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Summer 2011

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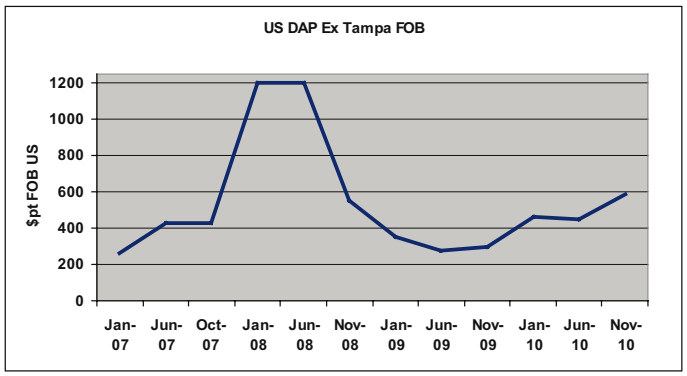
FERTILISER PRICING 2011

DAP and Urea prices have lifted approximately US$150/t in the last six months from a relatively low base, thankfully our stronger Australian dollar has so far minimised local price increases. However as the economies of the world continue to recover and demand for food increases, a further rise in fertiliser prices appears to be inevitable.

Reinforcing this trend is the current increase in world grain prices, on the back of production problems in Russia and now harvest losses in Australia. If grain prices remain high into the new season we will see a further increase in the use of fertiliser for grain production increasing the pressure on fertiliser price rises.

DAP

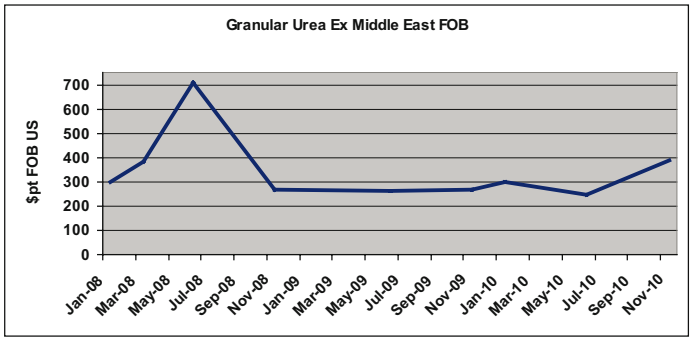


Source: FMB weekly fertiliser reports

Demand for DAP and MAP is traditionally low at this time of year, particularly in the United States. Markets have factored in reduced exports from China in the New Year with DAP being quoted currently at US$590 Ex Tampa FOB. Australian importers are now setting boats for the coming season for delivery in January and February, with fluctuations in the exchange rate impacting on domestic prices in the order of $10 to $20 per tonne.

However concerns over problems associated with the Australian wheat harvest have increased grain prices and demand from India and Pakistan for ammonium phosphates is predicted to increase in the New Year, it would be expected that DAP and particularly MAP prices will increase globally influencing our domestic prices in April and May.

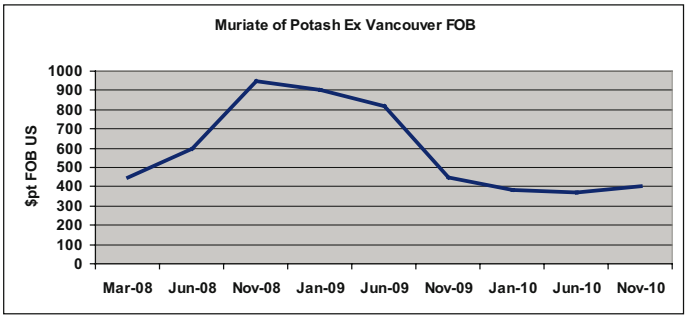
Urea



Source: FMB weekly fertiliser reports

A greater number of suppliers of Urea globally tends to mean a less volatile market. Global prices in January and February are a better indicator of our domestic prices for the coming season.

MOP



Source: FMB weekly fertiliser reports

BHP's attempt to take over Potash Corp in Canada reflects the expectation of greater profits from the supply of Potassium. Potassium is at the low end of the price cycle and given the small number of global suppliers, any increase in demand will see a much quicker increase in price in comparison to other fertilisers. The market is watching China at the moment, having had several years of reduced imports; any increase in demand from this sector will see increasing price pressure. Domestically we have seen the same reduction in potassium use over the last two years, but given low soil test results this year we are expecting more potassium to be used.

Best wishes for the festive season, from all the staff at Vickery Bros

NITROGEN RESPONSE ON SUMMER CROPS

By Kate Shaw

The last few months have been unseasonally wet which has meant good soil moisture; coupled with warm soil temperatures summer crops have jumped out of the ground and are growing well.

However it does pay to remember that with these ideal growing conditions the potential for summer crops to run out of nitrogen reserves is high. Because many pastures and winter crops have yielded well throughout the year soil nitrogen reserves are expected to be lower than usual. Even more so if a paddock has been double cropped as there will have been nutrient removed in harvest (fodder or grain) and any residual dry matter will not supply the soil with nitrogen until it is fully broken down. This breaking down process initially causes a nitrogen deficit as nitrogen is required by soil microorganisms to break down organic matter before this organic matter can release nitrogen back into the system. As such, even in a pasture situation with residual dry matter present the potential for nitrogen deficiency is possible.

The heavy rainfall throughout the year also has the potential to leach nitrogen (both naturally occurring and applied) beyond the root zone of summer crops.

Nitrogen applied at planting will have given the crop a good start however it may now be worth following up with a second application either prior to the first grazing (depending on growth stage) or after grazing to ensure continued growth. Summer crops due to their ability to grow rapidly use large quantities of nitrogen and are therefore very responsive.

Recent work in Western Victoria reported yield increases of as much as 50% with a single application of 50 kg/ha nitrogen in brassica crops prior to the first grazing. The potential for an increased yield at a low cost makes sound economic sense given solid commodity prices and the possibility of reduced availability of good quality grain due to a wet harvest period. Increases in crude protein percentages of around 2% can also be expected through nitrogen application, thereby making summer crops comparable to good quality grain at around 14% CP.

When applying nitrogen to any grazed pastures or crops, care must be taken with subsequent grazing. Grazing too soon after nitrogen application, can result in stock ingesting a high level of nitrate, which can be toxic and cause death. To avoid this, do not apply nitrogen closer than 6 weeks from the expected grazing date in brassicas. In sorghum and millet crops 3 weeks is advisable.

Given that a wet summer is predicted applications of nitrogen after each grazing is possible. Providing there is sufficient soil moisture available (i.e. the soil is damp in the top 10 cm), applications between 35 to 50 kg N/ha are suggested.

Granular Urea applied in summer will be subject to volatilisation (lost as NO2 gas) if applied under hot and dry conditions. However, a summer crop with some canopy cover will reduce potential volatilisation loss. In C4 crops such as sorghum and millet top-dress when at 10-15cm high. As insurance against volatilisation, Agrotain coated Urea is recommended to give a wider window of opportunity to top-dress urea on crops.

Liquid urea ammonium nitrate (UAN) is also an option for application to summer crops but streaming nozzles should be used if applying at higher rates.

Depending on soil sulphur levels, summer crops (in particular brassicas) may require sulphur to be included in the blend and boron to achieve optimum responses.

Strategic nitrogen applications in summer crops have the potential to significantly boost yields at a relatively low cost and should be considered as the season progresses.

Ken Harris inspecting summer crop

POTASH DEFICIENCY PREVALENT

By Bill Feely

This spring has been an outstanding growing season, however big differences in grazing management, fodder conservation and soil fertility levels are contributing to big variations in pasture composition.

The exceptionally wet season has contributed to higher levels of sulphur and particularly potash leaching. Tell tale signs in paddocks are higher numbers of annuals, in particular sweet vernal grass and broad leaf weeds such as sorrel and dandelion that are classic potash deficiency indicators. The prevalence of larger clover leaves in dung patches compared with small leaves outside of dung patches are also a tell tale sign. Other indications of potash deficiency on Lucerne and clover leaves include necrotic spotting and pale mottled margins.

Generally these symptoms are indicative of paddocks continuously cut for hay and silage caused by inadequate applications of potash to replace nutrient removed at harvest, however this year signs are

Potassium deficiency symptoms on lucerne

becoming more prevalent in "normal" grazing paddocks.

Muriate of Potash, Sulphate of Potash and K-mag can be used to supply Potash in immediately available and slower release forms, which are more resistant to leaching. Whilst applications of Potash have been reduced over previous years due to higher prices, (MOP retailing over $1,000 per tonne), it has been to the detriment of most responsive pastures. Potash is currently trading at its lowest level for some time but the expectation is that it will begin to increase in price in line with Phosphorus and Nitrogen fertilisers.

Potash is invaluable with respect to plant health and plants having adequate Potash applications tend to hang on later in the season and exhibit greater tolerances to pests and disease.

COPPER DEFICIENCY IN LIVESTOCK

By Harry Armstrong

Our clients have reported a number of cases of copper deficient livestock this season. Common symptoms of deficiency are retardation of growth, failure to fatten, coarsening and depigmentation of hair (pale, harsh dry coats in cattle), steely wool in sheep, nervous disorder in lambs (swayback) and anaemia (low haemoglobin in blood). Copper deficiency can also impact on fertility in severe cases.

Wet years such as we have just come through seem to bring with them more cases of livestock showing some of the symptoms mentioned above. Lambs with weak, easily broken legs at marking time have been more prevalent this year. Some mobs are also showing a larger "tail" this year. Blood and liver biopsies have shown lower than adequate levels of copper in these lambs.

Copper deficiency in cereal crops grown on red gum soils in South West Victoria is well documented and crops grown in this region are routinely sown with copper fortified fertiliser at sowing and sometimes have copper applied as a foliar in crop. So it is not surprising that animals grazing pastures grown in this area are often suffering from low copper levels.

In flocks with the symptoms outlined above the direct losses associated with reduced weights are obvious, but potentially the real (and perhaps undetected) losses associated with sub clinical copper deficiency could be having a substantial impact in terms of kg/ha of lamb turned off. If all of your lambs produced were suffering with sub clinical copper deficiency and were only 2kg/head (dressed weight) lighter than they could have been, the loss per head is in the order of $10 at current market prices of around $5/kg. If you are turning off 8 lambs/ha this could equate to a loss of $80/ha.

Soils in this region are commonly acidic and it is common practice to apply lime to reduce both acidity and aluminium levels. The application of lime can give a temporary lift in molybdenum levels which in some cases can limit the availability of copper to grazing animals. This situation can be made worse if molybdenum has been applied in the same year as the lime. Molybdenum is an essential trace element for healthy clover growth and producers should regularly monitor paddocks (with tissue tests) and apply molybdenum when required to ensure a healthy and sustainable clover % in their pastures. Tissue tests will also provide information regarding the copper status of pastures. Ideally tissue testing for copper ought to be done in late winter or very early spring. If your livestock are showing symptoms of copper deficiency, you should seek advice from your veterinarian who will be able to offer guidance regarding blood sampling and the most effective method of supplementing your animals.

The traditional approach when it comes to applying copper to pastures has been to apply 1kg/ha of copper about every fifth year. This time frame also applies to molybdenum and they are often applied in the same year. Molybdenum is applied at 60grams/ha. An alternative would be to apply smaller amounts of these trace elements more often. Perhaps 200grams of copper/ha each year and 12gram/ha of molybdenum. Another approach is to apply the full amount to 1/5th of the property each year.

Selenium is also essential for livestock and can also be applied with fertiliser. Once again veterinary advice should be sought regarding diagnosing selenium deficiency in livestock.

With current livestock values (particularly sheep & lambs) it is timely to have another look at the trace element status of both our pastures and our livestock that depend on them.

REACTIVE PHOSPHATE ROCK

By Geoff Robertson

The use of any source of nutrient in our farming systems must be based on the economic value we are able to achieve. The cheapest isn't always the best and vice versa the most expensive product doesn't always guarantee success. Our soils are generally deficient in Phosphorus (P) and the application of P in combination with good grazing management is a key driver of farm profitability. P unlike Nitrogen (N) can't be synthesised by plants and hence needs to be applied regularly to maintain this productivity.

P is present in various forms, with the solubility of the respective forms the best indicator of performance. The P in Superphosphate is highly water soluble and is an excellent source of P that will work under a range of soil types and environments. Superphosphate is Phosphate rock treated with sulphuric acid to improve the solubility of the P. As the cost of water soluble fertiliser increases the use of Phosphate rock in particular Reactive Phosphate Rock (RPR) becomes an economic proposition.

Raw phosphate rocks vary greatly in their level of solubility and soil reactivity. Traditionally the agronomic quality of phosphorus fertilisers has been based on their Total P and 2% citric acid soluble P levels. This is the proportion of Phosphorous that is extracted using a solution of 2% citric acid, a simulation of the fertilisers reaction within the soil environment and hence availability to the plant. Superphosphate for example has a total P level of 8.8% and a citric acid solubility of 8.6%.

To be considered a "reactive" phosphate rock 30% or more of the P is solubilised by the citric acid extraction test, our current Reactive Phosphate Rock source has a total P of 13.1% and citric acid solubility of 37%. Further research indicates that a 2% Formic acid extraction test gives an improved assessment of the benefits of RPR, with our RPR testing at 54% soluble. Our RPR has the potential to perform as well as water soluble P sources but there are also other factors that must be considered when using RPR.

Factors effecting response to RPR:

Reactivity increases the finer the particle size, the interactions of soil conditions and the type of crop also play an important part in the usefulness of RPR.

Research carried out in Australia highlights that soil pH has the greatest

influence on the agronomic effectiveness of RPR. As the soil pH increases above pH (water) of 6 the agronomic value of RPR diminishes. Rainfall above 600mm also improved the response to top dressed RPR.

The greater the P fixing capacity of the soil, generally the more effective RPR is, however short season crops may require some form of water soluble P initially as there is a lag in availability compared with a long season or perennial crop.

Individual crop species vary in their response to the application of RPR. The root systems of Canola for example exude organics acids which aid the solubility of RPR Phosphorous.

Liming soils:

Most of our soils require the application of Lime to raise pH and to reduce the impact of Aluminium toxicity, as discussed responses to RPR are less effective on higher pH soils. Liming should therefore be carried out to achieve a soil pH (water) between 5.5 and 6, this range minimises the impact of Aluminium in the soil and allows for the benefits of RPR. Historically our soils have been limed at rates of 2.5 tonne per ha every 10 to 15 years. As farm production increases and hence product removal from farms increases, Liming may need to occur more regularly but at lower rates. This prevents soil pH falling back to far, maintaining that productive band between 5.5 and 6.

While P is a driver of plant production other elements such as potassium and sulphur may need to be included with the application of RPR to ensure good plant responses.

In summary Reactive Phosphate Rock provides an economic source of P. For optimum responses soil pH in water should be less than 6 and rainfall above 600mm. RPR can be top dressed on its own, where sulphur levels are adequate, or incorporated with Gypsum and or Superphosphate to provide plant available S and P. We have formulated several blends to suit our local soil conditions.

Organic Super supplies P via a RPR in conjunction with Gypsum as a source of plant available sulphur.

Pasture Extender is a combination of RPR and Superphosphate to supply slow release and water soluble P with plant available sulphur.

Both of these products provide economic alternatives to single super and can be further combined with potassium and trace element for effective plant responses.

SUMMER GRAZING MANAGEMENT

By Kate Shaw

Grazing management has the greatest impact when pastures are actively growing however setting up your pastures for the year ahead in summer is still important.

The assumption that because a pasture is inactive in summer then it is dead and no damage can be done is incorrect. Rather than dying, perennial pastures species become dormant over summer their roots and growing points are still alive. Annual species such as sub-clover do die but if given the opportunity will have produced seeds to continue their life cycle in the next season. As such if we consider a summer pasture as still living but in hibernation our approach to grazing management over this time needs to focus on setting a pasture up for the moment when it comes back to life with the autumn break.

There are three critical points to remember when grazing summer pastures:

- protect the growing points of perennial pastures
- maintain groundcover to reduce soil erosion
- reduce dry standing feed to maximise pasture nutritive quality and quantity following the break

Summer typically sees animal demands outweigh pasture availability and maintaining dry matter above target levels can be difficult. However due to an excellent spring the problem this season may be grazing paddocks down to their target levels before the autumn break. If this is the case, focussing on effectively grazing your better pastures is advisable.

Reducing dry plant residues to around 1000 kg DM/ha (1200 kg/ha for a phalaris dominant pasture) by the autumn break allows annual legumes to germinate without damaging the desirable perennial grasses or allowing too many weeds. It is expected that clover content in pastures may decline next year due to excessive dry pasture residues shading out and reducing sub-clover germination and growth. If this is a concern in a particular paddock consider grazing down to 800 kg DM/ha – but only in a ryegrass based pasture as clumping grasses such as phalaris cannot withstand such heavy grazing.

The La Nina event we are currently experiencing in our part of the world is predicted to persist at least until next autumn. We can therefore expect above average summer rainfall. This will affect pasture quality greatly. Even at the best of times summer pastures are of low nutritive value however rain on these dry pastures leaches out any existing nutrient. Therefore looks can be deceiving; there may look to be a swathe of feed in front of grazing stock but they are going backwards. It may be that the animal cannot consume enough of the poor quality pasture to meet its' needs or that the available pasture requires more energy to digest than it provides the animal. Either way a feedtest to determine pasture quality and supplementary feeding where necessary (especially growing stock in which controlled weight loss is not advisable) is recommended.

Perennial pasture plants such as phalaris and perennial ryegrass have dormancy mechanisms which will 'switch off' the plant but will leave it ready to 'switch on' again when conditions are right for growth i.e. with opening rains. False breaks can stimulate a plant to switch from dormant to active and grazing the resultant green pick can be detrimental to plant survival and growth potential after the autumn break. With sufficient moisture a perennial plant will begin to actively grow, to do this it will utilise root reserves of energy. To replace these reserves the plant needs to have a large enough leaf area which will act as a solar panel to capture light energy. Removing this leaf through grazing prevents these root reserves from being replenished which in turn reduces plant growth at the break. Furthermore should the summer dormant growing points be stimulated by a false break, grazing these new tillers can kill them and the plant.

Similarly grazing too hard can damage dormant growing points thereby compromising the persistence of perennial pastures. While set stocking may be appropriate over most of summer, continuous heavy grazing is not advisable. Spreading stock over a greater area or rotating mobs is best practice. Remember maintaining the dry sheath of plants to help protect the growing points is crucial.

Targeting pasture residues above 1000 kg/ha and a minimum of 70% groundcover provides adequate groundcover to reduce soil erosion from summer storms or at the break. On steeper paddocks aim for 100% groundcover to prevent erosion. These targets will also reduce the chance of the wind blowing your topsoil into Bass Strait. Erosion of topsoils by wind or runoff takes with it nutrients and organic carbon all of which are vital for the health of the soil and production.

With every 1 mm of topsoil eroded, approximately 13 t/ha of topsoil, 130 kg/ha of organic carbon, 20 kg/ha of nitrogen equivalent to 40 kg of urea and 8 kg/ha of phosphorous equivalent to 100 kg of superphosphate are lost. Phosphorous and some nitrogen can be replaced through fertiliser however organic carbon takes decades of appropriate management to build up in soils.

To sum up, a summer pasture still requires management. This season expect to see a lot of dry pasture residues and managing this will be the challenge. It may be impossible to get all pasture levels down to the target height however focussing on achieving this with the better pastures on your farm should be achievable.

Kate Shaw and Alex Baulch inspecting phalaris-subclover pasture

WHAT AM I GOING TO DO WITH THAT STUBBLE? By James Stewart

As we get ready for harvest which is looking great in most places I've visited, I am going to look at a topic that a lot of clients ask my opinion on.

Stubble!!

There are several options when tackling stubble. These include burning, physically removing (cutting, baling), or retaining it in the paddock. Weather it be standing or incorporated.

Lets start with burning.....

The main advantages of burning is it's a cheap option, while at the same time being quick and most of the time easy. It's a great option for long term cropping paddocks that have become dirty with weeds. Not being able to do in crop sprays on wet paddocks the last couple of years has meant weeds such as ryegrass and radish have become heavily populated in certain paddocks.

It improves insect control. I don't have to remind certain clients the problems they had with slugs at the start of this year.

And finally it improves disease control. Diseases that are carried over in retained stubble, as mentioned in my previous newsletter articles. Diseases such as scald, net blotch-net form and spot form and powdery mildew are all diseases related to barley. Wheat diseases carried through retained stubble are septoria and yellow leaf spot.

After hearing all that, your'e probably thinking why aren't we burning every year?? As with all agricultural practices we have advantages and disadvantages.

The main disadvantage out of several is the loss of nutrients.

Unburnt soils contain nearly double the amounts of carbon and nitrogen and much more phosphorus than burnt soils. Unburnt soils have double the microbial biomass, and CO2 respiration is 3 times higher in unburnt soils.

What is the value of cereal straw?

The grain/straw ratio of cereals varies with factors such as variety, seasonal conditions and soil fertility. This ratio is usually within the range of 1:1.5-2.

That is, a 4 tonne crop of wheat produces 6-8 tonne of straw per hectare.

So the way the season is panning out with mild temperatures and some spring rain, 5t/ha should be achievable (if you didn't get too wet) which will produce 7.5t/ha stubble per ha.

AMOUNT OF NUTRIENTS IN STUBBLE (KG/HA)

Working on an average of all these nutrients, 62% of these amounts are lost during a hot burn.

Nutrients	Amount	Nutrients	Amount
N	56	Ca	9.7
P	5.9	Cu	0.015
K	109	Zn	0.23
S	7.2	Mn	0.26

Ref: Australian Farm Journal (December 2003).

So the amount of fertiliser needed to replace lost major nutrients (kg/ha)

Nutrients	Units
N	21.3 = 46 kg/ha Urea
P	2.3 = 26 kg/ha SSP
K	41.4 = 83 kg/ha MOP
S	2.7 = 17 kg/ha Gypsum
Ca	3.7 = 23 kg/ha Gypsum

Does not include trace elements Copper, Zinc, Manganese.

In hot fires, some surviving phosphorus and potassium which is not included above can be lost off-site in wind blown ash. You can also expect to lose 80% of the carbon from the stubble. So a 7.5t/ha stubble gives you around 3450kg/ha of carbon. Minus 80% meaning 2760 kg/ha of carbon is lost in a hot burn.

So now you've got to this point of the article, you're wondering with the removal of all those nutrients and with higher fertiliser prices maybe I should look at retaining stubbles. Let's look at the pros and cons of standing (retained) stubble to stubble incorporation.

Standing retained stubble...

Standing stubbles are great at protecting soils from losses due to wind and water erosion.

Standing stubbles normally work best with low stubble loads (2-3t/ha) in this case a small amount of stubble remains at the start of the following season to cause problems such as nitrogen tie-up, increased pest pressure (eg slugs, mice) or difficulties with ground preparation. Standing surface retention of stubble usually works better in dryland cropping systems in low rainfall areas meaning not all that suited for our area.

As stubble loads increase pest pressure also increases (eg slugs, snails & mice). Direct drilling into wheat stubble can reduce growth and yield of canola by 25%.

Reasons for this can be:

- Nitrogen is tied-up by microbes as they decompose the stubble and is not available for plants.
- Shading of seedlings by the standing stubble.

- Toxic by-products of decomposition affect seedlings.

To reduce some of these issues use wider row spacings, narrow points and press wheels, as a lot of you have already implemented.

Stubble Incorporation...

Every year more and more farmers are purchasing incorporating machines and there are a number of different manufactures making them.

Stubble incorporating means another implement that needs to be purchased on top of sowing/seeding gear. Otherwise contractors that have purchased incorporating machines should be available, meaning another pass of the paddock, meaning another cost.

Cultivation does cause a slight degradation of soil structure compared to soils with surface retained stubble, but soil structure is often better than in traditionally tilled soils where stubbles have been burnt. Cultivation can lead to an increase in the decomposing rate of organic matter.

In situations, where high surface stubble loads can cause problems such as affecting crop emergence or increased pest pressure, stubble incorporation may be a viable option.

There are some factors to consider.

Ploughing stubble in can mean there is less nitrogen available for the crop as micro-organisms use it to break down the crop residues. However, this hasn't been found to effect yields at crop maturity. Applying nitrogen to systems with incorporated stubble doesn't affect the organic carbon levels but does increase microbial activity which may inturn speed up the process of the stubble breaking down. Extra urea may be required to offset reduced nitrogen uptake efficiency, where there are low levels of soil nitrogen.

Other advantages of retained stubbles are:

- Increased moisture retention. Not that we needed it this year!!
- With increased organic matter which has been mentioned worm activity will increase.
- And of course the recycling of valuable nutrients retained in stubbles.

The several stubble management options that have been mentioned each have positives and negatives relating to them. They need to be studied in relation to your particular cropping system to determine the best approach. The issues you need to consider include:

- How convenient/efficient is the system.
- How the soil is affected.
- How it affects yield and plant establishment.
- How much does it cost?
- What environmental impact does it have?
- Does it make other problems worse (weeds, slugs)?

Good Luck and happy harvesting!!

Incoporating stubble

FORAGE RYE CORN FOR EARLY FEED

By Bill Feely

The recent run of irregular autumns and unreliable performance of perennial pastures has created a demand for fodder options that can produce bulk feed in late autumn and winter. Also the need to use supplemented fodder such as grain, silage and hay during late autumn breaks is a costly exercise. Therefore the opportunity to grow "catch crops", opportunistic crops to meet feed shortages, is imperative. Forage rye corn is one such crop that can be grown to meet this need.

Ideally sowing from mid to late March rye corn provides quick autumn feed within 45 days and if managed properly will provide feed well into winter before bolting, ie going to head.

It can be used as a tool to clean up troublesome weeds such as onion grass and then be sown back down or enables the paddock to be double cropped.

Establishment

As with all sowings a good starter fertiliser is vital particularly nitrogen and phosphorus. As the paddock will be ultimately sown down, a soil test to check the soil pH and aluminium levels should be carried out to check the requirement for Lime and any capital nutrient requirements. Optimum plant growth does not come from "rundown soils". Depending on any other potential limitations as identified by a soil test, a DAP/MAP type fertiliser at a minimum of 100 kg/ha is required. If the season growing conditions are favourable then the opportunity to use nitrogen post grazing is also a possibility to optimise feed production.

Grazing management

As Rye Corn grows a lot of feed, there has been a temptation to let it get well advanced before grazing. By doing this the risk of wastage through stemmy, unpalatable plants and trampling is most likely, so to avoid this commence grazing at around 20 cm and take it down to no lower than 6 cm as this will help tillering and will produce quicker regrowth.

Spring crop

The advantage of sowing Rye corn in addition to achieving extra grazing in late autumn and winter, is that the paddock can then be sprayed out and prepared for a second crop.

Depending on the weed population either a spring sown permanent pasture, lucerne or summer crop can be established. Alternatively Rye corn can be sown in mixtures with other grasses later in the autumn such as Italian ryegrass extending the growing season. As the Rye corn diminishes the Italian rye grass keeps growing making the stand suitable for silage on top of winter grazing.

UPS AND DOWNS OF SOIL TESTING

Dr Malcolm McCaskill
Soil and Water Scientist
Department of Primary Industries Hamilton

It is well accepted that sown pastures respond to additional phosphorus fertilizer up to a soil test Olsen P of 15 mg/kg. But if a paddock has a soil test result above 15, does that mean the year's fertiliser application can be skipped?

Regular soil testing has been undertaken at the Hamilton Long-term Phosphate Experiment since it started in 1979. Data since 1989 shows that there has been a gradual increase in Olsen P for plots receiving 15 kg P/ha or more each year (see graph). There is also considerable fluctuation around the trend-line, especially at the higher P application rates. This graph highlights the need to treat individual test values with caution until there is a time trend.

Soil testing may appear to be a precise science, but those in the industry know that it is only a guide. A single value Olsen P value over 15 mg/kg may either be a sign that the paddock has non-limiting P fertility, or simply that there is variation around a longer-term trend.

It's important to look at other signs, such as the appearance of clover during spring. If clover density is low, leaves are small, and growth is lacking in vigour, these are signs the pasture may be lacking in P.

Also check previous fertiliser records. A sudden high soil test value following only maintenance fertiliser levels should be viewed with caution. On the EverGraze project site at Hamilton, a maintenance P rate of 18 kg P/ha has been required to simply maintain the Olsen P for high-producing meat-sheep.

If no fertiliser P is applied to a pasture with an Olsen P of 15 mg/kg, we can expect the Olsen P to drop by about 2 mg/kg each year. This value is based on the Long-term Phosphate Experiment when fertiliser was withheld for a period of three years.

The decline in Olsen P is due to available P being exported from the farm in the bones and flesh of the livestock (about 4 kg P/ha/yr), transferred to camp areas (about 1 kg P/ha/yr), and fixed in less-available forms within the soil.

Why is there so much variation in soil test results?

1. If the soil is not moist enough at sampling, then the soil sampling tool may not be inserted to the required depth, resulting in soil cores that are not the full 10 cm length. Shorter samples will be richer in P, because P from surface application is concentrated in surface layers.
2. If soil samples are processed by different laboratories, this may introduce additional variation. All soil samples from the Long-term Phosphate Experiment were submitted to the same laboratory, which has high internal standards.
3. If a different transect within the paddock is sampled, this may change the results. On the Long-term Phosphate Experiment, the paddocks are long and narrow and have a sampling transect down the middle.
4. If samples are allowed to "incubate" in warm moist conditions, microbes will convert organic phosphorus into Olsen-extractable P. This incubation may occur on the farm, in the fertiliser distributor's office, or en route to the laboratory. We normally dry the samples at 40oC immediately after collection to arrest the incubation process before dispatch to a laboratory.
5. The same microbial processes occur in the natural soil, with microbes releasing available P and plants taking it up. A mismatch between these processes leads to short term fluctuations in Olsen P.

Despite taking all these precautions, our results have variation, and it has taken several years before we have the confidence to change application fertiliser rates.

As fertility of the experimental site has built up, it has required less P input to maintain the optimum Olsen P. For example in 1997, it required an annual P application rate of 23 kg P/ha to achieve the optimal Olsen P level of 15 kg/mg. However, in 2010 an application of only 15 kg P/ha achieved this Olsen P level due to the residual effects of previous fertiliser applications.

The gradual rise in Olsen P on the Long-term Phosphate Experiment makes it difficult to interpret the relationship between fertiliser rate and animal output. To facilitate data interpretation, we have decided to lower our top three fertilizer rates, so that the Olsen P values match those of the period with the most intensive data collection, which was between 1988 and 1997. In this way, subsequent measurements can be more easily related to the period with the most complete production data.

There are likely to be other pastures in southern Victoria with a good history of phosphorus application where soil tests may reveal that Olsen P fertility could be maintained with slightly lower rates of P. In these paddocks, there is also the option of temporarily lowering P rates during times of high fertiliser prices with minimal effect on productivity.

However, on paddocks that have a poorer history of P application (less than about 15 kg P/ha/yr), any temporary lowering of P rates would quickly become evident in a lower carrying capacity, less clover, and lower weight gains in lambs. Here there is no "P bank" to fall back on.

The Long-term Phosphate Experiment is maintained by the Victorian Department of Primary Industries through the project 'Understanding Soil and Farming Systems'. Results from earlier years of the experiment are available by searching "long term phosphate" on the DPI website www.dpi.vic.gov.au

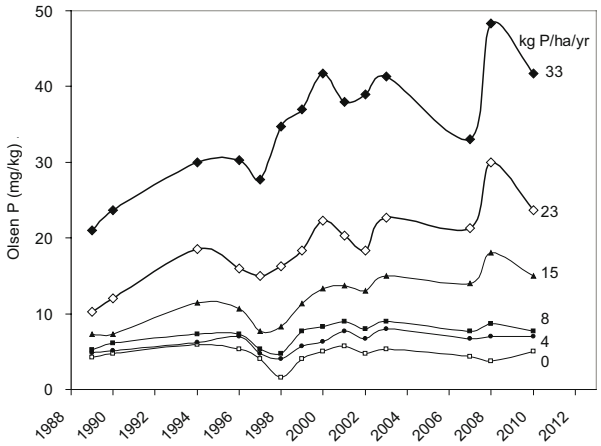


Figure. Olsen P values for the Long-term Phosphate Experiment at Hamilton, for P application rates of 0 to 33 kg/ha/year as superphosphate. Values are the mean of 3 plots with the same P application rate.

"4kg/ha of P vs 20kg/ha of P, pcik the difference"

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SEASONAL REMINDERS

- ☐ Save on early delivery of fertiliser
- ☐ Nitrogen for responsive summer crops
- ☐ Falling Potassium levels need to be addressed

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