml/ha MCPA 750																							
	17	1.5lt/ha Agtryne																							
	18	2lt/ha Thistrol Gold + 500ml/ha Hasten																							
	19	4lt/ha Thistrol Gold + 500ml/ha Hasten																							
	20	1.2lt/ha Jaguar																							
	21	10gr/ha Progibb + 1lt/ha Triathlon																							
	22	150gr/ha Diuron + 500ml/ha MCPA 750																							
	23	100gr/ha Diuron + 400ml/ha Ecopar + 600ml/ha MCPA 750																							
	24	100gr/ha Diuron + 50ml/ha Bonanza Elite + 500ml/ha MCPA 750																							
	25	50gr/ha Raptor + 500ml/ha Hasten																							
	26	50ml/ha Spiniker + 200ml/ha Spreadwett																							

Sown 14th May — Plots 1-16 Sprayed 8th July — North

Sprayed 24th June - 500ml/ha Platnium + 100ml/ha Firepower + 200ml/ha Spreadwett 1000 — Plots 17-25 Sprayed 9th July

With a lot of talk about the production and growth from annual ryegrasses in the past few years we were keen to see how different rates of fertiliser affected the growth and annual production of a very common annual rye. Also looking at the differences in soil/plant nutrient concentrations to see what changes occur under different situations. Using a common annual ryegrass (Adrenalin) sown at 15kg/ha on the 15th of May, measurements and recordings at the trial site have been taken weekly to see the progress.

Birdseye view of sowing fertiliser

Ryegrass Trial 1: Sowing fertiliser trial

In this randomised and replicated trial we have sown the ryegrass with different rates of MAP and DAP fertiliser down the tube. Rates were 0, 50, 100, 150 and 200kg/ha of product. The site was adequate in nutrient concentration at the start of the trial, and with the addition of the fertiliser down the tube it will be interesting to see the differences in the dry matter (DM) cuts, tissue and the soil samples off the different replicates. Currently there have been no outstanding visual differences between the plots. DM cuts, tissue and soil samples on this site were taken on the 31st of July and we are still processing the results.

Ryegrass Trial 2: Nitrogen demonstration

Whilst there have been many replicated trials showing the benefits of nitrogen application on annual ryegrass we wanted to explore some other interesting nutrient correlations with N applications such as sulphur and molybdenum. This site is not replicated and is purely a demonstration again on the annual ryegrass site. The treatments contain 20-80 units of N/ha, the same N with 20 units of sulphur applied and the N rates again with the addition of 10g/ha of molybdenum. As above we have taken DM cuts and tissue samples of the ryegrass to assess what the different nutrient applications have changed in the growth and development of the ryegrass.

Summary: There are many attributes that need to be considered when comparing and evaluating which pasture varieties are best suited to your pasture systems. We feel by investing time in this work it gives everyone involved more confidence in making the right decisions to achieve the best outcomes to maintain and improve our high performing pastures and increase profit margins.

The trial site is for the benefit of our local community and therefore if there is anything you particularly would like to see with your own eyes in the future, please contact one of the team at Vickery Bros or McDonald Rural to discuss the possibility. Furthermore, if you are interested in having a look at the trial site feel free to contact us.

WELCOME ALISE

Alise recently completed an Advanced Diploma of Agribusiness Management and Diploma of Agronomy at Longerenong College. Born in Western Australia and moving to Echuca, Victoria at age 13, Alise has always been interested in agriculture. Despite only being from a small acreage property, Alise developed an interest in agronomy and decided to pursue it as a career. Having recently relocated to Coleraine she is excited to get to know the locals. She enjoys reading, cooking, camping, horse riding and other outdoor activities in her spare time. Alise is eager to learn from the experienced group of agronomists at Vickery Bros. and looks forward to meeting clients and learning to service their agronomic needs.

WEEDING BETWEEN THE LINES ON ANNUAL GRASS WEEDS

ELIZABETH KENNEDY

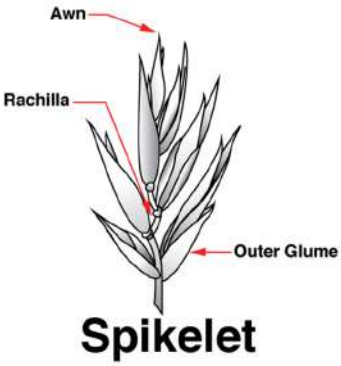
Weeds are part of the parcel of farming, some can provide benefit in different parts of the year, while others are a complete waste of space. Below are some common annual grass weeds that you probably have around the farm and a quick handle on what to look for when identifying grasses.

The ' B-Awn' Identity

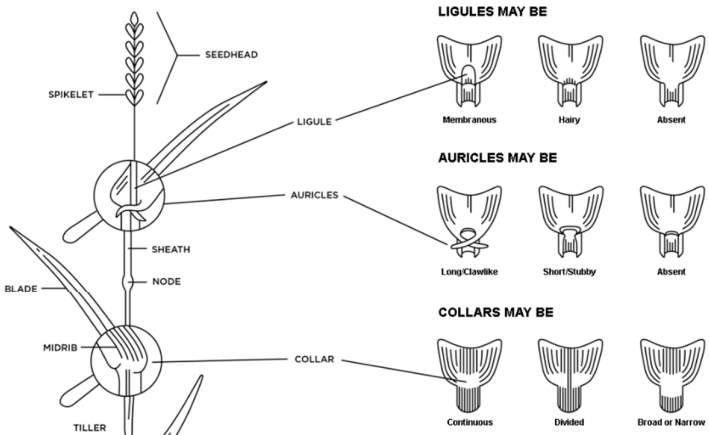
As you have probably figured out most grasses may be similar in appearance while growing before a flower or seed head emerges. However, on a closer look at a few key areas you can distinguish them apart. The easiest way to distinguish between species is through the flower/seed head.

Some features of note here are:

- Awn: whether or not there are thin spikes coming out of the seed head, how long it is, is it straight or bent, smooth or hairy.
- What the flowerhead looks like



When identifying a plant before it has flowered use the collar region where the leaf joins to the stem as a guide:



- Auricles: whether or not there are wrap-arounds at the base of the leaf blade.
- Ligule: whether or not there is a membrane-like structure at the base of the leaf blade and if so, what length.

The Classics

Barley Grass

Positive: Good source of early Autumn feed due to quick germination

Negative: Seeds get stuck in wool, are rough and can cause damage to stock mouths.

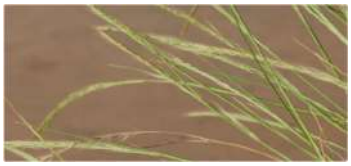
Has a wider leaf than ryegrass and tends to look quite luscious, usually quite prominent in stock camp areas, but can also be throughout the paddock.

Winter Grass

Positive: Still a feed source that grows everywhere.

Negative: Throws down heaps of seed making it very hard to control. Small light green grass that is very prominent through winter. Very tufty appearance and shorter in height compared to silver and rye grasses. Matures quite a lot faster than other grasses and has a fairy-like, white seed head appearance.

Silver Grass



Positive: No positives, it is just feed for when nothing else is there.

Negative: Very poor feed quality and has an allopathic reaction with clover (affects its germination and growth).

Much finer leaves than ryegrass is white or green at base of plant instead of red and is slightly darker green. Does not really hit its stripes till spring when it starts to grow fast and start flowering. Has a wispy flower-seed head that is finer than ryegrass and is only on one side of the stem.

Soft Brome

Positive: Seed heads are soft and do not cause that much damage to stock.

Negative: Hard to kill.

Medium height plant that has wide, hairy leaves with a seed head on a long stalk. The seed heads are plump and quite compact before spreading out when mature and contain many flowers.

Weed	Auricles	Ligules	Awn	Colour	Flower head	Leaves/stems
Barley grass	big	long & membranous	wide, rough & sharp	pale green	densely packed, half enclosed by flag leaf	hairless stems often branched at base and spread/bent upwards
Silver grass	none	short & membranous	twice the length of the seed	dark green	branched, very open	hairless
Winter grass	none	short & membranous	none	light green	very open	small plant
Soft brome	none	ragged tip, membranous greater than 2 mm long	soft	pale green	compact, spread out when mature	soft, flat & hairy leaves

SOIL AND TISSUE TESTING

REBECCA STEWART

Tricky questions are part of our daily lives as agronomists in the field. Some questions are always easier to answer than others but when we are faced with "why won't this paddock grow?" usually the answer is not always clear cut. Soil and tissue testing provide valuable information on the requirements of nutrient and soil ameliorant applications.

Spring can be a hectic time of the year and this often means some vital monitoring and farm planning is dropped in the rush. The importance of soil and tissue testing must not be forgotten as high-quality pastures rely on nutrient rich soils.

Now is a good time to walk over your pastures and check their performance in terms of botanical composition, production, weed & pest invasion and also livestock growth from the pasture. Paddocks which have any issues need to be investigated further so management decisions can be made to improve their productivity.

Macro nutrients like phosphorus, potassium, sulphur and soil pH should be monitored using soil tests. A soil test gives a good overview of the major nutrients within the soil which will enable most of the nutrient issues to be rectified. An annual nutrient budget should not be formed without looking at current soil tests. With sound results in front of us, agronomic and farm management decisions can be made to help identify opportunities to increase productivity and profitability. Cation Exchange Capacity (CEC) and Phosphorus Buffering Index (PBI) levels also assist in planning nutrient applications as well as looking at the soil's texture and organic matter to make decisions of nutrient holding and exchange capacity.

Trace elements like molybdenum, copper, boron and zinc are best checked by sampling and testing the plant tissue. Tissue testing can be likened to a blood test and provides valuable insight into specific nutrient status of the particular plant sampled. Molybdenum deficiency can reduce clover and pasture growth considerably. This is enhanced by acidic soils and high iron levels (common for the western district). Moly should not be applied without copper as it can interfere with animals' ability to absorb copper. Copper deficiency can affect animal health greatly and is best checked in July/August. Low moly pastures often have a good fertiliser nutrition history with adequate levels of phosphorus and potassium.

Boron is a complex nutrient as it is necessary for a number of functions within the plant but can become toxic. There is small margin between a boron deficiency and a toxicity so graziers need to be extremely cautious. When looking at cropping paddocks, tissue sampling even if plants that are not visually showing symptoms can give vital information to pre-empt a deficiency to avoid yield losses. In most cropping cases, yield losses occur well before the plants even begin to show deficiency symptoms.

Most of the time with valuable information from a topsoil analysis and plant tissue sample we can solve any issues which are arising in productivity. However, sometimes we need to be digging a little deeper…literally. Long term perennial pastures access nutrient from the top 10cm of soil but are also able to access deeper nutrient sources as the root system grows at depths of up to 60cm. Unfortunately, when plants are accessing nutrients at greater depths they are also exposed to other soil and nutrient constraints. In the past some paddocks that we have sampled showed adequate nutrient levels within the top 10cm but increased in acidity and aluminium toxicity at depth. From this the plant growth suffered and the persistence was reduced with a lot of root pruning and the plants losing access to moisture and nutrients.

Taking soil samples at depth to assess any constraints (salt, sodium, aluminium, boron) can save you some heartache in the long term when re-sowing pastures. Depending on the depth of the problem it may take a couple of years for symptoms and pasture deterioration to occur. By this stage when the pasture has already been established, applying ameliorants at depth can be a tough task as addressing these problems using ameliorants will typically require cultivation to get products into the sub soil.

There are three basic steps that must be followed if meaningful results are to be obtained from soil/tissue testing.

They are as follows;

1. Take representative samples of the soil/pasture for analysis. Top soil samples require a full 0-10cm core depth and around 30 cores per sample and leaf tissue tests need around 200grams (plant material). Sub soil samples can be segmented into 10cm to 30cm increments (depending on the segments required and situation) with at least 500g of soil sent to the laboratory.

2. Analyse the soil/plant material using the accepted procedures that have been calibrated against experiments in that/your district (soil/plant type and enterprise)

3. Interpret the results using criteria derived from those calibrated experiments

Samples may be taken by the farmer or by an agronomist, it should then be sent to an accredited analytical laboratory for testing, with test results coming back to an agronomist to interpret and develop recommendations for the farmer.

Forward thinking and gathering as much information as possible is essential for sound planning and budgeting purposes next season. There is no better time than spring to start your farm nutrient budget.

Speak to your local Vickery Bros agronomist today to start planning your farm nutrient budget and take advantage of our soil testing promotion to be prepared for 2021!

SLUGS

HARRY ARMSTRONG

Slug numbers in new sown pastures and crops this autumn are the worst we've seen them in many years. Canola growers have been aware of these pests for many years and routinely bait for them both pre and post sowing.

Symptoms of slug damage are an absence of sown species when pastures or crops are inspected for seedling emergence. Once eaten seedlings don't recover, so by the time you have detected damage it's too late. Slugs can be hard to find as they tend to be nocturnal feeders. They spend the daylight hours hiding in drill rows, under clods rocks etc. If you inspect paddocks at night time with a torch you will be surprised how many are present. Strategically placed hessian bags have historically been the method of detection. And if enough of them are used it can still give you good idea of slug numbers and whether you will need to spread bait or not. Sprinkling small amounts of bait in lower lying areas and near fence lines will also give a good indication of slug numbers. Areas with a bit of trash are also prime spots to find slugs. Inspect these baited areas in the morning before the birds find them. Check these spots more than once because sometimes more slugs are detected on morning 2 or 3 or even later. Taking action early to detect possible hot spots or high-pressure areas will pay dividends later when you can decide if you need a single or double blanket application, a perimeter spread or follow up baiting of the known hot spots. Be careful not to leave or spill piles of bait as it is highly toxic to dogs. Store any carry over bait in sealed containers preferably in a locked chemical storage area.

Soils with a high clay content are the worst areas generally, but in recent times we are seeing more of them in lighter textured soils as well. Full cultivation and stubble burning can reduce their numbers but don't rely on these for control as we do still see them in previously burnt and cultivated paddocks.

Successful pasture establishment is often preceded with a summer crop. Slugs enjoy eating brassicas and are often in large numbers in summer crops, so it is good practice to bait summer crops immediately post sowing. This not only protects your emerging crop seedlings but may reduce overall slug numbers for the following autumn. There has been an increasing trend towards direct drilling summer crops. Done correctly in the right situation, using a double knockdown herbicide, direct drilling summer crops can be very cost effective but it does leave crops more susceptible to slug attack, so baiting would be worthwhile in most years.

Prevention: Prevention is the key word as there really isn't much of a cure. As I stated earlier once seedlings have been eaten by slugs there is no coming back and resowing is the only option.

None of the insecticide sprays we use are of any use for slugs and spreading bait is the only effective prevention method.

Timing: Baiting close to the initial knock down herbicide application is a good time, assuming a double knockdown is being done. If a single knockdown is being done then perhaps baiting needs to be done a couple of weeks earlier. Either way a second bait can be applied immediately post sowing.

Application rate: There are 2 types of bait. Waterproof (Slugoff) and non-waterproof (Meta). 3kg/ha of the waterproof type is recommended and up to 10kg/ha of the non-waterproof type. The prevailing weather will be a guide as to which option is best for your situation. Depending on the severity of the slug problem more than 1 application may be warranted

Cost: Waterproof Slugoff spread @ 3kg/ha works out to $30/ha.

Non-Waterproof Meta spread @ 10kg/ha works out @ $18/ha.

A blend of 70% Meta & 30% Slugoff spread @ 7kg/ha works out @ $30/ha.

A mixture of each type is good practice. Seek advice from agronomy staff at either Vickery Bros or McDonald Rural for rates and timing. We also have 3 bait spreaders for loan if required.

Summary: In slug prone areas and situations, slug baiting should be considered as just another part of the job rather than an add on after the slugs have destroyed significant areas of your new pasture. Spending $20-$30/ha on slug prevention for a new phalaris pasture is an insignificant cost when you consider the 30 + years of a good phalaris paddock. Even in our highly productive perennial and annual rye grass pastures slugs need to be controlled. There is little point sowing paddocks of high value feed and allowing slugs to take out 25% of it.

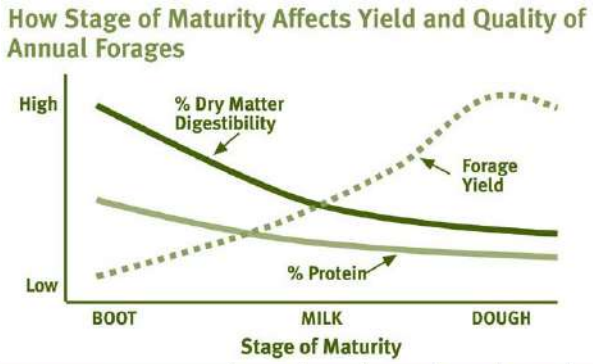
SILAGE AND HAY SEASON 2020

ROGER GEE

According to the Bureau of Meteorology, the outlook for August to October indicates that most of the eastern two-thirds of Australia are likely to see a wetter than average three months, so I suspect Western Victoria is looking towards a big silage and hay season.

There's a good deal of information about which is better, hay or silage and how to make it, so I'm not about to enter that debate. But what is not in question is quality: quality silage or quality hay is king when it comes to conserved fodder, otherwise it's just expensive filler.

The following chart and graph illustrate clearly what we should target when harvesting silage or hay, and quality feed has true value.



Analysis Measurement	Very high	High	Average	Poor	Very Poor	Target Values
Dry Matter Content (% DM) Bulk silage	30 - 35[1]	30 - 35[1]	30 - 35[1]	<30 - >38	<25 - >40	30 - 35[1]
Dry Matter Content (% DM) Baled silage	40 - 50[2]	40 - 50[2]	40 - 50[2]	37 - 55	37 - 55	40 - 50[2]
Metabolisable Energy (ME/kg DM)[3]	>11.0	10.5 - 11.0	9.0 - 10.0	8.0 - 9.0	<8.0	>10.5
Crude Protein (% CP)	>18	14 - 18	10 - 14.0	6.0 - 10	<6	14 - 20
Neutral Detergent Fibre (NDF)	30 - 36	34 - 40	41 - 55	56 - 65	>66	30 - 36
Ammonia-Nitrogen as % of total N (% NH-N)	<5%	5 - 10.0	10 - 15.0	15 - 20	>20	<5
Acidity (pH)**	4.50 - 4.65	4.50 - 4.65	4.20 - 4.40	3.5 - 4.2	<3.5	4.50 - 4.65

[1] Precision chopped silage 30 - 40 %
[2] Large square baled silage 40 - 60 %
[3] Metabolisable Energy (Megajoules of Metabolisable Energy per Kilogram Dry Matter)
** pH varies with DM content and less useful if >35% DM such as with baled silage, normal, about 5%, 2 units

To ensure quality silage & hay, ideally soil tests should be taken on specific paddocks earmarked for fodder production/crops, to check that there's adequate soil fertility. Applying a complete NPKS blend can address nutrient deficiencies, thus reducing fertility limitations to quality, and quantity of fodder produced.

Watch for prevalence of insects such as red-legged earth mite, lucerne flea, aphids, blue oat mites, and army-worms in cereals, spraying with an appropriate pesticide before their populations increase dramatically. Pastures, especially legume pastures, once locked up are most at risk of pest infestations.

Where capeweed or other weeds have infiltrated large areas of the paddock, spray with an appropriate herbicide early to control, as weeds reduce the quality of pasture crops and compete for valuable nutrients and moisture.

Applying nitrogen in a range of 30-60 kg N/ha is generally the most effective. Expect pasture responses of about 15 - 25 kg/DM/Ha for every kg N applied about 4 - 6 weeks after the nitrogen application during spring. Higher responses will be achieved on some newer varieties of both annual and perennial ryegrass. (Note; low fertility paddocks will respond poorly to nitrogen).

Other critical nutrients for successful hay and silage production are potassium & magnesium. Pasture and fodder crops can take up luxury amounts of potassium shortly after applications. If there is a known potassium deficiency, consider split applications, one in autumn, and then again well before paddock lock up.

Magnesium is not only required by the plant for quality growth, but it helps address grass tetany.

Representative nutrient concentrations in hay and silage grown in southeastern Australia
(P.Finn, Hamilton Pastoral and Veterinary Research Institute, Vic)

Hay & Silage - Average Nutrients in kg/tonne 2/12/2000

Type of Hay or Silage	Moisture	Mean Nutrient Concentration (kg/t FW)					
	(%)	N*	P	K	S	Ca	Mg
Legume hay (clover or medic)	89	22	1.7	18	1.6	8.6	2.3
Lucerne hay	87	30	2	24	2.6	9.9	2.7
Legume / Grass hay	88	21	2	18	1.7	5.3	1.9
Oaten hay	90	13	1.6	17	1.1	2.3	1.2
Pasture hay	88	18	1.8	15	1.6	5	1.8
Grass silage	44	24	2.8	24	2.2	5.3	2.1
Maize silage	62	12	1.9	15	1	2.1	2.4
Pasture silage	48	26	2.8	26	2.3	5.9	2.1
Oaten silage	45	20	2.5	23	1.8	3.7	1.7

* N concentrations expressed on an oven dry basis

From the table shown we can calculate that the removal of a 4 ton/ha hay crop will remove 7.2kg/ha of P, 60kg/ha of K, 6.4kg/ha of S and 7.2 kg/ha of magnesium. To replace these nutrients will require approximately 250kg/ha of Super Potash 1:1 + 5kg of magnesium, or an equivalent. This assumes that the entire crop is taken from the paddock and none is returned. Replacing the nutrients removed is essential. You should consider the effect of harvesting silage or hay, and this impact on the whole farm's fertiliser profile.

When do we replace? Continued depletion of nutrients, even from fertile paddocks will eventually reduce yields and productivity.

Standard practice has been to apply a high rate of NPKS, to selected silage & hay paddocks in early spring to address nutrient limitation, but current thinking is suggesting phosphorus & potassium should be addressed much earlier, then use nitrogen to maximise spring growth. Following with post-harvest applications, where high tonnages have been removed, or if there are known fertility limitations. Consideration should also be given to applying a NPKS blend to new perennial pastures in early spring, to not only extend the grazing season, but to give them some extra vigour going into their first summer.

Lastly, current research of late spring applications of nitrogen, once thought as wasteful, are now deemed as highly beneficial to pushing growth while there's still moisture in the profile, and the unused nitrogen, as the soil dries, is held in the soil to mineralise back out in the following autumn.

Regular soil testings will keep track of nutrients transferred both around, and off the farm, and tissue tests will enable close monitoring of trace elements.

Following these few rules/guidelines will ensure the pasture/fodder crops you are growing have every opportunity of reaching the highest quality.

NITROGEN DURING COLDER MONTHS

FRANZI RIEGGER

Definition: Nitrogen (N), non-metallic element of group 15 of the periodic table. It is a colourless, odorless, tasteless gas that is the most plentiful element in earth's atmosphere and is a constituent of all living matter.

Nitrogen is an integral part of plant growth. It is found in the plant's chlorophyll, nucleic acids and amino acids. It is a major component of proteins and enzymes, controlling most biological processes. In short: Nitrogen is necessary to all plants and for our food supply, but excess nitrogen can also lead to environmental issues. Despite nitrogen being one of the most abundant elements on earth, nitrogen deficiency is one of the most common nutritional problems affecting plants.

So where does the nitrogen that our plants use come from?

- 200-500kgN/ha comes from dung and urine (in grazing systems only)
- 0-250kgN/ha comes from legumes by nitrogen fixation
- 60-250kgN/ha from soil through mineralisation

Tallying up these numbers, a pasture could receive between 300 – 1000kg of nitrogen/ha/year. And, it takes about 600kgN/ha/year to grow 12 tons of dry matter. So why, are you asking, are we needing to apply nitrogen fertiliser?

To answer these questions, we need to have a closer look at the above listed sources of N and what their functionality depends on:

Dung and Urine

- Nitrogen from urine and dung patches could be a big contributor, as a single urine patch from a sheep or beef cow contains 250-600kgN/ha. 60-90% of the N in urine is liquid urea, of which 40-60% can be lost. The other downfall is that unfortunately animals don't urinate very evenly over a paddock, in fact it is only every 3-6 years a paddock can be entirely covered. Good rotational grazing could theoretically make the utilisation of nitrogen from urine and dung more efficient.

Legumes

- For the legumes in pastures to fix the amounts of nitrogen mentioned above, the pasture needs to consist of 25-30% of clover.

In Western Victoria the average clover content in a pasture is 8-15%.

Therefore, let's take the top end of the scale and our pastures produce 125kgN/ha/year.

- pH often is another limiting factor. A pH (CaCl2) of below 5.2 reduces the effectiveness and number of rhizobia bacteria that are required for clover to fix nitrogen. Out of 1700 0-10cm soil tests submitted by Vickery Bros in the last financial year, 64% are below 5.2. Therefore, even if there are nodules on the clover roots when you dig them up, they may not necessarily be producing nitrogen as rhizobia bacteria cannot survive in a low pH environment. So, if your pasture with 15% clover has a pH (CaCl2) below 5, you can expect very little N to be produced. For those paddocks with a pH above 5.2 we could be expecting 125kgN/ha to be fixed by legumes.
- Nitrogen fixation by legumes is also dependent on temperature, where no nitrogen gets fixed at soil temperatures below 10°c. Two moisture probes installed on perennial pastures in Harrow and Dartmoor show that the soil temperature at 30cm depth has been below 10°c from 4th June onwards this year.

Last year on the same sites the soil temp didn't reach above 10 degrees until the 8th of September. This means that we have three months of our 6-8month long growing season where clover grows but doesn't produce the nitrogen that would support the growth of the grasses within the pasture.

- Molybdenum and sulphur are also important for successful nodulation.
- Due to these limitations in the vast majority of stable pasture systems in the area we could only be getting between 30-100kgN/ha per year that is fixed by legumes, and this only happens when soil temperatures are above 10 degrees

Soil Organic Nitrogen

- Soil organic nitrogen is sourced from decaying grass and legume roots, dung and urine.

Pasture soils contain up to 6-8tN/ha in the top 15cm but only 1-3% gets mineralised and made available to plants every year, this is about 60-240kgN/ha.

What needs to be remembered is that mineralisation is also restricted at low soil temperatures (<10degrees) therefore mineralised nitrogen is only available during wet, warmer months, too.

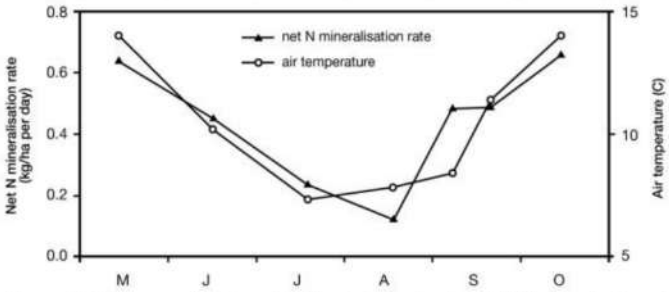


Figure 6.7. The seasonal pattern of (a) N uptake by wheat and (b) N mineralisation rate and soil temperature (Stein *et al.*, 1987).

Summary:

- In the best-case scenario we get nitrogen mineralised and fixed, but only when temperatures are warm and we have adequate soil moisture, which is always depending on the season, but generally happens in spring and autumn.

Responses to applied nitrogen in autumn can therefore vary. In spring time however, when adequate moisture is available, even greater responses to nitrogen can be achieved due to big spring flush.

- In the worst-case scenario, we don't get any nitrogen fixed or mineralised at all, due to constraints mentioned above. This is why paddocks with a below optimum pH and/or low clover content always show good responses to nitrogen fertiliser in spring, given there are no other limitations.

What does nitrogen actually do in the plant?

Nitrogen is essential for plant protein.

- Growth Rate

Nitrogen accelerates plant growth rates, increases leaf length and leaf width and doesn't actually change the leaf appearance rate, which is genetically determined.

With an application of nitrogen, we can get somewhere between 30 – 150% increase in growth rate. If, for example, your grass is growing at a rate of 10kgDM/ha/day in the middle of winter, applying nitrogen can double that growth rate. In spring time however you may only get another 50% of additional dry matter to your already high growth rate of say 60kgDM/ha/day.

- Root volume

Gives plants cold and stress tolerance. The plant doesn't just take up nutrients to grow leaves but also help grow the roots, therefore you get a bigger and better root system. This will strengthen the plant going into winter giving it better water use efficiency and also into a drought period making it more drought tolerant. A bigger root system means more moisture and nutrients can be accessed, enabling the plant to hang on for longer in late spring, early summer.

Pasture doesn't care what source the nitrogen comes from. By the time nitrogen is fixed by legumes, and/or recycled from dung and urine, it is in the same form as it is when applied in the form of inorganic fertiliser.

If you have just realised that you may have one or more paddocks on the farm that have been struggling through winter and nitrogen could have been the problem, feel free to contact your agronomist to discuss how to combat this issue going forward.

WHAT COLOUR IS YOUR COCKCHAFER?

ALISE RILEY

This season has seen a number of reports of pasture cockchafers damaging pastures in south-west Victoria. Pasture cockchafers are members of the Scarab family of insects and are native to Australia. They begin their life as larvae before maturing into a beetle. In their larval form, these grubs can cause extensive damage to perennial pastures. Correct identification of these pests is critical to their control. But how do you tell them apart? Here is a guide to identify three common types of pasture cockchafer.

Blackheaded Pasture Cockchafer (Acrossidiud tasmaniae):

The blackheaded pasture cockchafer is white to grey-white in colour as a grub with a distinctive smooth brown to black head. They are easily identifiable by their rear opening which is enclosed by a hair arrangement in a shape similar to that of brackets. The blackheaded cockchafer is approximately 15mm long and will form the iconic C-shape at rest. These pasture cockchafers will create vertical holes in the ground that are roughly the width of a pencil. A small mound of dirt will often be seen next to the tunnel. The grub will emerge from its hole at night to feed on the foliage of pasture. The blackheaded pasture cockchafer prefers clovers, grasses and some broadleaf weeds. Damage can be seen as bare patches of ground in established pasture. This damage is seen in mid-autumn to late winter. This pasture cockchafer prefers light, well-draining soils with short, open pasture with a high clover percentage. Blackheaded pasture chafer can be controlled by the use of insecticide.

Redheaded Pasture Cockchafer (Adoryphorus couloni):

The redheaded pasture cockchafer is white in colour with a rough, red head as a grub. They can be identified by their grey coloured ends and distinctive horizontal rear opening with a fringe of long hairs. The redheaded cockchafer is up to 30mm in length and forms a C-shape at rest. These pasture cockchafers do not form holes in the ground as they spend the majority of their lives below the surface. They feed on roots and other organic material in the soil. This causes the severing of plant roots and the distribution of roots caused by movement of the grub. Obvious damage caused by the redheaded cockchafer can be hard to identify. The most damage is done when stock graze the paddock and pull pasture up by the roots. This causes gaps to appear in pasture where plants once were. The grub prefers rank pasture high in grasses such a ryegrass. Ryegrass is particularly susceptible to the feeding style of the redheaded pasture cockchafer, whilst phalaris is often largely unaffected. The subterranean lifestyle of these pasture cockchafers makes them nearly impossible to control with the use of insecticide.

Yellowheaded Pasture Cockchafer (Sericesthis spp):

The yellowheaded pasture cockchafer refers to approximately 20 different members of the Sericesthis spp. of scarabs. They are creamy in colour and have a smooth head that is yellow-orange in colour. These grubs can be identified by the inverted Y shape on their rear opening. The yellowheaded cockchafer is 5-30mm in length and will form a C-shape at rest. This group of grubs will spend the majority of its life underground. They feed on the roots of plants and other organic material in the soil. Damage is often contained to a half hectare area in a pasture. Specific feeding habits vary between species of yellowheaded cockchafer; however, damage is often seen when stock pull pasture up by the roots. The damage caused by this pest is similar to that of the redheaded cockchafer. Locating the grub is vital to identification. The subterranean feeding of these pasture cockchafers means they cannot be controlled by the use of insecticide. Consult your agronomist at Vickery Bros or McDonald Rural about the best way to manage cockchafer infestation on your property.

CAN I DIRECT DRILL MY SUMMER CROP?

HARRY ARMSTRONG

A knockdown herbicide and full cultivation is still the most common method used when establishing summer crops.

This method of establishment is well known and usually very reliable. However, there are options in the right situation to direct drill these crops. In situations where there is heavy onion weed or bent grass present, full cultivation is still the preferred option. Likewise, if the area is very rough and in need of levelling, then cultivation is still required and recommended. If your intention is to grow turnips rather than rape, cultivation is probably preferable as the bulb which represents half the crop yield needs cultivated soil to develop fully.

However, if we are simply updating or renewing an existing pasture that has previously been ploughed or has had some history of cropping then these paddocks can be considered for either direct drilling or minimum cultivation, maybe a pass with a speed tiller. Before rushing to renovate a pasture, it is critical that an assessment is done to determine the cause of that pasture failing in the first place. A soil test at $130 is a great start.

The cost of establishing a summer crop is around $280/ha. The biggest single component of the cost is cultivation @ $100/ha, so eliminating that cost has a dramatic effect on the cost of establishment.

Double knockdown:

Knockdown herbicide becomes more critical if you intend to direct drill. Robust rates need to be used particularly if you are looking at hard to kill perennial weeds such as fog grass, bent grass and even the old outdated perennial rye grass can be difficult to kill. This initial spray will not only kill weeds and existing pasture but critically locks up any available soil moisture, so timing is important for this one. As soon as conditions allow is probably the right time: from late Aug onwards in most areas. The first knockdown herbicide could contain chemicals such as dicamba that take out dock and sorrel for instance if they are present. Plant back periods for these treatments are typically 2 weeks, so the second knockdown and sowing would need to be completed 2 weeks later.

The second knockdown spray should be a glyphosate or spray seed herbicide with a nil plant-back period and needs to be applied immediately prior to sowing. Whilst it is tempting to rush in and sow after the first knockdown, a second knockdown is critical to the success of your summer crop. Old pastures are typically quite dense in spring and it is difficult to get a complete kill with a single application. Keep water rates on the high side when doing the second knockdown as weeds are obviously very small at this time. The second spray is absolutely essential. We saw examples in spring 2019 where the second spray was not done and the summer crop pretty much failed and in most cases the weed control was so bad that the planned pasture sowing in Autumn 2020 had to be delayed.

Timing of sowing is more important when not cultivating. Ideally sowing should be done the day before a significant rainfall event. Delay sowing if there is significant smearing in the drill rows. Drill rows can be left open if a rain event is imminent, otherwise harrow and/or roll.

Obviously when direct drilling into uncultivated soil the drill used needs to be of good quality and capable of accurately sowing into a slot deep enough to find some moist soil.

Fertiliser and sowing rates are similar if direct drilling or cultivating. Even if capital fertiliser is applied prior to sowing some should be sown “down the tube” as well. Well fertilised summer crops resist insect attack. When you consider some crops are sprayed up to 3 times with expensive insecticides, increasing the fertiliser applied can seem cheap. And there are also long-term benefits for the new pasture sown in the following autumn. We tend to think of only applying capital amounts of phosphorus (P) to summer crops, but it is equally important to consider potassium (K) as well.

To sum up, there are advantages of direct drilling summer crops in the right situation. Like most things we do, success is a result of careful planning.

IMPORTANCE OF PASTURE GRAZING MANAGEMENT

JASLEEN SANDHU

The stocking rate of an enterprise depends on several factors, but it is primarily influenced by pasture growth rates and patterns in addition to preparedness to utilise supplementary feed. Other critical information to be considered in terms of decision making for carrying capacity include metabolisable energy value of pasture when growth stage changes as well as energy requirements for each livestock class at each physiological state. Lower SE is an area that is well suited to growing large amounts of high-quality pasture. This is important because pasture utilisation is a key part of profitability in majority of production systems considering it is a comparatively low-cost system.

Rotation length is a crucial aspect of grazing management and plays a critical role in the amount and quality of pasture grown as well as its survival and persistence. It is worth noting that rotation length depends on the LER (leaf emergence rate) which is heavily influenced by temperature and soil moisture. The ideal growth stage for a perennial ryegrass to be grazed is between the 2nd and 3rd leaf stage. A perennial ryegrass tiller normally maintains three live leaves. After the first grazing, the regrowth of pastures is slow. Figure 1 below displays the growth rate for ryegrass following grazing or harvest and the phases it goes through.

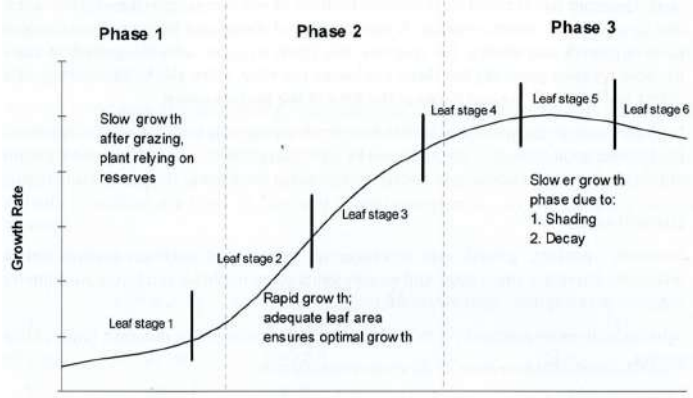


Figure 1: Growth pattern for ryegrass following grazing

The 1st emerging leaf is produced using soluble carbohydrate sugars stored at the base of the plant. As the 2nd leaf emerges, the plant will start restoring some of the sugar reserves that has been used up. However, it is only once the 3rd leaf has nearly fully emerged that the sugar reserves in the plant are fully restored. After that point, as the 4th leaf emerges, the oldest leaf (the one to emerge first), begins to die as presented in figure 2.

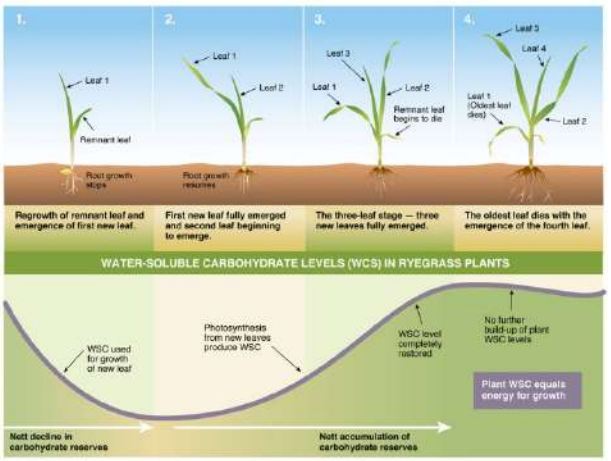


Figure 2: Regrowth of a perennial ryegrass tiller

With newly sown pastures, it is not recommended to graze early under dry conditions or if the grasses are poorly developed. There is recent research suggesting perennial grasses have the capacity to be more persistent when rested and allowed some form of rotational grazing for at least part of the year.

Pasture persistence relies on growth of a good, well developed root system which depends heavily on resting pastures on an appropriately long grazing interval. This enables them to accumulate adequate reserves. As discussed later in the article, root growth of the plant stops after grazing and plenty of the small roots die as a result of plant reserves being diverted to producing a new leaf. (*as displayed by Figure 3*) When the pasture is grazed too frequently, the root growth is supressed longer. This suppression of root growth affects the plants ability to survive stressful periods such as hot, dry summers.

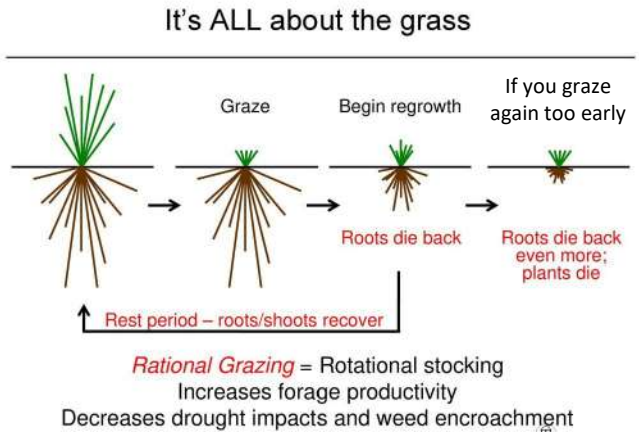


Figure 3: Effects of grazing on the roots

It is important to note plants such as cocksfoot and fescue have differences in ideal grazing time. Cocksfoot maintains four to five leaves per tiller and is ideally grazed between four and five leaves per tiller to achieve the best growth and quality. Whereas plants such as fescue are ideally grazed at the four-leaf stage.

Grazing them at the correct growth stage, under ideal growing conditions will enhance tillering and root development. This effect is due to the plant's ability to produce daughter tillers originating from the base of a larger parent plant. These are normally initiated in autumn and spring and will only be produced in summer if there is sufficient irrigation provided. They survive for about 12 months.

What happens when grazed too early?

Note that grazing prior to the emergence of the 2nd leaf will negatively impact regrowth rates and threaten the plant's survival. At this stage, the plant has started to replenish some of the reserves used but it's only at the emergence of the 3rd leaf of the plant that the reserves are fully replenished.

Intensive grazing without a rest period will constantly deplete the sugar reserves and result in fewer and smaller tillers and decreased root growth (as presented by Figure 1). As previously mentioned, persistency is compromised and the plant is more susceptible to stress (drought, cockchafers).

Consequences of leaving pastures to be grazed too late!

In summary as discussed above, if the plant is grazed after the 2.5 and 3 leaf stage, the first leaf produced is effectively wasted and the feed quality decreases as the dead material builds up.

In addition to that, there are benefits related to dry matter production and energy gains by ensuring pastures are grazed at the optimal leaf stage. If rotation length is increased at different times of the regrowth, the pasture has the capacity to grow more kg DM/ha/day especially during spring (refer Table 1).

Leaf stage	Growth rate (kg DM/ha/day)
1 leaf	10-20
2 leaves	30-60
3 leaves	80-100

Table 1: Growth rates for ryegrass during spring at each leaf stage.

An increase in the proportion of dead materials within the pasture reduces its overall growth potential because it is taking up space that actively growing pastures could be utilising. To achieve a constant cover of green leaf, adequate plant and tiller density is required in addition to minimising the presence of bare ground. Sunlight is needed at the base of the plant for new tiller production therefore it is important to not accumulate dead material by leaving high post grazing residuals recurrently. At the same time care needs to be taken with ensuring pastures are not overgrazed as mentioned earlier due to other factors (feed quality, persistence being affected).

The ideal grazing stage varies slightly in late autumn and winter as opposed to spring. In late autumn and winter, it is generally beneficial to graze closer to the 3rd leaf stage as there is potential for more growth to be captured by waiting for the full emergence of the 3rd leaf. An interesting point to note in Table 2, is when grazed at the 3-leaf stage, there is more DM produced as opposed to grazing at the 2nd leaf stage. The percentages displayed also indicate a 33% increase in the DM produced when grazed at the 1st leaf stage as opposed to the 3rd leaf stage.

Leaf Stage	Pasture growth rate (kg/DM/Ha/day)	# days	Dry matter produced	%
1 leaf	10	10	100	17
2 leaf	20	10	200	33
3 leaf	30	10	300	50
		30	**600**	

Table 2: Pasture growth and leaf stage

Whereas in spring, especially under high nitrogen fertility, it is beneficial to graze closer to the 2nd leaf stage for several reasons. The growing point of a ryegrass tiller is modified in late spring, generally October as the onset of reproductive growth occurs. At some stage in early November, a seed head emerges, and the tiller loses its capacity to produce leaves. This process when allowed to continue increases the growth rates to high levels due to stem growth.

The quality of the sward decreases due to increased fiber and reduced digestibility (stem has high lignin and cell wall content). The quality of pasture changes during re-growth therefore the nutritive value pasture at each growth stage should be considered as displayed in Table 3 below:

	Total energy	Carbohydrates/ protein	Total protein	Mineral balance	
Leaf stage	Energy (kg)	NSC/DIP	%RDN	Ca:P	K/(Ca+Mg)
1	1.3	1 : 2	35	1 : 1	8
2	2.5	1 : 1	25	1.5 : 1	-
3	3.0	2 : 1	24	2 : 1	2.5
Optimal	-	2 : 1	19	2 : 1	2.2

NSC – Non-structural carbohydrates
DIP – Degradable intake protein
RDN – Rumen degradable nitrogen

Ca - Calcium
P - Phosphorus
K – Potassium
Mg - Magnesium

Table 3: Changes in feed quality of ryegrass at each leaf stage. Fulkerson et.al (1988) Australian Journal of Experimental Agriculture

The palatability of the pasture is also negatively impacted at this stage and stock are less likely to consume the feed resulting in less efficient pasture utilisation. Once the process of seeding is completed the tiller dies off.

Grazing at the 2-leaf stage ensures tillers that are becoming reproductive are consumed while the seed head is still in the stem of the plant. These tillers are going to die off once the seed is set as mentioned earlier, and grazing removes them from the sward prior to it becoming unpalatable.

The survival of the sward is dependent on the daughter tillers which were established in the previous springs and autumns. This reinforces the importance of pastures being managed appropriately to minimise the shading effect on the daughter tillers as this not only impacts the density of the pasture negatively, but as well as the persistence to a certain extent.

Pasture Utilisation and potential stocking rate

Managing a farm close to its potential carrying capacity is crucial because farms that run a higher stocking rate are more profitable. This can be optimised by matching animal demand with the average pasture curve and ensuring that any pasture produced is being utilised. Simply growing feed is not enough, it's a matter of utilisation and increasing the live weight produced per hectare.

Spring is an important period for pasture growth and for producers. Applying grazing pressure during this time and rotationally grazing pastures is especially important.

Rotational grazing ensures better pasture utilisation and this heavily influences the live weight produced per hectare which is key for profitability. This also maximises kg/DM produced per day and positively improves productivity of a paddock because its potential carrying capacity is increased. Therefore, it is important to match the grazing system with the livestock requirements to maximise profitability.

In conclusion, the importance of grazing management for pastures and grazing them at the correct leaf growth stage are not to be under estimated, especially with newly sown pastures. A good grazing system improves not only persistence of newly sown pastures but also the utilisation of existing pastures in addition to improving DM production.

WILL MY HAY/SILAGE PADDOCKS BE RESPONSIVE TO FERTILISER APPLICATIONS AND HOW DO I MAXIMISE RETURNS?

LEIGHTON REES

There are many things to consider when looking at potential responses to fertiliser applications in your hay or silage paddocks.

These responses will change considerably from farm to farm and are very site specific. The need to address each farm on an individual basis to get a clear focus on the potential outcome is extremely important.

There is no given response. We need to understand the area we intend to fertilise and take into account many factors. These factors will determine our potential agronomic & economic responses.

Fertiliser history

Having current & accurate soil data is a good place to start. From this we can determine if a particular area of your property has sufficient levels of base nutrient.

If you only have an old soil test (2-3 years old) we can still get a reasonable measure as to where levels will be by taking into account subsequent & previous applications, stocking rates, removals, buffering index of the soil etc.

When developing a blend for a hay/silage paddock this information is vital as it determines where you will get your best response in terms of nutrient applied.

To achieve economical responses we firstly need to address any potential limitations.

This is especially the case for phosphorus which is the main driver in any pasture system and is required for the efficient uptake of all other nutrients. With limited phosphorus levels other elements may not be taken up by the plant which will reduce its potential growth. Optimal phosphorus levels will play a vital role in nitrogen responses also. Without sufficient P levels, responses to nitrogen, which makes up a fair percentage of a typical hay blend will be relatively poor. In some cases you may be better off directing funds to capital applications of phosphorus rather than nitrogen based blends. A soil test will take the guess work out of things and ensure that your money is being spent where it can give you the best return.

Ask yourself what is my most limiting nutrient? Could it be potassium from previous high removals of hay or silage? Is my phosphorus too low to get positive benefits from applications of potassium? This can be determined by your agronomist who will consider what limitations one element can potentially have on other elements in terms of that nutrient being plant available etc.

There needs to be a balance between all nutrients to achieve the most economical returns. A depletion in one nutrient can affect the uptake of another.

Provided that all nutrients are in balance including pH we can then take a look at what crop or pasture we are planning to fertilise.

What is the composition of my pasture & are there responsive species present?

It's not just a matter of applying fertiliser and watching the grass grow. Your responses are going to be determined by your pasture base also.

Are the plant species in my paddocks going to be responsive to applications of fertiliser?

Not all plant species are going to be responsive to nutrient applications and the difference between species & responses vary dramatically.

There are no two hay/silage paddocks the same. All will have a slightly different pasture base. You will need to assess these paddocks individually, based on their composition.

Don't expect maximum responses from applying a nitrogen based blend to a paddock with a pasture base of onion grass & silver grass, no matter how much you throw at it. In this case you may be better off applying increased rates of phosphorus & potassium to promote clover growth. If the sward is grass dominant then nitrogen will have the potential to give good DM responses.

Returns on investment will always be higher on pastures or crops with a quality base of desirable species.

We need to ask ourselves what pasture species are in the sward that we are dealing with and are they responsive species.

Fertiliser will deliver cost effective responses when used in the right environment.

Below I have listed some common plant species and their potential to respond to nutrient. You or your agronomist will need to be able to identify these species to determine whether or not you will achieve what you were hoping to achieve from fertiliser applications.

Responsive species

- Annual ryegrass
- Italian ryegrass
- Perennial ryegrasses. (Vic rye will give a lower response to applied nutrient than some later season varieties)
- Phalaris
- Barley grass (can be responsive to nutrient applications but its downfall is its seed head & early maturity.
- Cocksfoot
- Capeweed (responsive but 90% moisture content)
- Sub clovers

Non responsive species

- Silver grass
- Onion grass
- Bent grass
- Dock
- Sorrell
- Fog grass
- Winter grass

Species such as Brome grass & native clovers will have a response somewhere in between.

We also need to consider the clover content of the particular area and identify whether it is functioning properly. This can be done by inspecting the plants roots & looking at their nodules to determine if they are healthy with your agronomist.

Clover is very important in any pasture base as it has the ability to release large amounts of free nitrogen into the soil profile which can then be used to drive pasture growth in your deep rooted perennials such as phalaris & ryegrass.

If there is a high clover content in the sward that is functioning properly the need for higher rates of applied nitrogen may not be justified. Clover on the other hand has a high demand for potassium. All this needs to be taken into account when developing a blend for your hay/silage paddocks.

Note: clover will only function correctly when you have an adequate pH. The lower your pH the less nitrogen it will be producing.

Where there is no clover present in the sward and a high amount of grasses, responses to nitrogen based products are normally high, especially when we take into account warm temperatures and typically good levels of sub soil moisture during the spring.

Responses

As mentioned earlier D/M responses will be maximized when you have no limitations in your nutrient levels and where your pasture base contains responsive species with a low percentage of undesirables.

In the case of a paddock with a high percentage of non- responsive species, it may be worthwhile selecting a different paddock to lock up.

In terms of responses here is what you can expect from nitrogen applications based on your pasture composition & time of year. Table by Frank McKenzie.

Lineal responses can be expected from N applications ranging from 30-60 units of N applied (65-130kg/ha urea). Rates below 30 units N (65kg/ha urea) have proven to give unreliable responses.

We are typically applying rates at the lower end of the scale with the potential to capture higher returns from increased rates of N during these warmer periods.

Be wary of only applying nitrogen to hay/silage paddocks. The extra D/M grown from the nitrogen depletes the pool of other necessary nutrients such as phosphorus, potassium & sulphur basically meaning that you are mining what's there. All this needs to be replaced otherwise you may encounter a shortfall of nutrient further down the track.

There is an exception to this when farmers apply capital rates of super potash (above maintenance) to their selected hay paddocks in the autumn.

Some farmers will also choose to applying capital rates of phosphorus only to their hay paddocks in autumn and then supply the nitrogen & potassium as a booster in the spring.

Summary

In summary the need to understand your soils ability to respond to potential fertilizer applications is vital, as is understanding the pasture or crop species you are dealing with.

Potential response to D/M grown can be maximized with targeted applications of the right nutrient.

This being said, current & accurate soil data is the key to starting the decision-making process. Without this information we are limited to visually accessing areas.

It's not always about extra kg/DM grown either. Some of the other nutrients within a typical pasture blend are there to replace what you are removing, so as to not have a shortfall in production down the track when we have depleted our available nutrient pool of a certain nutrient. This will vary between nutrients with excess phosphorus remaining in the soil to be used when needed.

Potassium on the other hand will be taken up by plants as a luxury nutrient meaning that the majority of K applied will be up in the plants leaf come cutting and therefore be removed with the hay/silage cut.

Contact your agronomist early to consider your possible needs for soil testing. I will leave you with a typical nutrient removal chart that you can consider when organizing your hay/silage blends. It may surprise you as to what is taken out in an average crop.

Nutrient removed by	Kilograms						Grams		
Hay/Pasture	N	P	K	S	Ca	Mg	Cu	Zn	Mn
Cereal Hay tDM*	20	2	18	1.4	0.6	NA	7	25	50
Lucerne Hay tDM	33	3.3	28	2.4	11	2.1	6	21	56
Lucerne Seed	60	6.8	11	2.5	1.3	2.2	11	43	17
Medic Hay tDM	30	3	25	2	9	NA	8	20	15
Medic Seed	64	8.4	12	5	2	NA	7	23	13
Oaten Hay tDM	20	2	18	1.4	0.6	NA			
Hay (Clover/ryegrass) tDM	30	3	25	2	9	2			
Silage (Clover/ryegrass) tDM	30	4.3	27	NA	7	1.7			

All figures are general in nature and will vary within individual systems, use as a guide only.

Burning or removal of stubble will increase the nutrient removal rate of Nitrogen, Sulphur and Carbon, other nutrients such as Potassium, Phosphorus and trace elements will remain but are more susceptible to erosion from wind or water.

*tDM = tonne of dry matter NA = Not Available

Nitrogen Decision Support System Look-up Table for Western Victoria (compiled by Frank McKenzie)

Average N response (kgDM/kgN)												
Pasture Index	**Jan***	**Feb***	**Mar***	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov***	**Dec***
Low	**	**	**	5	5	4	4	7	8	8	**	**
Medium	9	9	9	8	7	5	5	8	14	14	11	11
High	14	14	14	10	9	8	8	12	20	20	15	15
% Range in actual	22	22	22	35	32	34	34	27	25	25	24	24
Typical Response Time (days)	21-32	21-32	25-35	28-36	28-42	36-90	21-32	18-28	14-28	14-21	14-28	18-32
Notes	Ryegrass				Olsen P		Colwell K		pH (H_2O)			
Low =	< 30%				< 12 ppm		< 80 ppm		<4.5			
High =	> 60 %				> 25 ppm		> 275 ppm		>5.5			

Comments:

* = Assumes irrigation, as summer rainfall in SW Victoria (Nov - Mar) is often too unreliable to allow for N applications

** = would not irrigate low potential pasture

Responses need to be adjusted within the range given, based on rainfall and temperature for the current season.

Responses are quote for average responses to nitrogen applied early in the month and responses measure late in the same month

Summer nitrogen responses are highly dependent on adequate soil moisture, usually only adequate with irrigation

Short regrowth times (eg 14-16 days) may reduce responses

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SEASONAL REMINDERS

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