

PRODUCTIVE PASTURES



This guide has been developed to help graziers lift the productivity of their enterprise through pasture improvement.

The aim of pasture improvement is to reach a high level of production with an optimum grass to clover ratio of between 70:30 and 60:40.

The amount and quality of pastures grown, and the correct utilisation of pastures, has an enormous impact on the productivity and profitability of grazing enterprises.

To put it simply, graziers can gain more by growing more quality pasture and grazing more green leaf efficiently.



Soil fertility

A healthy soil is needed to grow productive legume/grass pastures.

The best way to ensure paddocks are fertile and free from nutrient deficiencies is to soil test.

Soil testing is used to predict nutrient requirements, giving a clearer picture of how much fertiliser is (or may not be) required to meet production goals and the type of fertiliser to use.

This results in improved pasture growth rates, farmer returns, soil health and value for money spent on fertilisers.

It can also be used to monitor management and fertiliser practices or diagnose problems.

Fertiliser management programs based on soil tests can detail nutrient status for major and minor nutrients, trends over time, soil amendments or fertiliser products needed, rates and application systems.

Soil test results can also be valuable records for ongoing management.

Range of soil tests available

The following soil properties and nutrients can be measured using soil tests:

Colour and texture

pH (w)

pH (CaCl₂)

Electrical conductivity (EC)

Organic carbon (OC%)

Nitrate nitrogen

Ammonium nitrogen

Total nitrogen

Phosphorus (Colwell, Bray or Olsen)

Phosphorus Buffering Capacity (PBC)

Sulphate (MCP)

Sulphate (KCl)

Potassium (K)

Calcium (Ca)

Magnesium (Mg)

Sodium (Na)

Chloride (Cl)

Aluminium (Al)

Copper (Cu)

Zinc (Zn)

Manganese (Mn)

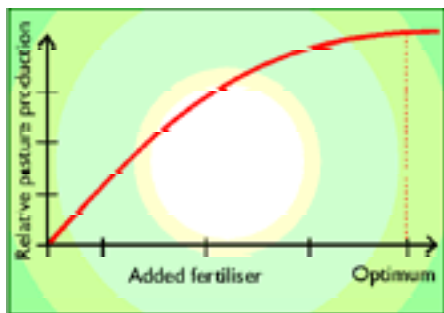
Iron (Fe)

Boron (B)

Carb/Bicarb

Building and maintaining soil fertility

Optimum soil fertility



Pasture productivity improves with improvements in soil fertility until it is at an optimum level. Maintenance applications are then required to sustain soil fertility at this level.

As well as addressing any nutrient deficiencies, graziers need to apply phosphorus and sulphur fertilisers every year to sustain high levels of production in beef, lamb and wool systems.

High performing, improved pasture species require good soil nutrition. Nutrients are removed from the system over time, with for example, the sale of stock and wool.

Figure 1 is a guide for estimating nutrient removal and redistribution from the farm.

In established pastures, phosphorus and sulphur fertilisers such as Pasture Special, Superfos or SuPerfect supply the soluble phosphorus needed to kick start perennial grasses and start the sub-clover/white clover growth cycle.

Don't forget potassium

It is also important to maintain soil potassium levels, particularly in hay and forage production systems.

When pastures or crops are cut for hay or forage, all the nutrients in the plant material are removed.

Nutrient removal from a hay cut is greater than when grain crops are harvested.

Grain growers are only removing the nutrients in grain and leaving the nutrients in straw in the paddock.

Most of the potassium in plants is stored in the leaves and stems. This is why so much potassium is removed after a hay cut.

Incitec Pivot offers a range of pasture blends with potassium (see page 4).

Nutrient removal (kg/ha)

Product (1 t/ha)	N	P	K	S	Ca	Mg
Mixed pasture/hay	25	2.5	17	2.5	9	4
Lucerne hay	34.5	2.7	19.6	3.2	9.1	4.6
Meat (lamb/beef)	21	8	1.8	1.5	14	1.5
Greasy wool	17	0.26	15.8	28.5	1.2	0.3
Cereal grain	16.5	3	3.9	1.5	0.5	1

Figure 1: NSW Tablelands pasture. For example, 10 t/ha of hay removes 25 kg/ha of phosphorus and sulphur, which can be replaced with 197 kg/ha of Pasture Special. A large amount of potassium is also removed which can be replaced with muriate of potash. NOTE: Most of the nitrogen in healthy pastures is provided from legumes.



These two paddocks were part of a trial at Bookham, NSW, which compared wool production from an unfertilised paddock (left) with one given 125 kg/ha of superphosphate annually. Applying fertiliser allowed stocking rates to be doubled. See page 14 for the full results.

Widely used pasture fertilisers

Product	Features	Phosphorus (%)	Sulphur (%)	Other nutrients (%)
Superphosphate	Superphosphate is a proven fertiliser which supplies a balance of phosphorus, sulphur and calcium to pastures. It provides excellent distribution of nutrients to encourage uniform and healthy plant growth.	Total 8.8	Sulphate 11 Total 11	Calcium 20 (0.025 or 0.05% molybdenum added on request.)
Superfos	Superfos is a high phosphorus pasture fertiliser, great for lifting soil phosphorus levels fast and fuelling the growth of high performance pastures.	Total 15.7	Sulphate 5.8 Total 5.8	
Pasture Special	This high analysis compound pasture fertiliser contains elemental and sulphate sulphur. An economical product when high rates of phosphorus and sulphur are required in equal amounts. Contains a high level of sulphate sulphur.	Total 12.6	Sulphate 7.2 Elemental 5.5 Total 12.7	(Molybdenum added on request.)
SF 45	This high sulphur product contains both elemental sulphur for slow release and plant available sulphate sulphur. Useful in high phosphorus soils and often used in rotation with other products to give a large sulphur supply every few years.	Total 5.6	Sulphate 7 Elemental 35 Total 42	Calcium 12.7 (Molybdenum added on request.)
Super Potash blends	Several superphosphate and muriate of potash blends are available at varying ratios. Used where potassium levels in soil are low, for example, in country with a history of cropping, hay or silage production.	From 4.4 to 6.7	Sulphate sulphur from 5.5 to 8.2	Calcium from 10 to 15 Potassium (muriate of potash) from 12.5 to 25 (Molybdenum added on request.)
Granulock 12	A compound fertiliser containing nitrogen, phosphorus and sulphur, particularly useful in sowing pastures where a high rate of phosphorus is needed.	Total 18	Sulphate 7 Total 7	Nitrogen 8 (Molybdenum added on request.)
Granulock 15	A compound fertiliser with balanced nitrogen, phosphorus and sulphur content for sowing.	Total 12	Sulphate 10.5 Total 10.5	Nitrogen 14.3 (Molybdenum added on request)
Urea	A nitrogen fertiliser used for topdressing where rain or irrigation closely follow application.			Nitrogen 46
Aftergraze	A pasture or fodder crop topdressing fertiliser containing nitrogen, phosphorus, sulphur and potassium. With the benefits of fast acting nitrate nitrogen and a balance of other nutrients, Aftergraze is useful for applying after grazing or cutting to give a fast response in growth of both grass and clover and higher production levels.	Total 3.3	Sulphate 1.8 Total 1.8	Ammonium nitrogen 12 Nitrate nitrogen 10.2 Total nitrogen 22.2 Potassium (muriate of potash) 7.5
Easy N	A liquid nitrogen fertiliser for application through fertigation, directed soil sprays, soil banding, soil injection and foliar sprays.			Ammonium nitrogen (w/v) 10.5 Nitrate nitrogen (w/v) 10.5 Urea (w/v) 21.5 Total nitrogen (w/v) 42.5
Easy Cal	A liquid calcium nitrate fertiliser for application through fertigation, directed soil sprays, soil banding, soil injection and foliar sprays.			Nitrate nitrogen (w/v) 12.6 Calcium nitrate (w/v) 18.1

For the full range of pasture fertilisers available from Incitec Pivot, see your local Agent or Dealer.

Topdressing pasture fertilisers



Phosphorus

Phosphorus is involved in cell division at the growing points and helps pasture plants develop strong root systems.

Most phosphorus is taken up early in the life of plants, so the best growth response to phosphorus fertiliser is obtained when it is applied early (before the main growing period for perennial pastures).

Clover and grass seedlings can then start using the applied phosphorus as soon as the seed germinates after the first autumn/spring rains.

Applying pasture fertilisers after the opening rains and after the clover has germinated will mean a reduced growing response.

If the soil phosphorus status has been built up to a satisfactory level so that only maintenance applications are required, it does not matter greatly when pasture fertilisers are applied.

Graziers may choose to apply in spring when trucks, spreaders and aircraft are more readily available.

Phosphorus Buffering Capacity

A new soil characterisation tool is now available to measure the propensity for a soil to hold phosphorus until plants need it. This is known as Phosphorus Buffering Capacity (PBC).

PBC tests help calculate the phosphorus inputs required for maintaining and raising soil phosphorus.

This helps farmers and advisers target phosphorus fertiliser recommendations accurately to specific soil types.

Agent and Dealer agronomists can guide graziers through the test and provide fertiliser recommendations in conjunction with traditional soil testing.

Sulphur

Plants take up sulphur for plant tissue growth and to aid photosynthesis.

The form of sulphur in pasture fertilisers will affect how it is used by pastures.

When soil sulphur levels are low and

a quick plant response is required, products containing a large proportion of sulphate sulphur should be used.

Sulphate sulphur in fertilisers is immediately available for plant uptake, while elemental sulphur first needs to be oxidised to the sulphate form by soil bacteria.

This microbial process occurs faster under warm and moist conditions.

When soil sulphur levels are close to optimum, products containing a greater proportion of elemental sulphur can be used.

Many of Incitec Pivot's high analysis pasture fertilisers contain elemental and sulphate sulphur.



Strategic nitrogen applications

Given that the clover content of most pastures is lower than ideal (35%) and fixes less than 100 kg/ha of nitrogen annually, there is often scope to supplement with fertiliser.

When nitrogen fertilisers are applied, they are incorporated into the nitrogen cycle.

Grazing animals are an integral part of the nitrogen cycle in legume pastures. Nitrogen from clover, obtained by biological nitrogen fixation, is transferred to grass by urine return, dung or decomposition of old leaf litter and roots. It then becomes available for grass growth over the next one to five years.

Nitrogen fertilisers can be used strategically to boost feed availability at critical times of the year when there is insufficient soil nitrogen from legumes.

The addition of nitrogen fertiliser will provide a significant boost in pasture production.

It can be useful in early to mid autumn, when much of the nitrogen produced by the pasture over late spring and summer has been utilised.

Many graziers use nitrogen to boost pasture growth and create a feed wedge coming into winter.

Pastures take up most of their nitrogen as nitrate.

Most nitrogen fertilisers need to be converted in the soil to nitrate before being taken up by plants.

The speed of this conversion is predominantly governed by soil moisture and temperature.

Amberger & Vilsmeier (1984) showed that under cool conditions, conversion from ammonium to nitrate slows up.

Soil Temp (°C)	50% of ammonium converted after
5	6 weeks
8	4 weeks
10	2 weeks
20	1 week

Where a quick response is required under cool conditions, consider using a fertiliser containing some nitrate nitrogen, such as Aftergraze.

Fertilisers containing some nitrate nitrogen can also be used to reduce the risk of volatilisation losses that can occur when rain does not follow the application to carry the fertiliser into the soil.



Ensuring mic

Pasture production may be limited if micro-nutrients or trace elements such as molybdenum, zinc and copper are deficient in the soil.

Micro-nutrient deficiencies can also affect animal health.

Molybdenum is particularly important to legume growth. Pastures grown on acidic soils in higher rainfall areas tend to need more Mo.

Applying low rates of molybdenum with pasture fertiliser every three to four years should overcome any deficiency.

It is important not to apply too much molybdenum, as high levels in the soil can induce copper deficiency in stock.

Copper levels in stock should be monitored with blood tests, particularly in intensive enterprises.

Granulock Copper, with 2% copper in every granule, can be applied if needed.

Zinc deficiencies often occur on lighter textured soils, particularly if alkaline.

Again, a Granulock fertiliser with zinc in every granule is available to remedy the deficiency.

Selenium deficiency is widespread in Australian soils, leading to:

- white muscle disease in lambs and calves
- reduced growth rates
- chronic diarrhoea in calves
- lowered milk production in cattle
- mastitis in cattle
- reproductive failure, including retained after-birth in cattle
- greater susceptibility to disease
- ill-thrift in young sheep
- lowered fertility in ewes
- reduced wool growth in sheep
- hoof problems in cattle.

Even at subclinical deficiency levels, selenium deficiency can cause

Micro-nutrients aren't limiting growth

significant productivity losses such as lower lambing percentages, loss of embryos, an increase in the retention of placentas in cows, poor conception rates and general inability to thrive due to increased disease pressure.

Problems are more common in years when there is good pasture and clover growth.

It can be easily detected through regular blood tests and remedied using Selcote Ultra with pasture fertiliser.

Selcote Ultra is a selenium granule that provides a continuous natural source of selenium for up to two years, eliminating the need for drenches or injections.

It can be used when topdressing pastures or sowing forage crops including brassicas, lucerne or grazing cereals.

It contains fast and slow release forms of selenium. Selcote Ultra releases plant available selenates, which are taken up by plants and converted to selenomethione, which is readily absorbed in cows through the rumen.

This natural form is absorbed up to five times more readily than inorganic forms such as bullets and drenches.

Selcote Ultra offers cost effective protection against selenium deficiency.

Keeping cadmium levels low

Cadmium, ingested in pasture, can concentrate in the kidneys and livers of grazing animals, affecting the marketability and use of offal meats from aged animals for human consumption.

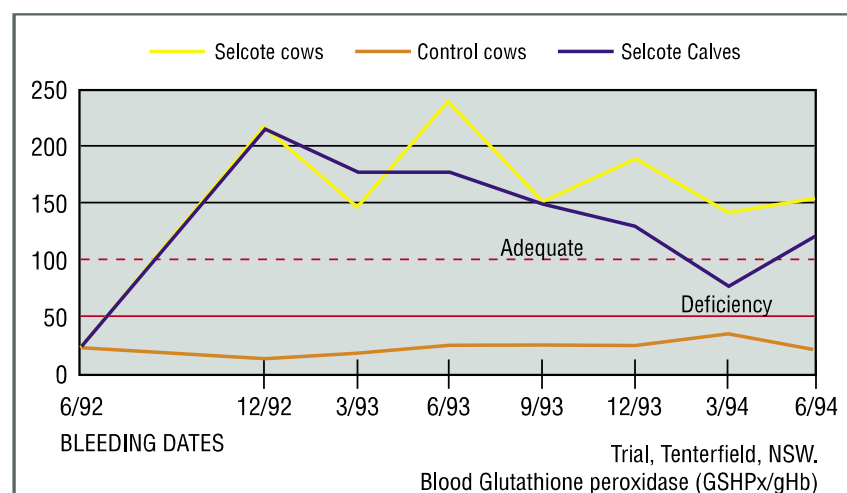
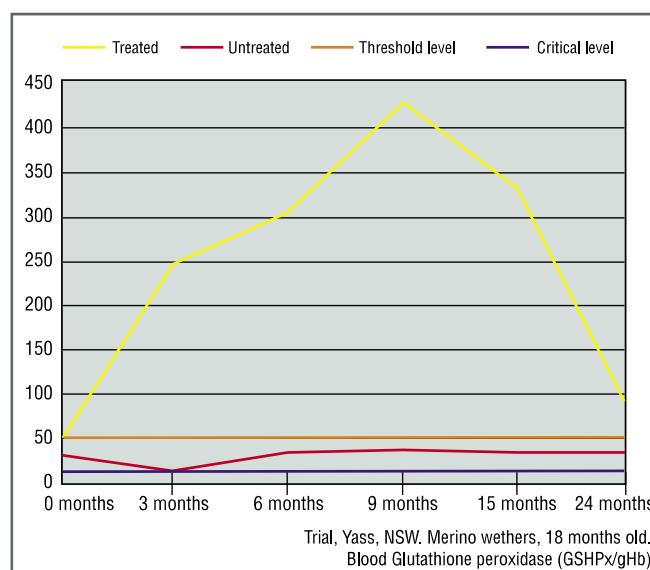
Cadmium levels in meat, milk and other animal products rarely exceed accepted limits.

Cadmium is present as an impurity in rock phosphate and therefore in superphosphate.

Its use over many years can gradually increase soil cadmium levels and plant uptake. Low Cad Super is available, with less than 100 mg Cd/kgP.



Selcote Ultra keeps stock selenium levels up



Establishing improved pastures

The best times to sow new pastures are autumn or early spring so that the new plants receive adequate warmth and moisture.

Nutrient management is particularly important when establishing new pastures.

New pastures need a boost of nitrogen, phosphorus and sulphate sulphur for early growth and strong establishment. Granulock 12 and Granulock 15 contain these nutrients in every granule, making them ideal for most pasture sowing situations.

Banding Granulock at sowing can increase dry matter production by more than three times compared with sowing without fertiliser.

Granulock fertilisers are also a better option than MAP and DAP, which may not provide enough sulphur for establishing pastures.

SSP	How applied?	DM kg/ha produced
0		1029.4
250 kg/ha	Broadcast	2598.6
250 kg/ha	Banded	4042.1
500 kg/ha	Broadcast	4130.1
500 kg/ha	Banded	5234.8

The effect of banding seed and fertiliser together compared with broadcasting on pasture production. (Source: AFL Fertilizer Handbook 1981)

Pasture establishment tips

- Start building soil fertility 12 - 18 months before sowing.
- Sow pastures in autumn or early spring so that the new plants receive adequate warmth and moisture for quick germination and survival.
- Direct drill, sowing into ploughed ground and oversowing are reliable and effective sowing techniques. However, less plant available sulphur is released during sowing by direct drill and oversowing, making Granulock particularly valuable when using these methods.
- Sow seed to knuckle depth (you should be able to see about a third of the seed after sowing).
- Choose a premium starter such as Granulock.
- Band Granulock to the side of or below the seed row where it is easily accessed by new roots.
- Control weeds and pests before and after sowing.
- Only begin grazing the pasture when plants are well-anchored, usually at 100 mm (use a pull test).
- Keep grazing light at first to promote tillering.

Seed placement

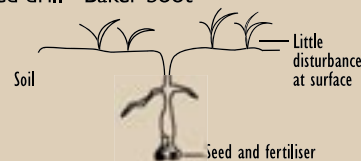
Combine



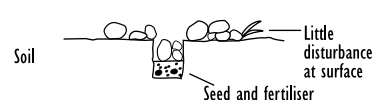
Tined drill



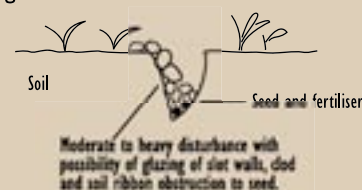
Tined drill - Baker boot



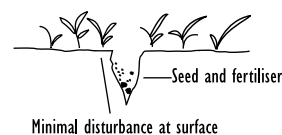
Slot seeder



Single disc drill



Triple disc drill



Tined drills are ideal when sowing new pastures.



Soil pH and nutrient availability

Soil acidification is a natural process occurring as part of soil fertility development.

Soils are formed when algae and lichens colonise rock surfaces and release acids to break them down.

This process continues as more highly developed plants replace them. Meanwhile, leaching removes basic cations like calcium and magnesium, which further contributes to natural acidification.

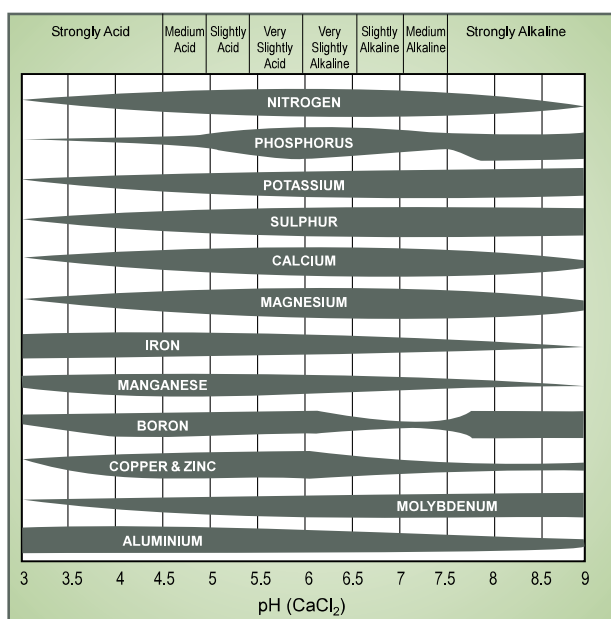
Any intensive agricultural practice which leads to the production of more plant residues causes acidification.

In pastures, gradual acidification takes place when organic matter in the soil breaks down, nitrogen is fixed by legumes, leaching occurs or neutralising elements are removed from the farm.

Acidity and nitrogen cycling

Soils can become more acid as nitrate nitrogen in the soil is leached down the soil profile, taking cations like calcium with it.

Influence of pH on nutrient availability



Adequate amounts of the nutrient must be present in the soil for it to become available at the right pH.

The fixation of atmospheric nitrogen by legumes also causes gradual acidification, as the area surrounding the roots becomes more acid in the process.

The acidifying effect of legumes tends to be reduced when grown in a pasture rather than by themselves.

In a balanced pasture, the grasses will take up nitrogen produced by the legumes and reduce nitrate leaching, minimising the acidification process.

Finally, the removal of key neutralising elements such as calcium, magnesium and potassium from the farm in produce such as wool, livestock or lucerne hay can increase soil acidity over time.

Soil pH has a major influence on the availability of nutrients required for plant growth.

A major influence on a plant's ability to grow in acid soils is its tolerance of aluminium and manganese.

Lucerne, white clover and annual medics cannot tolerate high levels.

Improving pH improves the life and effectiveness of rhizobia which is

essential for healthy pasture growth. Rhizobia will not thrive at low pH levels and using lime pellets at sowing will only increase pH in the short term.

Products which will correct acidity include:

- Calcium carbonate
- Dolomitic limestone
- Agricultural lime
- Burnt lime
- Hydrated lime.

Improving nitrogen and water use efficiency, and growing acid-tolerant species can also improve productivity.



How much lime is required to neutralise the acidification caused by the removal of produce? See the table below.

Produce removed	Lime requirement
	Kg/t of produce
Milk	4
Wheat	9
Wool*	14
Meat*	17
Lupins	20
Grass hay	25
Clover hay	40
Maize silage	40
Lucerne hay	70

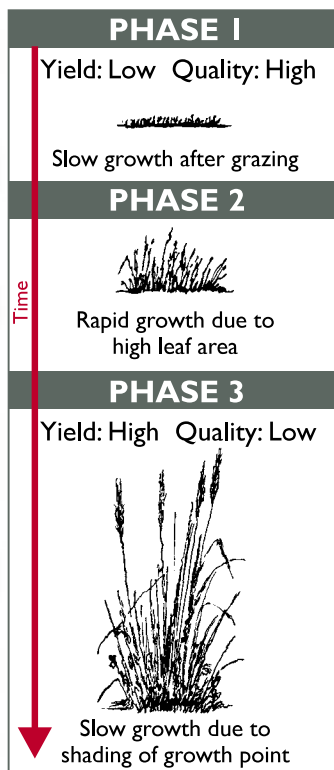
* Further acidification occurs with set stocking of sheep due to the uneven deposition of animal excreta in stock camps. An estimated 25 kg lime/ha is needed to neutralise the acidification of the remainder of the paddock.

Utilising pastures efficiently



To improve pasture utilisation, it is essential to understand the interaction between the soil, plants and animals in the system.

It involves understanding how pastures grow, what makes them perform and managing the pasture to achieve high growth rates.



The aim is to balance maximum pasture growth with maximum animal production rates.

Not only does efficient grazing allow graziers to maximise productivity from stock, but it helps to improve the pasture in the long term. A well-grazed pasture will be more productive, persistent and offer stock a higher quality of feed.

Feed quality is even more important than quantity when it comes to maximising productivity from stock. It is the main driver of animal performance per head or per hectare.

Pasture quality is reflected by its digestibility - the higher the digestibility, the higher the quality.

Digestibility is defined by the proportion of ingested feed retained in the animal. For example, a cow might eat 10 kg of dry matter feed that is 60% digestible. This means that 6 kg of dry matter is used by the cow for maintenance and growth and 4 kg is lost and returned to the pasture as faeces.

The digestibility of pasture is directly influenced by stage of growth, i.e. young, actively growing pastures are more digestible.

A pasture with high digestibility will have a higher proportion of metabolisable energy and protein.

Consider animals with the same weight and genotype and the same rate of pasture intake. As feed quality (metabolisable energy and protein content per kilogram of drymatter) increases:

- energy intake increases,
- liveweight gain rates increase, and
- feed quantity requirements decrease.

Most graziers use a mix of perennial grasses and legumes in their pastures. A ratio of between 60 and 70% grass with 30 to 40% legumes is ideal in most situations.

Maximum production from perennial

grasses is obtained from intermittent grazing, whereas continuous grazing favours high production and seed set from sub-clovers.

Grazing management

The diagram below breaks pasture growth into three distinct phases.

Best practice grazing management aims to keep pastures in phase two.

The best rates of growth are achieved when the pasture is between 5 and 10 cm high, with between 1400 and 1600 kg DM/ha.

The lower end of phase two is seen when pastures are down to 2.5 cm high with 800 kg DM/ha.

If pastures continue to be grazed beyond this level, regrowth will be slow because of an insufficient leaf area for photosynthesis.

Leaving pastures to grow for too long is also detrimental.

As a general rule, pasture growth rates and quality are reduced when pastures grow beyond 15 cm tall and 3000 kg DM/ha.

Despite the quantity of feed, the sward is likely to have less leaf, fewer tillers and more dead leaves, reducing feed quality and the potential for regrowth.



Good grazing management requires good paddock records.

To compare various paddocks and their productivity, it is important to know their carrying capacity per year on a DSE basis.

Agents and Dealers can help with a paddock potential planner for recording pasture before and after grazing, the date stock are moved in or out of each paddock, their numbers, DSE rating and condition score.

It is also useful to record information like rainfall, effective paddock area, fertiliser history, pasture species present, soil test results, spraying history and the cost of specific operations such as sowing or liming.

Fodder conservation

Autumn pasture growth is variable and depends on the time of the break. In winter, pasture growth is restricted due to cool temperatures and sometimes waterlogging. Summer growth is generally restricted by limited rainfall.

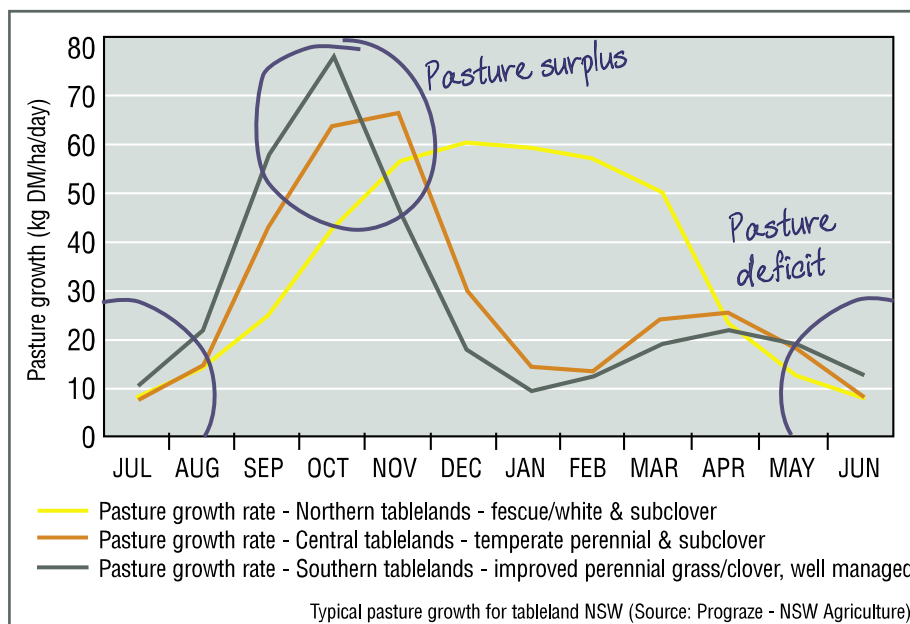
Spring growth, however, accounts for over half the annual dry matter produced on many farms.

As a result, stocking rates in spring are often too low to fully utilise the feed produced.

Even at high stocking rates, spring growth is difficult to manage.



Spring pasture growth



Spring growth can account for over half of annual dry matter production.

The conservation of hay or silage can improve pasture utilisation, while avoiding problems associated with rank pastures in the coming months.

- The peak rate of pasture dry matter production that occurs in spring is generally reproductive rather than vegetative growth.

- An early silage cut prompts the regrowth of the predominantly vegetative plant material with a higher feed value.
- Conserved forage will provide feed for stock in less productive months and extended dry periods when pasture growth cannot meet stock requirements.

DSE ratings

Mature ewes			
Liveweight (kg)	Dry	Pregnant	Lactating
40	0.9	1.1	2.1
50	1.0	1.3	2.5
60	1.2	1.4	2.9
Growing lambs			
Liveweight (kg)	Growing at 50g/day	Growing at 100 g/day	Growing at 150 g/day
20	0.6	0.8	1.0
30	0.9	1.1	1.3
40	1	1.3	1.5
Breeding cattle			
Liveweight (kg)	Dry	Pregnant	Lactating
350	6.0	7.0	12.3
400	6.5	7.7	13.7
450	6.9	8.2	14.8
500	7.1	8.4	15.2
550	7.7	9.0	16.5
600	8.4	9.7	17.3
Growing cattle			
Liveweight (kg)	Growing at 0.5 kg/day	Growing at 1 kg/day	Growing at 1.5 kg/day
200	5.3	6.8	8.3
250	6.4	8.1	9.7
300	7.3	9.2	11.1
350	8.4	10.6	12.9
400	9.1	11.4	13.7

Note: Merino wethers are rated at 1 DSE.

Better environmental management

It makes sense to avoid spreading fertilisers where ground cover is insufficient and when there is a high likelihood that a heavy rainstorm could wash it away.

The Department of Land and Water Conservation has shown that 70% ground cover is needed if large soil losses are to be prevented during heavy rain. At less than 70% ground cover, bare ground patches start to interconnect and runoff is unimpeded.

This is why, where possible, graziers should avoid phosphorus fertiliser application within four days of a storm that is likely to cause runoff. Also avoid application on waterlogged soils.

Grow more pasture for every mm of water!

Scarce water resources are making graziers more conscious of the need to maximise feed grown per unit of water available, whether irrigated or rain fed.

Good grazing management is also important for maximising water use efficiency. Maximum water use efficiency occurs when the pasture is between 1500 and 2500 kg/green/ha.

To optimise water use efficiency, the right nutrients need to be present in sufficient levels in a plant available form.

Water use efficiency can also be improved by selecting pasture species with deep root systems, a long growing season and a large leaf area.

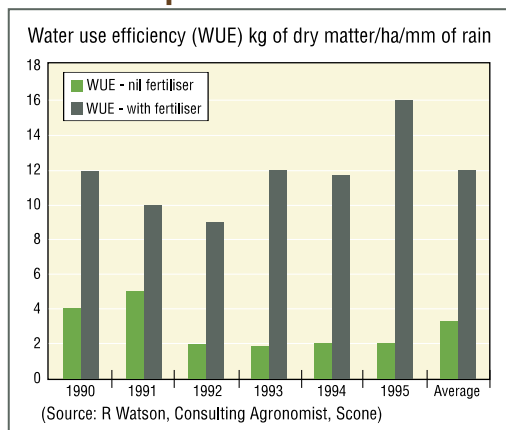
Feeding microbial populations

Some farmers worry that inorganic fertiliser applications are harming the soil's microbial population.

However, there is much research to show that the opposite is true.

Improved pastures that regularly receive

Fertiliser improves WUE



Soil fertility is an important part of water use efficiency.

superphosphate contribute a higher nutrient content, providing a better quality feed source for colonising microbes.

Improved pastures have more soil bugs, and this in turn results in a faster return of nutrients to plants.



Fertilised pastures improve soil health

Characteristic	Non-fertilised	Fertilised	% change
Organic carbon (%)	1.8	3.6	100
Water infiltration rate (mm per minute)	1.3	10.5	707
Soil plant cover (%) (July 1996)	60	100	66
Water use efficiency (kg dry matter/ha/mm rainfall)	2.03	11.13	448
Basal respiration (mg CO ₂ /hr/100g DM soil)	0.222	1.146	416
mg Microbial (C/100g DM soil)	95.03	175.19	84
Average annual dry matter production (kg/ha winter/spring)	567	3111	448
Nitrate nitrogen (mg/kg)	5	15	200
Phosphorus (Colwell - mg/kg)	30	40	33
pH (CaCl ₂)	5.9	5.7	-3

(Source: Fertiliser trial, Toorawandi, Ulamambi, NSW from 'Light soils - managing them better', R. Freebairn et al, NSW Agriculture)

Converting grass into profit

The ultimate aim of any grazing enterprise is to make money by converting grass into profit.

However, many graziers don't link investments in pastures and fertilisers with profit at the other end of the system.

Gross margin (income from your enterprise less the direct costs of that enterprise) is one of the most important tools for graziers who want to measure the gains they are making in their business.

Calculating returns through a gross margin process is a good tool for measuring your gains in the paddock, but it is not the whole story on farm profit.

There are two other factors that impact on the overall profitability of the farm that cannot be ignored. These are the level of farm overheads and the turnover or scale of the business. See figure 1.

By pulling all these components together, graziers can develop a clear business plan that identifies the production targets and price targets they need to achieve to meet their personal goals.

This process is one of the areas covered in Incitec Pivot's Grow More, Graze More, Gain More workshops.

For most graziers though, improving carrying capacity will improve profits.

A productive pasture base, with a good percentage of legumes, is essential for improving carrying capacity in all grazing enterprises.

The phalaris/white clover mix in the example below illustrates the significant production increases that can be achieved with legumes over a phalaris dominant pasture.

The presence of white clover in the sward had a substantial effect on stocking rate, production and gross returns.



The farm business

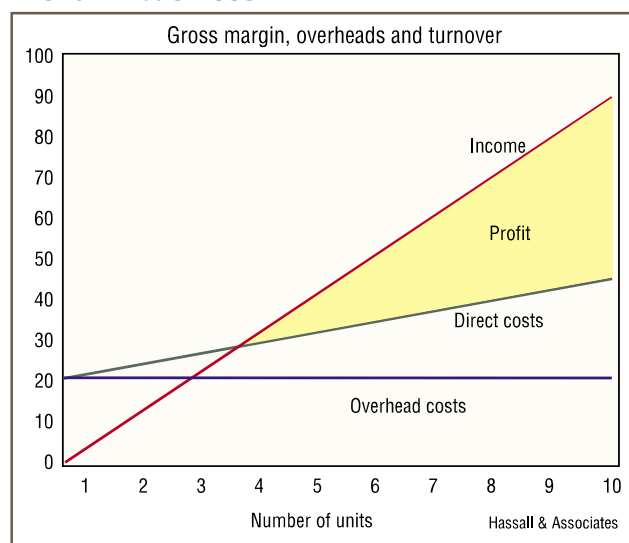
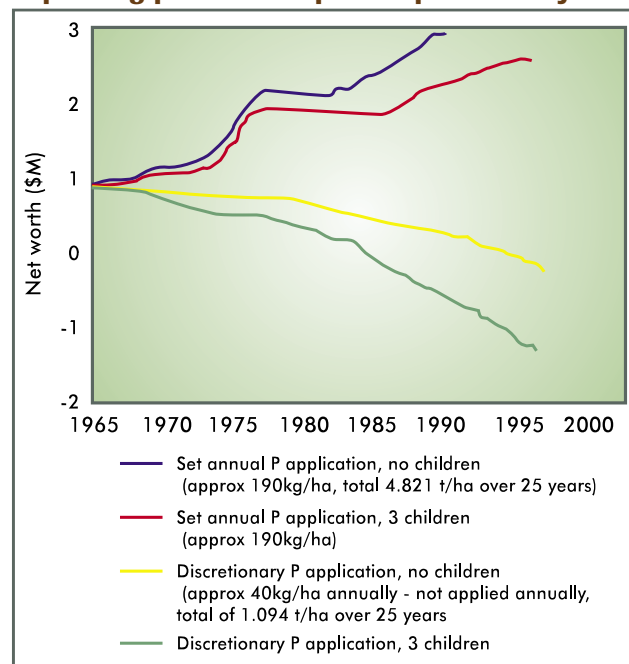


Figure 1. Gross margins, overheads and turnover can all affect profit.

Improving pastures improves profitability



The value of an additional tonne/ha of superphosphate, spread over 25 years, was approximately \$1 million, as measured by gains in final wealth. (J.M Scott & O. Cacho, 2000)

The importance of clover in pastures

	Degraded	Phalaris	Phalaris/White clover
Stocking rate (DSE/ha)	9.9	14	14.8
Liveweight gain (kg/ha/yr)	54.5	140	222
Wool production (kg/ha/yr)	29.7	47.6	68.1
Gross return (\$/ha/yr)	233	425	630
Mineral nitrogen (gN/g soil)	13.5	13	29

The presence of white clover in the sward had a substantial effect on stocking rate, production and gross returns. Source: Jim Scott, UNE, Armidale, NSW.

Gain more from more productive pastures

The following four examples illustrate the value of increasing pasture productivity to increase stocking rate and profitability in specific enterprises.

The first, a fine wool operation at Kia Ora near Bookham in New South Wales, compared an unfertilised paddock with one given 125 kg/ha of single superphosphate annually over five years. See Figure 1.

The fertiliser applications corrected both phosphorus and sulphur deficiencies at the site and allowed the stocking rate to be doubled.



Wool cut per head and fibre diameter were essentially unchanged, but wool cut per hectare, and consequently profit, doubled.

This was because the improved production allowed fixed costs per hectare to be offset against a larger income per hectare.

The second example shows the effect of a pasture response to superphosphate on prime lamb, wool and beef production.

The results of this trial, held at Tumbarumba in southern New South Wales, clearly show that production gains can be achieved from improved pastures.

The third example is from a grazing trial conducted at the Grafton Agricultural Research and Advisory Station. See Figure 3.

It looked at the effect of superphosphate applications at two rates on finishing cattle. Hereford steers were stocked at 2.5 steers/ha on white clover/carpet grass.

Liveweight gains were almost always higher where superphosphate was applied, and improved with the increase in rate applied.

The fourth example is from a grazing demonstration on a beef property on the South Coast of New South Wales in the mid 1980s. See figure 4.

It showed that improving pasture species and soil fertility can significantly improve

liveweight gains, carrying capacity and returns for the business.

In this trial, the native paddock only finished cattle during the late spring / summer period.

Young cattle tended to carry over in store condition and did not finish before 2 to 2.5 years.

The improved pasture with legumes finished cattle from mid spring to late autumn with a much quicker turnaround.

Keeping the gains coming

Maintaining soil fertility may seem like a lot of expense for little gain, but consider the alternative.

Without annual applications of fertilisers, soil fertility, pasture growth and productivity can quickly decline.

Consider the trial by NSW Agriculture that showed pasture production declining by almost three quarters after three years of no fertiliser on low phosphorus and sulphur country.

Once phosphorus levels decline, clover percentage decreases and nitrogen fixation decreases.

This leads to a lower quality pasture, making it difficult to finish animals.

Stocking rates decline and better grass species, such as fescue, ryegrass and phalaris will decline in vigour, become over grazed and die out.

High performing, improved pasture species require good soil nutrition.

The difference superphosphate can make to a wool enterprise

	Stocking rate (wethers/ha)	Clean wool (kg/ha)	Clean wool (kg/head)	Fibre diameter (micron)	Staple length (mm)	Staple strength (N/Ktex)	Profit* (\$/ha)	Production (\$/kg clean)
No superphosphate	6.3	20.7	3.29	19.5	90	35	35.09	6.53
Superphosphate	11.8	39.9	3.38	19.7	90	34	72.25	6.02

Figure 1. * Profit is calculated as net farm income using the wool price current after November shearing (approximate average fleece price, unfertilised pasture = 914 c/kg clean; fertilised pasture 870 c/kg), variable costs of production, and an allowance of \$90/ha (based on local data) for the fixed costs of production.

Source: NSW Agriculture

Pastures

Pasture response to superphosphate

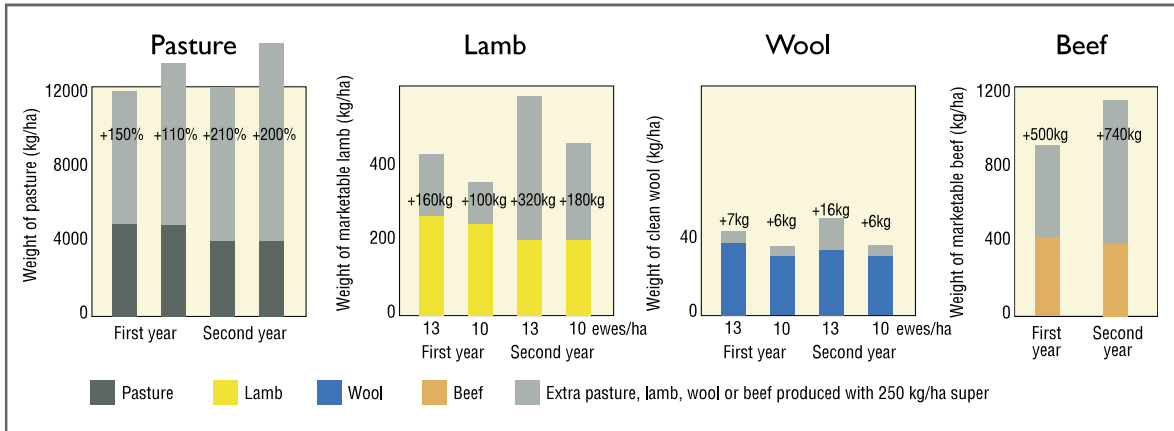


Figure 2: Southern NSW

Effect of superphosphate

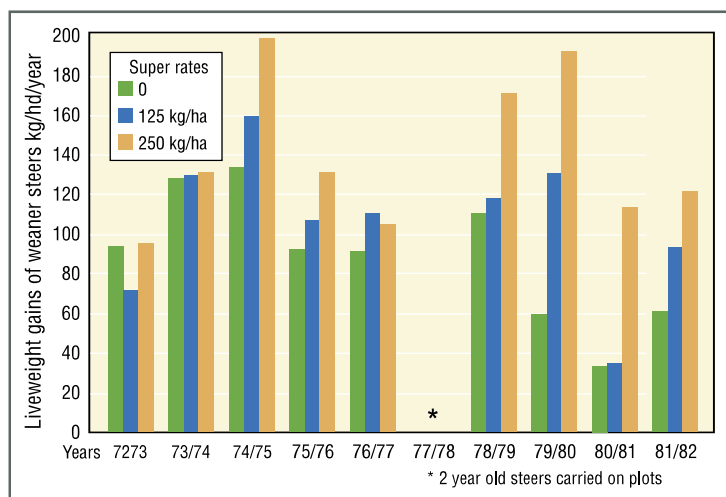


Figure 3: Northern Tablelands NSW

Beef grazing demonstration

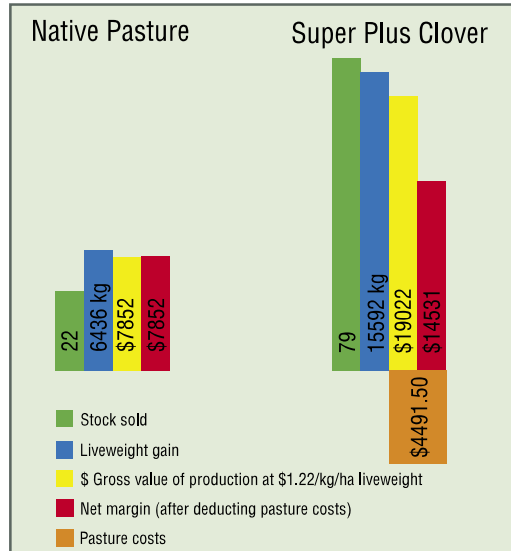
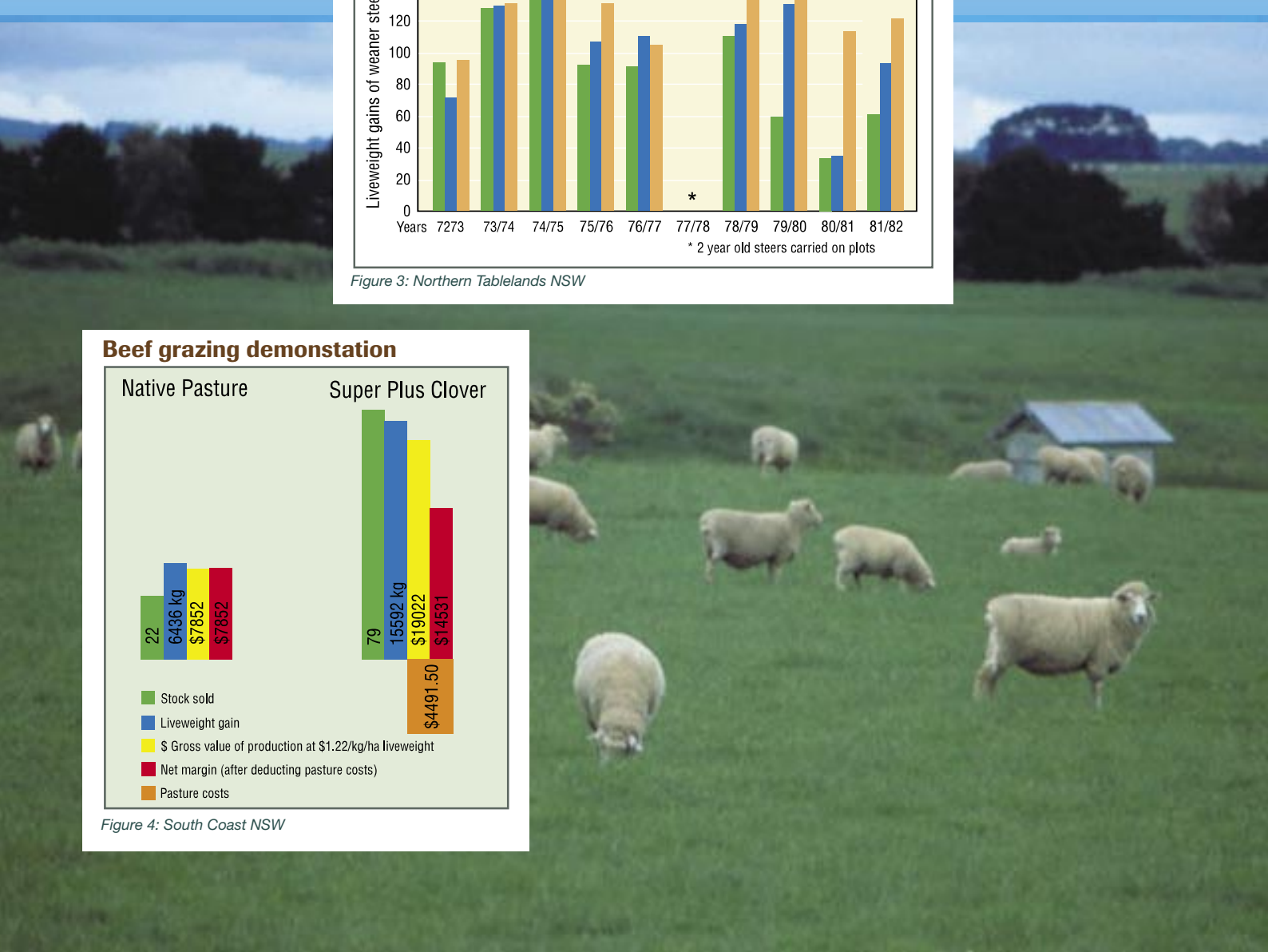


Figure 4: South Coast NSW



Profitable pastures

The Grow More, Graze More, Gain More workshops are a great opportunity for producers to develop better pasture management and business skills.

Pastures are the powerhouse behind grazing based businesses, so the workshops are aimed at developing a better understanding of how pasture can be converted into profit.

They provide an opportunity to develop a greater understanding of the key profit drivers in a grazing business.

It is easy to say that good pastures drive profit in a grazing business, but the real questions are: How do you get good pastures? How do you keep them? How do you ensure they are improving your bottom line? How can you measure the performance of pastures?

The workshops focus on these issues.

For more information on how to get involved in a Grow More, Graze More, Gain More workshop, please contact your local Incitec Pivot Agent or Dealer.

Getting help

To pull all these ideas together and develop a specific pasture plan, we recommend graziers work closely with their Incitec Pivot Agent or Dealer.

Their agronomists are pasture specialists - please take the opportunity to utilise their skills and expertise.



Productive Pastures was produced by Incitec Pivot. Your comments and feedback are welcome.

Contact:

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