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NEWSLETTER
VOLUME 23: NUMBER 2, 2008

I have heard from the Tamworth committee and been told that preparations for the Tamworth Conference on July 21, 22, 23, are proceeding well. We can look forward to a stimulating conference on "Pastures at the cutting edge". The four sessions are:- 1)Making pastures pay – the profit drivers; 2) Taking control of soil health; 3) Pastures on the horizon; 4) Balancing pastures, livestock and climate.

We have said farewell to our secretary – Dianne Smith. We are particularly grateful to Dianne for the excellent service she has provided over the last few years. She has been particularly helpful to me as editor ensuring that the contributions to the Newsletter arrive at the printers in appropriate form. We welcome aboard as the new secretary Janelle Witschi whose family has had an association with agriculture on the Central Tablelands over many years.

We have reached the time-of-year when many of our members are hoping to welcome the autumn break. Some members in the South of the state are still suffering very dry conditions but reports from North and the Centre have been encouraging. We are still uncertain whether the dry seasons we have just endured are symptomatic of climate change.

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All of our members will be very concerned about the recent very high price rise of fertilisers. I have not seen a credible explanation for the price increases. Adding to producer's cost has been the rise in the price of the herbicide glyphosate. So, despite good prices for all pasture-based products producers are still doing it tough.

Peter Simpson once stated that "rising salt is arguably the single most important environmental problem faced by our producers." Salinity is now being very actively researched by The Future Farms Industry CRC. They publish their activities and supporting producers in the magazine "Salt." In their latest issue there were two interesting articles – one on "Perennials for overcoming salinity" and one on "Pasture cropping at Gulgong NSW." "Salt" is available from:- Future Farm Industries CRC., The University of W.A.MO81, 35 Stirling Highway, Crawley, WA 6009.

The Federal and State governments have brokered a deal of over 10 billion dollars for a national plan to salvage the Murray-Darling and open the way for the States to seek early access to Federal funds for water saving projects. We hope that this deal will be of benefit to our members.

I suggest our members read the latest (April) issue of "Agriculture Today" There are interesting articles on pastures on pages 8, 9, 10 and 11 which are particularly relevant to our members. In particular, the discussion on whether or not too apply superphosphate despite the recent price hike are very interesting.

Haydn Lloyd Davies
Editor

2008 Grasslands Society of NSW Annual Conference "Pastures at the cutting edge", Tamworth 21-23 July

This year's Annual Conference will be held at the Tamworth Regional Entertainment Centre, Tamworth on 21-23 July 2008.

Conference convenor Loretta Serafin, NSW Department of Primary Industries District Agronomist, Tamworth commented "Planning is well under way with an impressive array of key-note speakers, contributed poster-papers, farm visits and industry sponsors already in place."

"This year we decided to employ the assistance of local farmers to provide suggestions on the key challenging and relevant themes' to be covered in the conference. This proved to be extremely worthwhile to the organising committee which consists of a mix of growers, agribusiness and seed company representatives, grazing industry and NSW DPI staff."

The theme for this year's conference is '***Pastures at the Cutting Edge'***. Presentations by scientific experts, industry consultants and local producers will focus on the latest pasture technology for profitable grazing in an era of challenging market conditions, climate variability, and environmental awareness.

The 4 sub-themes to be addressed during the conference are:
1. *'Making pastures pay – the profit drivers'*. Speakers will discuss contemporary and future influences, opportunities and practices that make producers more profitable and better able to manage variability.
2. *'Taking control of soil health'* which targets the use of biochar, soil organic matter, soil microbes and nutrient cycling and their roles in sequestering carbon, increasing yield and improving the efficiency of fertiliser use. First hand experience of rehabilitating degraded country by a local producer will be a highlight.
3. '*Pastures on the horizon'* will explore future directions with conventional and molecular breeding for locally adapted varieties, the latest research into tropical grass agronomy and incorporating these into optimising animal nutrition. Producer experience with integrating temperate and tropical species for improved animal production will effectively pull the pieces of this puzzle together.
4. *'Balancing pastures, livestock and climate'* will focus on managing the feed year with producer talks on management strategies. Specialists will also reveal what pastures can do for climate change, defining the feed-year and management for improved grazing production.

Trade displays by our sponsors will be a major feature of the conference and will showcase their latest products and information during the entire conference. Company representatives will be on hand for discussion.

Conference registration will commence Monday afternoon on 21 July and be followed by tours of the Tamworth Agricultural Institute, the Annual General Meeting and a BBQ. The conference will open on Tuesday 22 July with bus tours to 3 local areas and be followed by an afternoon of conference sessions. The conference dinner will be held that evening at the West Leagues Club with Murray Hartin, bush poet as our special guest. Wednesday 23 will continue with conference sessions to conclude with lunch.

For further details on the conference, including registration details or to enquire about contributing poster-papers contact Loretta Serafin, NSW DPI, Tamworth on (02) 6763 1100 or Email: loretta.serafin@dpi.nsw.gov.au

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The Grassland Society gratefully acknowledges the following corporate sponsor for 2007/2008

THE LAND
Your Rural Weekly

Selecting the best variety of perennial grass for your local environment and paddock microclimate to enhance persistence

Belinda Hackney, Brian Dear and Richard Hayes, NSW Department of Primary Industries and EH Graham Centre for Agricultural Innovation, Wagga Wagga NSW 2650. Email: belinda.hackney@dpi.nsw.gov.au

Part 2

Experiment results

A description of the sites rainfall, soil and average seasonal temperatures are shown in Table 1. All sites were sown in autumn and assessments of herbage production made seasonally with plant persistence measured on an annual basis following the autumn break. Following each herbage production assessment, plots were either crash grazed by sheep if available, or mowed off.

Table 1. Characteristics of experimental sites used in the evaluation of perennial grass species

		Barmedman	Holbrook	Berridale	Burraga
Average annual rainfall (mm)		480	680	480	750
% annual rainfall in summer		41	18	32	27
Elevation		280	280	860	850
Soil pH $_{(CaCl2)}$	0-10 cm	4.8	4.7	4.8	5.0
	10-20 cm	5.0	4.2	4.8	4.2
Exchangeable aluminium %	0-10 cm	0	3	0	2
	10-20 cm	0	21	0	25
Average daily temperature range	Summer	16-31	13-28	9-24	9-26
	Autumn	6-23	7-20	5-17	4-19
	Winter	3-14	2-11	-1-9	-1-11
	Spring	8-23	6-19	4-18	3-19

Site 1 Barmedman

Site characteristics – low rainfall, long periods of moisture stress, low altitude, high summer temperatures

While the long-term rainfall figures (Table 1) indicate a high percentage of rainfall falls in the summer months and therefore it would be expected that intermediate dormancy and summer active varieties would be well suited to the area, this proved not to be the case. In fact Kasbah, a highly summer dormant cocksfoot was the most persistent perennial grass in this evaluation maintaining the highest plant density of all varieties sown (Figure 3). Currie, which has intermediate dormancy and a summer active experimental line both failed to persist in this environment in sufficient quantity to form a useful pasture. Atlas PG, a highly summer dormant variety of phalaris was more persistent than Sirolan, a variety with low summer dormancy. While Resolute Max P (a semi-summer dormant tall fescue) was slightly more persistent than AU Triumph (a summer active tall fescue), neither proved persistent enough for this environment.

While on average a large percentage of rainfall falls in summer at this site, it is largely a result of summer storms which can vary greatly from year to year in the amount of rainfall received. Plants for areas where summer rainfall can be highly variable need to cope with the worst as well as the best seasons, particularly where high temperatures are also encountered that reduce the effectiveness of any summer rainfall received by increasing evaporation rates. Even in summers where a large quantity of rainfall is received, the effectiveness of rainfall in sustaining plant survival will depend on whether the rain falls in one or two substantial events or a number of less significant events. Where rainfall in the summer months occurs sporadically, intermediate dormancy varieties will be continually switching growth on and off. Each time this occurs the carbohydrate reserve of the plant is reduced and if it happens frequently enough the plant will die. Similarly a summer active variety which attempts to continue to grow regardless of weather conditions will under long periods of moisture stress run out of plant reserves and die. So while it may appear that summer active or intermediate dormancy varieties would be better suited to the Barmedman site, the lack of reliability of summer rainfall events, coupled with high temperatures that reduce the effectiveness of rainfall received, reduce their suitability to such climates.

Something which should be noted is that in the first two years of the experiment, annual rainfall was well below average (280 mm and 300 mm respectively). While this is unseasonally low, when pasture establishment costs are high, pasture species need to be able to cope with all climatic conditions encountered. Additionally as it is expected that rainfall will become less reliable in the future, choice of hardy plants which can survive under such extreme conditions becomes more important.

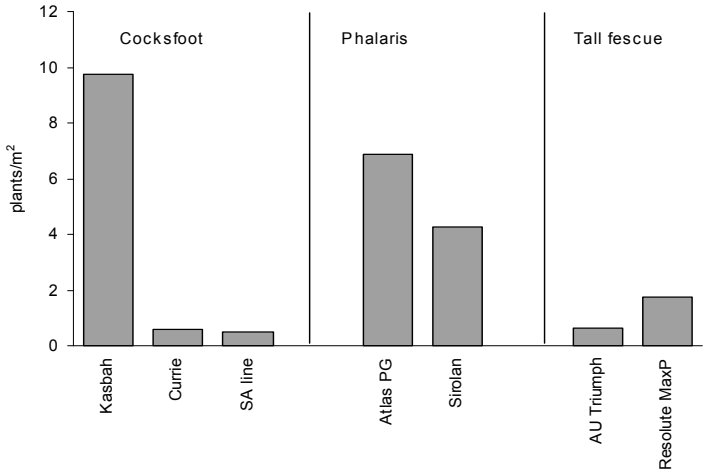

Figure 3. Density (plants/m^2) of several cocksfoot, phalaris and tall fescue varieties three years after sowing at Barmedman NSW. (Note the SA line was an experimental line of summer active cocksfoot)

Site 2 Holbrook

Site characteristics – medium to high rainfall, moderate periods of moisture stress, low elevation, hot summers

At Holbrook where average annual rainfall was higher than Barmedman, but moderate to long periods of summer moisture stress can still occur as evidenced by the low percentage of annual rainfall received in the summer months (18%), the highly summer dormant Kasbah was still the most persistent cocksfoot variety sown (Figure 4). Uplands cocksfoot an intermediate dormancy variety had similar persistence to Currie while Porto, a more summer active variety did not persist. Australian phalaris, a variety with low summer dormancy, was as persistent as Atlas PG. Resolute Max P, a semi summer dormant variety of tall fescue was more persistent than the summer active AU Triumph.

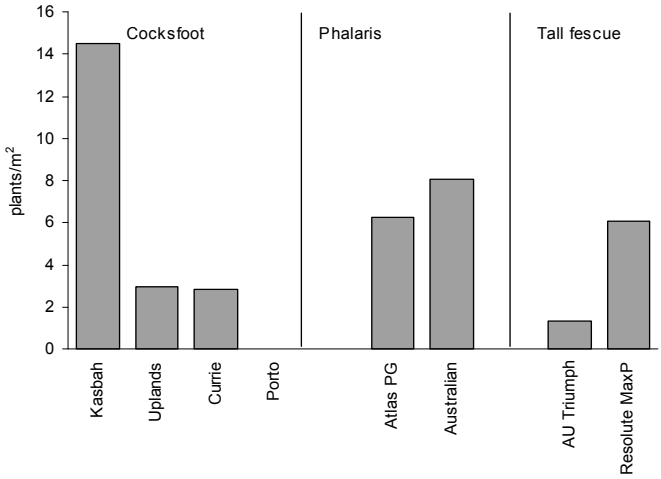

Figure 4. Density (plants/m^2) of several cocksfoot, phalaris and tall fescue varieties three years after sowing at Holbrook NSW.

Site 3 Berridale

Site characteristics – low rainfall, moderate to long periods of moisture stress, high elevation, cool summers.

At Berridale, cocksfoot varieties with intermediate dormancy (Uplands and Currie) have proved to be the most persistent cocksfoots (Figure 5). The intermediate dormancy mechanism enables them to take advantage of significant summer storm events that may pass through the region. Lower summer temperatures also favour the survival of these intermediate dormancy types. Australian phalaris, a low summer dormancy variety, has also proved to be more persistent in this environment than the highly summer dormant variety Atlas PG. There was little difference in the performance of the summer and winter active tall fescue varieties, both of which were inferior to the best cocksfoot and phalaris varieties.

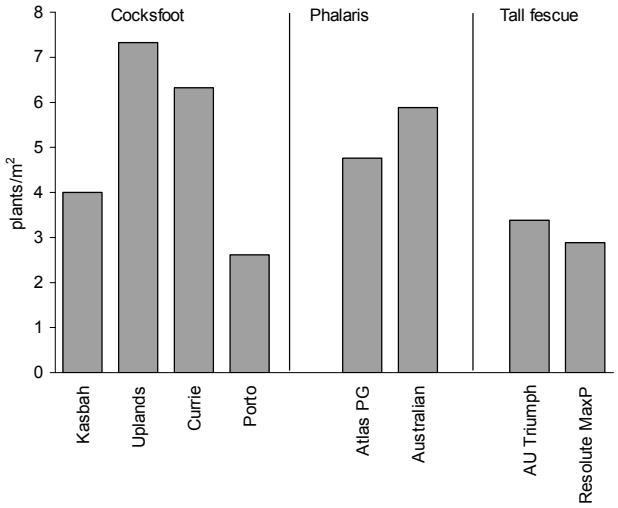

Figure 5. Density (plants/m^2) of several cocksfoot, phalaris and tall fescue varieties three years after sowing at Berridale NSW.

Site 4 Burraga

Site characteristics – high rainfall, moderate periods moisture stress, high elevation, cool summers

At Burraga on the central Tablelands of NSW, experiments were sown on east and west aspects to determine whether aspect/microclimate had an impact on perennial grass persistence. It should be noted that soil chemical conditions (pH, available phosphorus, exchangeable aluminium) were identical on both the east and west aspect. Average temperatures of the sites are show in Table 1, however both air and soil temperatures were consistently higher on the westerly aspect compared to the eastern aspect resulting in lower soil moisture levels on the westerly aspect and this has had a considerable impact on persistence. With the exception of Kasbah cocksfoot, persistence of all varieties of perennial grasses was higher on the eastern than on the western aspect (Figure 6). Kasbah and Uplands cocksfoot (a summer dormant and intermediate type respectively) were more persistent on the hotter and drier western aspect than the more summer active variety, Porto. Holdfast phalaris was the most persistent phalaris on both aspects but was inferior to the best cocksfoots. Both the summer active tall fescue, AU Triumph, the winter active tall fescue Resolute MaxP proved to be very persistent on the eastern aspect, but performed poorly on the western aspect.

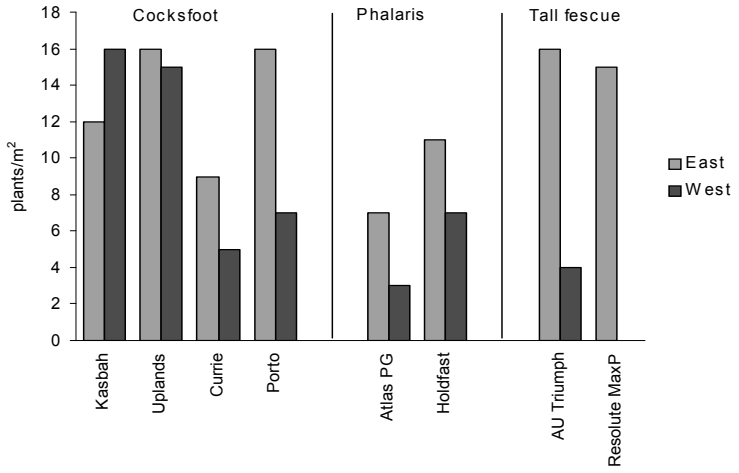

Figure 6. Density (plants/m^2) of several cocksfoot, phalaris and tall fescue varieties 2.5 years after sowing on an east and west aspect at Burraga NSW.

Conclusions

The results of these studies show that consideration of summer dormancy levels when selecting varieties of perennial grasses to sow can be a useful tool to improve persistence. Some general themes which emerged as a result of this research were;

1. Where both high summer temperatures and long periods of moisture stress are encountered varieties of cocksfoot and phalaris with very high levels of summer dormancy (that is those from the obligate dormant category) need to be chosen to ensure adequate persistence. Neither semi-summer dormant or summer active varieties of tall fescue proved to be sufficiently persistent in such environments.
2. Where high summer temperatures occur but rainfall is higher and therefore less severe moisture stresses occur, varieties of phalaris with lower levels of summer dormancy persist as well as those with greater levels of dormancy, but if you are considering growing cocksfoot then still choose varieties with very high levels of summer dormancy. Semi-summer dormant tall fescue were more persistent than summer active varieties in this environment but was still inferior to the best cocksfoot and phalaris varieties.

3. Where summer temperatures are cooler, varieties of cocksfoot with intermediate levels of dormancy and phalaris varieties with low summer dormancy proved most persistent. Varieties with these characteristics are also better able to capitalise on significant summer rainfall events in these regions providing high quality summer feed. Tall fescue also showed some potential in such regions, but only in microclimates where soil temperature and soil moisture conditions were most favourable (e.g east facing aspect)
4. It is vital in areas of variable topography that farmers consider microclimate variability within a paddock when deciding which varieties of perennial grass to sow. In more favourable microclimates (e.g cooler aspects with higher soil moisture as experienced on the eastern aspect of the Burraga site), summer active varieties of cocksfoot and tall fescues proved to be very persistent. However where microclimate conditions are harsher (e.g. west aspect) it is important that farmers choose varieties that are better able to cope with higher summer temperatures and lower soil moisture, that is, varieties with higher levels of summer dormancy. The effect of changing aspect in this study had as big an effect on persistence as did changes from region to region.

Appreciation of variability in summer dormancy within and between species and varieties of perennial grasses is something that has not been considered widely in the past. However, results of these studies show that choosing varieties with greater or lesser degrees of dormancy, depending on regional and microclimate characteristics can greatly affect persistence. What should also not be forgotten is the significant overriding effect of management, particularly the importance of grazing management and adequate spelling of pastures at critical times. Sound management practices in conjunction with choice of appropriate varieties suited to the environment should in the future enhance persistence of perennial pastures thus allowing farmers to recoup sowing costs and capitalise on the benefits healthy perennial pastures can offer.

Acknowledgements
The research conducted in this project was funded by the Grains Research and Development Corporation (GRDC) through the CRC for Plant-Based Management of Dryland Salinity (Project code UWA 397).

The Grassland Society gratefully acknowledges the following major sponsors for 2007/2008

Increasing Fertiliser Prices

Phil Graham & Fiona Leech, NSW DPI, Yass

The dramatic price increase for fertiliser has caused many producers to question the value of applying fertiliser.

The 13 year data set from the Bookham Grazing Demonstration site near Yass (1993 – 2006) has been used to look at the impact on profit from the price increase.

The Bookham Grazing Demonstration was set up as a paired paddock (12ha each) demonstration, on native based pastures (microlaena, danthonia, sub and naturalised clover and annual grasses) to look at the economics of supering such country when grazing with merino wethers for fine wool production. The supered paddock over the 13 year period received an average of 112 kg/ha/year while the no supered paddock received no fertiliser.

The demonstration lies on a granite soil with pH (CaCL) 4.2 to depth. The topsoil consists of a sandy loam to a depth of 50cm and the subsoil consists of a heavy clay beneath 50cm.

The stocking rate on the supered paddock has averaged 13.4 wethers/ha over the 13 year period while the no super paddock averaged 6.1 wethers/ha.

To investigate the profitability of fertilising following the fertiliser price increase, a fertiliser cost of $400/t spread (excl GST) has been used for each of the 13 years when calculating each year's gross margin. All other prices and production were left the same. The profit from the supered paddock (13 year average) before raising the fertiliser price was $113.31/ha. After allowing for the increased fertiliser cost, the figure dropped to $96.38/ha (13 year average). The price increase for super removed $17/ha profit from the system. The no super input system had a profit of $34.55/ha (13 year average).

Even though these figures are specific for the Bookham demonstration site the $17/ha profit reduction due to increased fertiliser price is robust across all locations for fertiliser applications of 112 kg/ha/year. The reality of this fertiliser price increase is that the same amount of money will be spent on fertiliser, meaning that a reduced tonnage will be purchased.

The following factors should be considered when deciding which country is supered:

- Is your stocking rate down? Will it be increased during autumn/winter 2008? If your answers are yes and no respectively, then your area for fertilising should be reduced to reflect the reduced stock demand.
- Are your pastures badly affected by drought? Are there the species present to respond to improved fertility? A priority should be to fertilise any paddocks with perennial grasses and sub clover still present.
- Work over the last 6 years has shown on Yass soils that 90kg single super/ha maintains soil phosphorous levels. So this maintenance rate could be used to increase the area of country covered.
- Hill country or shallow soil areas should be avoided within paddocks. Fertilise those parts of paddocks which will give the best response – soil depth is your indicator. Many people did not fertilise last year, so another year missed will have a negative impact on winter production.

For further information on the Bookham Grazing Demonstration, please call either Phil Graham or Fiona Leech at the Yass NSW DPI office on 6226 2199.

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Heritage SEEDS

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Minimal damage from cattle trampling on self-mulching soils

Dr Chris Guppy, Precision Agriculture Research Group & Centre for Sustainable Farming Systems, School of Environmental and Rural Science, University of New England, Armidale, NSW

Two small trials on a self mulching soil suggest damage to soil physical properties is minimal following cattle trampling/grazing. The smaller than expected risks of compaction damage affecting grain production, particularly in self mulching soils, may allow increased flexibility for producers using mixed farming systems.

A key question asked within the Grain and Graze program in Border Rivers concerns whether to allow grazing on good cropping country. Two Rural Science students from UNE undertook Honours research programs within the project to look into this question. One student examined the effect of stocking rate on soil physical properties, the other looked at rainfall intensity and trampling damage.

Stocking rate effects were examined by placing 3 steers or 9 steers on ~0.4 ha of grazing triticale for 3 weeks. These are equivalent stocking rates of 40 and 120 DSE/ha. Soil moisture, hydraulic conductivity, penetration resistance and aggregate stability were monitored at GPS located points within each treatment. Cattle were removed after the heavily grazed site was grazed to 50-100 mm, at which time a 27 mm storm fell. Sampling occurred two weeks later. Differences in hydraulic conductivity and soil moisture at depth were most likely related to the storm (Table 1). Soil penetration resistance, a surrogate for bulk density and soil strength when measured at a constant water content (near field capacity) increased in the typical compaction zone from animal trampling (70-150 mm) only under heavy grazing (Table 1).

Cattle hoof pressures are reportedly in the range of 170-190 kPa, but can be up to 3 times that depending on how many feet are in contact with the ground at any one time. The stocking rate trial observed differences of ~300 kPa after heavy grazing. As root growth is rarely impeded at soil resistance values less than 1000 kPa, particularly in cracking clay soils which allow secondary pathways for roots, the likelihood of compaction damage on a following crop is minimal.

The investigation into rainfall intensity and trampling damage resulted in the Warialda version of the 'Running of the Cows'. A 24 m long race was established and 3 rainfall applications of 50 mm were applied at 17, 33 or 67 mm/h. The purpose of the trial was to determine whether storm events create more damage if

cattle are on self-mulching soils due to more water remaining on the surface. Four control plots received no water. Twenty cows were moved through the race and depth of hoof print, penetration resistance at the base of hoof prints, and aggregate stability and size were measured before and after they passed through. Eleven weeks later, following 3 partial wetting/drying cycles involving 160 mm of rainfall, depth of hoof prints were again measured and aggregate stability determined.

Hoof prints were 50 mm deep in the control plots and ~150 mm deep where water was applied. After 11 weeks, depressions were only half these depths. No differences in aggregate size were observed following trampling, suggesting smearing of aggregates was minimal even under high moisture and low resistance to compactive forces. Penetration resistance was ~300 kPa higher in the 50-150 mm depth below hoof prints (Figure 1). This amount of resistance is consistent with what cattle hooves would have imparted to the soil. Again, these penetration resistance values, even in the control plots, are below those that are commonly considered to impede plant root growth. Trampling damage is visually disturbing, however soil physical properties were not affected to any great extent. Although planting activities may be complicated by uneven surfaces, particularly in no-till situations, the uneven soil surface may provide benefits in fallow moisture harvesting, as surface irregularities will enhance surface depressional storage capacities and therefore allow longer water infiltration times.

Cursory examination of the subsequent grain crop sown over the stocking rate experimental site revealed more moisture under the heavily grazed treatment prior to sowing, which in turn translated to improved vigour and yield in a dry season. Emergence was clearly unaffected by compaction damage. The excess moisture was most likely related to the removal of biomass by the grazing cattle earlier than the control plots. Future experimental work should consider spraying out control sites to effectively determine whether fallow efficiency is affected by grazing treatments. The clear lack of effect of heavy grazing on the subsequent crop may be related to seasonal conditions; were the season better, yield declines may still have arisen. These early results showing minimal physical impact on soil are tempered by reports in the literature that compaction effects from stock may be cumulative. Repeated trampling may limit the capacity of self-mulching soils to repair damage.

Take home message

- Soil physical damage from trampling may not be as high as initially thought
- Self-mulching soils have a high capacity to repair themselves
- Further research is necessary that follows grazing and cropping in greater detail

The author would like to acknowledge A/Prof Heiko Daniel. Phil Gray and Adam Altmann for undertaking Honours with us. Members of the Precision Agriculture Research Group (A/Prof David Lamb, Dr Paul Frazier, Dr Mark Trotter) and staff at the UNE McMaster Research Station for assistance and input. This project was a Grain and Graze project (http://brgg.org.au/).

For more information contact Dr Chris Guppy (02 6773 3567) or cguppy@une.edu.au

Table 1. Stocking rate effects on soil moisture, hydraulic conductivity, penetration resistance from 70-150mm and aggregate stability in a Black Vertosol following 21 days grazing with 0, 3 or 9 400 kg steers on 0.4 ha. Values are the means of 6 measurements at GPS located points before and after grazing.

	0 steers		3 steers		9 steers	
	Before	After	Before	After	Before	After
Volumetric moisture 0-30 mm (%)	39	37	36	35	37	35
Volumetric moisture 30-100 mm (%)	32	37	33	37	33	36
Hydraulic conductivity (mm/hr)	110	52	60	72	71	52
Penetration resistance (kPa)	410	405	400	410	320	590
Mean weight diameter	2.8	3.0	2.8	2.5	2.4	3.0

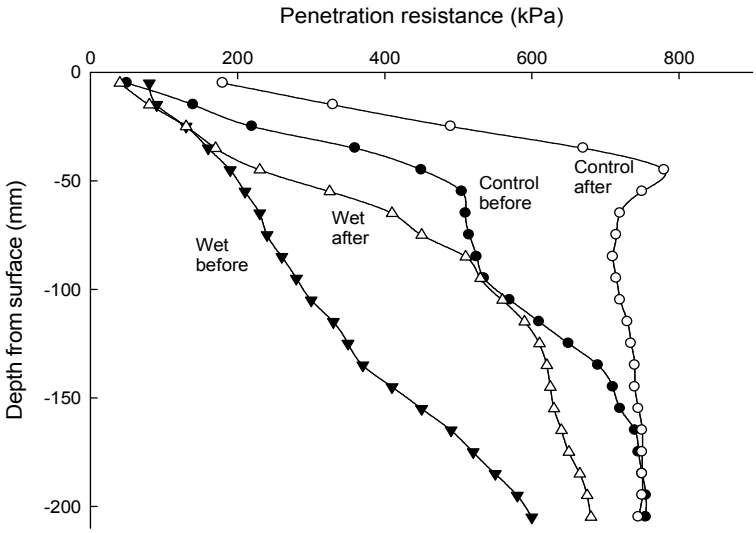

Figure 1. Soil penetration resistance to 200 mm immediately before and after trampling of a Black Vertosol by 20 cattle following application of 50mm of rainfall at varying intensity. Values are the mean of 3 replicates for control plots and 9 replicates for wet plots. There was no difference in penetration resistance for intensities of 17, 33 or 67 mm/hr.

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Dow AgroSciences™

Supering Pastures – Will it Pay

Michael Keys, Agronomist (Special Projects), NSW Dept Primary Industries – Queanbeyan

In the October 2007 issue of Ag-Today I asked a similar question with regard to sowing new pastures in light of the high cost involved. Recent price hikes in the cost of fertiliser prompt a similar question. The reply is remarkably similar – only fertilise where necessary, fertilise pastures (and landscapes) that have productive potential and make sure you can utilise the extra feed produced.

Why is super so dear? Will the price return to pre 2008 levels?

There is a limited supply of phosphate rock world-wide and in fact all the rock used to make single superphosphate in Australia has to be imported. In the last 12 months the price of phosphate rock has risen 400% - hence the near doubling of the price of super. To make matters worse, a recent embargo on the export of rock from China (the world's largest supplier) will ensure restricted world supply and continuing high prices.

What pastures are suitable to fertilise?

Provided they are productive with good potential, it doesn't matter whether we are talking about introduced pastures or modified native pastures – the over-riding principles are the same. The enterprise run must be matched to the pasture and land class, with potential to generate a good income. Stocking rates must be sufficiently high to capitalise on the extra pasture grown in response to the fertiliser while ensuring the pasture is not over-grazed. Soil fertility levels must be known, any deficiency addressed and rates of fertiliser matched to the stocking rate and export of nutrients. Remember it is more cost effective to maintain soil phosphorus levels near the critical levels rather than let them fall and have to build them up again later.

In this article I will provide data from a 5 paddock, 42ha long-term grazing study, on a wallaby grass, microlaena and sub clover based native pasture that commenced in 1995 on the Central Tablelands. The aim was to wean 2nd cross, late July drop prime lambs @ 38 kg/hd LWt in mid December. In 1995 soil phosphate levels averaged 11 mg/kg compared to a critical level (for 90% sub clover production) of approximately 30 mg/kg. The district practice paddock received 125 kg/ha single super I year in 3 and ran 5 ewes /ha. Two other paddocks received 140 kg/ha annually and stocking rates were slowly raised after

a couple of years to peak at 7.5 ewes after 6 years. The high super paddocks received nearly 1t/ha of super in the first three years, then a maintenance rate of approximately 160 kg/ha annually. Stocking rate was raised 20% from day one and eventually peaked at 8 ewes/ha.

In addition to recording livestock data, detailed measurements were taken of species composition, perennial grass persistence and soil fertility in each paddock. We found that increased fertiliser did not destabilise native pastures or reduce the number of species present. By November 2005 soil phosphate level in the district practice paddock remained the same as in 1995, in the annually supered paddocks it was 32 mg/kg and in the high super paddocks it had been raised too high (for maximum cost-benefit) to 37 mg/kg.

The Economics

The table below summarises financial data over 12 years, using actual stocking rates, lamb numbers, weights and sale prices but applying a 2008 superphosphate price of $465 per tonne for the entire period.

Average Costs & Returns ($/ha/annum) over 12 years using 2008 super prices.

	District Practice	**Annual Super @ 140kg/ha**	**High Super Regime**
Gross Return – Lambs & Wool	**$205.19**	**$314.43**	**$372.58**
Variable Costs /ha incl. supp. feed	$55.19	$70.60	$87.35
Fertiliser Costs /ha	$19.83	$66.64	$100.93
Av. Net Return / ha /annum	$130.16	$175.80	$184.67
% Return on extra $'s c.f. Dist. Prac.	0	72%	48%
Net Return less Overheads	***$25.16***	***$70.80***	***$79.67***
Average Stocking Rate (ewes/ha)	**4.8**	**6.2**	**7.3**
Fertiliser Cost per head	**$4.30**	**$11.21**	**$14.60**
Cost per head @ 125 kg/ha/annum using 2008 prices		**$10.01**	

While the highest returns are generated by the High Super regime, the best return on dollars invested was from the Annual Super paddocks where stocking rates were slowly increased as the paddock grew more pasture. It is unlikely that a high input approach will be economic, especially in the short term, with current fertiliser prices.

It should be noted that simply reducing costs (inputs) did NOT increase profits, particularly as the cost being reduced was the one addressing the most limiting factor - in this case P, S & Mo. Once these deficiencies were addressed, legumes thrived, feed quantity and quality began to rise and more stock were able to be run.

Despite the higher stocking rates, all annually fertilised paddocks had significant numbers of lambs reaching the target weight of 38kg at weaning. In fact only one lamb ever reached the target weight (and thus higher $/kg value) from the district practice paddock.

Guiding Principles

- Use soil tests to determine the nutrient status of your soils and know the critical soil P levels to achieve for your soils.

- Aim to maintain soil P levels wherever responsive pastures are present, where soil depth and landscape features are favourable and you have profitable enterprises and appropriate stocking rates to utilise the pastures grown.

- Superphosphate is currently 75% dearer than during the previous decade so target where you use fertiliser for maximum benefit. On a cost / head basis you need to allow $10/head if you are carrying 6.2 ewes/ha (see table above).

- Net Return/ha/annum **less overheads** is the best measure of your farm's "profitability"

This work has clearly shown that modified native pastures can be productive and are not adversely affected by fertiliser application, especially if fertility is the most limiting factor to production as it was here. It is vital however to know what native grass species are in the paddock so that appropriate management can be employed to ensure their long-term persistence. As a general rule more harm is done to native pastures by lax grazing or inadequate matching of pasture growth to stocking rate and stock requirements, than by hard grazing.

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Are "shotgun mixtures" the answer for tropical grasses?

Lester McCormick, Technical Specialist Pastures (North)

Producers will often sow a range of species and maturities in a pasture mix (also known as 'shotgun mixes') in a bid to cover soil, seasonal and growing time variables.
While it makes sense to add tropical grass species to reduce establishment costs, the decision sometimes fails to consider the competition that may occur between the sown species.

Tropical grass establishment is a difficult enough job to get right given the time of year they need to be sown and the impacts of temperature and moisture, sowing depth and weeds.

Therefore, some knowledge of the likely impact that species competing together may have on successful establishment is an important consideration.

Pasture mixes, such as sowing different cultivars of subterranean clover with a range of maturities to handle variable seasons have long been recommended.

When sown at the same plant density several studies have also shown that there is a lack of competition between phalaris and subterranean clover, so producers are often advised to sow as a mix.

But what about the impact of sowing "shotgun mixes" of two or more perennial tropical grasses on the successful establishment of a pasture sward?

Competition between species at establishment is affected by several factors including seed weight, seedling vigour and the way the seedling grows. For example, does it tiller early like grassy weeds or spread by stolons, like Rhodes grass, or is it upright, tillering later like digit grass.

This question was considered by researchers at NSW DPI's Tamworth Agricultural Institute as part of the *Agronomy of Perennial Grasses* project, funded by the Future Farm Industries Cooperative Research Centre (CRC).

Led by Drs Greg Lodge and Sue Boschma, the research team investigated the impact of sowing the stoloniferous, spreading Katambora Rhodes grass with more erect upright growing species (Bambatsi panic and Premier digit grass).

The results show that the production of Premier digit and Bambatsi panic is adversely affected by Katambora Rhodes grass when sowing mixtures of tropical perennial grasses, according to Dr Lodge.

“While Katambora’s dry matter production was largely unaffected by Premier or Bambatsi , it certainly had an effect on their dry matter production,” he said.

“Dry matter production for Premier was reduced by 70% and Bambatsi by 90% compared with growing them as single species. These results were gained when Katambora was only 25% of the mix.”

Interestingly, when Bambatsi panic and Premier digit were sown together there didn’t appear to be competition for the same resources, which meant there was little reduction in their dry matter production compared with growing them separately.

It is clear that a “shotgun mix” of tropical grasses with different growth habits is not desirable with upright species such as Premier and Bambatsi being affected by the stoloniferous growth habit of Katambora Rhodes grass.

End: Lester McCormick, Technical Specialist Pastures (North), PH 0427 401 542

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Implications for Pastoral Agriculture of Climate Change in Southern Australia

Mark Norton, Research Agronomist, NSW DPI, Canberra

The implications for southern Australian agriculture of the changes to our climate outlined in the report, "Climate Change in Australia-Observed Changes and Predictions" (CSIRO, BOM 2007) will be profound requiring significant changes to agricultural systems. A decline in winter and spring rainfall is predicted for most of southern Australia, while the levels in summer and autumn are likely to remain unchanged. On top of this, temperatures will rise. Moreover, if the current rate of increase in atmospheric CO_2 remains at its very high level the decline in rainfall is likely to be greater with even more deleterious implications for agriculture.

Winter rainfall is particularly important because it increases both the levels of water stored in the soil and stream flow. Little moisture is lost by evaporation during cold weather so winter rainfall is highly effective. A decline in winter rainfall will lead to lower levels of water stored in the soil and less runoff. As a result agricultural production will decline and there will be less water in our dams and reservoirs.

In southern Australia, spring is the season of peak plant production because temperatures are optimal for the growth of most plants and soil moisture is usually carried over from winter. The predicted decline of spring rainfall, particularly as it follows on from lower winter totals, will exacerbate the decline in agricultural productivity as soil water shortages increasingly limit crops and pastures.

Rainfall is not predicted to decline in summer. However, higher summer temperatures are likely to lead to higher evaporation levels so that a greater proportion of rain falling at this time may be lost to evaporation. Rainfall intensity is predicted to increase in summer with greater possible runoff, in turn leading to more soil erosion. We could expect to see an increased proportion of warm-season grasses in our pastures (together with a decline in the more digestible cool-season grasses) as a result of both this shift in rainfall distribution (declining winter/spring rainfall) and the increase in temperature caused by global warming.

Although we could respond to these changes by using more warm-season crop and pasture species, this might be difficult to achieve not least because these are often sown in spring, a season predicted to become drier.

Autumn rainfall is predicted to remain unchanged. However, the amount and timing of rainfall in autumn is already highly variable leading even now to uncertainty in whether operations such as sowing can be performed reliably and in a timely manner. It seems that the unreliability of autumn conditions will remain so that farmers will continue to face this problem together with the traditional autumn shortage of forage that limits animal production.

Given this scenario there is a pressing need to plan for these changes and to undertake the research necessary to develop agricultural systems with greater resilience. On the pastoral scene the emphasis on perennial species is likely to stay because they are crucial for the efficient utilisation and management of natural resources. This is despite evidence showing that it is usually harder to maintain perennial species in a grazed pasture as the environment becomes drier.

In this context some worthwhile research topics necessary to strengthen the resilience of our pastures include:

- Improve understanding of the drought resistance of our important pasture species (both native and introduced) and particularly while under the additional stress of grazing,
- Develop cultivars of perennial pasture species with enhanced drought resistance;
- Improve understanding of the principles of growing mixtures of perennial grasses and legumes and develop the necessary management packages to ensure long-term pasture stability;
- Explore potential for the greater use of warm-season perennial grasses and legumes (already occurring in Northern NSW, but needs to occur further south).

In any case researchers and policy makers who serve the pastoral industries will have little option but to make adaptation to the changing climate a primary priority for their future activities.

Reference

CSIRO, BOM (2007) Climate Change in Australia-Observed Changes and Projections, http://www.climatechangeinaustralia.gov.au/resources.php accessed on 17 January 2008.

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From the President's desk

A stop – start autumn, with more stop than start, seems to be common over much of NSW. The exceptions are some coastal areas where rainfall since early in the year has been very good. Let's hope for some of this weather to move west of the Divide in time for big crop and pasture sowings in May.

The Tamworth conference planning is now well advanced under the leadership of Loretta Serafin. Details of the conference appear elsewhere in this newsletter and underline a most interesting program that will cater for a broad range of interests. The focus is on achieving top results from temperate and tropical pastures, including two excellent speakers on animal nutrition.

Once again, our editor Haydn Lloyd Davies has done a first class job compiling a lot of topical and informative articles of interest to all members. Haydn welcomes letters on appropriate subjects, so if you have any thoughts or contributions, please send them to our secretary at P.O. Box 471, Orange, 2800.

A rather late, but very genuine welcome to our new secretary, Janelle Witschi, who replaces Dianne Smith. We look forward to working with Janelle as the Society progresses into the future. We thank Dianne for her dedication and wish her well with her golf and many other interests.

Don't forget to put the conference dates into the diary; July 21 – 23 in sunny Tamworth.

Best wishes to all members.

Mick Duncan

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THE GRASSLAND SOCIETY OF NSW INC.

A unique blend of people with a common interest in developing our most important resource – our Grasslands

The Grassland Society of NSW was formed in March 1985. The Society now has approx. 500 members and associates, 75% of whom are farmers and graziers. The balance are agricultural scientists, farm advisers, consultants, and executives or representatives of organisations concerned with fertilisers, seeds, chemicals and machinery.

The aims of the Society are to advance the investigation of problems affecting grassland husbandry and to encourage the adoption into practice of results of research and practical experience. The Society holds an annual conference, publishes a quarterly newsletter, holds field days, and is establishing regional branches throughout the State.

Membership is open to any person or company interested in grassland management and the aims of the Society.

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Subscription for 12 months (July to June) is $50. This entitles you to copies of the Newsletters and a copy of the Annual Conference Proceedings.

For more information, please contact the Society's Secretary, Janelle Witschi (telephone: 02 6369 0011).

Send membership application to:

The Secretary
Grassland Society of NSW
PO Box 471
Orange NSW 2800