Registered by Australia Post:
No PP 242028/00004

NEWSLETTER

VOLUME 20: NUMBER 4, 2005

Members of the committee held a dinner to farewell Ken Archer on the thirteenth of September as a small gesture of thanks for all he had done for Grasslands in New South Wales and his committed support for the Society. Ken retires in October with our very best wishes. The Department of Primary Industries has lost many fine Grassland scientists recently including Ken, Malcolm Campbell, Peter Simpson, Warren McDonald, John Read and others. Sadly, the Department has chosen not to replace some of the positions at this stage. This is highly regrettable.

Professor Jim Scott recently sent me a copy of the Proceedings of a Symposium to review the "Cicerone Farms: Under the Microscope" The Cicerone Farms are three 50 hectare farmlets at the CSIRO research station, Chiswick near Armidale. Farm A was a high input farm, applying superphosphate every year increasing soil P (Colwell) to a target of 60 ppm, aiming for an average of 15 DSE per hectare; Farm B was a medium input with superphosphate applied at the rate 11 kg P per ha to a third of the farm and aiming at 7.5 DSE per hectare.

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Both A and B had 8 paddocks. Farm C was medium output with 16 paddocks and electric fencing, the aims being a minimum average of 15 DSE per hectare with longer rest periods and very intensive rotational grazing. The Cicerone work has generated a very large amount of very important data on soil, plant, animal and economic information. There will inevitably be some critics of the selected treatments – you cannot please all the people all the time! Copies of the symposium assessing five years of the Cicerone project are available from Professor Jim Scott, Centre for Sustainable Farming, University of New England, Armidale, New South Wales 2351.

The Society's Annual Conference in 2006 will be held at Wagga Wagga. We have many producer and technical members in the southern parts of the state so we can look forward to another stimulating conference. The Society's member with responsibility for informing the executive and members is Belinda Hackney and she will be giving details of the Wagga Conference in the near future.

Our sister Society – The Grassland Society of Southern Australia (they have members from South Australia, Tasmania and Southern New South Wales), held their 2005 annual conference at Ballarat. The theme was "Turning Grass into Gold". As with us there were some very good papers. One in particular which caught my attention was by a former student, Grant Burbidge from Tarcutta on "How I managed two years of drought". I highly recommend the proceedings of the conference to all our members. The Proceedings are available from:- Linda Bennison, Executive Officer, Grassland Society of Southern Australia, PO Box 1349, Warragul, Victoria, 3820.

For health reasons I was unable, as I had hoped, to attend the XX International Grassland Congress in Dublin this July. However, I have included in this Newsletter a report by a student, Conrad Ferris on the Conference to the British Grassland Society. He expresses viewpoints which I am sure will interest many of our members on present day trends in UK and Europe.

Haydn Lloyd-Davies
Editor

Report for the British Grassland Society on XX IGC, Dublin

***Conrad Ferris**, ARINI, Large Park, Hillsborough Co Down, BT26 6DR*

During the last week of June 2005, I was fortunate to be able to attend the XX International Grassland Congress at University College Dublin, Ireland. The theme of the Congress, 'Grassland – a Global Resource', was highly appropriate, with over 1000 delegates, from 80 different countries in attendance. The three key Congress Themes, 'Efficient production from grassland', 'Grassland and the environment' and 'Delivering the benefits from grassland', were addressed through 30 invited papers, 800 offered papers, and a number of focused discussion sessions. The range of topics covered was vast, and with three different sessions normally running concurrently, it was possible only to attend a proportion of the presentations. Some of the key points from papers that I attended are presented below.

The world demand for livestock products will increase rapidly during the next 20 years, with the greatest increase in demand being in the developing world, a consequence of rapid urbanisation and a growth in income. While part of this increase in demand will be met through the intensive sector, the demand for livestock products from grasslands is likely to increase. This is especially true in view of the increasing awareness by consumers of the links between diet and health. Indeed it is suggested that grasslands offer considerable scope to help create product differentiation in increasingly competitive markets. For example, meat and milk products are rich sources of omega-3 fatty acids and conjugated linoleic acid, with their content being enhanced by grassland production systems.

The important role of models, both in research and on farm, was highlighted. It was suggested that as it is impossible to do enough trials under a sufficiently diverse range that recognises environmental values, which at the same time ensures that farm incomes do not suffer.

The producer session and stakeholders forum provided lively discussion and an insight into the mindset of consultants, farmers and government, both at local level and abroad. Producers were urged to focus on returns from performance and not subsidies, and to realise that as costs continue to increase, profits must increase just to 'stand still'. Options include getting bigger and/or smarter, with a focus on 'controlling the controllable' if it drives profit. The

need to examine returns and know what drives profit was the key. Technical efficiency and business management were suggested to be equally important. Other interesting points were that genetic improvement should focus on profit and not 'beauty', and that labour should be put where profit is, and a policy of culling to reduce labour should be adopted. Despite the fact that the playing field is not level on a world basis, we now operate in a global market place, where the lowest cost, highest quality, will survive. The 'farmer voice' highlighted the need for independent research, and suggested that researchers need to be more proactive in advocating 'best practices'. High quality science was perceived to be critical for the continued development of economically viable agricultural systems. Research priorities have clearly changed over time, with the main thrust of DEFRA's research now on climate change, energy-waste-water, the environment and landscape and food quality/composition and human health. It was noted that 'more of the same' in R&D will not satisfy the customer in the future.

The poster displays which accompanied each session provided an opportunity to put names to faces, make contacts, and to discuss results on a more informal basis. While of environmental conditions, and across enough years, to provide answers to all questions, trials should be used to validate models. In addition, it was noted that models make science available, while computers make models available. However, while the expectations of the eighties in regard to computer based Decision Support Systems (DSS) have not been met, DSS do have huge potential to increase farm profitability, and to play a key role for a host of other users. However the benefits of DSS will only be realised if the message is delivered to someone who can respond to it, and if it is delivered in a form that is understood and usable.

Other papers of particular interest examined options to overcome seasonality of production in grassland-based systems, and recent improvements in forage conservation technology. With regards to the former, scope still exists in many situations for farmers to increase their reliance on grazed grass, while in situations where conservation is inevitable, improving the efficiency of the conservation process, and reducing the costs involved, are both critical.

A number of papers emphasised the important role that grassland based systems can play in maintaining and indeed enhancing the environment. However, it was noted that to manage grasslands for production and enhanced environmental values requires a redefinition of the frameworks within which management decisions are made, and a tailoring of

practices to suit the ways that farmers operate. The case was made for the adoption of a more conservative approach to utilising grasslands in order to sustain local ecosystems and to improve water quality, nutrient and energy cycling and biodiversity. It was suggested that there is a need to find a payment or market system. The numbers of posters on display were vast, careful selection allowed valuable information to be gleaned. In addition, the poster sessions allowed me to present the findings from two of my own studies.

The wide range of mid Congress tours provided delegates with an opportunity to go beyond Dublin and visit farms, research institutes and sites of historic and tourist interest. This provided opportunity for many of the themes examined within the formal setting of the Congress to be discussed at a more practical level.

Monaro Grasslands Research & Demonstration Project (NSW DPI)

The Project

A predominant land use of the Monaro region is the grazing of native grass pastures. The continued healthy functioning of these grasslands is vital from environmental, economic and social perspectives. The Monaro Grasslands Research, Development and Demonstration of Sustainable Grassland Management Project being carried out by the NSW Department of Primary Industries in conjunction with the Southern Rivers CMA is investigating land management strategies to maximise native grassland productivity while retaining or enhancing the natural resources of the Monaro.

Combined research / demonstration sites have been established within the Snowy Monaro Biodiversity Conservation Strategy (SMBCS) pilot area during 2003/04. All of these trials necessarily require long-term maintenance and monitoring, as they are investigating relatively slow ecological changes in a harsh and variable environment. There are 4 sets of experiments:

1. Two large scale grazing trials, one on basalt soil and the other on granite, are exploring the productivity gains possible in native grasslands on the Monaro through the use of fertiliser and

legume addition. These trials are monitoring the impact of these inputs on pasture and animal productivity and also on the stability of the native perennial grass base and overall grassland biodiversity.

2. Small plot trials will evaluate the suitability of a range of possible legumes and alternative perennial grass species as useful agricultural species in the Monaro environment. These trials will be conducted adjacent to the grazing trials.

3. A trial investigating the potential of revegetation of low productivity, non-arable sites with early successional native grass, shrub and tree species as a potential long-term control method for serrated tussock infestations on such sites.

4. Two small alternative fertiliser trials to evaluate the effects of recycled organic waste products that may be used in agriculture on the Monaro. These treatments are to be applied to both native and improved pastures.

The soil food-web and its biological role in temperate pastures

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Background

Farmers show an intense interest in the "living soil" and its biological role of recycling essential nutrients from plant residues and animal excreta. However, with a few notable exceptions, Australia's agricultural research has ignored the study of soil biology, aside from a few specialized soil organisms linked to root function and nitrification. This ignores the thousands of free-living species (decomposers), which drive the vital role of recycling nutrients from organic residues (detritus). In addition many of these species improve the physical structure of soils by building pore structure, binding water-stable aggregates, fragmenting organic residues and mixing them into the soil. When the temperate pasture ecosystem is viewed as a whole, by combining above and below ground processes, it is apparent that more than 80% of the total production is processed

collectively by these decomposer organisms within a structure called the food-web (See Figure). The biological production and turnover of their enzymes provides the functional linkage between soil biology and soil chemistry. However, soil carbon analyses (labile and total) are generally correlated with microbial biomass and may provide a useful surrogate for soil biological function.

There is sharp contrast between Australia's research priorities and those of northern hemisphere countries, where soil biology has been given equal or even greater importance than chemical and physical processes. There are at least two historical reasons for our relative indifference to soil biology. The *first* is that most of our soils are geologically very old, highly weathered and hence lacking in essential nutrients required for a productive agriculture that is based on sown exotic species. Understandably, our first priority for temperate pastures has been to apply fertilizer (notably "super") as a source of P and S, with legumes sown to provide a source of N. For sown pastures, this practice was little challenged until a recent recognition of potential environmental damage from off-farm nutrient losses, and in a lesser way a growing interest in organic farming. The Europeans started from a very different base, being endowed with mostly fertile soils and without need for an initial and substantial lift in levels of fertility required for a highly productive temperate sown pasture. The *second* Australian research reality was that virtually none of our early teachers of agriculture came with any significant background in soil biology. At the tertiary level the subject was virtually untaught. This inevitably has influenced our disciplinary background and thence the planning of our agricultural research.

An example:

To put some numbers on the role of decomposer biota in temperate pastures, we have chosen a high production sown perennial pasture at Armidale. This pasture was sown with phalaris and white clover, developed under light grazing and subsequently grazed at 10 dse/ha with Merino wethers 3-5 years of age. For this example, we have chosen data from one year of near average rainfall (819mm) that was reasonably well distributed. The choice was from a 20-year experiment with annual 'super' additions and a substantially stable pasture composition. For studying litter-soil biological processes, it is mandatory to dissect the *total* production of the pasture, both above and below ground. The yearly total pasture production in the year of choice was 15.8 tonnes of dry matter, which can be approximately divided as 60:40 above and below ground respectively.

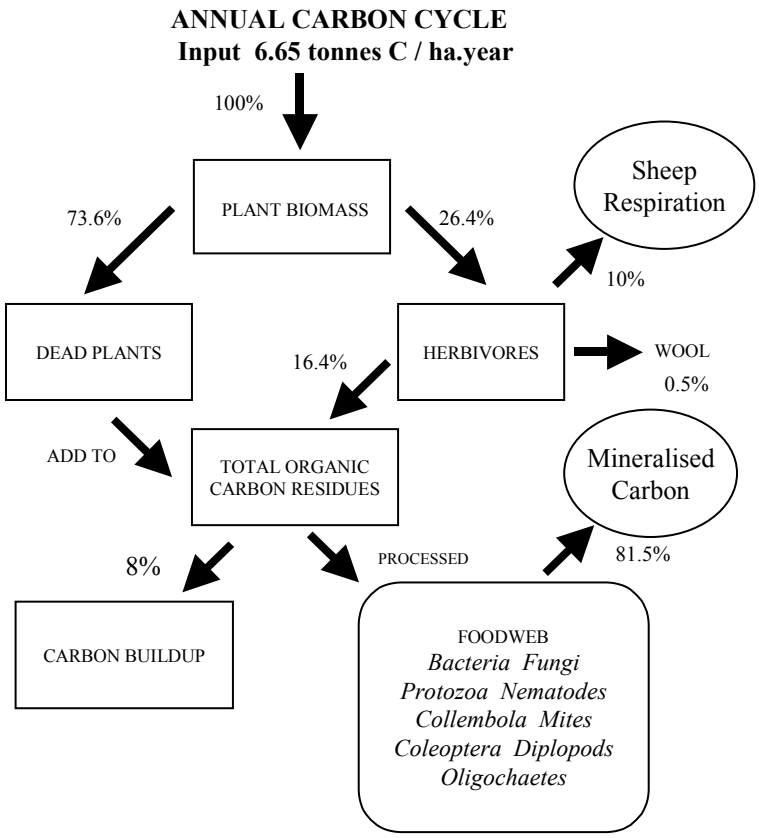

Figure: Annual carbon flows through high production sown temperate pasture.

The arrows show the annual flows of carbon between the labelled boxes, expressed as percentages of the annual plant production of 6.65 tonnes of carbon per hectare.

A brief description of the carbon cycle shown may be useful. The total annual pasture production is based on energy units (Mega-joules per hectare), which is transformed firstly to the total pasture dry matter (15.8 tonnes) and then to carbon (C) using a multiplier of 0.42. The Figure shows that the total carbon mineralization is (91.5%), made up from respiratory losses (CO_2-C) from the sheep flock and notably (81.5%) from the decomposer biota assembled in the soil food-web. These

carbon flows provide a basis for calculating the annual recycling of essential nutrients, provided that the ratios of carbon to nutrient are known for each step.

The results may surprise. Firstly, they indicate that raw wool production is trivial (0.5%) when compared to other system processes. If the enterprise had been based on breeding ewes and fat lamb production the percentage would have between significantly greater. Secondly, the 8% annual build up in soil carbon appears to be high. The previous pasture was native, unfertilized and grazed at 2.5 dse/ha. Its sown and fertilized replacement (above) was grazed with 10 dse /ha, its pasture production increased by two to threefold and the soil carbon store responded rapidly.

The vital year-to-year nutrient and physical functions of food webs has been noted. One additional and long-term function can be added. Without terrestrial decomposer organisms, and disturbance from fire and grazing, the grassland ecosystem would eventually become dysfunctional, with plant residues from building up to the point where seedling emergence would be suppressed.

Armidale soil food-webs:
The only published and substantive food-web for grassland is based on the short-grass prairie in the US (Hunt *et al* 1987, *Biol. Fertil. Soils* 3:57-68). Their synthesis was based on the feeding linkages of groups (see. Figure) on the basis of "who eats whom". Using the US structure and our own data (1968-98) we have recently constructed two more food-webs, which represent our "goal-post" temperate pasture function (Native, unfertilized and lightly stocked with 2.5 dse/ha *versus* Sown, fertilized pasture with 10 dse/ha). Quantitative functional differences between these two web responses are striking and importantly they are consistent with other elements of pasture ecosystem function. Together all these functional elements present a "three-fold" rule, wherein plant production, sheep production, stocking level, soil and litter biota and the economies of both carbon and nitrogen differ by about three-fold.

The reality is that the condition of our temperate grazing systems is widely distributed within these "goal-posts". Their performance reflects the impacts of climate, nutrient status, grazing disturbance and plant stability all of which interact with soil food-web function.

Extending white clover into the NSW dry margins

John Ayres and Leah Lane (Department of Primary Industries), Derek Woodfield (AgResearch Limited (NZ), and Robert Murison (University of New England)

White clover breeding in NSW to date has principally been undertaken through an Australasian alliance of the NSW Department of Primary Industries and Grasslanz Technology as the breeders, and Meat and Livestock Australia in conjunction with Agricom (New Zealand) Ltd as the commercial partner developing and marketing new cultivars, both in Australia and internationally.

The alliance set out from the early 1990's with a blueprint to develop 3 white clover types for beef/sheep pastures in Australia:-

1. A broad adaptation cultivar for summer rainfall and winter rainfall environments - Grasslands NuSiral was released in 1999

2. A cultivar with tolerance of summer-moisture stress for the high (850 -1,000 mm AAR) rainfall zone – Grasslands Trophy is in final seed multiplication and is set for commercial release soon

3. A "dry margins" cultivar for the 650 - 850 mm average annual rainfall – the current breeding project.

DPI and AgResearch plant breeders Dr John Ayres and Dr Derek Woodfield have recently begun work on project 3 - a major white clover breeding project that, where successful, will extend white clover use in Australia into regions previously too dry for white clover.

For example, grazing production in lower rainfall (650-850 AAR) margins of the perennial pasture zone in NSW (for example: North-West slopes, Hunter Region, Central/Southern & Monaro tablelands) can be limited by lack of reliable perennial pasture legumes. White clover cultivars are now being developed for these 'dry margins' that presently have few perennial legume options.

The breeding project is an MLA 'partnerships-in-innovation' project in which a commercial partner co-invests in the R&D project from the outset. This funding model ensures that industry and commercial priorities are at the forefront of planning and implementation of the research and that the products arising from the project are effectively commercialised and adopted.

This combination of research and industry partners will be a key to the success of this breeding project. In the current alliance, Agricom (New Zealand) Ltd and Grasslanz Technology Ltd will commercialise the cultivars developed in partnership with the breeder organizations NSW DPI and AgResearch. This proven partnership harnesses the plant breeding capabilities within AgResearch and the plant and animal science capabilities within NSW DPI to develop improved white clover cultivars for the Australian meat and livestock industries.

The project utilises promising breeding lines developed internationally by AgResearch as prospective parental germplasm that offers unique traits with the potential to dramatically improve drought-stress tolerance and animal performance. DPI is contributing 'drought selections', novel 'correlation–breakers' and ecotypes from its working collection plus germplasm developed in conjunction with AgResearch in Australia. The breeding strategy is a 'fast-track' 3 year breeding project combining the development and evaluation of breeding lines in conjunction with merit testing.

AgResearch has internationally recognised expertise in white clover improvement based on breeding projects extending back to the 1930's. A strong emphasis has been placed on innovations such as hybrid vigour, key traits that influence animal performance, nematode and virus resistance and the physiology of root systems as affected by moisture and nutrient stress. AgResearch has a white clover collection of more than 25,000 accessions and significant investments in gene discovery, molecular mapping, quantitative genetics and conventional breeding in white clover. DPI has significant expertise with white clover improvement based on accessing, conserving and characterising NSW's 800 line white clover germplasm collection, and evaluating germplasm in joint breeding projects with AgResearch. This expertise has also developed an extensive local knowledge-base of white clover technology.

This project is anticipated to develop new white clover cultivars with increased seasonal growth, improved persistence and better grazing value for dry margins environments. White clover cultivars that have the ability to be productive and persist in marginal rainfall environments will have potential to overcome feed-gaps and improve the grazing value of pasture, and to double the Australian white clover zone to at least 16 million hectares. Importantly, these cultivars with adaptation to moisture-stress and better drought tolerance will also have an increasingly important role to play in high rainfall pasture environments

that may in future experience greater heat-stress and dry conditions associated with global warming. The development of white clover cultivars with adaptation to these marginal rainfall environments will provide graziers with reliable options to improve grazing value, increase profitability of livestock enterprises and enhance the agricultural environment.

Best practice for phosphorus fertiliser application on improved pasture in Victoria

An extract from a Newsletter of the Grassland Society of Southern Australia Inc.

Background

Australian soils are generally deficient in phosphorus. Phosphorus is essential for plant growth and is involved in the production of sugars, fat and protein in the plant. A plentiful supply promotes rapid growth, hastens maturity and stimulates flower, seed and fruit production. Phosphorus is also important for root development.

Phosphorus fertiliser is applied to correct soil deficiencies and encourage the growth of introduced productive pasture species. Both manufactured and natural forms of phosphorus fertiliser provide the same nutrient to plants and should be applied using best practice procedures.

Environmental considerations

A well-fertilised and well-managed improved pasture is an environmentally sound form of land use. Benefits from dense, well-managed pastures include improved ground cover, reduced runoff and higher water usage by plants[1].

Most soils readily fix applied phosphorus, resulting in the applied phosphorus remaining within the top few centimetres of where it was applied. Research into phosphorus run-off on the Long Term Phosphate Trial at Hamilton Pastoral and Veterinary Institute has shown losses of applied phosphorus were at most 0.3%[2]. However, even small amounts of phosphorus can contribute to environmental problems in waterways[3], impacting on flora and fauna habitat and, ultimately, the marine environment. Best practice in applying phosphorus fertiliser can minimise potential fertiliser loss and reduce any impact on the non-target environment.

Effect on timing of application

Recent research by Agriculture Victoria has shown that phosphorus in fertilisers is quickly transferred into the soil[4]. Upon application, phosphorus fertiliser granules will absorb moisture (from the soil and the atmosphere) even in the absence of rain, and the phosphorus will be absorbed in the soil[5]. In practice, this means that phosphorus should only be applied when there is little chance of surface runoff occurring.

Past research has shown that no differences in pasture yield occurred with autumn versus summer phosphorus fertiliser application[6]. This means that phosphorus fertiliser may be applied earlier than the traditional autumn application without an increased likelihood of loss through runoff or yield. An added bonus is the early delivery price discounts offered by some fertiliser companies. Early application can coincide with a higher storm risk, so weather forecasts should be taken into account. Fertiliser application should be avoided if heavy rains are forecast within four days.

1. Optimise the plants' use of applied phosphorus

- Determine optimum soil phosphorus levels, using soil tests and plant tissue tests.
- Fertilise soils deficient in phosphorus before the autumn break to maximise profitability.
- Maintain soil phosphorus levels in the optimum range, and monitor soil fertility levels with soil tests.
- Ensure other nutrients and trace elements are adequate to maximise the benefit of phosphorus application, using soil tests and plant tissue tests.
- Apply fertiliser according to soil test results and pasture or crop requirements.

2. Reduce the potential for phosphorus loss

- Avoid applying fertiliser when ground cover is less than 70%, such as overgrazed, bare, drought-affected or fire-affected pasture.
- Prevent fertiliser from entering waterways or water storages during application.
- Do not apply fertiliser if heavy rain is forecast within four days.
- Avoid applying fertiliser to waterlogged soils or soils likely to flood following application.
- Locate fertiliser storage sites away from potential runoff areas.

Research into the effects of phosphorus fertiliser is continuing at several sites in Victoria with the aim of lifting productivity and minimising environmental impacts. Fertiliser users should keep themselves informed of the results from these research projects and follow best practice when applying fertiliser.

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Further information:

Grassland Society of Southern Australia Inc. (www.grasslands.org.au)

Fertiliser Industry Federation of Australia Inc. (www.fifa.asn.au)

Department of Primary Industries (www.dpi.vic.gov.au)

Department of Sustainability and Environment (www.dpi.vic.gov.au)

Environment Protection Authority – Victoria (www.epa.vic.gov.au)

The Grassland Society of NSW gratefully acknowledges the Grassland Society of Southern Australia for the use of this material.

The Cicerone Farms: Under the Microscope

Article contributed by Prof. Jim Scott, University of New England

Members of the NSW Grassland Society may be interested to hear a little about a recent 1-day symposium titled "The Cicerone Farms: Under the Microscope" which was held in early May, 2005 in Armidale NSW. It focused on presenting a summary of findings from the project to both Cicerone members and other interested parties – more than 80 people attended.

The Cicerone Project commenced in 1998 with funding from The WoolMark Company (now Australian Wool Innovation) and membership fees. Its aim is to improve the profitability and sustainability of livestock production on the Northern Tablelands. It operates under the motto "Compare – Measure – Learn – Adopt" and hence the day was all about presenting the evidence collected thus far about whole farm performance.

The Project is led by producers from the Northern Tablelands and benefits from the participation of research, education, extension and consulting partners from the region.

In 1999, planning commenced for a Central Learning Farm in which three different whole farm management systems could be investigated. Cicerone members decided what systems they wanted to see compared. Accordingly, the three farmlets differ in the level of inputs used (fertilisers and sown pastures) and their systems of grazing management (flexible rotations using 8 paddocks vs. intensive rotational grazing employing 33 paddocks).

This symposium reported the findings since the first management treatments were imposed in July 2000. A total of 26 papers were presented, 7 of them being from producer members. Other papers were contributed by extension and research colleagues and the 4 postgraduate students currently involved in the project.
In addition, a 10 minute video – showing a history of the farmlets – was shown.

The findings cannot be adequately summarised in a short article like this but to whet readers' appetites, some of the findings presented on the day included:

- An analysis of recent climate showing that the past 5 years have been below average in terms of plant available water,
- This has resulted in limited legume growth so far, in spite of legumes being re-sown several times,
- Large differences in soil fertility have been created through fertiliser additions but the dry weather has limited the growth response observed to date,
- The establishment of pastures and trees have been successful in spite of challenging seasons, thus confirming recommended establishment guidelines,
- The botanical composition changes suggest that the fertilizer responsive species are declining, especially when there is less fertiliser and less control of grazing.
- Each farmlet has been subjected to similar grazing pressure (that is, the balance between pasture growth and animal demand) allowing substantially higher stocking rates to be carried on the 'high input' farmlet,
- Per animal performance has tended to be highest on the farmlets practising flexible grazing,
- Parasite loads of all classes of sheep have been substantially lower on the intensive rotationally grazed farmlet requiring many fewer drenches,
- Large differences have occurred between farmlets in animal weights, fat scores, rates of twinning and percentage lambing,
- There was a good relationship between fat score at joining time and lambing performance,
- The economic data presented show large difference in net profit per farmlet occurring over time with early investments in fencing and other inputs taking some years to be recouped, and
- A range of presentations from producers gave insights into how they saw the different farmlets performing relative to each other and pointing out those aspects that producers saw as most relevant to their operations.

The presentations are all summarised in a Proceedings and include papers on aspects of climate, soil fertility changes, pasture establishment, botanical composition, animal performance, wool production and quality, animal parasite burdens, matching pasture supply and animal demand, tree plantings as well as the economic outcomes thus far.

The symposium was co-convened by the Cicerone Project Inc. and the University of New England's Centre for Sustainable Farming Systems.

The day was chaired by Australian Wool Innovation Program Manager, Ian Rogan, and summed up by Geoff Saul of the Victorian Department of Primary Industries.

This summary points out the problems of conducting whole farm system studies and makes several recommendations in order to get the most out of any further studies on the farmlets.

Copies of the 100 page symposium proceedings (either printed or on a CD) are available from Ms. Caroline Gaden, Executive Officer, Cicerone Project, PO Box 1593, Armidale 2350 for a cost of $25 (including postage).

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TALAHENI: More than a decade of success in managing saline watertables

***John Ive**, Canberra*

Dryland salinity becomes visible in the landscape when salty watertables rise to near the soil surface killing the vegetation and leaving the surface vulnerable to other erosion processes. Watertables rise because of an imbalance between that portion of the rainfall that enters the soil profile and the capacity of the current vegetation to use this water before it drains below the rooting depth of the vegetation. Consequently there is a need to manage ground water to minimise deep drainage by ensuring that the type of vegetation has the capacity to use soil moisture is well matched to the characteristics of the soil types and rainfall patterns.

Talaheni is a 250 ha property in the Yass Valley area of NSW running a mixed grazing operation with a self-replacing flock of ultrafine Saxon merinos, a commercial Angus herd and small farm forestry venture. Rainfall averages 730 mm per year and is relatively uniformly distributed throughout the year (February with 39 mm and July with 74 mm the extremes). The Yass Valley is widely noted for its salinity status and *Talaheni* is situated in some of the worst affected area. Twenty years ago saline seeps were common, pastures poor and declining, erosion sites active. With a combination of approaches the worst of the salinity has been rehabilitated and now support productive perennial pastures and groundwater levels over substantial areas are declining leading to increasing pasture and animal productivity.

How was this achieved?

In 1988 a major recharge area was identified- an area of near vertical sloping fractured beds of Ordovician meta-sediment that had been almost totally cleared of trees only to be replaced by a poor covering of annual and native pastures persisting on very shallow and infertile soil. The top of the hill was a sheep camp with barley grass, capeweed and a panoramic view in all directions. Due to the shallow rocky infertile soils and exposure deep-rooting perennial pastures would be extremely difficult to establish and most unlikely to persist and develop the vigour necessary to consistently prevent further recharge.

Red box and Ironbark trees were planted at about 1200 stems per ha and a series of eight piezometers installed to measure watertable response in the surrounding pasture land. These

piezometers have been measured at least once per week for over 15 years and although exhibiting an annual cycle show a persistent declining trend depending upon the distance the piezometers are from the edge of the tree plantation despite an increasing rainfall trend until end of 2000. Close to the trees (50 metres) the decline has been over 17 cm per year dropping to 3.5 cm per year 430 metres from the trees. In total, the influence of up to 2 metres decline now extends more than 500 metres from the trees with the watertable being lowered for more than 50 hectares of pastured land for every hectare planted to trees. This lowering of the watertable has lead to a reinvigoration on the flat of the Phalaris pasture that is now able to play its part in further lowering the watertable.

Although average weekly rainfall is relatively uniform throughout the year (varies greatly from year to year however), the average watertable response shows a very strong seasonal trend. A peak is reached in late spring and a trough in early winter. This seasonal trend follows very closely the trend in average evaporation. Evaporation provides a good surrogate for water use by plants as well as the general evaporative demand.

What are the lessons from this?

Winter rainfall remains a challenge because evaporation and current pastures are unable to use the rainfall received in the winter months. In the absence of super winter-active pastures (incidentally we average 100 frosts per year) we have to rely upon vegetative systems drying out the soil profile during the warmer growing months of late spring, summer and autumn to provide storage capacity for winter rain within the rooting depth so as to minimise drainage below this depth. This stored soil moisture is retained for pasture growth when temperatures warm up in the spring.

What does this indicate?

1. The hydrological processes currently being expressed at this site are localized- cause and affect is in close proximity. This is not always the case and consequently may influence the effectiveness of local actions.
2. A small and unproductive recharge area (in this case a small area of deeply fractured rock providing high infiltration opportunities) can put at risk a relatively large area of productive land.
3. Consequently a relatively small area of trees can provide protection to a much larger area of productive pasture land. The trees only have to use a relatively small proportion of the rainfall to have a substantial impact upon watertable levels.
4. The recovery process although slow is persistent and still

continues with no sign of a diminishing effect after 18 years.

5. Watertables respond to a number of factors including rainfall (duration and intensity), evapotranspiration (and therefore temperature, wind, humidity), barometric pressure, vegetative cover and current capacity to grow, soil water storage capacity and current soil moisture status. It is only by regular measurement of watertables that one gets a feeling for how these factors interact to influence watertables and provide the background for effective watertable management.

What are the lessons?

1. By undertaking to constantly read the landscape one can come to appreciate the processes that are operating and then seek approaches that are in harmony with these processes to avoid undesirable impacts.
2. By keeping detailed and regular records (piezometer and salinity, rainfall and paddock grazing records in this case) it is easy to demonstrate the gains being made over time.
3. One does not need to wait until all knowledge and understanding is available before taking steps to reverse degradation processes.

DON'T FORGET

YOUR 2005/2006 SUBSCRIPTION

IS NOW DUE

From the President's desk

As this newsletter goes to the printer, most of NSW is enjoying at least a good average spring, with some areas boasting "the best for 10 years"! I trust all the Grassland members (and others too!) are experiencing good pasture, livestock and crop prospects.

The Society is continuing to make progress in a number of areas. We are currently encouraging our sponsors from last year to once again support our efforts to improve the transfer of sound technology among all stakeholders in our agricultural industries. Letters to current and new sponsors have been sent and we are awaiting replies. If any of our current sponsors have yet to respond to our letter, we would very much appreciate your reply. Sponsorship benefits have been expanded on previous years and with a growing membership, it represents a sound investment as well as supplying the vital support that the Society needs.

Next year's conference will be held at Wagga Wagga. Already, a hard working committee is putting together a program that is shaping up as both challenging and very informative. As we have not met at Wagga for some years, this will provide an excellent opportunity to highlight developments in agricultural research and farm practice from the Southern area of the state. A summary of the draft program will appear in the next newsletter.

I am keen to hear from members whether there would be sufficient interest in participating in a study tour - possibly to New Zealand next year. The Society would be able to coordinate such an activity, provided there are adequate numbers. Please contact me or another committee member or e-mail our secretary – secretary@grasslandnsw.com.au.

Cheers,

Mick Duncan
President

Broadleaf weed seedlings of temperate crops and pastures

By J J Dellow, Weeds Agronomist, NSW DPI Orange
(with original reference drawings by Jennifer Tarleton)

Published by New South Wales Department of Primary Industries.
Price is $30.00 and is available from the Bookshop, NSW Department of Primary Industries, Orange Agricultural Institute, Forest Road, Orange NSW 2800, or telephone 1800 028 374, or fax 1800 642 065.

Jim Dellow is to be congratulated on this very valuable 112 page publication. As he states in his Introduction "---it is critical for farmers, graziers and agriculturists to correctly identify weeds and crop or pasture plants at the early seedling state when the weeds are easiest to control, have not set seed and have not significantly competed with crops and pasture species". This booklet is an outstanding contribution to seedling identification.

It covers 86 weeds; two crops, one forage crop and six legume pasture species. The guide to the use of this field guide at the beginning pages is a very clear exposition of parts of leaves and leaf shapes. The original reference drawings by Jennifer Tarleton are excellent. In addition to the photographs there are some valuable short notes on several of the species eg "subterranean clover, one of the most important pasture legumes".

I would highly recommend this publication to all our members.

Haydn Lloyd Davies

We would like to wish all members of the Grassland Society and their families a happy Christmas and best wishes for good seasons in 2006.

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 563 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.

OFFICE BEARERS OF THE GRASSLAND SOCIETY OF NSW - 2005-2006

STATE EXECUTIVE

Mick Duncan (President)
Rob Eccles (Vice President)
Dianne Smith (Secretary)
Linda Ayres (Treasurer)
Rob Eccles (Sponsorship)
Committee: John Coughlan, Hugh Dove, Haydn Lloyd Davies, Richard Bloomfield, David Harbison, Frank McRae, Lester McCormick, Belinda Hackney, Peter Johnson, Mike Keys

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APPLICATION FORM

Name: ……

Address: ……..
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Subscription for 2005/2006 (July to June) is $50. This entitles you to copies of the Newsletters and a copy of Annual Conference Proceedings.

For more information, please contact the Society's Secretary, Dianne Smith (telephone: 02 6362 6150).

Send membership application to:

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