GRASSLAND SOCIETY OF NSW INC.

Newsletter

Once again we are ready to wrap up another year – for many it has been a tough year on many fronts –drought, poor water security, many many hours of feeding and now bush fires. Living and working in the Northern Tablelands I can say that conditions have been unprecedented - yes this word is overused, but unfortunately in this case it is true.

A welcome shower of rain as I write this has given me a boost and reminds me that it will rain properly again one day and until it does all we can do is keep putting one foot in front of the other every day and support ourselves, our families and our communities through it all as best we can. Remember there are a number of support systems out there. Check out https://www.dpi.nsw.gov.au/climate-and-emergencies/droughthub and https://www.rfs.nsw.gov.au/plan-and-prepare/bush-fire-survival-plan for some useful resources and tips.

The last newsletter for 2019 is packed with great articles and I hope you get a chance to read through it over the holiday season. The third and final article on developing and using more efficient P pasture systems by Richard Simpson (CSIRO Canberra) and team appears on page 2. On page 5, Jeff McCormick from CSU Wagga Wagga guides us through assessing the triggers to renovating lucerne pastures post drought. Other articles in the newsletter includes a report on the New Zealand Grasslands Association annual conference (page 9) as well as an article outlining on what to look for when assessing pasture dieback in northern NSW and coastal regions (page 10).

Remember if you are looking for a unique present this Christmas consider a GS NSW membership. Membership includes a quarterly newsletter, a copy of the conference proceedings, discounted registration fees to the conference & other society events, eligibility for travel grants (after two years membership) and access to archived information & publications on the Society's website - at $60/year - its great value.

On behalf of the GS NSW committee I wish you and your families a happy, safe and relaxing festive season and a prosperous and wet year in 2020.

Carol Harris, Editor

In this newsletter

Don't forget to renew your GS NSW membership subscription.

Go to www.grasslandnsw.com.au and access the payment page via the green "JOIN NOW" button.

Progress in research to develop a more P-efficient pasture system

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In two previous Newsletter articles we have outlined how "critical" soil test benchmarks for phosphorus (P), sulfur and potassium have been developed to guide fertiliser use in pastures (Vol. 34, 2 June 2019), and then considered some practical issues for soil testing and application of the critical soil test benchmarks for P (Vol. 34, 3 Sept 2019).

The "critical" soil test P value is defined (technically) as the test value (typically mg Colwell P/ kg soil for a 0-10 cm depth soil sample) that will result in 95% of maximum yield. It is not mandatory to fertilise soils to achieve the critical P benchmark. However, this level of soil P fertility sets up the conditions under which a clover-based pasture can potentially grow at its fastest and water-use efficiency will be maximized. Provided attention has been given to any other potential constraints to production (i.e. clover content of the pasture is reasonable, no other nutrients are limiting, etc.), the practice of maintaining soil test P concentrations close to the critical P level should deliver high production per hectare and the most effective use of P fertiliser that is possible with current technology.

The technical challenge of low phosphorus efficiency in pastures

A significant technical challenge remains. The "efficiency" of P use in pastures is low. In an ideal world we would like to apply only the amount of P (i.e. as fertiliser) that we remove from the soil (i.e. in the animal products we sell off the farm). "Phosphorus balance efficiency" is an efficiency measure based on the ratio of P inputs and P outputs from a farm. For example, in the ideal situation when P applied equals P removed: P balance efficiency = 100 x (P input/P output) = 100%.

The reality for grazing enterprises in southern Australia is that median P balance efficiencies are: 11%, 19% and 29% for sheep, beef and dairy enterprises, respectively (Weaver and Wong 2011). The low P balance efficiencies are mostly due to our soils which accumulate P when fertilised (sometimes referred to as: "P-fixation"). Figure 1a shows the P budget from a fertilised pasture experiment grazed by sheep near Canberra. This particular grazing system was fertilised to maintain near-optimum P fertility and carried 18 sheep/ha (Simpson et al. 2015). Phosphorus balance efficiency was 20% (i.e. fairly typical). Removal of P from the grazing system averaged ~2 kg P/ha per year in wool and animal liveweight. However, it was necessary to apply ~10 kg P applied/ha as fertiliser to maintain pasture and animal production, because 8 kg P/ha was accumulating each year in the paddock (mostly in the soil).

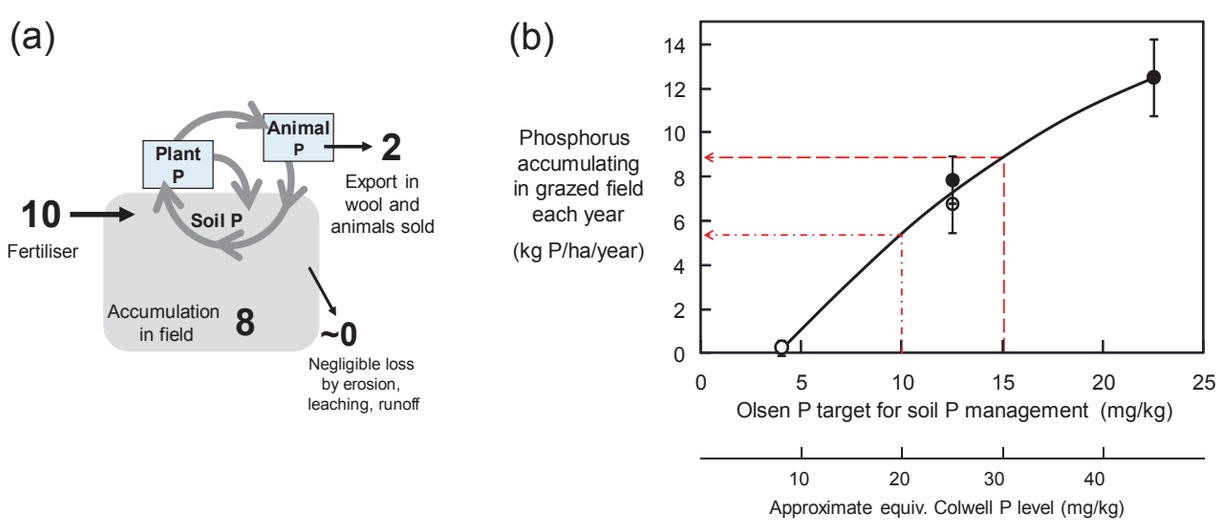

Figure 1. (a) Annual phosphorus budget (kg P/ha/year) of a permanent perennial grass and sub clover pasture fertilised to maintain near-optimum soil P fertility and grazed by sheep for wool and meat production (Simpson *et al*. 2015), and (b) average amounts of P accumulated each year in paddocks from the same grazed, fertiliser experiment. The paddocks were being maintained with low soil P (Olsen P: 4-6 mg P/kg soil; 9 sheep/ha [○]), nearoptimal soil P (target Olsen P range: 10-15 mg P/kg soil; 9 or 18 sheep/ha [•]), or were over-fertilised (target Olsen P range: 20-25 mg P/kg soil; 18 sheep/ha). The experiment was run near Canberra. The dashed line shows the recommended optimum soil test P level for subterranean clover pastures; the dash-dot line shows the optimum soil test P level for serradella (Sandral *et al*. 2019).

The experiment also examined the P budgets of pastures grown with suboptimal P supply (this supported low pasture and animal production; 9 sheep/ha), and pasture that was over-fertilised (production was roughly equivalent to the optimal treatment; 18 sheep/ha). The experiment showed that the amount of P accumulating in paddocks each year was related to the soil test P concentration at which the soil had been managed (Figure 1b).

There is one obvious message from Figure 1b: do not over-fertilise because it will lead to unnecessary P accumulation in your soil (you will also not produce any more pasture by doing so). Some farmers say this is just “P in the bank”, but we know that the availability of P to plants declines progressively after it has been applied to soil because phosphate continues to react with the soil. So excessive investments in the P bank give a very poor return.

The second message was that if we could find productive pasture legumes with lower critical P requirements than subterranean clover, the rate of P accumulation in fertilised paddocks would also be lower (Fig 1b). This should mean that less P fertiliser would need to be applied.

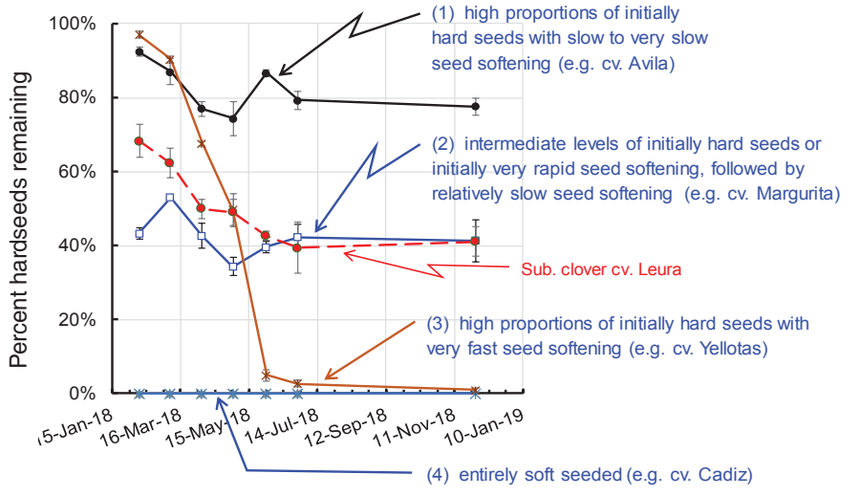

Figure 2. Seed softening patterns observed at Canberra in 2018 among a subset of serradella cultivars tested in a larger experiment. Note the seed softening pattern of subterranean clover cv. Leura which we suspect is near the ideal for a drought-prone climate. Sub clover was immediately available for germination at the start of the year, more seed softened during late summer and autumn giving protection against a false break, and there was residual bank of hard seeds that remained variable in the next year.

Finding P-efficient pasture legumes

A search for P-efficient legumes was commenced. The responses of 15 alternative pasture legumes to P fertiliser were examined at four sites near Yass and Wagga Wagga. Most legumes had critical P requirements that were similar to subterranean clover (Sandral et al. 2019). Three forage crop legumes (crimson, purple and arrowleaf clovers) and two pasture legumes (yellow and French (aka pink) serradella) had lower critical soil test P requirements in most years. In soils with phosphorus buffering indices (PBI) between 40-80, subterranean clover needed to be fertilised to 30-35 mg Colwell P/kg soil (or 15 mg Olsen P/kg). However, these P-efficient alternative legumes could be fertilised to 20-25 mg Colwell P/kg soil (or 7.5-10 mg Olsen P/kg) to achieve near-maximum herbage yield.

Serradella-based pastures: how close are we to having a viable option for permanent pastures?

Serradellas were first introduced to Australia for use on deep sandy soils where subterranean clover did not persist. They continue to be grown successfully in permanent pastures on light-textured, acid soils in WA and northern NSW (e.g. Coonabarabran area). Relatively recently, the Australian development of hardseeded varieties of French serradella (e.g. cv. Margurita) has underpinned expanded use as a legume pasture phase in crop rotations (WA and the NSW Riverina). However, wider use in permanent pastures on heavier textured soils has not occurred.

Current research has thrown some light on why this may be the case. Three observations stand out: (1) there are some large differences among the serradella cultivars in their seedling regeneration and persistence, (2) some varieties are flowering much earlier than we think they should when they are sown on an early break of season, (3) there has been a recurring problem of low serradella regeneration in the year after a new serradella pasture is sown. This may be a problem for specific cultivars (more data is needed). The problem corrects itself in the third growing season when the serradella germinates in reasonable numbers. Low regeneration in year 2 is not desirable because it may give weeds and other competing species a chance to get a strong foothold in a new pasture.

Flowering date stability: One of the factors important for seed production and persistence is “stable” flowering dates. Legume cultivars are selected for their ability to fit the length of growing season in each farming district and need to flower reliably after the risk of frost has diminished. There also needs to be adequate time between the end of frost and the start of the summer drought for seeds to form.

Flowering time experiments have shown that subterranean clovers often have near-perfect flowering date stability. They can germinate on a break at almost any time between February and June and they will flower reliability at their characteristic flowering date. However, only a handful of the serradellas have relatively stable flowering dates (Boschma et al. 2019).

Yellow serradella cv. Avila, which has so far been an outstanding yellow serradella for seedling regeneration in southern tablelands experiments, is one of the more stable flowering varieties. It is also of late season maturity, rather similar to subterranean

clover cvs Goulburn and Leura, but may not be as productive as these clovers. French serradella cv. Margurita (which is of a similar maturity type to subterranean clover cv. Seaton Park and so far has yielded similarly to sub clover) proved to have very unstable flowering dates.

Hardseededness, seed softening and the year-2 seedling regeneration issue: Hardseededness prevents the seed from germinating prematurely after a false break during summer. In the clovers, hardseededness breaks down over summer (seed softening) and a proportion of the seeds produced each year are then primed to germinate when the season breaks. Some seeds remain hard for one or more growing seasons and these are the seeds we rely on for pasture regeneration after a long-term drought.

The patterns of hardseededness and softening in the serradellas have been found to be very diverse (Fig. 2). Seed softening in many current cultivars is very slow (it may take two years or more to soften each cohort of seed). This is probably why we are seeing poor regeneration of some serradella varieties in the year after they were sown. Although not desirable, this is not a failure of these varieties as they will often bounce back in year 3. The research has confirmed that having some level of hardseeds is crucial for persistence because serradella varieties that were entirely softseeded have not survived during drought.

Conclusion

This research is still in its infancy and progress has been hampered by three years of drought. Serradella pastures potentially have a lot to offer, but we are concerned that the highest yielding varieties may not be persistent enough compared with subterranean clovers. The good news is that the research has identified a small number of 'best-bet' serradella varieties with relatively stable flowering dates for further work. These should now be taken forward to test their production and persistence under farm paddock conditions. The project has also shown there is a very wide diversity among serradellas in the rate of seed softening, so it is possible that cultivars with more ideal hardseededness and seed softening profiles can be developed.

Further reading:

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Acknowledgements:

Research to increase the effectiveness of phosphorus use is conducted under the "RnD4P-15-02-016 Phosphorus Efficient Pastures" project. The project is supported by funding from the Australian Government Department of Agriculture and Water Resources as part of its Rural R&D for Profit program, Meat and Livestock Australia, Dairy Australia, and Australian Wool Innovations Ltd.

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Post-drought lucerne pasture viability – how to assess trigger points to renovate

Jeff McCormick, Lecturer Charles Sturt University Wagga Wagga

Introduction

After a period of drought it is likely that lucerne pastures have degraded. Lucerne is a perennial legume species that does not recruit seedlings in the field and the population declines over time. Persistence of a lucerne pasture is related to the density of lucerne plants. Environmental stresses such as drought can significantly decrease the density of a lucerne stand. Therefore we can use a critical density of the lucerne to determine if management is required. Deciding which pastures to remove or retain will be an important decision prior to sowing. Selecting the correct management practices that increase forage production may alleviate feed deficit in the year ahead.

Determining a benchmark for lucerne density

When sufficient soil water is available, lucerne production is limited by the amount of light that is intercepted. These conditions can occur in many dryland areas in spring and it is lucerne density that will limit the amount of light intercepted by the crop. Maximum production under irrigation can be achieved with a lucerne density of 30 plants/m^2 (Palmer and Wynn-Williams 1976). Within the mixed farming zone densities between 20-40 plants/m^2 are sufficient for maximum production (Dear *et al*. 2007; Dolling *et al*. 2011). This may seem low particularly in comparison to the number of plants sown but the population of lucerne declines over time and does not recruit seedlings. When lower lucerne densities occur a companion species such as subterranean clover can intercept light increasing pasture production. Wolfe and Southwood (1980) suggested that at Wagga Wagga NSW that 10 lucerne plants/m^2 was adequate when lucerne was sown with a companion species such as subterranean clover.

Under low rainfall conditions the plant density required for maximum production is likely to be lower. Virgona (2003) demonstrated that lucerne density of 12 plants/m^2 could deplete the soil water to equivalent levels as higher densities. Presuming that water use is strongly related to lucerne growth that may indicate that 12 plants/m^2 could produce similar levels of biomass under water limited conditions. Similarly, a low rainfall site at Trangie and Condobolin, Bowman *et al*. (2002) demonstrated that 8 plants/m^2 was the critical value below which lucerne biomass production decreased.

Companion species

Subterranean clover or other annual clovers are the most useful companion species due to quality and nitrogen fixation. Research has indicated that 1000 seedlings/m^2 is sufficient for maximum pasture production from subterranean clover (Silsbury and Fukai 1977). Environmental conditions and perennial density affect seed production. Drought can lower the seed bank level of companion species. Other species can also be important in lucerne pastures. Barley grass can provide important feed early in the season but in spring quality will decrease and animals maybe injured due to grass seeds. Barley grass should be controlled in the winter which will reduce the pasture production. Annual ryegrass can also be a very useful pasture species in a lucerne stand due to high growth rate and high quality. If the pasture is likely to be returned to annual crops in the next two years it should be spray topped in the spring time to reduce seed set.

Decision making for the year ahead
As sowing time approaches growers will be trying to determine how much pasture to sow as well as what management strategies can be used

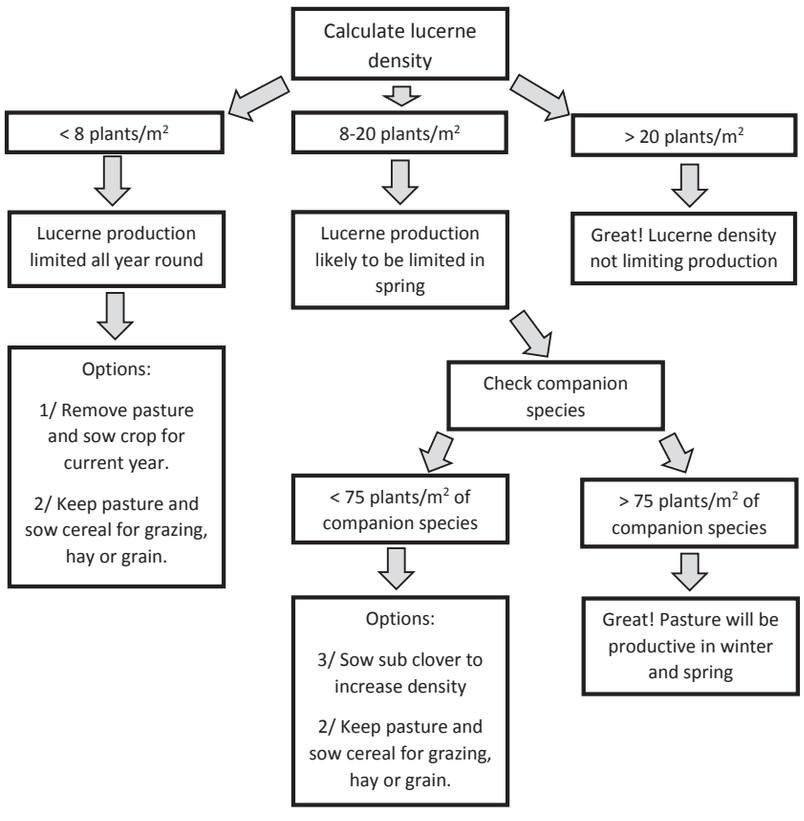

Figure 1. Pasture decision support tree

in existing pastures. Pasture removal should be for those pastures that have degraded over the last season and that are unlikely to be productive in the year ahead. Firstly all pastures should be assessed for lucerne density. This can be done by using a 50 x 50 cm quad randomly placed 30 times across the paddock. Determining actual plant numbers can be difficult in higher density stands as individual plants close together cannot be distinguished other than by digging up and counting tap roots. Paddocks should be ranked depending on density.

Companion species can also be assessed. This could be done using residue from last year i.e. grass seed heads or sub clover burrs. Very small areas (< 1m^2) could also be wet up from March to determine the number of seedlings that emerge. It is difficult to determine a critical value for subterranean clover seedling density. After the previous dry springs it is unlikely that any paddocks will reach the critical number of 1000 plants/m^2. Comparing a density to that achieved after a low sowing rate of subterranean clover would result in a critical value of 75 plants/m^2. There would be no point re-sowing subterranean clover if the density was already greater than that which could be achieved by sowing.

The decision tree (Figure 1) outlines different options for available for paddocks depending on the density of lucerne determined.

Options for pasture renovation

There are a number of options in response to pastures that have a low density of lucerne. It is recommended not to re-sow lucerne back into old lucerne stands due to disease and autotoxicity (Kehr 1983). Pastures could be over sown with subterranean clover or a cereal to increase forage production. Alternatively the pasture could be removed to sow an annual crop.

Using the decision support tree (Figure 1) will lead to the various options described below:

Option 1 - Remove pasture and sow crop for current year.

If there is no requirement for the pasture or forage can be supplemented elsewhere with sown cereals (see option 2) then this paddock should be brought back into the cropping phase.

Opportunities – Moves the paddock into the cropping phase.

Limitations – If pasture is still present in autumn it is likely that the soil has not stored summer rainfall and the lucerne will be difficult to remove. Does not provide any extra pasture.

Option 2 - Keep pasture and sow cereal for grazing, hay or grain.

Cereals can be successfully direct drilled into lucerne stands. Dry sowing can be an option but should not be undertaken too early as lucerne will compete strongly for moisture in the autumn. Cereal species used will depend on what is required. Oats is vigorous and will provide early feed. Barley could be late sown and yet is still vigorous. Winter wheat could be suitable for early sowing with the potential for grain although late grazing may limit significant grain recovery. The opportunity for hay or silage would be high and enable refilling of haysheds. Decision on cereal species will also depend on seed cost and availability.

Opportunities – high quality forage for autumn, winter and early spring. Potential for hay, silage or grain.

Limitations – Cost of sowing operation and seed. One year only. If lucerne density is low then there is still limited production from the lucerne.

Option 3 - Sow sub clover to increase density

Ideally high sowing rates of sub clover will ensure a fast establishment for grazing. Seed should be sown rather than broadcast on the soil as surface sowing success rate is low. Pre-sowing herbicides should be used.

Opportunities – Should increase the productivity of the pasture for the next few years.

Limitations – Can be an expensive option. Number of seeds sown is much less that an established seed bank and therefore growth will be slower.

Conclusion

Pastures will have likely to have degraded following the drought. It is crucial that pastures are assessed to determine their productive potential. Management options can be used to increase forage supply to ensure that livestock enterprises are not impacted by poor pastures.

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Research Update

Keeping you up-to-date with pasture and grassland research in Australia. Abstracts of recently published research papers will be reprinted as well as the citation and author details in you wish to follow up the full paper.

Elevated CO2 causes large changes to morphology of perennial ryegrass (*Lolium perenne*)

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Abstract: Plant morphology and architecture are essential characteristics for all plants, but perhaps most importantly for agricultural species because economic traits are linked to simple features such as blade length and plant height. Key morphological traits likely respond to CO2 concentration ([CO2]), and the degree of this response could be influenced by water availability; however, this has received comparatively little research attention. This study aimed to determine the impacts of [CO2] on gross morphology of perennial ryegrass (Lolium perenne L.), the most widespread temperate pasture species, and whether these impacts are influenced by water availability. Perennial ryegrass cv. Base AR37 was grown in a well-fertilised FACE (free-air carbon dioxide enrichment) experiment in southern Tasmania. Plants were exposed to three CO2 concentrations (~400 (ambient), 475 and 550 µmol mol–1) at three watering-treatment levels (adequate, limited and excess). Shoot dry weight, height, total leaf area, leaf-blade separation, leaf size, relative water content and specific leaf area were determined, as well as shoot density per unit area as a measure of tillering. Plant morphology responded dramatically to elevated [CO2], plants being smaller with shorter leaf-blade separation lengths and smaller leaves than in ambient (control) plots. Elevated [CO2] increased tillering but did not substantially affect relative water content or specific leaf area. Water supply did not affect any measured trait or the response to elevated [CO2]. Observed impacts of elevated [CO2] on the morphology of a globally important forage crop could have profound implications for pasture productivity. The reductions in plant and leaf size were consistent across a range of soil-water availability, indicating that they are likely to be uniform. Elucidating the mechanisms driving these responses will be essential to improving predictability of these changes and may assist in breeding varieties suited to future conditions.

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Vale Hugh Dove

Hugh Dove (AM) joined CSIRO in 1975 and over 40 years became an acknowledged international expert in animal nutrition, rising to the position of Chief Research Scientist. He published 250 scientific journals and Chapters and revised and rewrote books related to the nutrient requirements for ruminant animals, including driving policy, legislation, welfare and animal ethics. He was an elected Fellow of numerous learned institutes and societies with appointments to important committees and science academies in Australia and overseas.

Hugh pioneered the use of the new alkane technique that used the signature waxes present on different plant leaves to determine the exact components of grazing animal diets by analysing faecal samples. This new technique revolutionised animal nutrition as it replaced invasive measurements of gut content, or the laborious visual observations of feeding behaviour, to precisely measure an animal's diet selection. Hugh continued to teach and mentor others in its use globally, and to expand its application from grazing animals to other domestic and wild animals.

More recently Hugh focussed his attention on dual-purpose crops, both wheat and canola. Hugh's remarkable scientific and practical contribution to this area was to realise that wheat leaves, unlike pasture grasses, are very low in sodium, and specifically in the digestive system of ruminants such low sodium can affect magnesium uptake with significant effects on animal health and growth rates. Hugh's research in this area in the late-2000s led to widespread adoption of simple and cheap salt supplements to animals grazing wheat, which increased animal growth by up to 40% and generated a 15:1 return on investment for farmers. The research remains a remarkable example of careful scientific investigation leading to rapid and extensive commercial impact. Hugh collaborated on the new concept of grazing canola, as a profitable rotation crop for wheat that also provided a grazing opportunity. As canola had not traditionally been grazed many questions emerged related to both animal nutrition and crop recovery and yield after grazing. Over a decade from 2004 to 2014 Hugh worked closely with crop agronomists to take dual-purpose canola from an idea, to commercial reality and to develop ways to integrate wheat and canola as dual-purpose crops on farms across Australia.

Hugh contributed enormously and selflessly to the broader "community of science", unseen effort on which the discipline of science depends to create its impact for humanity. He acted as a reviewer and Editor for Journal of the Science of Food and Agriculture, Open Food Science Journal and Grass and Forage Science; acted on the CSIRO Animal Ethics Committee; was on the organising committees and Chair of several international conferences including the series of International Symposia on Herbivore Nutrition, and for Australian Society of Animal Production and a contributor to Australian Institute of Agricultural Science and Technology (President ACT and Sth NSW 2006 -2010); Nutrition Society of Australia (Hon Treasurer Canberra Group); Grassland Society of NSW (member State Management Committee).

Hugh had many qualities, beyond scientific excellence and impact, that made him a wonderful colleague and mentor. As a colleague he was patient and professional and brought a calm reasonableness to a team of younger scientists who greatly valued that input. Hugh faced up to his treatment and periods of absence with incredible strength of character and professionalism always ensuring the work goals were met while tending to his treatment. In this way he was a great inspiration to the younger team members, and it speaks to his character that his illness was never held as an impediment to ongoing scientific success.

Above all, Hugh was a dedicated family man who was enormously proud of his children and their achievements and greatly appreciative of his wife Marge for her continuing support. He never spoke unkindly or critically of others outside the context of scientific issues, and often provided wise and mature counsel. He was staunchly loyal to his own staff, and went to great lengths to ensure that their efforts were recognised and rewarded.

Summary of achievements

* 2004 Appointed to Editorial Board for Encyclopedia of Animal Science

* 2004 Australian Academy of Science, National Committee on Plant and Animal Sciences

* 2004 USA National Academy of Science, National Research Council Review on small ruminant nutrition

* 2006 Invited member Primary Industries Standing Committee to review ruminant

* 2006 Elected a Fellow of the Australian Institute of Agricultural Science and Technology

* 2006 Elected an Honorary member of Nutrition Society of Australia

* 2007 Awarded the Research Medal of the Nutrition Society of Australia

* 2007 Chairman, International Advisory Committee, the International Symposia on Herbivore Nutrition

* 2008 Elected a Fellow of the Australian Society of Animal Production

* 2008 Invited member Science Reference Group for Greening Australia

* 2009 Co-recipient of CSIRO Strategic Excellence Award

* 2017 Member (AM) in the General Division of the order of Australia for significant service to agricultural science as a researcher and editor, and to the study of animal nutrition

Hugh's life was celebrated at the Norwood Park Crematorium outdoor chapel on Tuesday 22nd October.

Information supplied by Michiel van Lookeren Campagne and John Kirkegaard CSIRO

NZ Grasslands Association Conference Report

Hamish Best, Agricom, Stephen Pasture Seeds & AusWest Seeds National Product Development Manager

Farming the future, that was the theme for the 2019 NZ Grasslands Association (NZGA) conference and it didn't disappoint. The layout of the 3-day conference was great, for the first two days there were key speakers in the first hour of each day, followed by 1-1.5 hours of technical presentations and a half day field trip starting at midday with a pre-packed lunch. The final day was another half day of technical information finishing around 1pm, giving everyone time to get home. There was also a very well attended NZGA dinner on the final night.

The opening session introduced us to the Hawkes Bay region and the challenges it faces over the next decade. The regional council outlined the environmental challenges farmers will encounter and introduced a concept that new regulations will make farmers think about how to achieve the maximum amount of productivity on farm whilst maintaining and improving their environmental footprint. We also heard from Gerard Hickey on the success of vertical integration in the venison and wagyu beef company – First Light. Gerard and the next speaker Melissa Clark-Reynolds discussed the importance of marketing NZ red meat to get it out of the commodity space, its vitally important to know the consumer and build a story on their purchasing habits, and the grass-fed story was an essential part of this. One important idea that came from Melissa's presentation titled " Vegans are coming: Business models for farming" was that in history there have been large shifts that were laughed at or mocked that are now common practice, such as nylon based carpet or margarine, the take home message being, lets not sit back and mock the vegan movement, lets take it as a serious competitor and work out how we can counter the vegan movement with naturally grown, grassland fed sources of protein.

After the inspiring first session we moved onto the concurrent sessions, where papers were presented in 10-minute timeslots, with the flexibility to move between rooms. The two sessions were titled 'Pasture measurement technology' and 'Dryland forages and performance'. The latter session focussed on animal production systems on pure stand of lucerne, plantain or chicory and had a paper presented on maximising the sub clover content on hill country farms.

Day one finished up with a field trip to a 1250 cow dairy farm in Patoka which can be seen in the attached photo. The farm produces approximately 380-420kg of milk solids per season and regrass up to 10% of their farm per year through winter and summer forage crops which are regressed into perennial ryegrass. They also focussed on their environmental impact, but there was also a great sense of community where the staff really felt a part of the business. The main objective of the field trip was to look at the Mangaone Catchment Group and how the group are aiming to achieve their objective of monitoring key land and water measures to improve the quality of the Mangaone River, which was inspirational to see a farmer led group wanting to improve their river quality, rather than being forced to by regulation.

Derrick Moot discussing lucerne use and management at Kereru Station

Day two started out with farmer presentations, firstly from a young Hawkes Bay farming couple, showing how they got into farm ownership and how they plan to achieve their goals by working jobs off farm as well as running the farm. The next session as workshop themed, where delegates could choose 3 of the 4 thirty-minute sessions: Optimising animal performance, alternate land use for sheep and beef – looking at quinoa production, managing future animal health issues, or precision fertiliser application on hill country. These sessions consisted of a 10-15-minute presentation followed by an open panel whereby delegates could ask a farmer and a 'technical expert' questions on the topic. They were very engaging and informative.

Day two had the choice of two field trips, one to Brownrigg Agriculture and the other to Kereru Station. These are two very interesting farming systems and I'd had the pleasure of working with both of them in my previous role back in NZ, so the decision was tough. Brownriggs is a family owned business which focusses on vegetable crops, corn production, lamb finishing and Wagyu beef genetics. They have 2000ha of squash, 850ha of corn for grain, 125ha of onions, 130ha of barley, 25ha of hemp and finish 100-130,000 lambs annually. They also grow 450ha of plantain/clover/lucerne crops, 500ha of annual ryegrass, 150 of winter kale, 110ha of pure lucerne and 40ha of pure red clover and their rainfall ranges from 495mm-1070mm per annum.

Kereru station is owned by a charitable trust and is a traditional sheep and

beef farm. They farm 2114ha and have gorges which are retired from farming.

They receive an annual rainfall of 900-1100mm/year and annually plant 60ha kale and 20 ha of swedes for winter feed and 35ha of Raphno brassica for summer lamb production. They also have 120ha of lucerne for lambing ewes in spring, finishing lambs in summer and making silage for dry seasons. The farm runs 735 Friesian bulls, 310 angus cows, and approximately 7200 ewes lambing 142% (excluding replacements) and all lambs are finished on farm. The farm tour consisted of a drive around the farm and a session with Derrick Moot in a paddock of Titan 5 lucerne, shown in the picture below.

The final day started with a keynote address from Dr Sinead Leahy on mitigating green house gas emissions from NZ pasture-based vestock systems, which was controversial but made the crowd think about where they need to head as an industry to meet government targets.

The morning then had more 10-minute paper presentations with sessions titled 'Plantain in a dairy system, Nutrient management, technology and pasture management, biosecurity/weeds/ pests, genetic improvement/alternate pasture use. All of which were great sessions summarising the key points from the papers that contribute to the 81st edition of conference proceedings.

Overall the conference was a success and the research that was presented had plenty of depth and uniqueness to it.

Raphano brassica at Kereru Station

Be on the lookout for Pasture Dieback

Sarah Baker and Suzanne Boschma
NSW Department of Primary Industries, Tamworth Agricultural Institute, Tamworth

NSW Department of Primary Industries (DPI) are advising producers and advisors to be on the lookout for pasture dieback. The area of particular concern is northern NSW, including the coastal regions.

Pasture dieback is a condition killing summer growing grasses in Queensland. It was first identified in Central Queensland and has now spread to Far North Queensland and south to the NSW border. Pasture dieback was first observed in buffel grass in the 1990's. Since 2012 it has been identified in a range of summer growing grass species, both sown and native. The first report of suspected pasture dieback in NSW occurred in autumn 2019 near the Queensland border. The site is being monitored, however due to the ongoing dry conditions other causes of plant death are yet to be eliminated. More recently a site on the north coast has also been investigated.

The condition is only known to affect grasses, both sown and native. The majority of the summer growing grasses sown in NSW are susceptible to pasture dieback. Symptoms begin with yellowing and reddening/ purpling of the leaves (Figure 1). Discolouration affects the oldest leaves first and typically starts at the leaf tip and progresses along the leaf blade. Affected plants become stunted, unthrifty and have small root systems. Pasture dieback appears to affect individual plants spreading to form small patches. These patches increase in size and cover large areas across the landscape (Figure 2).

The affected plants are unpalatable to livestock. Eventually plants die and areas are invaded by broadleaf weed and legume species. Symptoms are most evident when pastures are actively growing at the start of the growing season in spring or following significant rainfall during summer and autumn. Before assuming a pasture is affected pasture dieback, it is important to rule out other causes of plant stress such as drought, nematodes, nutritional deficiency, herbicide damage, water logging, or other diseases.

Pasture dieback appears to be a complex interaction of multiple contributing factors including the environment. The exact cause of pasture dieback is not yet understood. Current research is working to identify the cause and develop strategies to maintain productivity in affected areas.

Figure 1: Initial symptoms of pasture dieback are yellowing and reddening on leaves of grasses

From the President

Well, conditions have only got worse since the last newsletter, and many would be thinking, was that possible? Very sadly, fire has run rampant over much of the New England, North and Mid North Coast regions of NSW. Not only have these fires devastated grazing land, but it has taken life and community spirits with it. Well over one million ha's have been burnt, with much of it still alight and yet to be controlled as I write. As if the drought wasn't bad enough, this 'double whammy' for many is just soul destroying. Community strength will be tested to the extreme now, and most importantly for us all is to keep in contact, stay in touch, and talk.

On a wider scale, most of central and western NSW has stock numbers at near record lows. Many enterprises are now at 25 – 40% of stock numbers compared to 'normal', some have totally destocked. Feed and water sources have been 'all but' exhausted in many regions, as has the farmers will to keep feeding.

Breeders are still being fed where they can be, in the hope that a break will come soon. Bourke and a few nearby districts were fortunate about 3 weeks ago, but that is about all the joy that was received in that change. Thirty to fourty degree days now will take care of any soil moisture remaining, and it will be the 'luck of the storm' that sees any paddocks receive rain between here and the end of summer. Hopefully a rainfall event "or 6" will fall over much of the fire affected areas to assist with control and ground cover regrowth.

Hay and other forage quality have really come under the microscope this spring. Lots of crop was cut following frost or failing crop situations, with resulting forage quality ranging widely. NSW DPI has been doing extensive forage testing, with some figures surprising even the best district vets and livestock officers. Most forage is ranging from 'maintenance or better' metabolizable energy (ME) and protein (8 – 12 MJ/Kg ME and 9 – 15% protein), but more than expected samples are returning poor nutritive values. Producers could easily believe they are 'maintaining' stock, only to be feeding forage with below maintenance quality. Be sure to get a test done and be more informed of how you can get the best from the forage you have.

On behalf of the Grassland Society of NSW, I wish all our members, their families and friends a very safe and merry Christmas, and I hope to hear of a prosperous start in all regions of NSW in 2020. For those who have lost loved ones of recent times, this may be a difficult time for you. Take comfort as we will all be thinking of you. Stay well, think of others, and as always, don't be afraid to ask "How are you going?"

Keep talking, and all the best.
Regards,
David Harbison,
President.

Be on the lookout for Pasture Dieback continued

Researchers are investigating the involvement of a couple of insects, including pasture mealy bug (*Heliococcus summervillei*) which was first identified in Queensland in 1926.

NSW DPI are recommending producers follow good biosecurity protocol of "come clean and go clean". Ensure workers and visitors follow farm hygiene requirements. Monitor pastures for changes and keep good farm records.

There have been reports in Queensland of pasture dieback being spread in hay. The NSW DPI is not restricting the movement of fodder from Queensland to NSW. However in addition to the usual biosecurity measures to minimise weed risk, NSW DPI is recommending producers avoid buying pasture grass hay from dieback areas. Lucerne and cereal hays appear to not be susceptible to pasture dieback so have a low risk of carrying the condition. NSW DPI also suggests storing and feeding fodder in consistent locations and monitoring these areas regularly.

If you suspect symptoms of pasture dieback ring the Exotic Plant Pest hotline 1800 084 881.

For further information on pasture dieback visit the NSW DPI website and search 'Pasture dieback' or go to https://www.dpi.nsw.gov.au/agriculture/pastures-and-rangelands/establishment-mgmt/pests-and-diseases/pasture-dieback

Figure 2: Affected plants occur in patches which increase in size following significant rainfall.

The Grassland Society of NSW Inc is 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 approximately 500 members and associates, 75% of whom are farmers and graziers. The balance of membership is made up of agricultural scientists, farm advisers, consultants, and or 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. For membership details go to www.grasslandnsw.com.au
or contact the Secretary at secretary@grasslandnsw.com.au or at PO Box 471 Orange 2800

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If you are interested in reactivating an old branch or forming a new branch please contact the Secretary at secretary@grasslandnsw.com.au or by mail at PO Box 471 Orange NSW 2800

Grassland Society of NSW Snippets

Next Newsletter: The next edition of the newsletter will be circulated in March 2020. If you wish to submit an article, short item, a letter to the Editor or a photo please send your contribution to the Editor - Carol Harris at carol.harris@dpi.nsw.gov.au or DPI NSW 444 Strathbogie Road Glen Innes 2370. The deadline for submissions for the next newsletter is the Friday 14th February 2020.

Electronic newsletter: Don't forget you can receive the Grassland Society of NSW newsletter electronically. Just email your details to Janelle (secretary@grasslandnsw.com.au) and you will be added to the list. Next newsletter you will receive an email notification with a link to the newsletter on the website.

Fan of Facebook - make sure you check out the Grassland Society of NSW Facebook page. You can either search for GrasslandNSW or access the Facebook page through our web site. Pasture Update details will be posted on the Facebook page as well as the website. Please feel free to Like Us, as well as post photos of pasture and/or related topics in your area.

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