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NEWSLETTER
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At the latest meeting of the Society's executive committee Hugh Dove gave a full and detailed account of the plans for our next annual conference. It is to be held at the Function Centre, Queanbeyan on July 18 and 19. The overall theme will be "Managing for a Variable Climate" incorporating four main themes: 1) Climate and Environment, 2) Developing and Managing Plants for a Variable Climate, 3) Maximising Cash Flow and Adversity and 4) Managing On-farm Water in a Variable Climate.

Day 1 is to start at 12.30 with a bus leaving Queanbeyan Function Centre (or drive yourself) to go to Ginninderra for a CSIRO tour. The AGM is to be held, probably 5-6 pm. Instead of a formal dinner it was considered that a family barbecue at Gold Creek, adjacent to Ginninderra would be an appropriate option.

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Editorial cont.

On Tuesday 3 April there was a dinner to farewell Jim Dellow who is retiring from NSW DPI. Jim was awarded Honorary Life Membership of the Society. – a well deserved honour. Jim was a foundation member and had given outstanding service to the Society. He was our first treasurer and continued in that post for many years and ensured that the Society was in a particularly strong financial situation. Thank you Jim.

We learnt from Northern NSW based committee members that Glen Innes, Armidale and Tamworth had had very good summer rains and there was excellent follow up rain. Let us hope that by the time you receive this newsletter that Central, Southern and Western New South Wales will have received their long overdue autumn and drought-breaking rains.

There was an interesting article in the latest newsletter of the Grassland Society of Southern New South Wales on the pasture seed situation.. Supplies of Italian and hybrid ryegrass will be good. Victorian and Kangaroo Valley perennial ryegrass are in short supply. Supplies of Australian and Uneta Phalaris are in short supply but cultivars grown under irrigation should meet producer demand. Some cultivars of subterranean clover – Trikala and Larissa will be in short supply but supplies of Riverina and Goulburn should be adequate. Generally there is a good carry-over of white clover seed and there are many cultivars of lucerne available. I apologise if this information is rather late but I did not learn about it until April.

I would particularly welcome contributions for the Newsletter from producer members on how they handled this very severe drought and is there a need for further research on dealing with drought, particularly in relation to animal survival and production.

Haydn Lloyd Davies
Editor

The importance of ewes to drought recovery

Dr Sue Hatcher, NSW DPI Senior Research Scientist

Since this drought began, sheep producers have had to make some tough decisions regarding their Merino flocks:

- How many stock can I run?
- What is the best flock composition?
- Which animals do I keep and which do I sell?
- Which ones to feed and how much to feed?

At this point in time you would have invested quite heavily in the ewes that you retained on farm. Given the historically small size of the Australian sheep flock, progeny born during 2007 will be more valuable than in most years- due to the relatively high cost of replacement stock. So what have we learnt from the Lifetime Wool project that will maximise the productivity of your flock post drought?

The previous edition of the NSW Life Time Wool newsletter (Volume 3, Issue 1 January 2007) highlighted the fact that the condition, liveweight or fat score, of your ewes at joining sets the potential number of lambs to be born into your flock. Across NSW, mating for a spring lambing has occurred, so there is little to no opportunity to increase the potential number of lambs to be born in 2007 by manipulating ewe fat score prior to joining.

The focus now needs to be on ewe management strategies to maximise the productivity of your breeding flock for the rest of this year. Actively managing the condition of your flock to fat score targets during the breeding cycle can have positive impacts on all aspects of the flock:

- improved ewe fat score at lambing will minimise ewe mortality and increase lamb survival
- increased progeny birth weights will improve lamb survival
- increased progeny growth rates will increase weaner survival
- positive impacts on the lifetime wool production and quality of the progeny.
- set your ewes up for joining in 2008.

What are the fat score targets?

The NSW Lifetime Wool team has developed three target fat profiles based on the energy requirements of the ewe during pregnancy and the 'typical' seasonal pattern of feed availability in each region. Choose the one that best matches your production system based on which region your flock graze in and your time of lambing:

1. Southern and Central NSW - autumn lambing

2. Southern and Central NSW - late winter lambing
3. Northern Tablelands - spring lambing.

Southern and Central NSW - autumn lambing

For autumn lambing flocks, the period between weaning and joining is critical to successful reproduction. During this time ewes need to increase their fat score to allow for a subsequent gradual loss of condition during pregnancy as pasture dries off and pasture quality declines during summer and autumn (Fig 1). For autumn lambing flocks a target fat score of 3.8 is required at joining which should be maintained through to pregnancy scanning at day 90. This allows a gradual decline to 3.2 at lambing and falling further to a minimum of about 2.8 during early lactation. The availability of green feed prior to and following lactation should be used to re-build the fat score of autumn lambing ewes prior to their next joining.

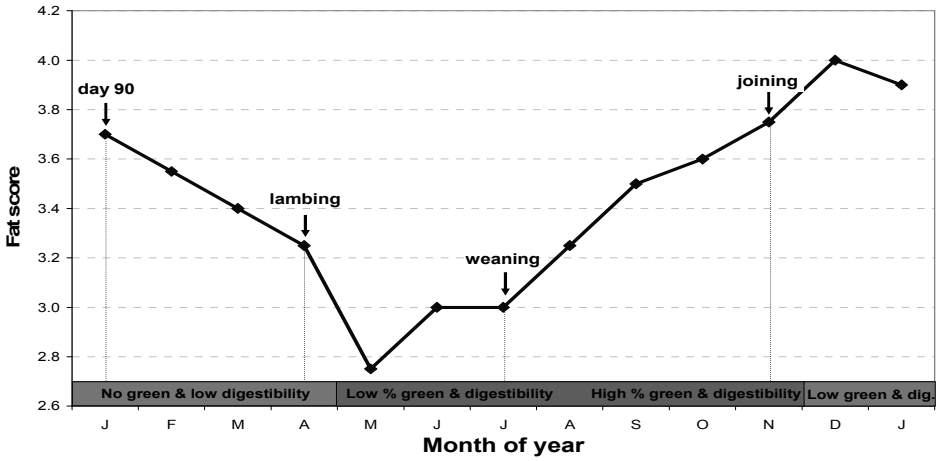

Figure 1: Target fat score profile for Merino breeding ewes in southern central NSW autumn lambing.

A Lifetime Wool economic analysis of an autumn lambing flock in the Great Southern Region of WA concluded that the optimum profile was for ewes to lose a moderate amount of weight through to lambing and then regain this condition after lambing. It was not profitable for producers to regain the ewe's weight prior to lambing because the only feed available to achieve this is grain which was more costly than the benefits likely to be received from the improved survival and production from the progeny.

Southern and Central NSW - late winter lambing

For southern and central NSW, lambing in late winter provides a better match between ewe energy requirements during pregnancy and available pasture quality and quantity. For late winter lambing flocks, a target fat score of 3 or above is required at joining, this allows for a slow weight loss during autumn which can then be turned around prior to day 90 on green feed to achieve a target fat score of 3 at lambing (Fig 2).

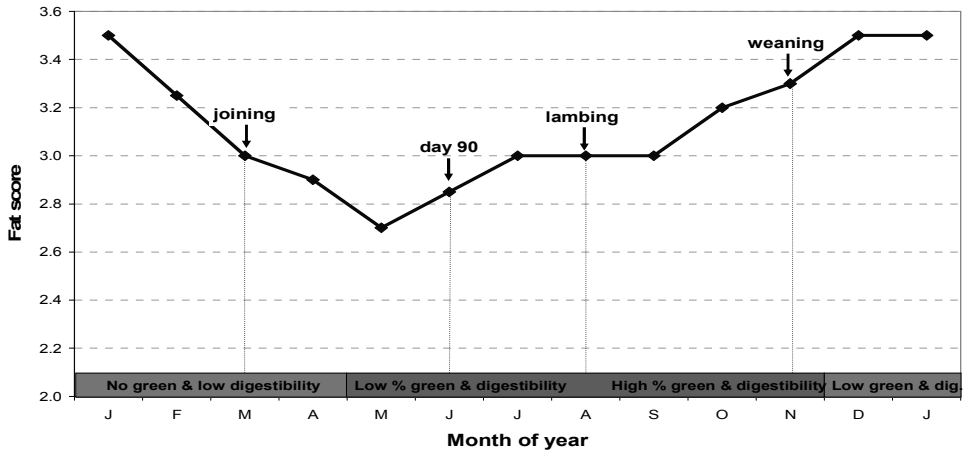

Figure 2: Target fat score profile for Merino breeding ewes in southern central NSW late winter lambing.

A moderate loss of condition from joining to day 90 of pregnancy is acceptable, provided the condition can be regained prior to lambing. But it is important to be able to regain the lost fat score using available pasture - if supplementary feeding is required to regain the lost condition the cost of the grain will negate some of the increased production value from the flock.

If it is not possible to regain the lost fat score using pasture than it is important to ***maintain*** the ewes fat score between joining and day 90 of pregnancy. Fat score loss followed by regaining the lost condition uses three times the amount of energy as maintaining a constant fat score.

Northern Tablelands - spring lambing

The pasture quality and quantity profile for the Northern Tablelands region is very different to that in other parts of the state and has implications for breeding ewe management. The weaning to joining period is critical for successful ewe reproduction on the Northern Tablelands. Ewes should be at least fat score 3.5 at joining to allow for a decline in fat score during pregnancy. As approximately

80% of sheep producers in this region shear between day 90 and 100 of pregnancy, breeding ewes face the additional energy requirement of thermoregulation post-shearing on top of the energy demands of late pregnancy.

While the ideal would be to maintain ewe fat score from day 90 of pregnancy to lambing, this is unlikely given the typical pasture growth pattern at this time (Fig 3). Late pregnancy coincides with a trough in pasture growth and much of the feed available at this time is low quality carryover native pasture from summer and autumn. This will vary between properties, depending on the extent of pasture While the target fat score profile shows an increase in fat score during lactation, this would be very difficult to achieve in practice - but gaining weight from weaning through to joining is generally not a problem in this region.

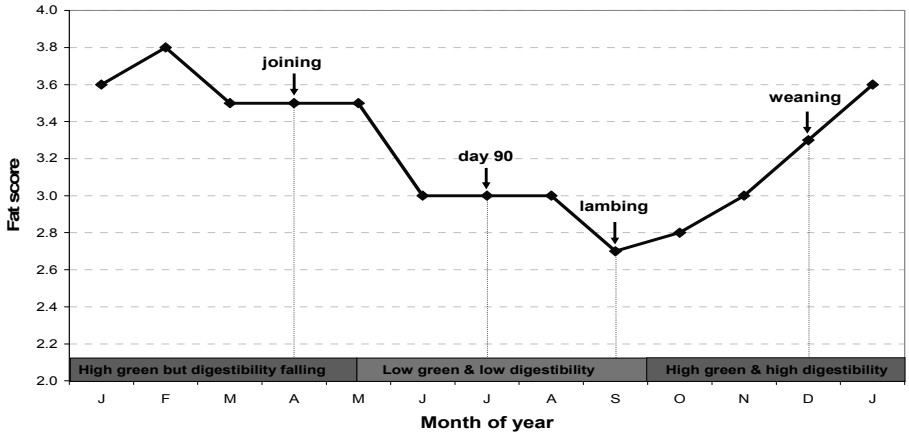

Figure 3: Target fat score profile for Merino breeding ewes in Northern Tablelands late winter lambing.

Monitoring the fat score of ewes at critical stages of the reproductive cycle in conjunction with regular pasture assessment will allow you to prepare more accurate feed budgets. This will ensure the differing nutritional requirements of the ewes at various stages of the reproductive cycle are met in the most cost effective manner. Remember that it is possible that your current management regime is close to these optimum fat score targets for breeding ewes - you need to regular assess the fat score of your ewes to determine where they sit in relation to the optimum profile.

The bottom line …..

Managing your ewes to the target fat score profile appropriate to your region will impact on farm profit by allowing you to balance the energy demands of ewes

during pregnancy and lactation with feed supply. This will lead to cost-effective supplementation at critical stages of the breeding cycle as you will only be feeding those ewes that require the additional feed. Additionally you will not be compromising the production from your breeding ewes - the impact of reproduction on the ewe's own clean fleece weight and wool quality will be minimised. At the same time you will be maximising the reproduction response of your flock, from conception to lambs weaned and setting your ewes up for joining in 2008.

Dry offers no break from worms

Stephen Love, NSW DPI State Worm Control Coordinator, Armidale

Although worm egg counts are often lower in a drought, sheep can become very wormy, very quickly for a number of reasons. Woolgrowers should not become complacent about internal parasite management just because of dry conditions. Rapid increases in worm numbers can occur due to management changes, declining immunity and localized weather events, such as short sharp showers, which can produce localized run-off and a fresh batch of infective larvae – and green pick – over parts of a paddock. In dry times in liver fluke country, sheep tend to spend more time foraging in 'flukey' parts of a farm where there is still some green feed.

Some round worms are better than others at handling dry conditions, for example small brown stomach worm (*Ostertagia/Teladorsagia*) and thin-necked intestinal worm (*Nematodirus*). Other worm species can quickly take advantage of conditions when they improve, notably barber's pole worm (*Haemonchus*), which is able to multiply rapidly.

During dry times, sheep can be more susceptible to worms because of nutritional stress, particularly late pregnant or lactating ewes, and young lambs. Worm infections can have a significant and costly impact on livestock performance. Sheep health is one of the easiest inputs into wool production to manage, and deserves to be given a high priority. During dry conditions, sheep producers should

- Keep up regular worm egg-count monitoring.
- Be guided by general worm control guidelines for their area and expert local knowledge.

- Check on the effectiveness of drenches used – if a full-blown drench-resistance test has not been done recently at least do a DrenchCheck (a simple worm egg count 14 days after a routine drench). If long-acting drenches are used, a second worm egg count 28 days after treatment is also recommended. Many farmers unwittingly use drenches that have become ineffective due to worm resistance.
- Use grazing management – for example, spelling or rotational grazing with cattle – and other non-chemical management strategies - to avoid excessive worm challenges for susceptible classes of sheep.

These are the four major principles recommended by Wormboss, which was developed by the Australian Sheep Industry Cooperative Research Centre Sheep and Australian Wool Innovation to help producers meet the challenges of worms in their sheep enterprise. The WormBoss website offers the livestock producer information on worm egg counts, immunity, nutrition, drenches, drench resistance and good management practices. It also features 'Ask the Boss', which allows users to ask questions regarding internal parasites in sheep and obtain advice on which steps to take. Producers can also register to receive monthly Worm Updates via email newsletter, with up-to-the-minute recommendations and research results.

For more information visit the Wormboss website www.wormboss.com.au

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To Lime or Not to Lime

By Mike Keys, Agronomist (Special Projects), DPI, Queanbeyan

The use of lime to correct soil acidity in crop rotations is a widespread practice and economically viable. The method used however is normally to incorporate the lime into the surface 10 cm via cultivation. In the perennial pasture zone where incorporation is not feasible and lime must be applied by top dressing it to the surface, the economic value is less clear-cut.

In 1978 the acid soil action programme commenced with several grazing sites throughout the tablelands. These aimed to evaluate the economics of surface applied lime on acid soils that supported perennial pastures. The various sites were also set up to measure the movement of top dressed lime over a number of years and of course to measure plant responses via livestock performance.

Earlier work by Keys et al as part of the prime pasture programme in the mid 1990's had involved some preliminary investigations of the movement of top dressed lime in perennial pastures. The site at Binalong on a granitic soil in a couple of wet years showed that surface supplied lime would move into the 5-10 cm layer over a 2 year period, provided the rate applied was sufficient to raise the surface 10 cm of soil to a pH of 5.2. Where a lower rate, namely 1.25 tonnes per hectare at this site, was applied the liming effect was not half as effective as the full 2.5 tonne per hectare rate.

Earlier work Ian Vimpany, Bruce Clements and Graham Kelso in the Bathurst area in the late 70's had measured the movement of different rates of lime in 3 different soils - 2 granites and a shale based soil. This work showed that 2.5 tonnes per hectare of lime on the light granite soil moved to 7.5 cm in the first year and 10 cms in the second year. On a slightly heavier granite it took 12 months longer to achieve the same results but on the slate shale soil the movement was only to 5 cm over 2 years. A heavier rate of 5 tonne per hectare moved to 10 cms in the first year and 12.5 cms in 2 years on the light granite to 5 cms to the first year and 10 cms in two years on the medium granite and reached 10 cms in 3 years on the slate shale soil

This work was tending to suggest that top dressed lime would move into the soil provided there was a sufficient rainfall and a coarse enough texture to allow the lime particles to move into the soil freely. Infiltration was significantly slowed in the finer textured soil.

Three acid soil action grazing experiments were set up in 1998 - one at Bathurst, one at Braidwood, one at Narrawa, west of Crookwell. All soils were granite derived with a relatively coarse texture. The Braidwood and Narrawa sites had soil pHs of around 4.3 and approx 14% aluminium in the top 10 cms. Both sites received 2.5 tonnes per hectare of lime. The Braidwood site was a slightly finer grained granite soil and with a slightly higher CEC (4.5 MEQ/100g). At the Narrawa site the liming effect had moved to 7.5 cms in the first year and 10 cms in the second year. While at the Braidwood site it took 2 years to reach 7.5 cms.

The Bathurst site was a very sandy soil but had been limed approximately 10 years previously. This effect was still present in the soil pH was 5.1 with only 2% aluminium. CEC was 6.6 yet the rate applied was only 2.5 tonnes per hectare. This was possibly insufficient to have a significant liming effect and combined with the higher soil pH it was found that even after 2 years the liming effect had only reached 5 cms despite the very porous nature of this soil at this site. These three acid action soil grazing experiments were using livestock to try to evaluate the economics of the top dressed liming. Unfortunately, while quite good and detailed information was recorded in terms of changes to soil chemistry, the livestock and pasture responses were smaller than were able to be recorded. It was also unfortunate that the acid soil action programme was terminated after only 6 years and so it was not possible to collect livestock data for the extended period that may be necessary to determine the economics of top dressed liming.

Another top dressed liming experiment has been conducted on John and Robyn Ives property 'Talaheni' near Murrumbateman. This is a shale derived soil with a pH of 4.3 and 34% aluminium in the top 10 cms. The liming rate required of this site to raise the soil pH in the top 10 cms to 5.2 was determined to be 3 tonnes per hectare. The experiment at this site compared no lime, 3 tonnes per hectare incorporated, 3 tonnes per hectare top dressed and 300 kg per hectare of a 50/50 lime/super mixture drilled with the seed. The results in terms of pasture establishment, particularly for phalaris were encouraging from both the top dressed lime and the drilled lime/super treatments with approximately 30% better pasture establishment where either top dressed lime or the drilled lime/super were used compared with the control which received no lime.

Conclusions

- TDL will move in many but not all soils – avoid fine textured shales.
- Re-liming appears to speed up the movement and depth of TDL effects.

- Correct rate (based on CEC and pH), soil porosity and rainfall are important.
- Soil chemical changes are easy to achieve and measure.
- Measurable effects on plant growth/mineral composition/feed quality minimal.
- Main plant benefits restricted to better establishment of acid sensitive seedlings – no long-term effect if established plants are sensitive.
- Livestock and economic benefits difficult to measure – enterprise type an issue.
- Liming prior to sowing phalaris the only situation where we can confidently predict an economic response.

Serrated Tussock in Native Pastures

A. Simmons, Charles Sturt University, Orange

Serrated tussock (*Nassella trichotoma*) is a weed of national significance that invades all types of grasslands of South-east Australia. It is particularly problematic, however, in native grasslands. This is because native grasslands often occur on areas that are inaccessible and/or have poor soils. These circumstances make conventional control of serrated tussock using mechanical disturbance and resowing with improved species impractical and/or uneconomical. This article will abridge a paper to be presented at the NSW Weeds conference in Wollongong on an integrated control strategy for serrated tussock in native pastures. It will also provide an overview of research currently underway by a team of researchers from the Orange campus of Charles Sturt University (Dr Aaron Simmons, Professor David Kemp, Marja Simpson) and the Orange Agricultural Institute (Dr Warwick Badgery, Dr David Michalk).

The integrated strategy we outline requires land managers to implement the 3 D's (diversity of methods, diligence and deliberation) of weed control (van der Meulen, Reeve and Sindel, 2006). Diversity of methods is the concept of using a number of control methods (van der Meulen et al., 2006). For serrated tussock control, these methods are grazing, herbicide, mechanical and competition.

Grazing

Overgrazing and selective grazing, particularly by sheep in set-stocked paddocks, are thought to be the primary cause of serrated tussock invasion. This is due to set

stocking increasing bare ground and reducing the perennial grass content of pastures that opens up resource gaps and reduces competition against serrated tussock seedlings. Changing to rotational grazing can reverse the effects of set stocking *i.e.* increases perennial grass content and decreases bare ground. These changes are highly beneficial as perennial grasses provide competition (see below) for serrated tussock plants at key times of the year and a reduction in bare ground reduces the spaces for serrated tussock seedlings to establish.

Competition

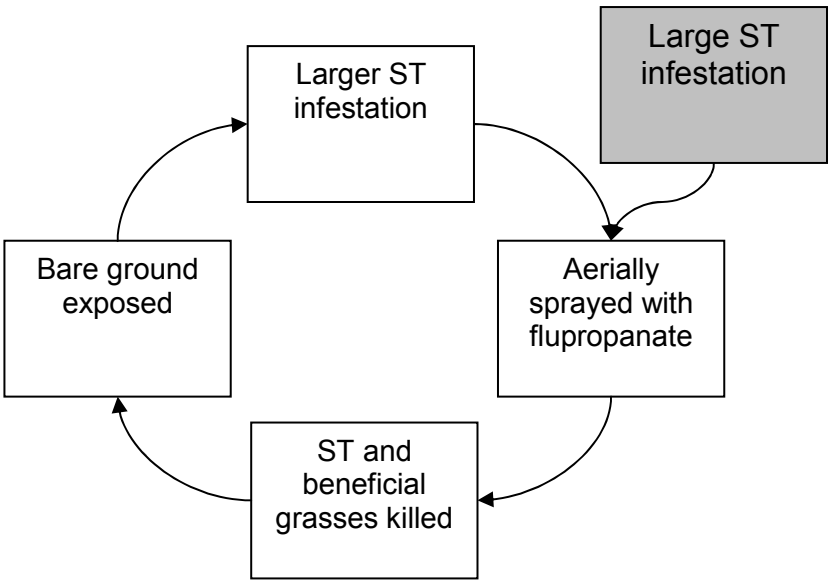
Rotationally grazing paddocks will improve competition by increasing perennial grass content and reducing bare ground. Field research has demonstrated that as little as 0.9 t/ha of perennial grass dry matter over the summer months can stop serrated tussock seedlings establishing. Further work currently being conducted will refine this limit however to ensure recommendations are robust it is arguably better to advocate a minimum of 1.5 t/ha of dry matter over the summer months. On hill country maintaining these levels of herbage mass over summer may mean that grazing is not possible. That also means there is little forage available for livestock and in fact it would be better to develop productive pastures or forage crops on flats where animals could be better fed through summer.

Evidence for native grasses out-competing adult serrated tussock plants is in contrast, uncertain. On extremely low fertility soils when ungrazed, the biomass of mature serrated tussock plants may decrease whilst surrounding C4 grasses biomass will increase. This suggests it may be possible to out-compete adult serrated tussock plants using native grasses. Further research is required to provide clear guidelines for when and how this interaction can be reliably managed.

Herbicide

Herbicides are a key aspect of any serrated tussock control program though the risk of collateral damage to potentially competitive native grasses means that they need to be used carefully. The most common herbicide used on large infestations on inaccessible terrain, is flupropanate (1.49 kg a.i. ha^{-1}) applied aerially. Flupropanate damages most native grasses so this treatment needs to be complemented by, at a minimum, an appropriate grazing strategy to avoid land managers getting stuck on the flupropanate treadmill (Figure 1.).

Figure 1. The flupropanate treadmill



Spot spraying with either glyphosate (20 mL L^{-1}) or flupropanate (2 mL L^{-1}) is a more effective method of herbicide use to minimise collateral damage to surrounding grasses. This maintains groundcover and provides competition for any serrated tussock seeds that germinate. Appropriate use of grazing to maintain herbage mass and minimise bare ground will further improve the effectiveness of this method of herbicide use.

Mechanical Removal

Mechanical removal is a very effective method of removing of serrated tussock as they do not tolerate disturbance of the root mass. This control method can though be difficult as machinery (e.g. tractor ploughs) cannot work on many native pastures infested with serrated tussock due to their inaccessibility. Some soils that can be accessed by machinery are too rocky for a conventional plough to work effectively e.g. Monaro region. Chipping serrated tussock with mattocks (as done routinely in New Zealand) is extremely effective but very time consuming, especially when infestations are dense and/or widespread. One negative aspect of mechanical removal is that it provides germination sites by exposing soil. If

grazing management is appropriate, however, a minimum number of seeds will establish themselves.

Diligence (in application of methods) is akin to keeping a watchful eye on a weeds population (van der Meulen et al., 2006) and not allowing an infestation to become established. This means any serrated tussock plant must be removed within its first year after establishment. Preliminary results from work being undertaken suggest diligence is a key factor in successful serrated tussock control. The majority of farmers who successfully control serrated tussock spend a portion of their time each year removing young establishing plants. Their aim is to not let any plants remain at the end of the year. Badgery's work showed that the main problem with reinfestations is the number of seedlings that survive through summer and autumn. Having clean paddocks by autumn is then a clear goal that one can aspire to.

Deliberation is the planned and strategic control of weeds in an integrated manner (van der Meulen et al., 2006). For serrated tussock the most important aspect is the removal of weeds prior to flowering and setting seed. Deliberation can also mean that plants are removed or sprayed in winter when they are easier to see against the, normally, green pastures. Taking action when they are easiest to see means that a higher number of plants will be seen and therefore controlled.

A number of experiments currently underway aim to further develop the integrated strategy outlined above. The first project is funded by MLA and AWI and has several components, much of which is an extension of the work done by Dr Warwick Badgery as part of his PhD studies. The primary experiment aims to evaluate the ability of a combination of tactics in controlling serrated tussock. The experiment is being conducted on a sheep property at Trunkey Creek on the Central Tablelands in a pasture comprised of *Austrostipa* spp., *Austrodanthonia* spp., *Microlaena stipoides* and *Bothriochloa* spp. as well as a *Themeda australis* dominated pasture. The differences in compositions allow us to make comparisons between the effects of these treatments on winter-growing and summer-growing pastures. This experiment takes an ecological approach to serrated tussock control by examining effects of control methods on the establishment of beneficial grasses, competition between beneficial grasses and serrated tussock, and how manipulating grazing can alter establishment and competition. Other work is looking at allelopathic effects of serrated tussock on the germination of native grasses and whether plant hormones can influence the competitive interactions between native grasses and serrated tussock. This may be

a more ecologically and economically effective method of shifting the competitive balance towards native grasses than herbicides.
The strategic use of glyphosate at a time of the year when the pasture has limited growth to minimise collateral damage is also being examined. In C4 based pastures that actively grow in summer, the use of glyphosate would be more beneficial in winter whereas the opposite applies for winter growing C3 grasses. In one experiment broadacre spraying with glyphosate in the height of summer in a C3 dominated pasture resulted in minimal collateral damage.

Another project is comparing the management, pasture composition and seedbank load of a paddock that has little to no serrated tussock with a neighbouring paddock, under different management, that has a large infestation. This will allow the key management decisions for serrated tussock control to be identified and will also allow the role of pasture composition and seedbank loads in an infestation to be ascertained.

We believe it is possible to manage native pastures in such a way that serrated tussock no longer invades and reduces productivity, and where serrated tussock is already present, to remove infestations. There will never be a 'magic bullet' for the control of serrated tussock and the approach outlined above is a long-term integrated approach for the control of serrated tussock in native pastures. Management of serrated tussock infested areas to achieve this differs to the current management practices utilised by many land managers. Changing management of infested native grasslands to reflect a diversity of methods for control of serrated tussock requires capital input for fencing and/or waterpoints that can often be offset in part by funding available from CMA's and Landcare. Diligence and deliberation are, however, the sole responsibility of farmers. The skills required to perform these functions are held by many but where they are not, we feel it is the place of CMA's, weeds bodies, extension staff and grower groups to implement programs that will provide these farmers the necessary skills.

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The Grassland Society of NSW is very grateful to MLA and Summit Agro for their sponsorship in 2006.

Managing recruitment of perennial grasses within existing swards

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The loss of perennial grasses from Australia's grasslands and replacement by annual species (principally attributed to management practices) has had severe implications for the productivity of livestock enterprises, weed invasion, erosion, salinity, acidity and nature conservation (Kemp *et al*., 2000; Michalk *et al*., 2003). The sustainability of these grasslands is of prominent concern both to landholders and to researchers. Previous research programs such as Temperate Pasture Sustainability Key Program (TPSKP) and Sustainable Grazing Systems program (SGS) have strengthened the concept that sustainable pastures are those that are based on perennial grasses (Mason and Andrew, 1998; Mason and Kay, 2000; Kemp and Dowling, 2000). However, the perennial content of many pasture systems is commonly low, often only about 20% (Kemp and Dowling, 2000) in comparison to the level (60+ %) that is desired for sustainability (Kemp and Dowling, 2000).

Many permanent pastures across southern Australia and in other parts of the world have suboptimal levels of perennial grass species, below that required for sustainability. The true long-term sustainability of perennial pastures is dependent on the successful replacement of perennial grass plants with others of the same species or functional types. This can be managed either by working with ecosystem principles to encourage seedling recruitment, or by a replacement approach of re-sowing productive perennial grass species, a common practice. The principal difference in these practices is that the former may take longer but can be a much lower cost and less financially risky than re-sowing, particularly on less-fertile soils with low rainfall.

Recent national research programs (TPSKP, SGS) have concentrated on increasing the perennial grass content by tactical management approaches. Much of that work has provided insights into the manipulation of vegetative growth of existing plants, but not into how existing plants can be replaced through seedling recruitment (Kemp *et al*., 2000). Pastures based on perennial grasses are sustained for the short-term through vegetative growth but fail to regenerate through new seedlings in the absence of optimum conditions. The result is the degeneration of pastures over the years and hence the need for the establishment of new pastures through re-sowing, a huge cost to farmers.

The need to reduce the costs of successfully establishing perennial species is an increasingly important issue. The cost of re-sowing, a key strategy for rehabilitating perennial pastures, is proving to be prohibitive. Re-establishing the paddock through re-sowing often costs around $250/ha and it takes 4-8 years to recover those costs (Vere *et al*., 1997) particularly in many areas where site productivity is only moderate. Farmers do not believe that re-sowing is always viable in the higher rainfall zone of south-eastern Australia (Reeve *et al*., 2000). Many degraded pastures though still have a residual of desirable perennial species that could be used as the base for seed production and recruitment of new plants once it is known how best to manage that process.

Learning how to encourage recruitment of new seedlings into existing swards would ultimately reduce the need to re-sow and the system would then be more sustainable. However, limited research has shown that there is often low or nil survival of desirable grass seedlings in existing paddock and the mechanisms underlying the process of recruitment is poorly understood. In a study of seed dormancy, germination, seedling emergence and survival of perennial pasture grasses, Lodge (2004) posed the challenge of identifying the causes that lead to limitations in successful recruitment of perennial grasses and highlighted the need for more research to devise appropriate and practical management options to encourage the emergence and survival of new seedlings into pastures. The work of Lenz and Facelli (2005) on recruitment of native perennial grass and exotics further identified the need for research to look into the reasons behind the low survival of perennial grass seedlings.

To identify ways of cost-effectively and reliably managing the recruitment of perennial grass seedlings, MLA have funded a research project at CSU Orange. The purpose of this recruitment project is to focus on the ecological principles of population dynamics in order to encourage the recruitment of new seedlings through intervention at various stages of the life cycle of these important perennial grasses. The research work is supported by studies of seed to seedling phase in the life cycles of key perennial grasses and of the characteristics of microsites within the plant / soil system where seedlings successfully recruit.

The project focus is in Central New South Wales, with three field experiments on native and introduced perennial grasses that are widespread and important for grazing in the region. The desirable perennial grasses being studied are:

- phalaris (*Phalaris aquatica*) a highly persistent, productive introduced species; being studied in a pasture on the CSU Orange campus.

- red grass (*Bothriochloa macra*) a C4 warm-season native grass that is of limited production, but known to maintain good swards when well managed on low fertility soils; being studied at the SGGS site at Wellington.
- wallaby grasses (*Austrodanthonia* spp.) a native C3 cool-season grasses that are widespread and known to survive even under heavy grazing; using a field site at Trunkey Creek where serrated tussock is also present.

Each experiment is investigating management practices that influence seed production by the desirable perennial grasses, how best to deliver that seed to the soil surface and how the sites at the soil surface can be modified to improve the chances that seeds will germinate and establish. Can we create microsites where there are higher chances of successful recruitment? The experiments aim to determine the pasture management practices that enable desirable perennial grass species to establish within existing swards. Establishment is defined as successful when a seedling survives the first summer after emergence.

The field work is supported by controlled environment (and modelling) studies to improve the predictability of recommendations. Field and glasshouse experiments are used to address the project aims and specifically investigate:

- seed production, soil seed bank and recruitment by key perennial grass species within existing swards;
- the nature of competition from established plants on seedling recruitment within the sward;
- the microsites required for satisfactory recruitment so that management practices to maximise the number of suitable sites can be devised.

Initial results show that seedlings will emerge within the existing sward when there is sufficient moisture and availability of seeds. One good rainfall (50mm or so) in late summer after seed fall can result in many perennial grass seedlings emerging, before annual grasses become competitive as they germinate more in autumn and winter. Unfortunately there seems to be few perennial grass seeds in the soil from previous years as soil cores now taken from several studies find few desirable perennial grass seeds. The success of germination and survival thus depends more on the production of current seed. Rest from grazing during the periods of seed head development and seed set is critical to increase the amount of seed that can germinate.

Site preparation in the form of scarifying the ground *e.g.* with light harrows, before seed fall and creating gaps seem to be important in encouraging the

germination of perennial grasses in the field. However, even when there was a massive germination the previous autumn seedlings did not survive the following dry summer. Survival depends on a variety of factors, competition from existing plants and annual grasses being significant in causing mortality of perennial grass seedlings during the initial stages. Warwick Badgery's work with serrated tussock showed that in dry years the equivalent of 1 t DM / ha of desirable perennial grasses was enough to kill off any surviving tussock seedlings over summer. Future work needs to find the level of competition that these weak seedlings can manage.

Further work is also needed to assess how frequently rainfall events are needed to keep seedlings alive through the year after germination. Interestingly some preliminary results indicate that leaving swards tall may be preferable to slashing and building up a layer of litter on the ground. This affect may arise from subtle changes in humidity at ground level; changes that are very difficult to measure.

It is hoped that the drought is over and next year will mean some better results in recruitment.

The research is supported by Meat and Livestock Australia (MLA) and Charles Sturt University (CSU) for the period 2005-2008. It is supervised by Professor David Kemp and the team includes Drs David Michalk, Warwick Badgery, Peter Dowling and Bruce Auld.

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Vale – Don Arnott

Don Arnott, who died recently, was a founding member of The Grassland Society of NSW. He was one of the original 28 who gathered at the Sydney showground in 1986 at the invitation of the RAS to discuss and affirm the formation of the Society.

Don served on the Management Committee of the Society for twelve years helping direct the Society and building our membership from the original 28 to our maximum of over 1000.

Don was a strong force in maintaining the Society on a practical agricultural course. He was an innovator of new agronomic methods on his property "Coolah Creek" up in the Liverpool Ranges.

His energy and foresight ensured the Society had as its major platform service to the landholder and transmission of agricultural information to producers. He actively supported our major activity, the extension of information from leading producers to other producers through presentation of papers at our annual conferences, distribution of our Conference Proceedings and field days on outstanding properties.

Don was held in high esteem by members of the Society and was greatly valued as a friend and compatriot. His soft and delightful personality will be sorely missed.

We extend our deepest sympathy to Don's family.

Thank you Don for all your wonderful contributions to the Society and to NSW agriculture.

Promising new perennial grasses and legumes for NSW from the Tasmanian Institute of Agricultural Research.

Eric Hall, Tasmanian Institute of Agricultural Research, Launceston, Tasmania

The Tasmanian Institute of Agricultural Research (TIAR) has bred a range of new perennial grass and perennial legume varieties through its Forage and Pasture Development Program.
Under evaluation in Southern NSW The performance of the new material has been very encouraging.

New South Wales DPI researcher Belinda Hackney has been trialing TIAR's new varieties of Spanish cocksfoot (*Dactylis glomerata* ssp. *hispanica*), Caucasian *clover (Trifolium ambiguum*) and Talish clover (*Trifolium tumens*) at a number of sites including Holbrook, Berridale, Bookham, Bathurst and Cooma.

The Forage and Pasture Development Program run by TIAR, was initiated in the early 1990's, in response to the need for better-adapted and more persistent species/varieties specifically for the cool temperate, low to medium rainfall regions.

Over the life of the program TIAR/DPIW staff have participated in four major collecting missions: Spain/Portugal (1993), Tunisia (1995), Kazakhstan (2002) and Azerbaijan (2004). These missions have resulted in TIAR gaining access to a broad array of wild plant germplasm. This material is used as a basis for screening and the identification of traits such as salt, acid, cold, drought or waterlogging tolerance.

The main focus of the program over the past fifteen years has been to assemble, identify and develop productive, drought tolerant and persistent perennial grasses and legumes, annual legumes and browse plants for sustainable agricultural use across low rainfall, temperate environments.

The first commercial variety developed within this program is the late maturing annual Arrowleaf clover (*Trifolium vesiculosum*) variety Arrotas[A], released to farmers in 2005 through the programs' commercial partner Tas Global Seeds.

Over the next five years a number of promising new varieties will be released from the program, including those performing well in NSW trials.

The new varieties include:

- **Spanish cocksfoot (*Dactylis glomerata* ssp *hispanica*) varieties, Uplands[A] and Sendace[A]**

Spanish cocksfoot is a fine leafed summer dormant perennial grass found growing naturally around the Mediterranean region. The two new varieties, Uplands[A] and Sendace[A] were selected from ecotypes collected in north central Spain in 1993 by Mr Bob Reid, growing under very dry conditions (400 mm annual average rainfall), with cold winters (-18°C) and in an area which had been heavily grazed by sheep for centuries. This material has been trialed extensively across some of the harshest, low rainfall regions of Tasmania. Long-term (10 years) plant persistence has been excellent with plant survival percentages of upto 95% at sites where the annual rainfall has been as low as 250 mm. This is compared to survival percentages of 20% for commercial phalaris varieties at the same sites.

Uplands[A] and Sendace[A] are both very fine leafed, with a high tiller density. Uplands[A] has a semi erect growth habit and Sendace a semi prostrate growth habit, making it more suitable for areas where set stocking is the common practise. They both have a high level of drought tolerance through their ability to become dormant over summer. Although summer dormant they are highly autumn/winter/spring active, producing high protein, high energy forage with a high level of digestibility and nutritive value.

Uplands[A] and Sendace[A] are adapted to a range of well-drained soil types and would compliment phalaris across large areas of southern and central NSW including the Tablelands, Southwest slopes and medium rainfall areas of the wheatbelt.

It is hoped that commercial seed of Uplands[A] and Sendace[A] will become available in 2008.

- **Caucasian or Kura clover (*Trifolium ambiguum*) variety Kuratas[A]**

Caucasian clover is native to Asia Minor and the Caucasus regions of Armenia, Georgia and Azerbaijan. Caucasian clover is known for its persistence, disease resistance, high forage quality and ability to survive in a large range of soil and climatic conditions. Its rhizomatous growth habit makes it highly tolerant to drought, cold and grazing. Although adapted to many soil types Caucasian clover

tends to perform better where summer temperatures do not get too high, it grows best on well drained, fertile soils with a neutral pH.

The new variety Kuratas[A] was bred from material originating from the former Soviet Union. Kuratas[A] was selected for improved seedling vigour, winter activity and seed production over the only variety available commercially, Endura. Under Tasmania's cool temperate conditions Kuratas[A] has shown a high level of drought tolerance, surviving at sites receiving 250 mm annual rainfall.

Kuratas[A] would be an excellent perennial legume to sow in a mix with Uplands[A] or Sendace[A] in the Tablelands and cooler slopes regions of NSW.

- **Talish clover (*Trifolium tumens*) variety Permatas**

Talish clover is native to Turkey, Iran and the Caucasus regions of Armenia, Georgia and Azerbaijan. Talish clover is a new species to agriculture and there are no commercial varieties available. It grows naturally across a range of environments and soil types, from neutral to alkaline soils and areas with an annual average rainfall ranging from 350 to 1400 mm.

Permatas was bred from material collected in the former Soviet Union.

Permatas is a shortly stoloniferous, persistent perennial clover with a dense prostrate growth habit and a very deep taproot. It has a very high level of drought and cold tolerance. Once established Permatas can tolerate persistent close grazing by sheep as the plants growing point is below the soil surface.

Permatas would also be an excellent perennial legume to sow in a mix with Uplands[A] or Sendace[A] in the Tablelands, low and mid slopes regions of southern NSW legume and possibly the upper/mid slopes of northern NSW although this species has not been evaluated in this region.

All new varieties released through TIAR's Pasture Development Program program are licensed to Tasmanian seed company Tasglobal Seeds (www.tasglobalseeds.com) for commercialisation.

For further information visit the Tasglobal Seeds website.

The NSW Grassland Society is very grateful to its sponsors for their generosity. Without the support of our sponsors we would have very restricted activity. Premier sponsors have donated $3,000 (sometimes also 'in kind').
Major sponsors have donated $1,500 and Corporate sponsors have donated $750.

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From the President's desk

At the time of writing this short note, useful rain has fallen over much of the State. This has been very welcome for winter crop plans as well as pasture recovery. With optimistic forecasts for improved winter rainfall the general outlook has certainly brightened in the past month.

How timely and topical the annual conference with its theme of "Managing for a Variable Climate" to be held at Queanbeyan will be over the 18th–19th,July. The organizing committee has put together a stimulating program with innovative changes from previous conferences. Recognising the effects of drought and associated pressures on farm families and the agribusiness sector, the committee has cut this year's conference to one and a half days and reduced the total cost significantly so the conference is within everyone's reach.

Speakers will provide information on climate and environment change, pasture management within these restraints and the important aspect of economic management. As usual, the conference will also feature sessions from producers who have adapted to the recent dry seasons and are willing to share their knowledge. These producer segments are always interesting and provide a valuable complement to the other "academic" sessions.

An added feature will be the half day tours to either CSIRO at Ginninderra to look at advances in pasture grass breeding and dual purpose crops or to a pasture research site near Sutton to inspect pasture types to fit variable landscapes.

The conference dinner this year will be a departure from the usual formal event. The organizers have arranged for an indoor BBQ at Gold Creek which will allow for more informal discussion and keep costs down.

I encourage all members to have a close look at the full agenda detailed in this newsletter or on the internet site (www.grasslandnsw.com.au) and register early for the conference. An extra bonus for people living away from Queanbeyan is the opportunity to spend some time in the National Capital following the conference. I am assured the weather will be balmy with only light frosts and sunny days!

I hope to see many members in Queanbeyan next month for what will be a first class conference. Remember, non member friends are welcome to attend all sessions and to join the Society.

Best wishes to all members.

Mick Duncan

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, Dianne Smith (telephone: 02 6362 6150).

Send membership application to:
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