SPRAYING FOR TRACE ELEMENT DEFICIENCIES IN CROP THIS SEASON

REBECCA STEWART

Although trace elements are required in such small amounts they are just as important as the major elements such as N, P & S. If these micronutrients are not managed correctly, productivity of crops and also pasture can be greatly affected and deficiencies can lead to secondary issues such as increased disease and frost susceptibility.

With continuous cropping rotations, more and more nutrients are being removed from the soil and being exported as grain off farm. This is concerning because in some areas, these nutritional barriers could be the major factor impacting production.

Out of all trace elements, Southern Australian cropping soils will most likely be deficient in zinc, copper and manganese rather than any other nutrients.

Zinc deficiency is probably the most important as it is current across a wide area and can severely limit legume production and reduce cereal grain yields by up to 30%. It is difficult to diagnose zinc deficiency as symptoms are rarely shown in the crop. Plant symptoms appear to be worst during the heart of winter when conditions are cold, wet and light intensity is low.


Zinc Deficiency in Wheat

Zinc is very important for many functions within plants but it is essential to have it available early as it is a major component of root development. The preferred method for zinc application is applying it to the fertiliser as a coating. By doing this you can ensure that all plants will be able to access the zinc as it will be on every granule. This is extremely important as zinc does not move from where it is placed in the soil.

Copper is a major component of many plant functions but it is mostly important for pollen formation and seed set. A deficiency in copper can also greatly increase the risk of fungal attack and can cause a total crop failure.

Copper is very immobile in both the soil and plant therefore it is essential to get an even distribution throughout the paddock. Once again copper coating on fertilisers is the best way to ensure copper is supplied to all plants. Yield responses can be achieved if copper is applied earlier rather than later as a foliar spray and this is also less likely to cause canopy damage if you are using a copper sulphate spray.


Copper Deficiency in Wheat

Manganese availability is strongly correlated to the soil pH and also seasonal conditions. Manganese availability will be at its lowest with a high pH and also during a dry spring. Deficiency causes plants to be weak, pale green/yellow and floppy.

On a high pH soil, applications of manganese with granular fertiliser will not be viable as the manganese oxidises as soon as it hits the soil. Foliar applications are required to correct a deficiency but need to be applied annually.

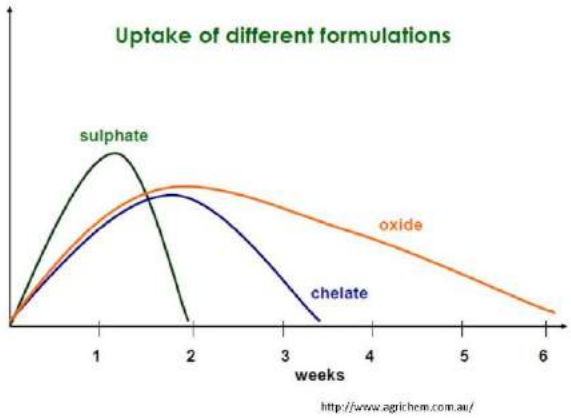

Manganese Deficiency in Wheat

Trace element deficiencies can usually be corrected during the season with a cheap foliar which will see you through the season. However, for the long term sustainability and to prevent rather than cure, most trace elements should be applied early on to the soil in the fertilisers applied.

Contents:

There are many different chemical structures and they all perform differently on plant surfaces and within the soil. Understanding their characteristics is important so that you can make a correct choice of product for different situations.

Sulphates, oxides and chelates are different structures and need to be understood to use them effectively.



Sulphates are very quickly taken up by plants but will not provide the plant with nutrients for an extended period of time. A sulphate product will be taken up within a week but will only provide nutrients for around 2 weeks. They have a high salt index which means they may burn sensitive plants if the temperatures are high and conditions are harsh. Sulphates have a low tank mix compatibility as they are highly reactive.

Chelates are chemical structures which wrap around individual trace elements protecting them from chemical attack. Chelated nutrients do not react with other elements in tank mixes due to their structure and also will not be affected by soil pH or residual anions. Synthetic chelate molecules have a low analysis due to being such large structures. If a product claims to have a microelement analysis greater than 7.5%, the product will not usually be fully chelated and this will react in tank mixes. A chelated product will hang around a lot longer than a sulphate (around 3-4 weeks) but uptake will take around two weeks.

Oxides have a high nutrient analysis and are usually suspension products. The uptake of these products is a lot slower (around 2 weeks) but they provide nutrients for a longer period of time, up to 6 weeks. Oxides do not contain salts, therefore are safer to use on sensitive crops and under extreme weather conditions. No salt means they are not reactive and are more compatible in tank mixes than sulphates.

When it comes to plant uptake the particle size of a liquid suspension matters. In many products, the particle size is large and unrefined. From these particles the uptake of the micronutrients is slow and ineffective. If there are fewer particles on the leaves, the surface area and uptake is reduced, many of these particles are wasted as some of them are too big to stay on the leaves. Smaller particles obviously increase surface area and uptake.

When purchasing foliar trace element sprays, ensure that you are purchasing the right product for your situation and check the foliar suspension for particle size and distribution.

INTRODUCING

FRANZI RIEGGER

The latest addition to the Vickery Bros' Agronomy Team is Franziska (Franzi) Riegger.

Born and raised in Germany, Franzi moved to Australia in November 2013. Growing up in a small rural village near the Black Forest, she spent considerable time as a member of a local agricultural club, similar to Young Farmers, which arranged and promoted local agricultural events.

After finishing Senior Schooling in 2012 she decided to travel to broaden her horizons. Not long after coming to Australia, she met her partner Aaron, whom she now lives with near Portland. As he runs a successful fabrication business with his father, Franzi has made it her responsibility to help run the family farm and has almost completed her Diploma of Agronomy through South West TAFE. "The studies that I have undertaken so far have allowed me to improve farm practices on my partner's family farm in Gorae, including introducing summer crops and renovating existing pastures. This has reinforced my enthusiasm for agriculture and the commitment to have a career in agronomy."

As a member of the agronomy team, Franzi looks forward to gaining experience and extending her knowledge as well as meeting clients to service their agronomic needs.

ONION GRASS CONTROL

LEIGHTON REES

Onion grass (Guildford grass) is a low fertility weed which contributes to the composition of many pastures in South West Victoria. The plant can regenerate from seed or from old corms. If left unmanaged or if conditions suit, there is potential for large increases of plant numbers through seed germination.

Onion grass is extremely unproductive utilising valuable moisture and nutrients. It can also have adverse effects on stock health including infertility in sheep and fibre balls in the stomach of cattle. This can lead to stock death in severe cases.

Onion grass has no feed value and consequently is of no benefit to a pasture/livestock based operation.

It is possible to manage plant numbers using improved management techniques especially if there isn't a heavy infestation to start with.

The main technique used is to increase levels of phosphorus which subsequently improves the growth of desirable pasture species such as clover and ryegrass. These desirable species will then compete against the onion grass. High grazing pressure at this time will also increase the effects of this technique. Applications of 20kg/ha of P or above are recommended.

Where infestations are heavy, chemical control may be necessary. This can be done in late June or July depending on the season. Timing is critical and chemical must be applied at plant bulb exhaustion. This is just before or at the stage where the tip of the onion grass starts to become brown, (also known as browning off). It is at this stage that the chemical can be properly taken up by the plant. If done to early, chemical won't be taken up by the plant and the bulb will be unaffected and regrow the following season.

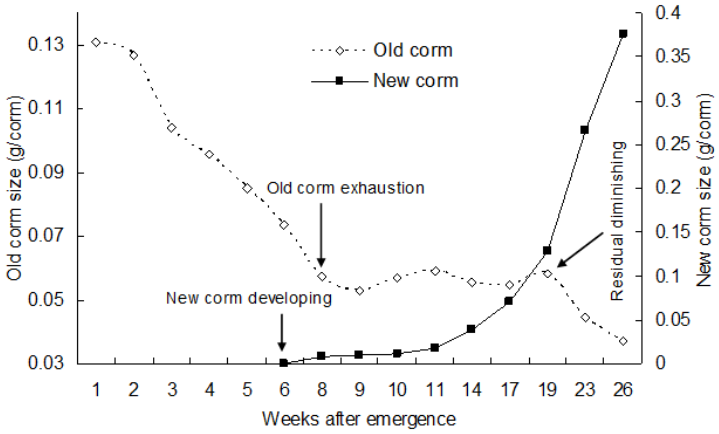
If you are unsure on the correct timing, dig up one of the corms. If it is starting to develop the second corm on the side of the first then it is time to spray.

The chemical used should have a metsulfuron methyl active. It is critical that a good quality wetter is used with this so that the chemical will stick to the thin waxy surface of the onion grass. In most cases the cost of the wetter can outweigh the price of the chemical but this is necessary to give good results. Be wary that when using a product such as metsulfuron methyl that clover growth will be effected and may need to be re sown the following year. Depending on rates used there will be a plant back period on legumes which will also depend on your soil type and rainfall.

In some areas where there is a sufficient seed bank there may be enough clover seed in the soil to repopulate the area in the following year.

Other areas may need to be over sown the following year to improve desirable plant populations.

By maintaining a high level of desirable pasture species, (at least 70% cover) as well as maintaining good fertility, you will dramatically reduce the presence of onion grass in your pastures and therefore reduce the need for chemical control.



THE BENEFITS OF EARLY NITROGEN USE TO HELP BUILD AUTUMN / WINTER FEED WEDGE

ROGER GEE

Nitrogen use in intensive pastures has been around for years, but not so much on broadacre pastures, where building an early feed wedge can be beneficial and quite profitable against bought in feeds.

At a recent farmer group meeting I was asked "when can I apply urea to push pasture production?" This was early May, and while the first drop of rain had turned most paddocks green, pasture length was still short on a lot of farms. Those in the group were well accustomed to applying nitrogen, so the question was more a matter of timing…

So to answer the question appropriately, these are the points that should be considered;

- Paddocks that are fertile and well drained respond well to nitrogen.
- Soil moisture is not limiting growth.
- Pastures with low phosphorus, potassium or sulphur will respond accordingly, resulting in inefficient use of nitrogen.
- Select a pasture with a good proportion of ryegrass as this pasture species is likely to respond well.
- Apply to pastures that are actively growing, pasture nitrogen requirements are highest during the active growth that takes place in the two weeks after grazing.
- Staggering applications will keep a continuous source of extra feed.
- Nitrogen can be applied at rates of up to 60kg N/ha (*130kg of Urea/Ha*).
- Lower rates of 30kg N/ha (*66kg of Urea/Ha*) can often give better economic responses than higher rates.
- Nitrogen not used by the pasture at any one time, will be lost to the pasture system resulting in extra cost.

Expected pasture growth responses from nitrogen, as a guide for dairy pastures in South West Victoria, you could expect to get:

- 10 to 15 kg DM/kg N applied in autumn.
- 5 to 10 kg DM/kg N applied in winter.
- 15 to 25 kg DM/kg N applied in spring.

Remembering anything that limits pasture growth (e.g. soil moisture, temperature, soil fertility etc.) will reduce the expected response to nitrogen.

To minimise the risk of nitrogen related disorders, grazing should not take place until 21 days after applying nitrogen. This is not always practical and cows/sheep should be carefully monitored if grazing nitrogen fertilised pasture earlier than this.

- Do not allow hungry, unadapted animals unrestricted access to nitrogen fertilised pasture.
- Strip graze or allocate small areas initially.

Given the expense of applying nitrogen fertiliser to grow more grass, make sure your pasture utilisation is good. The more grass that is wasted, the greater the expense of the extra dry matter grown.

Back to the question posed earlier, when to apply, well that answer is now. Urea is a lot softer in price than it has been for a few seasons, so while soil temperatures are still reasonable, with an application rate of 109 kg/ha of urea (50 units of N) you could expect to grow (8 kg DM/kg N) an extra 400 kg/DM/ha;

So if we said urea ex-works was $425/t @ 109 kg/ha producing an extra 400 kg/DM/ha, then that's 11.6 cents per kilo of DM, before freight, spread & GST.

Just as a comparison, oaten hay with an average DM% of 88.9%, from the Wimmera this week $320/t plus freight/handling & GST calculates out at $0.36 kg/DM. F3 barley with an average DM% of 88.7%, from the Wimmera this week $200/t plus freight/handling & GST calculates out at $0.22 kg/DM.

Nitrogen Decision Support System Look-up Table for Western Victoria (compiled by Frank McKenzie - Jan 2002)

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 quoted 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

Ref: Frank McKenzie – 2002 DNRE, "Using Nitrogen Confidently"

FILLING THE WINTER FEED GAP WITH GIBBERELLIC ACID

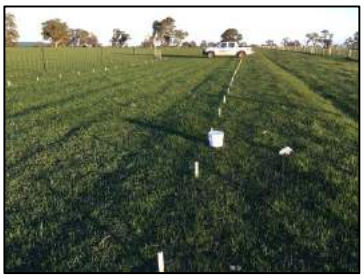
BRUCE LEWIS

Gibberellic acid is a naturally occurring plant hormone that promotes growth by increasing tiller size through leaf and stem elongation. Gibberellic acid (GA) is produced naturally by the plant in warmer months so larger increases in growth occur when GA is applied in winter when levels are low. Phalaris responds better than perennial ryegrass. Perennial ryegrass responds better than annual ryegrass. The rapid growth is often lighter (yellow) in colour for the first couple of weeks after application but the quality of the feed on offer is not affected. GA utilises plant nitrogen and carbon stores for stem elongation so if these are not topped up with fertiliser applications it may eventually result in what is known as 'post GA depression'. A study at Lincoln University in NZ (ryegrass) found that the way to rectify this was to apply nitrogen at the same time, as no negative effect on pasture production was observed for up to 10 repeat applications of GA plus nitrogen. A single application on a phalaris dominant pasture can have dramatic effect on winter growth rates. The best results have been achieved where GA is applied a week after a nitrogen application.

Table 1 - CSIRO trial data – Gibberellic acid response without nitrogen

Timing	Nil GA				10g/ha GA			
	Phalaris	A Grass	Clover	Total	Phalaris	A Grass	Clover	Total
First spray growth rate kg/ha/day	4.45	5.91	.3	11.2	26.06	6.51	0.036	33.5
Growth after 21 days kg/ha/DM	93	124	6.3	223	547	136	0.75	683
Increase in DM over 21 days kg/ha								460
Growth rate per day								22

Results can be obtained using rates of 5g to 20g of GA/ha. It is recommended that it is applied in a minimum volume of 100L/ha. Phalaris is highly responsive to GA and rates of 5g to 10g/100L are appropriate for phalaris dominant pastures. If applying to perennial ryegrass dominated pastures, annual ryegrass or cocksfoot, 10-20g/100L is required. Multiple applications can be used on a paddock in conjunction with a rotational grazing program. Growth stimulation is usually seen within seven days of application and ceases around 3-4 weeks after application. The final application of GA should be no later than mid-August. At this time the soil temperatures are rising, natural levels become sufficient in the plant and untreated areas will perform at similar levels to treated areas.



A field plot trial on ryegrass pastures on Northland pasture in NZ showed that a single application of GA (20g/ha) plus nitrogen (37 kg/ha) in July produced 1066 kg DM/ha more than the control treatment, while nitrogen alone produced 539kg DM/ha more than the control treatment. The addition of GA provided extra pasture growth at very low cost (7c/kg/DM). Plots receiving two applications without nitrogen (June and July) produced no additional pasture after application, but showed a negative effect later in the season.

Table 2 - Harvested pasture (kg DM/ha). Letters that are different indicate statistical differences. Various combinations of Gibb acid and nitrogen on Ryegrass in NZ. N applied at 37kg/ha. GA applied at 20g/ha. Northland Agricultural Research Farm.

	Cut 1		Cut 2		Cut 3		Cut 4		Cut 5	
	Jul-18		Aug-21		Sep-18		Oct-16		Nov-13	
Control	1678	a	774	a	731	abc	985	b	1041	bc
Liquid N - Jun, Jul, Aug	1828	ab	1055	bc	1482	d	2038	d	1243	c
Gibb acid - Jun, Jul	1789	ab	808	ab	532	a	642	a	785	a
Granular N & GA - Jun, Jul	1996	b	1178	c	825	bc	972	b	899	ab
Liquid N & GA - Jun, Jul, Aug	2041	b	960	abc	1832	e	1668	c	1100	bc
Liquid N - Jul only	-		1200	c	887	c	1023	b	961	ab
Liquid N & GA - July only	-		1695	d	876	c	1021	b	981	ab

Key Points for using Gibberellic Acid

- Pasture to be actively growing with adequate base nutrition.
- Adequate moisture (avoid water logging).
- Avoid recent frosts.
- Apply to dry leaf with 100litres/water/ha.
- Exclude stock for 21 days for optimum response.
- 10grams/ha for phalaris and 20g/ha for ryegrass and cocksfoot.
- To optimise response on ryegrass apply 5-7 days after nitrogen.
- GA will cost $6.80/ha for 10grams/ha or $13.60/ha for 20g/ha plus application costs.
- A 400kg/ha response in phalaris will produce additional dry matter for approx. 5.5c/kg ($15/ha application costs).
- A 300kg/ha response in ryegrass will produce additional dry matter for approx. 9.5c/kg.

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A TALE OF TWO SUMMERCROPS

PHIL WHITE

Farmer Brown

Farmer Brown utilises summercrops as a part of the pasture renovation program (rape in particular). Paddocks are selected the previous spring and a 24 month renovation plan is put in place. Ideally the summercrop provides an extension of the growing season to ensure a higher percentage of his second cross lambs make target sale weights. At a minimum, the summercrop is seen as a way to ensure the establishment of a successful permanent pasture.

Sequence of events

September 2015 A paddock identified as having a high weed burden (particularly annual grass weeds) and poor overall production is chosen for a September 2016 summercrop and spring 2017 permanent pasture.

Early October 2015 The paddock is grazed heavily with a large mob to ensure an even seed head set and the paddock is spray-topped with Spray-Seed or similar at label rates.

November 2015 The paddock is soil tested with the results indicating that it has high aluminium, low pH and P status. Other macro mineral status is adequate.

December 2015 The paddock is limed to ameliorate aluminium toxicity (which farmer Brown knows from experience retards fine root hair growth and hence moisture extraction) and additional phosphorus is added to this paddock in the normal January fertiliser application.

January 2016 The paddock is fenced to contour to split up the slope and tableland in the paddock and knowing the paddock is going into summercrop the next spring farmer Brown is motivated to finally connect the reticulated water to this paddock rather than rely on dam water.

During the 2016 growing season the paddock is grazed as normal but covers kept on top of. Farmer Brown notices increased sub clover production in the paddock and less annual grasses as the liming, additional P and reduction in the weed seed bank begin to take effect. He completes an effective herbicide application on the broadleaf weed population.

Early September 2016 Farmer Brown organises his seed (His old favourite Winifred Rape) which he has treated with a systemic insecticide treatment such as Gaucho. The paddock is inspected for weed burden and a specific knockdown herbicide/insecticide formulation is ordered for this paddock. Sowing contractor is also notified.

10th September 2016 A window of opportunity in the weather occurs. Because farmer Brown is organised, he has got his spray contractor ready to spray the paddock that day. From this point on all moisture is conserved for the summercrop. Farmer Brown has used a broadleaf weed spray that he knows has a 7 day plant back on rape and he observes this plant back period.

20th September 2016 The summercrop is direct drilled into a near full profile of moisture and with the warming soil temperatures and custom sowing fertiliser blend, it begins to rapidly germinate. Micronized slug bait is mixed with the seed and applied in furrow to ward off sub-surface feeding slugs. Again his contractor is available for sowing as most paddocks have yet to be sprayed out.

The crop is closely monitored at germination and an additional slug bait application is broadcast as insurance. The knockdown insecticide in conjunction with the systemic protection from the seed treatment seems to be warding off early insect attack.

Early November 2016 A rain event is predicted and farmer Brown organises to have an additional 100 kg/ha of Urea spread on his summercrop as he knows that he has little mineralisable N available given he did not cultivate the paddock.

A small number of summer broadleaf weeds begin to appear in the crop along with some diamond back moth pressure. Farmer Brown decides to apply a broadleaf weed spray along with an effective insecticide.

The crop has grown well with the full profile of moisture, limited nutrient stress and ability to extract all available moisture given the increase in soil pH and reduction in aluminium.

In conjunction with his nutrition consultant farmer Brown makes some calculations around available dry matter on the summer crop and chooses a weight range of lambs that will be finished on the crop. He knows it will take some time before they are fully adapted and achieve high live weight gains.

Lambs that are healthy, parasite free and not hungry are slowly adapted onto the crop. A fibre source is available to them at all times along with fresh water. After 14 days the lambs are on ad-lib summercrop (and still have access to fibre) and are achieving excellent LWG's.

As the residual of the summercrop is being reached the lambs are brought in for weighing and 90% have reached the LWG target. The summercrop is now rested.

Farmer Brown – Cont

A well predicted January storm is coming and farmer Brown organises his spreading contractor to spread additional Urea on the crop which has grown new leaves but is very moisture stressed.

In conjunction with the summer rain and nitrogen the crop grows well again and farmer Brown decides to put his replacement ewe lambs on the crop.

The autumn break arrives and again the summercrop responds well to moisture and warm temperatures. Farmer Brown who is currently containment feeding most of his livestock transitions a proportion of his ewe flock onto the crop – this allows permanent pastures time to build cover after the break.

After the stock are removed farmer Brown notices that some annual grasses have emerged in the crop – he removes them with a grass selective herbicide and now given he has had three effective kills on the grass weeds (with a knockdown to follow) he is confident the spring sown pasture will be annual grass weed free.

The remaining summercrop is eradicated with an appropriate knockdown in September 2017 and a permanent pasture of phalaris and clovers is sown down to a weed free seed bed.

Farmer Brown and his consultant sit down to discuss the last years result and perform an analysis of the summercrop – it shows the crop has been highly profitable without considering the flow on effects of having a permanent pasture sown down in an appropriate weed free environment.

Farmer Grey

Farmer Grey is an opportunist summercropper. Farmer Grey also favours rape as a summercrop but tends to make his decision as to which paddock to crop late in the spring the crop is to go in. He tends to cultivate and broadcast summer crops with the expectation the Oct/Nov rain will drive their production. Often similar paddocks are chosen for summercrop each year – usually the ones with a good reliable water supply.

Sequence of events

Early September 2016 Farmer Grey is deciding whether to plant a summercrop in paddock 10 or paddock 14 or whether to plant one at all. After a week of deliberation he decides to plant paddock 10 as it has a more reliable dam.

Mid-September 2016 Farmer Grey rings his spraying contractor to knock the paddock down – however he cannot get to the paddock for a week. When the spraying contractor arrives, farmer Grey uses chemical he has on hand and fails to take into account some of the deeper rooted perennial weeds that are present in the paddock. No insecticide is included.

Early October 2016 Farmer Grey has decided that working the paddock is the best option which he begins in earnest. However, as he is also cutting silage at the time, this process takes over a week and the topsoil is rapidly drying out in the worked sections.

Mid-October 2016 He heads to his local seed merchant to organise his seed – however they don't have any in stock today. It will arrive in 48 hours. Farmer Grey orders the seed (without any insecticide treatment as that was an additional $1.20/kg).

When the seed arrives farmer grey drops it off at his local spreading contractor who mixes it with superphosphate at farmer Greys request and it is spread on the worked paddock. Farmer Grey doesn't take soil tests but assumes super should do the job.

Farmer Greys summercrop experiences a week of fine weather after it is has been spread and whilst some seeds germinate quickly, others lie dormant. Establishment is patchy and insect damage is prevalent due to lack of insect control. The rain in early November germinates a good percentage of the remaining seed. Given the soil has been cultivated a large summer weed population also emerges with this rain. Farmer Grey has never sprayed a summercrop for weeds before as he is unaware of the options available and sees it all as feed anyway.

Farmer Grey lets some lambs onto the summercrop in mid-December as feed is getting tight. They adapt quite well (given the grass weed contamination helps with rumen adaption) however there is not the biomass in the paddock that farmer Grey initially thought and the crop disappears rapidly without the lambs putting much weight on.

Lambs are removed from the summercrop and put into a feedlot scenario which is another diet adaption. Farmer Grey again questions why he bothers with summercrops.

January 2017 a rainfall event mineralises a considerable amount of nitrogen in farmer Greys worked summercrop paddock – and it takes off quite rapidly. Farmer grey is happy to see some green feed and 14 days after the rainfall event puts some of his more advanced (but hungry) lambs onto the crop.

Between pulpy kidney and nitrate poisoning farmer Grey loses a few of the lambs he puts onto the crop – but overall is quite happy with what he gets from this grazing.

At the autumn break farmer Greys summercrop is quite dirty with annual grass weeds along with a nice crop of goosefoot and capeweed. He is unsure whether he can clean these weeds out and on balance decides to spray the paddock out and plant some annual ryegrass.

The annual ryegrass comes up well but has a considerable burden of annual grassweeds - farmer Grey however has no chemical options of control these grassweeds in annual ryegrass.

Farmer Grey questions whether the environment is suited to growing summercrops anymore and thinks he might give it a miss next year.

GRASS TETANY

REBECCA STEWART

As the cold and wet winter months set in, every farmer needs to be prepared in one, or many, different ways. Among other things dairy and beef farmers need to focus on what has been the main cause of deaths of adult beef cows on farms in South - Eastern Australia over the last 40 years.

Also known as grass staggers, clinical magnesium deficiency or hypomagnesaemia, grass tetany is a metabolic disease which is due to the abnormal metabolism of Magnesium (Mg) in the blood. Grass tetany can develop over a long period of time therefore cows are more likely to die before symptoms can be detected. Cattle hold magnesium within their bones and muscles but cannot readily access the stores when they need the magnesium the most. The low levels of magnesium are also usually associated with low levels of calcium. This leads to the muscles of the animal to stop working; it will be unable to breathe and therefore dies. Grass tetany is not only due to a deficiency of magnesium in the blood, there are many other factors which affect the magnesium levels.

Some factors are as follows;

- Potassium (K) interferes with the Mg absorption within the rumen.
- A deficiency in sodium (salt).
- A change in diet from dry feed to lush pastures.

Magnesium is essential for bone health, nervous system, enzyme production and reduces irritability. Mg requirements vary between different classes of stock (growing, dry or lactating) and are between 5.5 and 53g/day. The magnesium requirement for milk production is approximately 0.15g/litre and for maintenance of stock it is 1.8g/day.

The first "symptom" of grass tetany for most farmers will be the loss of a cow. Usually the cow has been frothing before death (there is froth coming from the cows' nose and mouth) and there are marks on the ground from where the animal has been kicking before death. The early warning signs such as twitching face and ears, wary appearance and stiff movement are often missed. In the mildest form of grass tetany, a cow can have low levels within the blood but not show any symptoms until even weeks later once the animal is stressed. A cow that is wild and doesn't like being driven is a sign of the disease in the intermediate form. Animals at this stage will hold their tail a little higher and can appear blind. In this form of the disease animals can recover but without immediate treatment, most worsen and die. In the worst form of the disease animals are very excited. They will be galloping, bellowing and staggering before soon going down and thrashing the legs. At this point the animals can die within minutes depending on how stressed they are.

There are a number of risk factors which will help determine the likelihood of grass tetany. The following table shows the most common factors and categorises them into high medium and low areas.

Table 1.1 Grass Tetany Risk Factors *(D.Rendell 2000)*

	HIGH	MEDIUM	LOW
Cow's Age (older cows absorb less Mg)	>6 years	3-5 years	2 years
Lactation Stage	< 2 mths post calving	2-4 mths post calving	>4 mths post calving DRY
Fat Score	4+ and less than 2	3-4	2-3
Time of Calving	April-July	March and August	September – February
Weather	<5°C Heavy Rain Strong Winds	5-10°C Light Rain Moderate Winds	>10°C Dry No Winds
Mustering & Yarding	Aggressive motorbikes/dogs >8 hours off feed	Moderate pace walk 4-8 hours off feed	Left alone in paddock <4 hours off feed
Soil Test K/(Ca+Mg)	Ratio > 0.1 High K >110 Acidic Soil pH <6	Ratio 0.06-0.10 K Level 90-110 pH 6-7	Ratio <0.05 K Level <90 Alkaline Soil pH >7
Plant Tissue Test	K/(Ca+Mg) Ratio >2.4	K/(Ca+Mg) Ratio 2.1-2.4	K/(Ca+Mg) Ratio <2.0
Pasture Composition	Grass dominant >30% of winter pasture carry over dry feed	Mixed	Clover dominant pasture. (Has 4 x better Mg ratio than grass)
Hay Supplement	Nil	During rough weather	Every 2nd day

From the table above the risk factors are fairly self-explanatory. As a producer you can assess your operation to put yourself into the risk categories to pre-empt any fatalities within your herd. Looking at the fat score risks, fatter cows are more prone to grass tetany due to their body fluids having less available magnesium. In some instances, a cow may simply be a poor absorber of magnesium.

Magnesium absorption is reduced by high potassium intake where they are consuming more than 3.5% of DM. This is common when cows graze vigorously growing pastures on naturally high K soils. A reduction in absorption levels can also be reduced when the rumen potassium levels are increased by a sodium (salt) deficiency. When looking at a tissue test the following levels will be an indicator to show if grass tetany is likely to occur:

- Magnesium levels <2g/kg DM
- Calcium concentration <3g/kg DM
- Sodium levels <1.5g/kg DM
- Potassium concentration >20g/kg DM
- Nitrogen levels >50g/kg DM

If you are suspicious about having a problem or have some cows that you think might be at high risk (have the early signs of grass tetany) you can take a blood test to check the magnesium levels. If a cow has less than 10mg/L of fluids, preventative measures need to be addressed.

If you do recognise the symptoms of grass tetany before any deaths have occurred, rapid treatment to restore the blood magnesium levels is essential. Because grass tetany is not always caused by a deficiency in Mg, straight Mg supplements may not be the answer. Calcium and magnesium solutions are available for injection into the jugular; these should be administered with great care. The solution packs should be brought up to body temperature in a bucket of warm water to make them easier to administer and also make it less stressful on the cow. Relapses can occur after a few hours so it is essential to start feeding the cow hay and Causmag as soon as possible. A follow up Injection one or two days after recovery can be helpful to restore blood magnesium levels. Also 60g of Causmag should be fed daily to keep the Mg levels up in affected cows.

As always prevention is better than cure. The most effective prevention for stock is hay that has been treated with a Causmag slurry. Cows require 60g/Causmag/head/day and to make up the slurry per cow you will need; 60g Causmag, 30g molasses and 20ml water. As an example if you have 80 cows you will require the following; 4.8kg Causmag 2.4kg molasses and 1.6L of water.

The slurry can be poured over the hay in the paddock and it will take 2-3 days for this treatment to take effect. If you are to stop administering the Causmag slurry the cows will no longer be protected against the disease. Another option is the use of magnesium bullets which can give protection for 80-90days. At least one week before a high risk period starts, the bullets should be given down the throat. These capsules release around 2g/day of Mg but this may not be adequate considering a milking cow which produces 25L of milk requires 5.55mg/day (from the blood).

By identifying high risk stock and treating them accordingly you can greatly reduce your risk of being affected by the disease. Something as simple as putting out hay and moving stock off lush green pastures during high risk periods can greatly reduce the instances of grass tetany.

For long term prevention, the soil health status needs to be addressed to manage the paddocks which may be at higher risk of causing grass tetany issues. Looking at table 1.1 you can see that by making sure you are liming paddocks when they are getting slightly acidic and keeping the calcium/magnesium ratio to optimal levels will ensure instances of grass tetany will be reduced. On acid soils here in the south west grass tetany is a large problem but with correct pasture, grazing, stock and soil management, the risks of getting the disease will be greatly reduced.

References:

Holmes, CW *et al*. (2002).
Milk production from pasture principle and practices.

Champness, D. (2007).
Grass tetany (Hypomagnesemia) in beef cattle. Ag Note AG0579

Congratulations

Vickery Bros. would like to congratulate our office staff member Sharon Mowatt on the safe arrival of Finn Daniel John Bishop - Mowatt

SEASONAL REMINDERS

- ☐ Forward purchase of fertiliser
- ☐ Nitrogen for winter growth
- ☐ Weed control on hay paddocks
- ☐ Soil test hay and silage paddocks