



Human issues loom large in Ag sector

Jacqueline Rowarth

On both sides of the Tasman, enrolments in agriculture are suffering from the combined effect of societal changes. In New Zealand, however, there are signs that a change may be occurring. By recognising the needs of the country, and of the current generation, and by leveraging the initiatives in place or being discussed in Australia, it should be possible to capitalise on the change and increase the numbers of students studying science in general, and agriculture in particular.

Doing so is vital if the country is to avert the looming shortfall that has been calculated for other countries.

The impending retirement of the Baby Boomers means that by 2025 Australia experience a deficit of 75,000 scientists and engineers - the UK 700,000 and China 850,000. The chances of New Zealand keeping even those it has trained are slim. (New Zealand already has over 20 % of its tertiary educated workforce overseas, in comparison with only 3 % in Australia.)

Scientists and engineers are important to any country wanting economic development. Management gurus Michael Porter and Scott Stern have produced convincing data showing that the ability to create wealth from innovation is dependent upon the ability to create that innovation – in fact, it is directly, positively and closely ($R^2=0.80$) related to the number of scientists and engineers in the workforce.

For New Zealand, the primary resource economy and its development depends on having an educated, creative, and innovative workforce at all stages in production.

But only 15 % of students enrolled at universities were in the sciences (natural, physical, agricultural and environmental) in 2001. By 2005 this had reduced to 13.5%.

In agriculture and environmental science, enrolments decreased 2,245 to 2,076, but graduates fell from 419 to 276. Numbers are reducing as well as proportion. Yet this is the area upon which our economy is based; it is the area where the country



Delegates to a Wellington seminar in August consider human capacity in AgHort

can least afford not to have a pool of motivated, creative, innovative and passionate workers.

Part of the change in enrolments reflects the fact that lifestyle features prominently in the minds

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From President John Caradus

The organisation for our Annual Conference is well in hand. Bruce Thorrold and I had a great day visiting the field day sites with local organisers Mark Cunningham and Steven Laird. The farming operations we will have the privilege to see on the half-day Field Trips will be worth attending the conference for, let alone the excellent papers we have lined up. I look forward to seeing you there.

As I look back over the last year, some of the achievements include:

Re-affirmation of our strategic intent: Excellence in facilitating the transfer of science and technology within New Zealand pastoral agriculture by:

- Interfacing science, agriculture and farming, fuelled by science and tempered by experience
- Providing opportunities for information dissemination and learning
- Promoting the value of research and its pastoral application
- Providing opportunities for networking

We have developed strategic targets for the association to increase our impact, relevance and outreach.

- Establishment of Rules Subcommittee, Service Subcommittee and the continuation of the Audit and Finance Subcommittee

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Human issues

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of members of the Y-generation as they choose their future careers, and hence decide on their educational discipline. Quite simply, if you have a car and mobile telephone (or two) to run, you need either parents with deep pockets and a generous disposition, or a job. More and more students are choosing the latter. This choice impacts upon their availability to attend lectures and laboratory classes.

At the University of Melbourne, the average full time student works in paid employment for 17 hours a week. The income is needed to support the lifestyle, even though three quarters of 18 to 27 year olds still live at home with parental support. In order to ensure that they have time for work, rest and play (remember that this is the generation most focussed on work-life balance), they choose their university courses accordingly. Contact hours in science-related degrees are somewhere between 25 and 35 hours a week (depending on subject choice), whereas in business they are 10-15.

No contest about which degree allows continued work. (Medical degrees and veterinary science are excluded from this – the students do the future salary calculations, consider kudos, and enrol despite the cost.)

It is generally agreed (on both sides of the Tasman) that cutting down contact hours for the students to achieve parity with business degrees would not be appropriate as the resulting qualification would not result in graduates meeting the needs of industry.

The alternative is serious educational funding in areas of national

priority. Australia has already created precedents for this and reduced costs to students in nursing and education where major shortfalls in meeting the labour market have been observed.

The Council of Deans of Agriculture, in conjunction with the Australian Institute of Agriculture, Science and Technology, is now working to ensure that Agriculture is also recognised as a national priority.

New Zealand can learn.

In his address to Federated Farmers shortly after taking office as Minister of Agriculture, the Hon Jim Anderton talked about establishing bursaries in agricultural education to ensure the 'brightest and best' are attracted. He also suggested that industry needed to buck up ideas about promotion of careers in agriculture.

"...the time is right to move back into leadership in agricultural education, agricultural research and agriculture itself."

Industry has. Primary industries, from soil through to plate, feature positively in the press and on television. (In contrast, the constant image in Australia is of drought and struggle, plus despoiling of nature.)

The next step is the establishment of the bursaries, the precedent being the Prime Minister's Scholarships for the Performing and Creative Arts.

New Zealand continues to be in a better environment (in all senses of the word) than Australia, and the time is right to move back into leadership in agricultural education, agricultural research and agriculture itself.

I'm looking forward to it.

President's column

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- Involvement as the umbrella group providing financial monitoring services and underwriting for the International Endophyte Association conference held in Christchurch from 26 to 28 March 2007, and organised by Syd Easton and his committee.
- Management of the delivery of a conference on "Human Capability in Agriculture and Horticulture, held in Wellington from 20 to 21 August, 2007. The role that the NZGA plays within these conferences is directly linked with our purpose of "facilitating the adoption of science and technology within New Zealand pastoral agriculture".
- Contribution to NZ Institute of Primary Industry Managers' meeting – from our conference in Dunedin a selection of papers were presented at a NZIPIM consultants' meeting in Canterbury.
- Discussion with NZ Federated Farmers – We have been progressing discussion with Federated Farmers to raise our profile through listing on their website and provision of information from our conference to them. We will be doing this in a way that ensures we do not lose farmer members (who make up about 50% of our membership) but at the same time provide improved benefit to the farming community. Federated Farmers have 17,000 members and so increased interaction with them will advance the Association's mission.
- Discussion with NZ Society of Animal Production - I have met with Richard Dewhurst (President of NZSAP) to begin exploring ways in which the two organisations can work together more effectively. The meeting was held with the understanding that any agreed joint activity would not detract from existing operations and profile of either organisation. Any agreed joint activity would need to increase the profile and impact of both organisations. Expect this dialogue to continue during the coming year.

We are delighted that AgResearch continues as our corporate sponsor and we are pleased to have continued support from all our other sponsors for the conference. Without them the Association could not function effectively.

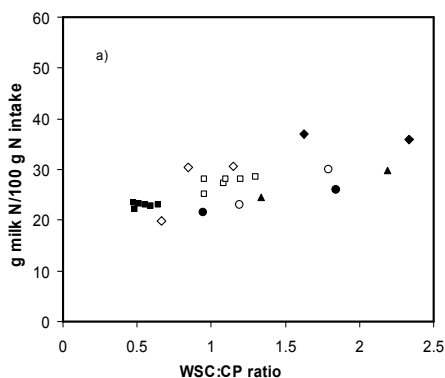
If you have any comment or feedback to the Executive, we would enjoy hearing from you.

The Australasian Dairy Science Symposium, held in Melbourne in September, brought to light several issues of considerable importance to the dairy sector. For New Zealand, foremost on the agenda, and being followed up at the Grasslands Conference in Wairakei this month, was the discussion on the role of High Sugar Grasses (HSG).

Are they appropriate for New Zealand? Will they do what is being suggested in terms of increasing animal performance and reducing environmental impact? What effect might they have in greenhouse gas emissions?

At Melbourne, Grant Edwards (Lincoln), working with Tony Parsons and Susanne Rasmussen (AgResearch), presented a review of the literature from the UK, the Netherlands and New Zealand which highlighted the substantial variation in animal responses to HSG.

Early results in the UK (Miller and Moorby leading the research) were promising, though only one out of four published studies showed a statistically significant increase in milk yield. Substantial efforts to resolve this (Tas and Taweel were the main researchers) in several studies in the Netherlands over 4 years failed to report any benefits in milk yield. In the only study in NZ to date (by Gerald Cosgrove funded by Dairy Insight, to be reported at the NZGA conference), milk yield was increased on one occasion (out of 4), but at a time when there was no significant difference in sugars between the grasses.



Similarly, the environmental advantages of HSG in increasing the capture of nitrogen (N) in the rumen, and so decreasing the fraction of the N eaten that is 'wasted' and lost as urine, is unclear. The review reported some improvements in nitrogen use efficiency (NUE) in the UK, but changes were not significant in the studies in the Netherlands, where the researchers attributed changes in nitrogen excretion almost entirely to differences in total N intake.

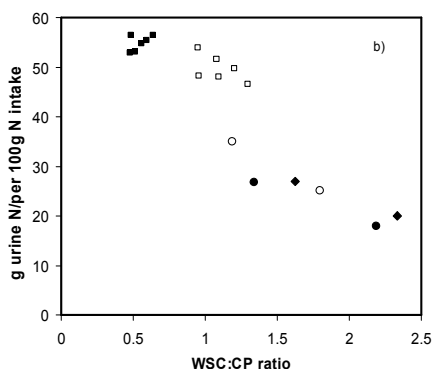
By plotting the results of all the trials together, Edwards, Parsons and Rasmussen have suggested that the studies may not be at loggerheads, but might form a continuum. Data presented in this way clearly show 'proof of concept'. So why aren't the benefits always seen?

The benefits associated with HSG have always been explained as correcting an imbalance in the supply of energy and protein in the rumen. What has been compared in the trials to date, however, has been the effect of different cultivars, with their consequent differences in **both** water soluble sugars and proteins, together. In the figures (copied from the review) the trial results are plotted not against sugar (or cultivar) but against sugar:protein ratio. (Similar

graphs could be drawn using ME/CP). The graphs reveal what the benefits would be **if** sugar:protein ratio could be increased.

The authors suggest that in several trials, although sugars were elevated, so too was crude protein, hence the trials did not create the essential difference in sugar:protein ratio. In particular, the UK studies used grass at rather low CP (c. 10%), and did get some differences in sugar:protein ratio. The Dutch purposely used grass at higher (more productive) crude protein levels (c. 20%) and, as in the NZ trial, the differences in sugar:protein ratio were smaller.

What is still required is an investigation of the direct effects on animal production (milk and nitrogen) of grass with a range in the ratio of



water soluble carbohydrate content to crude protein content. However, before expensive trials are established, a simple calculation indicates that, to achieve a given water soluble carbohydrate:crude protein ratio would require substantially more sugar in high crude protein herbage than in low crude protein (and hence nitrogen) herbage.

Edwards, Parsons and Rasmussen calculate that at 2% nitrogen in herbage, approximately 188 g/Kg are required to achieve a ratio of 1.5, whereas at 4% nitrogen (common in New Zealand pastures), as much as 376 g/kg are required for the same ratio. At present, sugar

contents are more like 100-250 g/kg Dry Matter. It is clear that increases in sugar content of around 40g/kg (as was seen in the UK HSG) might increase sugar:protein ratio in grass at low CP content, but the calculation suggests that far greater increases in sugar content (100 g/Kg+) would be required to get the same benefits in the higher CP grass typical in NZ.

While the concept of HSG is extremely attractive, clearly the target for sugar concentration is high (and plant breeding is not a rapid process) and the animal management systems likely to show most production response have yet to be identified. Furthermore, the implications for endophyte, insects/pests, mycorrhizal associations, and even the interaction between grass and clover, have yet to be investigated.

Of further concern and, no doubt, considerable discussion, is the suggestion from Edwards, Parsons and Rasmussen that there are close parallels between the effects of elevated CO₂ (one undoubted component of climate change), and high sugar grasses. HSG may increase C:N ratios more than climate change is predicted to do, and although pumping extra C into the soil/plant may help sequester C, it can also lead to a tying up of nutrients. This could result in a greater use of N fertiliser.

The authors stress the importance of assessing whether sugar grasses will mitigate or exacerbate the effects of climate change.

Unintended consequences have haunted agricultural research for decades as the fact that more and more people are being fed to a better state

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From the Executive Secretary

Conference 2007

As the newsletter reaches you, nearly 300 farmers, scientists, agribusiness people and regional council staff are preparing for NZGA's 69th Annual Conference, to be held this year at the Bayview Wairakei Hotel, near Taupo. This year's theme - Future proofing profitable farming - covers a wide range of topics from nitrogen caps to feed management in more than 50 papers, all of which have been selected for their relevance to pastoral farming now. This year, the presenters also cover a fairly wide spectrum as far as experience, from senior researcher Mike O'Connor to Katikati secondary school student Pippa Grierson, and the delegates come from areas as disparate as Southland and South America. Three days of presentations, field trips, social events and good-natured discussion, together with the blend of interests and backgrounds among delegates, make NZGA conferences unique in the world of pastoral science and technology. As ever, we at NZGA are grateful to the Taupo Local Organising Committee, the presenters, referees and the rest of the legion of volunteers who give up their time to make these events happen. And our sponsors.

There is some doubt, however, about the legitimacy of this event. We will not be seeing John Brock, Colin Brown, Deric Charlton or Richard Green or Prof Walker at Taupo this year, which will seem odd.

AGM

NZGA's 69th AGM will be held on Wednesday 14 November at the conference venue. The main items of business will be the adoption of the annual accounts and the election of the officers. One exec member, Greg Lambert, has indicated that he will not seek re-election at the expiry of his term. Greg has made a significant contribution to NZGA while holding down a senior position at AgResearch Grasslands. Our thanks go with him. Members will also be pleased to learn that the audited accounts will show a modest surplus again this year, which continues a track record of prudential management of members' funds.

Conference 2008

Warwick Lissaman and his team are already gearing up for the 70th conference, which will be held in Blenheim in mid-October 2008. Marlborough has a diverse range of land uses, including its world-famous wine industry which co-exists with dairying, sheep & beef and high-end horticulture. The magnificent new conference centre will be a fitting venue for what promises to be a very good conference: more details to come.

High Sugar Grasses

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of nutrition is accepted as read. In the New Zealand context, where Government funding for R&D is limited, contestable, and for specific areas each year – yet where the pastoral industry is being urged to stop environmental impacts due to nutrients (particularly N) and eructation (greenhouse gases) – investigation of the potential use of HSG may require political intervention to ensure immediate attention. Developing a forage plant with valuable quality traits, where proof of concept has been shown through the animal, and the grazing management system identified, will involve research from the molecular to whole systems level in plant, animal and environmental disciplines.

The potential for HSG to assist in the New Zealand goals of high production within environmentally-friendly management systems is theoretically high. However, current cultivars are likely to have an impact in low N areas (as less carbohydrate is needed to change the water soluble carbohydrate to crude protein ratio) whereas the greatest need to mitigate losses is in high N areas – those associated with intensive production systems. So whatever the theories, in practice there is some way to go down the research path before definitive statements about the use of HSG in New Zealand can be made.

More research is needed. It always is.

Conference 2010

Australian and New Zealand agronomists will combine with NZGA to hold a joint conference in Christchurch in 2010. The dates are yet to be finalised, but the conference is expected to be a big event—the Australians generally have a big turnout for their annual shindig, so the three associations expect to pack out the Christchurch venue. 2010 sounds as if it's a long way off, but it will be here before we know it. Watch this space.

Email

We now have email addresses for about 73% of our 960 members. We're not planning on making email delivery compulsory, but switching the majority of you to this mode saves money-and reduces our carbon footprint. If you're open to email for invoices, newsletters and notices, and you're not sure if we have your address, drop me a note and I'll check it out.

Newsletter topics

This newsletter contains an article by Jacqueline Rowarth which continues the discussion on HSG that began with Jock Allison's contribution in the last newsletter. We are happy to see this publication used as a medium for open debate, and we welcome your contributions on this or any other issue concerning grassland science and technology.

Subs

I don't like to nag - I do, actually, but I have to pretend - but there are a fair number of subs outstanding. Invoices for the period 1 April 2007-31 July 2008 were emailed or mailed in May (the 16 month period arises because last year's AGM approved a change in balance date). If you haven't received an invoice, or if you've lost one, please get in touch.

Onwards and upwards

David Shepherd, who chaired last year's organizing committee for the very successful Otago conference has gone on to bigger and better things as a newly-elected member of the Otago Regional Council. See what happens when you volunteer?

Proceedings

Members who do not attend conference will receive their copies of the Proceedings prior to Christmas. If you don't, please let me know.

Regards, Ross White

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